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Каталог

солнечных протонных событий 23-го цикла солнечной активности (1996 − 2008 гг.)

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Предисловие редактора

Настоящий Каталог солнечных протонных событий за 23-й цикл солнечной активности (июнь 1996 − декабрь 2008 гг.) является продолжением Каталогов предыдущих выпусков [1–5], начиная с 1970 г.*) [http://www.wdcb.ru/stp/data/SPE/]. В Каталоге собраны и систематизированы данные о солнечных событиях с генерацией протонов, для которых максимальный поток протонов с энергией Ep > 10 МэВ превышал значение $Jp \geq 1$ $см^{-2} \cdot c^{-1} \cdot cp^{-1}$ (pfu). Таких событий в 23-м цикле солнечной активности (СА) оказалось 142. Отметим, что в последние два года 23-го цикла СА (2007-2008 гг.) протонных событий с выбранным потоком частиц (> 1 pfu) не было, последнее событие, представленное в Каталоге, относится к декабрю 2006 г.

Кроме данных о потоках протонов, измеренных несколькими аппаратами, в Каталоге приведены сведения об источниках частиц и о связанном с данным событием электромагнитном излучении во всём доступном наблюдениям диапазоне. Для каждого события приведен интегральный энергетический спектр зарегистрированных протонов в максимуме временного профиля интенсивности. Некоторые события имеют сложный временной профиль потоков протонов с двумя, иногда тремя максимумами, в этих событиях для каждого из максимумов приведен отдельный энергетический спектр.

На основе построенного энергетического спектра протонов по оригинальной методике вычисляется значение энергии, при которой поток солнечных космических лучей (СКЛ) равен 0.1 потока галактических космических лучей (ГКЛ). Мы называем эту величину квазимаксимальной энергией СКЛ (Eqm) и рассматриваем ее как некоторое приближение к максимальной энергии протонов (Emax) для данного возрастания потоков протонов.

В отличие от предыдущих Каталогов каждое событие теперь иллюстрируется обзорными графиками рентгеновского излучения, потоков электронов и протонов, скорости солнечного ветра, напряженности межпланетного магнитного поля и Dst-вариаций в околоземном космическом пространстве во временном интервале, охватывающем данное событие. Каждое событие начинается с Легенды события, кратко характеризующей событие, подробным сведениям о котором посвящены основные страницы.

В число авторов Каталога входят представители разных институтов, сотрудники разных специальностей: физики космических лучей, солнечной, радио-, геофизики и межпланетного пространства, что обеспечивало широкий охват явлений, связанных с генерацией частиц на Солнце и их распространением в пространстве и земной магнитосфере.

Опыт работы с ранее выпущенными Каталогами показал, что они очень полезны для различных статистических исследований энергичных солнечных частиц, поиска закономерностей в их спектральных характеристиках, для изучения физических процессов, связанных с ускорением и распространением солнечных частиц. Сведения об энергетических спектрах необходимы при оценке и прогнозировании радиационной обстановки во внутренней гелиосфере. Данные Каталога будут полезны при изучении проникновения частиц в магнитосферу Земли, при исследовании некоторых геофизических явлений, таких как поглощение космического радиоизлучения в полярной шапке, а также для прогнозирования условий распространения радиоволн и решения других вопросов в рамках общей проблемы солнечно-земных связей.

Работа по созданию Каталога поддержана грантом РФФИ № 13-02-00612.

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*) Ссылки приведены в списке литературы к разделу «Описание материалов Каталога».

Описание материалов Каталога

Введение

В Каталоге представлены данные о потоках энергичных заряженных частиц солнечного происхождения в событиях 23-го цикла солнечной активности (апрель 1996 − декабрь 2008 гг.), зарегистрированных на различных космических аппаратах на 1 а.е., на шарах-зондах и наземными средствами. В 1996 г. и в минимуме СА 2007 − 2009 гг. событий, отвечающих условиям Каталога, не было, поэтому в Каталоге представлены данные только за 1997 − 2006 гг.

Солнечным протонным событием (СПС) считается такое возрастание потоков частиц на 1 а.е.**,** при котором максимальный поток протонов с энергией Ep > 10 МэВ превышает 1 $см^{-2}·с^{-1}·ср^{-1}$, или, другими словами Jp (> 10 МэВ) > 1 pfu. Как правило, оценка этого критического потока ориентируется на среднечасовые значения показаний прибора ESP геостационарных спутников GOES. Если данные этих аппаратов недоступны или магнитосфера Земли сильно возмущена, оценка критических потоков проводится по совокупности других представленных в Каталоге аппаратов. В Каталог включены не только изолированные возрастания потоков протонов с простым временным профилем, имеющим один максимум, но и некоторые события со сложным временным профилем с несколькими возрастаниями, которые считались одним событием с несколькими максимумами, источники которых, как правило, разные вспышечные события в одной активной области. В событиях со многими максимумами для построения спектров выбирались наиболее яркие из них (как правило, два, редко три максимума). Для каждого выбранного максимума в таблицах, описанных ниже, приведены такие же сведения, как и для событий с одним максимумом.

Краткое описание космических аппаратов (к.а.) и характеристики приборов даны в **Приложении 1.**

Одним из важнейших моментов изучения солнечного протонного события является определение его источника – вспышечного события на Солнце, генерировавшего энергичные протоны. Мы понимаем под солнечным вспышечным событием весь спектр явлений во всех диапазонах электромагнитного излучения со всеми динамическими явлениями, сопровождающими взрывное выделение энергии в ограниченных областях атмосферы Солнца. В зависимости от величины магнитного поля, в котором происходят вспышечные события, это могут быть солнечные вспышки или выбросы солнечных волокон. Если вспышечное событие происходит на невидимой полусфере, наблюдаются его проявления в верхних слоях атмосферы Солнца: корональные выбросы вещества − coronal mass ejection (CME), явления в радиодиапазоне. Проблема отождествления зарегистрированных на орбите Земли протонных возрастаний со вспышечными событиями на Солнце является актуальной с начала изучения СКЛ. Методика и использованные критерии для привязки Земли к Солнцу описаны во всех предыдущих каталогах [1−5], тем не менее, учитывая важность данной процедуры, здесь еще раз приведена несколько модифицированная методика **«Определение источников возрастаний потоков протонов во вспышечных событиях на Солнце» (Приложение 2)**.

Основным источником информации об интенсивности релятивистских СКЛ являются наземные установки, нейтронные мониторы (НМ), которые регистрируют солнечные события очень большой энергии, заряженные частицы которых достигают поверхности Земли. Эти возрастания принято называть GLE (Ground Level Enhancement) событиями или, иногда, вспышками в космических лучах. В течение 23-го цикла СА произошло 16 GLE событий (№ 55 – 70).

Переход от показаний НМ к потокам протонов за пределами магнитосферы Земли – сложный процесс, включающий учет нескольких механизмов распространения заряженных частиц в магнитном поле Земли и ее атмосфере, т.е. возникает необходимость решения обратной задачи – восстановления энергетического спектра релятивистских солнечных протонов в межпланетном пространстве по данным нейтронных мониторов. Рассматриваемая задача с каждым годом использует более совершенные модели распространения частиц, что частично учитывается в данном Каталоге, особо в тех событиях, возрастание частиц в которых показал только один НМ. Подробнее проблема описана в **Приложении 3 «Определение потоков и энергетического спектра релятивистских солнечных протонов по данным нейтронных мониторов».**

В каталоге 23-го цикла СА приводятся также данные о солнечных нейтронах, возникающих во вспышках на Солнце и зарегистрированных наземными нейтронными мониторами и специализированной сетью нейтронных телескопов на горах. Как правило, представлены дата и установка, зарегистрировавшая нейтроны. Мониторинг солнечных нейтронов в 23-м солнечном цикле не был постоянным, некоторые события могут быть пропущены. Методика восстановления потока и спектра нейтронов по данным НМ требует дополнительных предположений. Отметим, что в предыдущих выпусках Каталогов СПС солнечные нейтроны даже не упоминались, ибо их регистрация еще не была налажена. Тем не менее, солнечные нейтроны несут определенную информацию о процессах ускорения частиц во вспышках и их изучение в будущем будет только расширяться.

Отметим, что с 2006 г. измерение релятивистских частиц осуществляет еще орбитальный спектрометр PAMELA, который меряет в околоземном космическом пространстве потоки протонов и ядер с энергией в диапазоне от 80 МэВ до нескольких ГэВ. В Каталоге приведены данные по событию GLE–70 в 2006 г.

С целью оценки максимальной энергии ускоренных протонов в данном Каталоге вводится новый параметр: **квазимаксимальная энергия протонов в событии − Eqm** (Quasimaximal energy of protons in the event), характеризующий спектр события в области наибольших зарегистрированных энергий протонов. Введенный параметр Eqm является первым приближением к реальной максимальной энергии наблюдаемых потоков протонов в данном солнечном событии. **Квазимаксимальная энергия протонов в событии Eqm определяется как энергия, при которой поток солнечных протонов в данном событии равен 0.1 потока галактических протонов (протонов ГКЛ) той же энергии.** Методика определения Eqm приведена в **Приложении 4.**

Описание структуры представления материала для отдельного солнечного протонного события

Каждое событие начинается с его наименования, являющегося датой возникновения (начала) события, обозначенного двумя способами:

YYYY.MM.DD – (YYYY-DOY), например, первое событие Каталога, начавшееся 4 ноября 1997 года, именуется как **1997.11.04 – (1997-308)**. Упоминание значения DOY в названии события часто бывает удобно при сравнении с другими справочными данными. В правой части этой строки дается номер события. Нумерация событий ведется с первого события 1970 года, включенного в Каталог солнечных протонных событий 1970 – 1979 гг. [1].

Далее идет ЛЕГЕНДА события, включающая некоторые общие сведения о событии. Ниже дан пример легенды и пояснения к её каждой строке.

Event 2004.07.25 – (2004-207) **№ 450**

Particle event: To(Ep>10MeV) – 25d17^h
Tmax$_1$(Ep>10MeV) – 25d21^h, Jmax$_1$(Ep>10MeV) – 27 /cm^2.s.sr
Tmax$_2$(Ep>10MeV) – 26d23^h, Jmax$_2$(Ep>10MeV) – 430 /cm^2.s.sr
Duration of the event – 4 days
Quasimaximal energy of protons in the event – Eqm(max$_1$) = 140 MeV
– Eqm(max$_2$) = 155 MeV

Sources: ● solar flare 25d14^{h}19^m, M1.1/1F, N08W33, AR10652
Ø solar flare 26d17^{h}23^m, M1.1/2N, N03W45, AR10652
Main X-ray burst 1-8 Å: onset – 25d14^{h}19^m, max – 25d15^{h}14^m, Φ = 0.065 J/m^2
● CME: 25d14^{h}54^m; V = 1333 km/s; Δφ = 360^o; dA= 204˚
▲ SC 26d22^{h}49^m;

Здесь:
Event 2004.07.25 – (2004-207) –- наименование события и номер события: **№ 450.**

В первой строке:

Particle event: To(Ep>10MeV) – 25d17^h – день и время начала события, определенное по потоку протонов Ep > 10 МэВ по показаниям прибора ESP геостационарных аппаратов GOES или совокупности других, представленных в Каталоге аппаратов. Точность указания времени начала события лежит в пределах 1 часа.

Более точное определение времени начала события, даже если использовать данные с более высоким временным разрешением, из-за вариаций фонового счета приборов является затруднительным и может привести к дезинформации о реальном времени начала события в протонной компоненте.

Во второй (второй-a и второй-b) строке:

(a) Tmax$_1$(Ep>10MeV) – 25d21^h, Jmax$_1$(Ep>10MeV) – 27 /cm^2.s.sr
(b) Tmax$_2$(Ep>10MeV) – 26d23^h, Jmax$_2$(Ep>10MeV) – 430 /cm^2.s.sr

даны день и время максимума (в данном событии в двух максимумах) потока протонов с энергией > 10 МэВ в событии по данным совокупности представленных в Каталоге аппаратов, регистрировавших данное событие, и значение в максимуме (максимумах) потока Jp (см^2·с·ср)$^{-1}$, как правило, по данным к.а. GOES. В данном примере в событии наблюдалось два максимума и в ЛЕГЕНДЕ отведено две строки (a и b).

Все представленные потоки частиц в Каталогах являются среднечасовыми значениями, время всюду – UT. Точность указания времени максимального потока протонов Tmax составляет 1 час. Точность определения потока протонов Jmax (Ep > 10 МэВ) – не хуже ± 10%. Невысокая точность фиксации времени максимального потока протонов определяется использованием часовых средних значений потоков частиц на протяжении всего события. Кроме того, время максимального потока протонов предназначено, главным образом, для выделения конкретного максимума потоков в сложных событиях с несколькими максимумами, чтобы значения потоков при построении энергетических спектров по данным различных к.а. относились к одному и тому же максимуму.

В третьей строке указана полная длительность события (для сложного события – включая все отмеченные максимумы). В приведенном примере:

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Duration of the event – 4 days.
В последней строке приведены значения квазимаксимальной энергии протонов в данном событии Eqm, определяемой для каждого максимума данного события. Eqm (max_1) и Eqm (max_2) вычислены на основе интегрального энергетического спектра протонов или для каждого максимума в событии по методике, описанной в **Приложении 4**. В данном примере:

Quasimaximal energy of protons in the event – Eqm(max_1) = 140 MeV
– Eqm(max_2) = 155 MeV

Значение Eqm определено с точностью ± 10%.

Второй раздел ЛЕГЕНДЫ относится к солнечным источникам частиц, наблюдавшихся вблизи Земли. В приведенном примере события **Event 2004.07.25 – (2004-207)** дано:

Sources: ● solar flare $25d14^h19^m$, M1.1/1F, N08W33, AR10652
Ø solar flare $26d17^h23^m$, M1.1/2N, N03W45, AR10652
Main X-ray burst 1-8 Å: onset – $25d14^h19^m$, max – $25d15^h14^m$, Φ = 0.065 J/m^2
● CME: $25d14^h54^m$; V = 1333 km/s; Δφ = 360°; dA= 204°
▲ SC $26d22^h49^m$;

Если источником частиц является солнечная вспышка, то в первой строке приведены её основные характеристики: время максимума вспышки в линии Hα ($25d14^h19^m$) – день, часы, минуты вспышки, рентгеновский и оптической балл вспышки (M1.1/1F), координаты вспышки (N08W33) и номер активной области, где произошла вспышка (AR10652). Если для рентгеновского и оптического балла вспышки указана обратная очередность (например, 2N/M1.6), это значит, что начало вспышечного события в оптическом диапазоне отмечено раньше, чем в рентгеновском.

В начале этой строки ставится условный знак, характеризующий причастность вспышки к данному протонному событию и уверенность её привязки:
●,■ – данная вспышка определенно является источником наблюдаемых протонов;
⊙,⊡ − данная вспышка с большой вероятностью является источником наблюдаемых протонов;
○ – вспышка, возможно, является источником протонов данного события, но есть причины, по которым эта возможность подвергается сомнениям;
Ø – вспышка не является основным источником, но внесла (или могла внести) вклад в наблюдаемые потоки протонов.
Если источником протонов является не отождествляемая вспышка, то используются следующие обозначения:
□ − вспышка (или активность) за западным или восточным лимбом Солнца;
◊ − активность области на диске Солнца без привязки к конкретному вспышечному событию, модуляционные эффекты в межпланетном пространстве.
Методика определения вспышки, являющейся источником частиц в данном событии, приводится в **Приложении 2.**

Далее в разделе **Sources** даются сведения о всплеске мягкого рентгеновского излучения в диапазоне 1–8 Å (12.4–1.55 кэВ), по данным к.а. GOES: начало и максимум всплеска (в данном примере $25d14^h19^m$ и $25d15^h14^m$), Φ – интегральный поток энергии, от начала всплеска до момента спада на уровень 0.5 от максимального значения в Дж/м^2 (Φ = 0.065 J/m^2).

Затем приведены сведения о GLE (Ground Level Enhancement), связанном с рассматриваемым событием (если выброс имел место). Приведено: время его появления в

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поле зрения коронографа – в данном примере – $25d14^h54^m$, скорость выброса (V = 1333 km/s), угловой раствор коронального выброса вещества вблизи Солнца ($\Delta\varphi = 360°$) и позиционный угол первого появления данного СМЕ, обнаруженного коронографом LASCO-SOHO – (dA = 204°).

В последней строке при наличии одного внезапного начала SC (Sudden Comencement) или нескольких после знака ▲ или Δ указываются дата и время начала SC на 1 а.е.: ▲ – SC, внёсшее изменения в потоки частиц, Δ − SC, не отразившееся на профилях потоках частиц.

После легенды приведены обзорные графики, отражающие ситуацию на Солнце и в околоземном пространстве для описываемых событий. Представлены (сверху вниз): мягкое рентгеновское излучение Солнца по данным к.а. GOES с высоким временным разрешением (1 минута), потоки солнечных электронов по данным прибора EPHIN к.а. SOHO и протонов с энергией Ep >10, >30 и >100 МэВ по данным к.а. GOES (среднечасовые значения), скорость солнечного ветра, напряженность межпланетного магнитного поля (ММП) и возмущенность магнитосферы Земли (значения Dst-индекса).

Эти графики захватывают гораздо больший промежуток времени, чем длительность рассматриваемого события. Период, относящийся к данному событию, выделен легкой его затушевкой.

Временные профили протонов и электронов в обзорных графиках наглядно демонстрируют ситуацию на Солнце, тип события (одиночное, составное или сложное), число максимумов в сложном событии, вклад ударных волн в потоки частиц, форбуш-спады в солнечных частицах и первые представления о спектре протонов в интервале энергий 10 – 100 МэВ. Сопутствующие всплески мягкого рентгеновского излучения свидетельствуют о возможном источнике-вспышке на Солнце и его мощности.

После обзорной картины событий представлены временные профили потоков протонов более крупным планом, чем в обзорных графиках, и для большего числа аппаратов и энергий протонов. На верхнем блоке даны потоки протонов, зарегистрированные к.а. ACE и GOES (интегральные потоки), на нижнем – на SOHO (потоки в интервалах энергий). Эти аппараты наиболее полно отражают ситуацию как на геостационарной орбите в магнитосфере Земли (GOES), так и в точке либрации L1 (ACE и SOHO) перед, во время и после прихода солнечных протонов.

За временными профилями потоков протонов для данного события располагаются графики интегральных энергетических спектров протонов в максимуме (максимумах) событий. Интегральные спектры строились по максимальным потокам протонов всех энергий, зарегистрированных в данном событии. Потоки протонов, регистрировавшиеся в ограниченных интервалах энергии, пересчитывались в интегральные. Если в событии выделено два-три максимума, то спектры строились для каждого максимума.

Высокоэнергичная часть спектра аппроксимировалась степенной функцией ($Jp \sim E^{-\gamma}$), приведенной на графике для каждого спектра с указанием значения показателя степени γ. Эта процедура, из-за значительного разброса точек, полученных разными приборами, не претендует на высокую точность определения γ, которая оценивается в ± 10%.

К сожалению, в 23-м цикле СА мало экспериментальных данных космических аппаратов, охватывающих интервал энергий 200 − 600 МэВ, что затрудняет определение спектра для событий средней мощности. В некоторых случаях этот пробел заполняется данными аэростатных измерений, для мощных событий помогают данные нейтронных мониторов.

Переход от прямых показаний нейтронных мониторов (процентное возрастание скоростей счета в событии к фоновой скорости счета) к потокам протонов за границей магнитосферы Земли – сложная задача, решение которой для каждого события осуществляется отдельно. Отметим только, что для исключения эффектов сильной анизотропии потоков солнечных частиц в начале события, использовалась так называемая медленная компонента СКЛ по данным нейтронных мониторов [10]. Для слабых GLE событий использовалось максимальное зарегистрированное возрастание.

Описание таблиц потоков частиц

После обзорных графиков и энергетических спектров протонов расположены таблицы потоков протонов по данному событию. В таблицах приведены значения потоков протонов разных энергий в максимуме события (в нескольких максимумах), зарегистрированные различными космическими аппаратами. Для всех космических аппаратов используются общепринятые обозначения, BALLOONS означает измерения в стратосфере, NM – наземные измерения нейтронными мониторами. Описание приборов дано в **Приложении 1**.

Все обозначения в таблицах потоков частиц – общепринятые. Отметим, что при максимуме в тот же день, что и начало события, день не указывается, при максимуме на следующий день или позже, кроме времени указывается и день (например, 20^h – если максимум совпадает с днем начала события и $07d08^h$ – если максимум наступил на следующий день или позже). Если в событии было два или три максимума, они разделены «слэш»-знаком (например, $11^h/21^h$ – оба максимума в один день или $21^h/07d08^h$ – второй максимум на следующий день или ещё позже).

Потоки протонов в максимуме событий приведены без каких-либо поправок в оригинальных данных, кроме вычета фоновых значений. Точность измерения и представления данных в таблице не хуже 10%. Если в событии рассматривается два-три максимума, потоки между ними разделены «слэш»-знаком, в соответствии со временем максимумов. Длительность события измеряется в сутках. Отметим, что этот параметр испытывает наибольшие вариации как от прибора к прибору, так и для разных энергий протонов. Точность измерений здесь не хуже ± 1 суток.

Описание таблиц по солнечным явлениям

Далее представлены материалы по наблюдаемым солнечным вспышечным явлениям, источникам данного протонного события. Параметры и характеристики данного вспышечного события сведены в таблицу с цифровыми значениями и приведен график (графики) частотного спектра. Так как для разных вспышечных событий условия их регистрации и результаты различны, таблицы для разных событий также различаются. Для упрощения ориентации в табличных данных ниже дан перечень всех сведений во всех событиях, включенных в Каталог.

Все таблицы, как и во всех предыдущих каталогах [1–5], начинаются с заглавной строки, где указаны: дата, степень надёжности отождествления (●, ■, ⊙, ⊡, ○, □ или Ø) солнечного вспышечного события – источника соответствующего протонного события, номер активной области (AR) по данным службы Солнца Национального управления океанических и атмосферных исследований США (National Oceanic and Atmospheric Administration – NOAA) и порядковый номер протонного события.

Все обозначения, приведенные в таблице параметров – общепринятые в солнечной физике, подробности можно найти в описательных томах ежемесячного бюллетеня “Solar Geophysical Data” (SGD) [6]. Данные о всплесках в диапазоне мягкого рентгеновского излучения – по к.а. GOES. Основные данные по жёсткому рентгеновскому излучению, гамма диапазону и солнечным нейтронам за 1996 – 2010 гг. взяты из каталогов солнечных вспышек [http://www.ssl.berkeley.edu/~moka/rhessi/catalogs.html] и [7, 8]. Информация о всплесках в жёстком рентгене к.а. КОРОНАС-Ф взята из [9]. Данные по CME выложены в каталоге CME LASCO (SOHO) [http://cdaw.gsfc.nasa.gov/CME_list/].

Информация в таблицах Каталога организована по блокам, включающим все реально наблюдавшиеся диапазоны электромагнитного излучения (оптика, мягкое, жесткое рентгеновское, γ и радио), солнечные нейтроны, динамические явления, наблюдавшиеся в линии Hα и в непрерывном спектре (WL – в "белом" свете).

Для каждого блока данных значения столбцов в таблицах для разных событий несколько различаются. Каждый раздел таблицы отделяется узкой пустой строкой. Отсутствие каких-либо данных, целых строчек, в таблицах Каталога говорит, что соответствующих явлений или наблюдений в данном событии не было.

Информация группируется по столбцам (1 – 8) следующим образом:

- Данные в оптическом диапазоне: (1) – спектральная линия наблюдения (Hα), (2) – длина волны, (3 – 5) – время начала, максимума и конца события, (6) – гелиокоординаты, локализация вспышечного события на видимом диске Солнца, (7) – оптический балл вспышечного события, (8) – код вспышки, характеризующий структуру явления по SGD.
  Несколько следующих строк отражают динамические явления в оптическом диапазоне в линии Hα (EPL, LPS, DSF, SPY, BSL), если их наблюдали во время данного вспышечного события.
- Данные о мягком рентгеновском излучении: (1 и 2) – диапазон энергий и единица измерения, (3 – 5) время начала, максимума и конца события, (7) – поток излучения в максимуме всплеска (балл/класс всплеска), (8) – флюэнс интегральный поток мягкого рентгеновского излучения в джоулях на квадратный метр, Дж/м^2.
- Та же информация о жестком рентгене и/или γ- излучении.
- Данные о радиоизлучении на фиксированных частотах: (1) – частота, (2) – единицы измерения, (3 – 5) – время начала, максимума и конца радио события, (6) – код (см. объяснения ниже), (7) – логарифм потока в единицах $10^{-22}\cdot$Вт$\cdot$м$^{-2}\cdot$Гц$^{-1}$ (более подробно см. в описаниях предыдущих каталогов).
- Характеристики динамического спектра радио всплеска: (1) – вид, частотный диапазон в МГц, (3 и 5) – время начала и конца, (6) – тип, (7) – балл. Тип динамического спектра (DS) метровой компоненты и особенности радио всплеска взяты из [6, 10] и [Solar Radio Burst: ftp://ftp.ngdc.noaa.gov/STP/space-weather/solar-data/solar-features/solar-radio/radio-bursts/reports/spectral-listings].
- Данные о солнечных нейтронах: (1) – ^{o}n, означает, что в данном протонном событии зарегистрированы солнечные нейтроны; (7 – 8) – станция нейтронного монитора и/или спутник, зарегистрировавшие нейтроны по [7, 8].
- Данные о корональном выбросе вещества (CME): (2) – непрерывный спектр (WL) (3) – время первого появления в поле зрения коронографа LASCO/C2 к.а. SOHO, (4) – медианное значение скорости V (км/с) радиального распространения CME при движении в поле зрения коронографа. (5) – ускорение в км/с^2, может быть положительное, отрицательное или близкое к нулю, (6) – Δφ – угловой раствор (угловая ширина) CME вблизи Солнца в градусах, (7) – dA – позиционный угол первого появления CME.

Необходимо отметить, что отсутствие данных о CME не означает, что в данном вспышечном событии его не было. Возможно, что во время данного вспышечного события на коронографе не было наблюдений («gap»), или локализация вспышки за лимбом Солнца не способствовала возможности его регистрации.

После таблиц, описывающих солнечные явления, сопровождающих данное СПС, приведены графики спектров радиоизлучения на волнах дециметрового и сантиметрового диапазона длин волн. Эти спектры дают возможность оценить и, возможно, выявить закономерности, характерные для вспышечных событий – источников солнечных протонных событий.

Более подробное описание всех обозначений в таблицах приведено в **Приложении 5.**

Замыкает информационную часть материала о данном событии список кратких ссылок на публикации (отнюдь не полный). Подробная информация о публикациях содержится в общем списке публикаций, приведенном в конце материалов Каталога.

Заключение

В Каталоге представлены данные по 142 событиям в солнечных космических лучах в 23-м цикле солнечной активности (1996 − 2008 гг.). Каталог содержит цифровую и графическую информацию о потоках и энергетических спектрах солнечных протонов в окрестности Земли, временные профили потоков протонов для всех включенных в каталог событий. Приводятся обширные данные о сопутствующих солнечных явлениях, радио и рентгеновском излучениях, сведения об активных областях со вспышками и другая дополнительная информация.

Каталог рассчитан на широкий круг специалистов, работающих в области солнечно-земной физики, солнечников, специалистов радиационной безопасности космических полетов и лиц, интересующихся проблемами воздействия солнечной активности на атмосферу и биосферу Земли.

Литература к описанию материалов каталога

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Приложение 1

Сведения об аппаратах и приборах, регистрирующих протоны солнечных космических лучей

GOES (**G**eostationary **O**perational **E**nvironmental **S**atellite system) – спутники Земли на геостационарной орбите. В Каталоге использовались данные приборов **EPS** с аппаратов **GOES-9** и **GOES-10**. Прибор **EPS** – полупроводниковый телескоп, регистрирующий протоны по 6-ти интегральным каналам с энергией >5, >10, >30, >50, >60 и >100 МэВ. Данные по потокам частиц и подробное описание аппаратов **GOES** и прибора **EPS** смотри в GOES Data Book – [http://goes.gsfc.nasa.gov/text/databook/section05.pdf].

МЕТЕОР – общее название метеорологических спутников Земли на полярной солнечно-синхронизованной орбите на высоте 1000 км. Спутники **МЕТЕОР** при прохождении полярных районов Земли с помощью прибора **СБМ** (4 газоразрядных счетчика с разными поглощающими экранами) регистрировали протоны с энергиями >5, >15, >25, >40 МэВ, прибор **BP** (сцинтилляционный счетчик) регистрировал протоны с энергией >90 МэВ и прибор **ChD** (черенковский счетчик) − >600 МэВ. Данные по событиям 1997 г. получены на спутнике **МЕТЕОР-2**, с апреля 1998 г. со спутника **МЕТЕОР-3М**. Описание спутников **МЕТЕОР** и база данных: [http://smdc.sinp.msu.ru/index.py?nav=meteor3m].

КОРОНАС-Ф – спутник Земли с круговой полярной орбитой на высоте 500 км (подробное описание спутника **КОРОНАС-Ф** в [http://coronas.izmiran.ru/F/]). В Каталог включены результаты прибора **МКЛ,** регистрировавшего протоны в интервале энергий 1 − 50 МэВ [http://smdc.sinp.msu.ru/index.py?nav=coronasf]. Подробное описание прибора **МКЛ** дано в: Kuznetsov S.N., Bogomolov A.V., Galkin V.I. et al. Sientific set of instruments “Solar Cosmic Rays” // The Coronas-F Space Mission. Key Results for Solar Terrestrial Physics. Ed. V. Kuznetsov. Astrophysics and Space Science Library, V. 400, Springer, Berlin Heidelberg, 2014. P. 289−299. doi: 10.1007/978-3-642-39268-9-12. http://www.springer.com/us/book/9783642392672. Протоны регистрировались в четырёх дифференциальных каналах, описание которых приведено в [http://smdc.sinp.msu.ru/index.py?nav=coronasf]. Потоки солнечных протонов, измеряемые **КОРОНАС-Ф** в полярной шапке, приведены в Каталоге пересчитанными к интегральным потокам >1, >14, >26, >50 МэВ.

POES (**P**olar **O**rbiting **E**nvironmental **S**atellites) – серия спутников Земли на полярной круговой орбите с солнечной синхронизацией на высотах от 700 до 850 километров, длительность орбитального периода от 98 до 103 минут. **POES** – проект Национального управления океанических и атмосферных исследований США (National Oceanic and Atmospheric

Administration – NOAA). Регистрация протонов в солнечных протонных событиях на спутниках **POES** проводилась прибором **MEPED (M**edium **E**nergy **P**roton and **E**lectron **D**etector). Энергетический интервал прибора **MEPED** 0.024 − 140 МэВ. Для каталога использовались данные спутников **POES-15** и **POES-16**. Более подробное описание аппарата **POES** и прибора **MEPED** в [http://www.ngdc.noaa.gov/stp/satellite/poes/].

IMP-8 (**I**nterplanetary **M**onitoring **P**latform). Для Каталога используются данные прибора **CPME** (Charged Particles Measurement Experiment) – (Jhons Hopkins University, Applied Physics Laboratory – JHU/APL), [http://sd-www.jhuapl.edu/IMP/imp_index.html#cpme]).

ACE (**A**dvanced **C**omposition **E**xplorer**).** Описание аппарата и состав экспериментов см. в [http://www.srl.caltech.edu/ACE/]. В Каталоге используются данные прибора **SIS** (The **S**olar **I**sotope **S**pectrometer) по потокам протонов с энергией >10 МэВ и >30 МэВ, выложенные в [http://www.srl.caltech.edu/ACE/CRIS_SIS/].

SOHO (**SO**lar & **H**eliospheric **O**bservatory). Информация о космическом аппарате и составе приборов в [http://sohowww.nascom.nasa.gov/about/docs/SOHO_Fact_Sheet.pdf]. В Каталоге используются данные двух приборов:
– прибор **LION** (**L**ow Energy **ION** and Electron Instrument) предназначен для измерения спектров протонов в интервале энергий 44 кэВ – 6 МэВ. В Каталоге используются протонные каналы 0.75 − 2 МэВ и 2 − 6 МэВ.
– прибор **EPHIN** (**E**lectron **P**roton **H**elium **IN**strument). Для Каталога используются каналы, регистрирующие протоны с энергией: 4 − 8 МэВ; 8 − 25; 25 − 41 и 41 − 53 МэВ (после года полета два последних канала объединились в один 25 − 53 МэВ), а также канал INTEGRAL: >10 МэВ (электроны) + >50 МэВ (протоны).
Описание приборов и данные измерений приведены в [http://sohowww.nascom.nasa.gov/] и [http://www.ieap.uni-kiel.de/et/ag-heber/costep/].

STEREO (**S**olar **TE**rrestrial **RE**lations **O**bservatory). Аппараты **STEREO** описаны в [http://stereo-ssc.nascom.nasa.gov/] и в книге: The STEREO Mission. Ed. C.T. Russell. Springer Science & Business Media, BV. 2008. doi: 10.1007/978-0-387-09649-0_14. Для Каталога использовались данные приборов **HET** (**H**igh **E**nergy **T**elescope) по потокам протонов в интервале энергий 13.6 – 100 МэВ, разделенные на три энергетических интервала: 13.6 – 29.5 МэВ, 29.5 – 60 МэВ и 60 – 100 МэВ. Пересчет показаний приборов **HET** по этим трем каналам в интегральные потоки Jp(>13.6, >29.5, >60 МэВ) для энергетических спектров Каталога проводился авторами каталога [http://stereo-ssc.nascom.nasa.gov/].

PAMELA (**P**ayload for **A**ntimatter-**M**atter **E**xploration and **L**ight Nuclei **A**strophysics), телескоп-спектрометр начал эксперимент на орбите Земли в июне 2006 г. Спутник имеет квазиполярную орбиту с наклонением 70.4° и высотой 300 – 600 км, период обращения спутника 90 минут. Основными задачами эксперимента **PAMELA** являются исследования галактических космических лучей. Телескоп-спектрометр **PAMELA** позволяет надежно определять энергию, импульс, знак и значение заряда частиц. Дополнительной задачей являлось исследование высокоэнергичной компоненты солнечных протонных событий (от 80 МэВ до нескольких ГэВ). В 23-м цикле солнечной активности такие события наблюдались только в декабре 2006 г. Фоновый счет прибора **PAMELA** ограничивается потоком галактических космических лучей. Детали эксперимента описаны в: Adriani O. Barbarino G.C., Bazilevskaya G.A. et al. Observations of the 2006 December 13 and 14 solar particle events in the 80 MeV/n – 3 GeV/n range from space with the PAMELA detector // The Astrophysical Journal. 2011. V. 742. No 2. doi: 10.1088/0004-637X/742/2/102.

Стратосферные измерения потоков солнечных космических лучей при полетах исследовательских шаров-зондов (the balloons) также использовались в Каталоге. В 23-м цикле СА полеты проводились в Мурманске (Mu, R_c = 0.6 GV), Москве (Mo, R_c = 2.4 GV) и в Антарктиде, в Мирном (Mi, R_c = 0.03 GV). Прибор, поднимавшийся на баллонах – телескоп из двух газоразрядных счетчиков. Проводилась регистрация числа совпадений и счет одиночного (верхнего) счетчика. Энергия регистрируемых протонов определялась по высоте полета зонда. Для обоих каналов геометрический фактор инструмента зависел от энергетического спектра регистрируемых частиц. Для Каталога использовались данные обоих каналов, совместная оценка которых позволяла определить энергию протонов и их изотропный поток для каждой высоты, где проводилось измерение. Более подробное описание эксперимента в: Bazilevskaya G.A., Makhmutov V.S., Stozhkov Y.I. et al. Solar proton events recorded in the stratosphere during cosmic ray balloon observations in 1957 – 2008 // Advances in Space Research. 2010. V. 45. Iss. 5. P. 603−613.

Нейтронные мониторы (НМ) – приборы, регистрирующие наземными средствами высокоэнергичный участок энергетического спектра протонов в солнечном событии. Из-за геомагнитного обрезания и поглощения протонов атмосферой Земли (все **НМ** пока расположены на поверхности Земли), минимальная энергия протонов, регистрируемых **НМ,** составляет около 500 МэВ. **НМ** имеют очень большой геометрический фактор, что позволяет выделять даже небольшие возрастания потоков солнечных протонов. Так как **НМ** регистрируют вторичные нейтроны, создаваемые в атмосфере Земли и экранах счетчиков **НМ,** то возникает необходимость пересчета зарегистрированного возрастания скорости счета конкретного **НМ** к потокам протонов вне магнитосферы Земли. Эта задача решена по показаниям мировой сети станций **НМ** для всех событий, получивших название Ground Level Enhancement (GLE), и в Каталоге даны потоки протонов уже вне магнитосферы Земли**.** Подробно методика пересчета описана в **Приложении 3**.

Геометрические факторы (Г) всех приборов и их фоновый счет (в условиях спокойного Солнца) приведены ниже в таблице **«Аппараты и приборы»**, суммирующей всю приборную гамму использованных в Каталоге приборов, и в таблице «**Баллоны и нейтронные мониторы**».

Аппараты и приборы

Космические аппараты	**Прибор**	**E, ΔE,** МэВ	**Г,** см ^{2}·ср	**Фон прибора,** /см^2·с·ср	**Время работы в 23-м цикле СА,** гг.
GOES - 9, 10	EPS	>5	>0.06	0.25	1997 − 2009
	EPS	>10	>0.06	0.15	
	EPS	>30	>0.25	0.08	
	EPS	>50	>0.25	0.06	
	EPS	>60	>0.25	0.05	
	EPS	>100	>0.25	0.03	
МЕТЕОР - 2, МЕТЕОР - 3М	СБМ	>5	6.3	1.1	1997 − 1998
	СБМ	>15	6.3	1.1	и 2002 − 2005
	СБМ	>25	6.3	1.1	
	СБМ	>40	6.3	1.1	
	ВР	>90	94	0.20	
	ChD	>600	314	0.19	

POES - 15, 16	MEPED	>0.24	0.06	40	1998 – 2009
	MEPED	>0.8	0.06	33	
	MEPED	>2.5	0.06	32	
	MEPED	>6.9	0.06	30	
	MEPED	>16	1.6	0.5	
	MEPED	>36	1.6	0.5	
	MEPED	>70	1.6	0.3	
	MEPED	>140	1.6	0.27	
КОРОНАС-Ф	МКЛ	1 – 5	0.5	0.02	2001 – 2005
	МКЛ	14 – 26	30	0.03	
	МКЛ	26 – 50	2	0.05	
	МКЛ	50 – 90	2	0.06	
IMP-8	CPME	1 – 2	1.51	0.02	1997 – 2001
	CPME	2 – 4.6	1.51	0.02	
	CPME	4.6 – 15	1.51	0.03	
	CPME	15 – 25	0.32	0.03	
	CPME	25 – 48	0.32	0.1	
	CPME	48 – 96	0.32	0.1	
	CPME	>1	1.51	0.9	
	CPME	>4	1.51	0.8	
	CPME	>10	1.51	0.75	
	CPME	>30	0.32	0.7	
	CPME	>60	0.32	0.6	
ACE	SIS	>10	≈40	0.8	1997 – 2009
	SIS	>30	≈40	0.5	
SOHO	LION	0.75 – 2	0.32	0.03	1997 – 2009
	LION	2 – 6	0.32	0.03	
	EPHIN	4 – 8	5.1	0.0004	
	EPHIN	8 – 25	5.1	0.0002	
	EPHIN	25 – 53	5.1	0.0002	
	EPHIN	>50	5.1	0.16	
STEREO-A, -B	HET	13.6 – 100	0.61	0.04 – 0.02	2006 – 2009
PAMELA	PAMELA	>200	20	Фон ГКА	2006 – 2009

Баллоны и нейтронные мониторы

Приборы	**Место измерения**	**Е,** МэВ	**Г,** $см^2 \cdot ср$	**Время работы,** гг.	**Примечания**
Шары-зонды	Mo	F(h)	~ 30 – 90*)	1997 – 2009	h – высота точки измерения
	Mi	F(h)	~ 30 – 90*)		
	Mu	F(h)	~ 30 – 90*)		
Сеть НМ	Москва	F(R)		1997 – 2009	R – жесткость обрезания протонов данного НМ
	Апатиты	F(R)			
	Мирный	F(R)			
	и др.	F(R)			

*) **Г** – зависит от энергетического спектра протонов (см.: Bazilevskaya G.A., Makhmutov V.S., Stozhkov Y.I. et al. Solar proton events recorded in the stratosphere during cosmic ray balloon observations in 1957 – 2008 // Advances in Space Research. 2010. V. 45. Iss. 5. P. 603−613).

Приложение 2

Определение источников возрастаний потоков протонов во вспышечных событиях на Солнце

Событие в солнечных космических лучах (СКЛ), в Каталоге – солнечное протонное событие (СПС), определяется как популяция энергичных частиц, наблюдаемых в межпланетной среде в результате взрывного энерговыделения на Солнце, наиболее яркими причинами которых являются солнечные вспышки, сопровождаемые определенным набором электромагнитных излучений, и корональные выбросы вещества (CME) Вопрос об относительной роли в ускорении заряженных частиц процессов, связанных со вспышкой и с корональными выбросами вещества, является центральным в проблеме СКЛ в течение многих лет. Для продвижения в этой области необходимо как можно точнее определить вспышку и корональный выброс вещества – главный источник энергичных частиц в большинстве событий СКЛ.

Так как солнечные протоны могут приходить в околоземное космическое пространство даже от далёких залимбовых вспышечных событий, не всегда возможно найти собственно оптическую вспышку как источник СПС.

К сожалению, во многих случаях реальное отождествление вспышек-источников частиц остается субъективным. В описываемом Каталоге эта субъективность сведена к минимуму благодаря комплексному учету обоснованных и проверенных статистических закономерностей, ни одной из которых, однако, не придавалось решающего значения. Рассматривались три вида данных:

- потоки заряженных частиц, их временные профили и энергетические спектры;
- электромагнитное излучение вспышек в рентгеновском, оптическом и радиодиапазонах, их спектральные характеристики, поведение во времени и другие параметры;
- структура магнитного поля и эволюция активных областей, их вспышечная активность [Laurenza et al., 2007].

Первый вид данных давал возможность предварительно оценить локализацию и временной интервал вспышечного события, которое с определённой долей вероятности могло быть источником данного протонного события. Быстрое (часы) нарастание потока протонов с E >10 МэВ до максимума и жёсткий спектр в интервале энергий 10 – 100 МэВ (индекс интегрального степенного спектра $\gamma \leq 3$), с большой вероятностью свидетельствует о том, что вспышечное событие произошло на западном полушарии видимого диска Солнца. Медленное нарастание (>10 часов), широкий максимум и, как правило, более мягкий спектр ($\gamma \geq 3$) с большой вероятностью указывают на источник (вспышечное событие) на восточной полусфере видимого диска Солнца [e.g., Lario, 2005; Laurenza et al., 2007].

Если найдены основания считать источником СПС солнечное вспышечное событие, расположенное на западной полусфере Солнца, то для определения конкретного источника рассматривались все вспышечные события, предшествовавшие началу возрастания частиц в пределах 1 – 10 часов. В случае восточного вспышечного события, указанный интервал расширялся до 2 – 3 суток.

В настоящем Каталоге СПС (за 23-й цикл СА) появилась возможность включить данные о динамических явлениях, таких как выбросы солнечных волокон, лимбовые выбросы и другие явления в оптическом диапазоне, сопровождающие солнечные вспышечные события. Наиболее информативным из них являются корональные выбросы вещества, основные характеристики которых приводятся в Каталоге. Если протонное вспышечное событие происходит достаточно далеко за лимбом (обычно за западным), то его единственным свидетельством будет именно CME типа «гало» или «частичное гало III» [Park et al., 2012].

При анализе электромагнитного излучения вспышечного события прежде всего обращалось внимание на рентгеновский балл (класс) всплеска (1 – 8 Å, Ex = 1 – 12.5 кэВ), который для вспышек на видимом диске Солнца в диапазоне долгот E70 ÷ W70 должен превышать M1, причём вспышки среднего балла (M <5) обычно должны быть большой длительности (>1 часа) и интегральный поток излучения в данном диапазоне рентгена должен быть $\geq 5 \cdot 10^{-2}$ Дж/м^2. Если солнечные вспышечные события небольшого рентгеновского балла расположены на видимом диске Солнца, тогда они сопровождаются всем спектром динамических явлений, как в оптике, так и радиодиапазоне. Данные в оптическом диапазоне в линии водорода Hα (λ = 6563 Å), дающие точную локализацию вспышки, косвенно говорят об энергетике и временной структуре самого процесса вспышки.

Значимым диагностическим фактором является радиоизлучение вспышечного события: протонные вспышки, как правило, сопровождаются динамическими радио всплесками II и/или IV типа с наличием достаточно интенсивного радиоизлучения на сантиметровых (~ 9 ГГц) и метровых (~ 245 МГц) волнах при относительно слабой плотности потока в дециметровом диапазоне. Длительность нарастания микроволнового всплеска обычно ≥ 5 минут и имеет U-образный частотный спектр [Акиньян и др., 1980].

Существенным дополнительным фактором при отождествлении возрастания потока протонов с тем или иным вспышечным событием являются характеристики активных областей (АО) или комплекса активных областей (КАО), которые рассматриваются как источники частиц данного события. Протонные вспышечные события происходят в АО, в которой наблюдается быстрое всплытие нового магнитного потока большой величины, превращающего простую группу пятен в сложную. В таких АО вспышечное энерговыделение обычно реализуется в виде серии вспышек большой и средней мощности в ограниченный промежуток времени [Ishkov, 2003]. Особо необходимо отметить вспышечную активность КАО, состоящих из двух и более соседних групп пятен, связанных общим магнитным полем. Большое вспышечное событие обычно захватывает основные компоненты КАО, а его магнитная структура с большой вероятностью способствует выходу больших потоков протонов.

Особый класс составляют возрастания потока протонов, вызванные залимбовыми вспышечными событиями. Основными признаками, указывающими на связь данного возрастания с залимбовой вспышкой, являются:

– наличие CME и/или метровых радиовсплесков II и/или IV типа при отсутствии подходящих вспышечных событий на видимой полусфере;

– недавний (до 4 суток) уход за западный лимб вспышечной АО сложной магнитной конфигурации с большой вероятностью скорого всплытия нового магнитного потока или находящейся в периоде реализации больших вспышечных событий;

– ожидаемый выход из-за восточного лимба Солнца (до 3 суток) на видимый диск Солнца АО, которая на прошлом обороте была в высокой степени вспышечно-активной и ушла за западный лимб в полном развитии.

В случае присутствия этих признаков делается вывод, что источник вспышечного события, возрастания частиц, находится на невидимой полусфере Солнца.

Когда в некоторых СПС, чаще небольшой мощности, возрастание протонов не отождествляется ни с какими проявлениями вспышечной или CME активности, тогда приходится делать вывод, что его источник неизвестен.

Для всех событий в Каталогах указана достоверность источника данного СПС, основанная на вышеописанных подходах. Степень уверенности, с которой осуществлена привязка протонного события к источнику, обозначается соответствующими значками, приведенными в описании материалов Каталога, которые совпадают со схемой, разработанной в [Dodson, Hedeman, 1975].

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Приложение 3

Определение потоков и энергетического спектра релятивистских солнечных протонов по данным нейтронных мониторов

Основным источником информации об интенсивности релятивистских СКЛ являются наземные установки, которые регистрируют GLE, так называемые наземные возрастания СКЛ. Единственным исключением является орбитальный спектрометр PAMELA, который регистрирует в околоземном пространстве потоки протонов и ядер с энергией выше 80 МэВ и к настоящему времени зафиксировал потоки солнечных протонов в двух GLE (в конце 23-го и в 24-м солнечных циклах) [Adriani et al., 2011; Bazilevskaya et al., 2013].

В течение 23-го цикла солнечной активности зарегистрировано 16 GLE (№ 55 – 70). Переход от возрастания темпа счета наземного прибора к потокам СКЛ на границе атмосферы требует знания функций отклика прибора. Практически все сведения о релятивистских СКЛ получены из данных нейтронных мониторов, для которых разработано несколько методик восстановления энергетических спектров, использующих всю наземную сеть НМ как один гигантский детектор СКЛ [Shea and Smart, 1982; Cramp et al., 1997; Bieber et al., 2004; Plainaki et al., 2007; Vashenyuk et al., 2006].

Релятивистские частицы быстро достигают орбиты Земли, и в начальной стадии события потоки СКЛ обычно имеют сильную питч-угловую анизотропию (быстрая компонента), что отражается в значительной разнице показаний НМ с одинаковой жесткостью геомагнитного обрезания [Vashenyuk et al., 2006]. Для анизотропной стадии методика дает значения потока СКЛ, приходящего с наиболее благоприятного направления распространения частиц. На более поздней, изотропной, стадии события потоки СКЛ на разных НМ однозначно зависят от жесткости геомагнитного обрезания (медленная компонента). Поскольку в Каталоге приведены потоки и спектры солнечных протонов в максимуме временного профиля события, т.е. обычно не ранее, чем через ~30 минут после первого прихода солнечных частиц, мы полагаем, что этому условию наиболее адекватна интенсивность медленной компоненты, хотя более корректный подход мог бы учитывать интеграл по питч-угловому распределению быстрой компоненты.

В работе [Vashenyuk et al., 2011] даны параметры дифференциального энергетического спектра, полученные по данным мировой сети НМ для GLE 55 (06.11.1997), 59 (14.07.2000), 60 (15.04.2001), 61 (18.04.2001), 65 (28.10.2003), 67 (02.11.2003), 69 (20.01.2005) и 70 (13.12.2006).

В Каталоге представлены результаты интегрирования спектров медленной компоненты из [Vashenyuk et al., 2006] в диапазоне энергий 1000 МэВ – Ec, где Ec энергетический порог геомагнитного обрезания НМ с наибольшим Ec для данного события [www.nmdb.eu]. События GLE 56 − 58 (02.05.1998, 06.0 5.1998, 24.08.1998), 62 – 64 (04.11.2001, 26.12.2001, 24.08.2002), 66 (29.10.2003) и 68 (17.01.2005) зарегистрированы лишь небольшим числом НМ и не поддаются обработке общепринятым методом [Vashenyuk et al., 2006]. Для этих событий была применена процедура оценки интенсивности релятивистских солнечных протонов, описанная в работе [Caballero-Lopez and Moraal, 2012]. Использовалась формула связи между возрастанием темпа счета НМ с порогом геомагнитного обрезания *Rc*, *dN(Rc, t)/N(Rc, t)* и интенсивностью солнечных протонов на границе атмосферы *I(R, t)* [Дорман, 1957]:

$$\frac{dN}{N}(Rc,t) = \frac{1}{N(Rc,t)}\int_{Rc}^{Rm} I(R,t)\ m(R)dR,$$

где *m(R)* – нормированные интегральные кратности генерации вторичных частиц в атмосфере одной первичной частицей с жесткостью *R*, аппроксимация которых дана в работе [Caballero-Lopez and Moraal, 2012].

Темп счета нейтронного монитора *N(Rc, t)* взят из широтной зависимости счета нейтронного монитора в максимуме солнечной активности из той же работы [Caballero-Lopez and Moraal, 2012]. В качестве исходного спектра *I(R, t)* принимался степенной энергетический спектр солнечных протонов, полученный прибором HEPAD аппарата GOES, в диапазоне 350 – 510 МэВ (дифференциальные потоки). Если полученное значение *dN/N* не согласовывалось с экспериментально определенным значением, производилось увеличение показателя спектра до тех пор, пока рассчитанное значение *dN/N* не совпадало с экспериментальным в пределах 0.5 %. Для полученного таким образом спектра определялось значение потока протонов *I* (>500 МэВ). Нужно отметить, что немногочисленные экспериментальные значения в слабых событиях *dN/N* для разных НМ отличаются иногда в несколько раз (возможно, из-за вклада анизотропной компоненты), поэтому значения интенсивности *I* (>500 МэВ), приведенные в Каталоге для событий GLE 56 – 58, 62 – 64 и 66 имеют точность в пределах фактора 5.

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Приложение 4

Определение квазимаксимальной энергии солнечных протонов в событии

Одним из параметров события, характеризующих его мощность, может служить максимальная энергия зарегистрированных в событии частиц. Но прямая оценка максимальной энергии практически невозможна, нет никакой гарантии, что частиц с энергией, выше зарегистрированной, в данном событии не было. Любое принятое значение максимальной энергии будет условным. Надо принять (назначить) некоторое критическое значение потока протонов Jкрит. Энергию протонов, при которой наблюдается поток Jкрит в данном событии, можно условно считать максимальной, а называть её квазимаксимальной с обозначением Eqm.

Естественным критическим потоком могут служить постоянно присутствующие в пространстве галактические космические лучи. Энергетический спектр протонов ГКЛ очень стабилен, вариации потоков в области энергий, меньших 10 ГэВ, связанные с солнечной активностью, хорошо изучены. Использование потоков ГКЛ позволяет определить «максимальную» (на самом деле – Eqm) энергию ускоренных на Солнце частиц. Такое определение очень наглядно, спектры в событиях СКЛ легко сравнивать с привычным спектром протонов ГКЛ и приблизительно оценивать возможности Солнца в ускорении протонов в каждом событии.

Оказалось, что применяемые приборы для регистрации солнечных протонов способны измерять потоки протонов гораздо меньшие потоков протонов ГКЛ соответствующих энергий и, чтобы приблизиться к реальным «максимальным» энергиям, в методику определения Eqm включен не полный поток частиц ГКЛ, а только 10 % этого потока. Так как ГКЛ с энергией < 500 – 1000 МэВ в 11-летнем солнечном цикле испытывают почти двукратную вариацию, в данном определении отправной точкой сравнения принят поток ГКЛ в максимуме солнечной активности. Таким образом, квазимаксимальная энергия Eqm в данном событии определена по сравнению с 10% потока ГКЛ или 0.1·Jp(Егкл). Отсюда следует, что методика определения Eqm сводится к нахождению точки пересечения двух интегральных энергетических спектров: спектра 0.1·Jp(Егкл) и спектра данного солнечного события. В этой точке наблюдается равенство Jp(Ескл) = 0.1·Jp(Егкл) = Jp(Eqm). Энергия, которая обозначена как Eqm, приводится для каждого события, включенного в Каталог.

Отметим некоторые особенности определения энергии Eqm в солнечных протонных событиях, представленных в Каталоге. Для большинства событий энергетический спектр протонов в интервале энергий 10 – 100 МэВ хорошо описывается степенной функцией $J(>E) \sim E^{-\gamma}$. Для событий большей мощности степенной спектр простирается до более высоких энергий, но, естественно, при дальнейшем увеличении энергии спектр становится более крутым, описываемым другой зависимостью, например, $J(>E) \sim E^{-\gamma} \cdot \exp(-E/Eo)$. К сожалению, в 23-м цикле СА измерений потоков солнечных протонов при энергиях >100 МэВ очень мало, и воспользоваться каким-либо законом для аппроксимации спектра в реальных событиях не представляется возможным.

Чтобы при определении энергии Eqm учесть укручение спектра при высоких энергиях протонов, в Каталоге использовались нижние пределы значений потоков протонов по каналам Ep>100 МэВ прибора EPS (GOES) или Ep>1000 МэВ нейтронных мониторов. Во всех событиях 23-го цикла СА показания приборов по этим каналам не падали ниже значений $4 \cdot 10^{-3}$ pfu и 10^{-3} pfu соответственно, т.е. отсутствие показаний по этим каналам означало, что Jp(>100 МэВ) ≤ $4 \cdot 10^{-3}$ pfu и Jp(>1000 МэВ) ≤ 10^{-3} pfu. Спектр протонов, необходимый для определения Eqm, аппроксимировался степенным законом $J(>E) \sim E^{-\gamma^*}$, определение γ^* проводилось по двум точкам: по значению Jp(>E) для наибольшей измеренной энергии и значению Jp(>100 МэВ) = $4 \cdot 10^{-3}$ pfu или Jp(>1000 МэВ) = 10^{-3} pfu. Так как это верхние пределы потоков протонов, то реальный спектр будет круче построенного, т.е. $\gamma_{реал} > \gamma^*$, а значение Eqm(реал) < Eqm(вычисл). В материалах Каталога значения γ^* не приводятся.

В случаях наземных возрастаний СКЛ (GLE), когда событие наблюдалось не только высокоширотными НМ с жесткостью геомагнитного обрезания 1 ГВ, лучшим приближением к реальной максимальной энергии следует считать энергию геомагнитного обрезания самой низкоширотной из станций, зарегистрировавших это событие (см. таблицы Каталога), которая больше Eqm. Таких событий в 23-м цикле СА было всего восемь. Для однородности представления результатов в Каталоге для этих событий дается значение Eqm, определенное по общей стандартной методике.

Определенное таким образом значение Eqm дает представление о мощности солнечного события и позволяет иметь еще один единый параметр в событиях СКЛ, позволяющий проводить сравнения с другими характеристиками событий.

Приложение 5

Список обозначений и сокращений по явлениям и событиям, представленным в материалах Каталога

1. Обозначения в легенде события, обзорных графиках и таблицах потоков протонов

To – начало события;
Tmax – время максимума события;
Ep – энергия протонов;
Eqm – квазимаксимальная энергия протонов в событии;
Jmax – максимум потока протонов;

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Ф – интегральный поток энергии в рентгеновском диапазоне от начала всплеска до момента спада на уровень 1/2 от максимального значения в Дж/м^2*;*

pfu – единицы потока частиц (1 pfu = 1 см$^{-2}$с$^{-1}$ср$^{-1}$);

●, ■ – данная вспышка определенно является источником наблюдаемых протонов;

⊙, ⊡ – данная вспышка с большой вероятностью является источником наблюдаемых протонов;

○ – вспышка, возможно, является источником протонов данного события, но есть причины, по которым эта возможность подвергается сомнениям;

Ø – вспышка не является основным источником, но внесла (или могла внести) вклад в наблюдаемые потоки протонов;

□ – вспышка (или активность) за западным или восточным лимбом Солнца;

◊ – активность области на диске Солнца, модуляционные эффекты в межпланетном пространстве.

SC – внезапное начало магнитной бури, приход межпланетной ударной волны к Земле;

▲ – SC, внёсшее изменения в потоки частиц;

Δ – SC, не отразившееся на профилях потоков частиц;

CME – корональный выброс вещества;

V – медианная скорость CME в км/с;

Accel – ускорение CME (км/с^2);

Δφ – угловой раствор (угловая ширина) CME вблизи Солнца;

dA – позиционный угол первого появления CME;

gap – отсутствие наблюдений;

V_{sw} – скорость солнечного ветра;

B – величина магнитного поля в солнечном ветре (нТ);

Dst – индекс геомагнитной активности;

S/C – космический аппарат;

SCR, СКЛ – солнечные космические лучи;

GLE – солнечное протонное событие зарегистрированное наземными приборами;

Location – гелиокоординаты события;

WL – эмиссия в непрерывном спектре (белом свете);

2. Обозначения в оптической и рентгеновской области излучения

Код Hα-вспышки в виде набора латинских букв
(по системе издания Solar Geophysical Data)**,** обозначающий следующее:

A – эруптивный протуберанец на расстоянии <90° от центрального меридиана;
B – вероятный конец вспышки большого балла;
D – яркая точка;
E – две или больше ярких точек;
F – несколько эруптивных центров;
G – в окрестности вспышки нет видимых пятен;
H – вспышке сопутствуют высокоскоростные возмущения тёмного (в поглощении) волокна;
К – несколько максимумов интенсивности;
L – признаки внезапной активизации волокна, находящегося вблизи вспышки;
M – вспышка в белом свете;
N – в непрерывном свете присутствуют поляризационные эффекты;
O – наблюдения вспышки велись в линиях К и H CaII;
P – во вспышке наблюдалась эмиссия в линии D3;
Q – во вспышке наблюдалась эмиссия линий бальмеровского континуума;

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R – наблюдается асимметрия линии Hα, с выбросом вещества с большими скоростями;
S – уярчение, следует за исчезновением волокна;
U – две яркие вспышечные ленты, параллельные или сходящиеся;
V – наличие взрывной фазы вспышки; значительное и внезапное расширение области эмиссии вспышки примерно за 1 минуту;
W – большое увеличение площади эмиссии вспышки после максимума интенсивности;
X – необычно расширена линия Hα;
Y – наблюдались арочные вспышечные системы;
Z – тень большого пятна залита эмиссией вспышки.

Рентгеновский класс (балл) вспышки
в мягком рентгеновском всплеске в диапазоне 1 – 8 Å (1.6 – 12.7 кэВ)
[http://legacy-www.swpc.noaa.gov/weekly/index.html]:

Classification	Peak Flux Range (0.1-0.8 nm) mks system (W m^{-2})	cgs system (erg cm^{-2}s^{-1})
A	$\Phi < 10^{-7}$	$\Phi < 10^{-4}$
B	$10^{-7} \le \Phi < 10^{-6}$	$10^{-4} \le \Phi < 10^{-3}$
C	$10^{-6} \le \Phi < 10^{-5}$	$10^{-3} \le \Phi < 10^{-2}$
M	$10^{-5} \le \Phi < 10^{-4}$	$10^{-2} \le \Phi < 10^{-1}$
X	$10^{-4} \le \Phi$	$10^{-1} \le \Phi$

Оптический балл солнечной вспышки, наблюдаемой в линии Hα, определяется исправленной площадью вспышки в центре линии в гелиографических квадратных градусах в максимуме яркости [http://legacy-www.swpc.noaa.gov/weekly/index.html]:

S – субвспышка – *(площадь ≤ 2.0 кв.град.)*
1 – балл 1 *(2.1 ≤ площадь ≤ 5.1 кв.град.)*
2 – балл 2 *(5.2 ≤ площадь ≤ 12.4 кв.град.)*
3 – балл 3 *(12.5 ≤ площадь ≤ 24.7 кв.град.)*
4 – балл 4 *(площадь ≤ 24.8 кв.град.)*

Яркость – относительная яркость в максимуме вспышки:
F – слабая;
N – нормальная;
B – яркая.

Динамические явления, наблюдаемые в линии H_α (6563 Å):
EPL – эруптивный протуберанец на лимбе;
LPS – система петлевых протуберанцев = арочная система вспышечных волокон;
DSF – исчезновение солнечного волокна;
SPY – вспышечный спрей (гигантский выброс на лимбе в месте реализации вспышки;
BSL – яркий выброс на лимбе.

3. Обозначения в области радиоизлучения

Тип динамического спектра (DS) метровой компоненты радио всплеска [Illustrated Glossary for Solar and Solar-Terrestrial Physics. Eds. A. Bruzek and C.J. Durrant. Springer, Netherlands, 1977. doi: 10.1007/978-94-010-1245-4] и [ftp://ftp.ngdc.noaa.gov/STP/space-weather/solar-data/solar-features/solar-radio/radio-bursts/reports/spectral-listings]:
DS I – шумовая буря;
DS II – медленно дрейфующие всплески;

DS III – быстро дрейфующие всплески;
DS IV – продолжительный радио всплеск, занимающий широкую полосу частот;
DS V – широкополосное непрерывное излучение на длинных метровых волнах (связан с радио всплеском III типа);
CONT – широкополосное излучение всплесков IV типа;
DCIM – дециметровые всплески очень быстрых спайков или групп спайков с очень высокой степенью поляризации;
UNCLF – не классифицированная активность в радио диапазоне.

Код вида частотного спектра радио всплеска на волнах дециметрового и сантиметрового диапазонов:
P5 – спектр имеет максимум на частоте 5 ГГц, P5(2.3) означает, что логарифм максимальной плотности потока на 5 ГГц составляет 2.3 (максимальная плотность потока в приведенном примере равна $200 \cdot 10^{-22}$·Вт·м$^{-2}$·с$^{-1}$)*;*
1/9 – плотность потока радиоизлучения минимальна на частоте 1 ГГц и возрастает до частоты 9 ГГц; информация об интенсивности всплеска на более высоких и низких частотах отсутствует;
0.6\9 – спектр характеризуется ростом интенсивности при увеличении частоты от 0.6 до 9 ГГц;
0.6/9 – плотность потока уменьшается при повышении частоты от 0.6 до 9 ГГц*;*
U2 P7 –плотность потока минимальна на частоте 2 ГГц и возможно достигает максимума на частоте 7 ГГц;
3–9 – плоский частотный спектр между 3 и 9 ГГц.

Если элемент обозначения указан в квадратных скобках (например [P5]), это означает, что данный параметр определён недостаточно надёжно из-за неполноты или противоречивости исходных данных.

4. Источники сведений, используемые в Каталоге

SGD – Solar Geophysical Data;
PRF – The Preliminary Report and Forecast of Solar Geophysical Data [http://legacy-www.swpc.noaa.gov/weekly/index.html].

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События 1997 г.

			Стр.
1.	Event 1997.11.04 – (1997-308)	№ 335	37
2.	Event 1997.11.06 – (1997-310) - GLE	№ 336	42
3.	Event 1997.11.13 – (1997-317)	№ 337	47

Event 1997.11.04 – (1997-308) **№ 335**

Particle event: To(Ep>10 MeV) – 04d07^h

Tmax$_1$(Ep>10 MeV) – 04d11^h, Jmax$_1$ (Ep>10 MeV) – 66 /cm^2.s.sr

Tmax$_2$(Ep>10 MeV) – 05d02^h, Jmax$_2$ (Ep>10 MeV) –17.5 /cm^2.s.sr

Duration of the event – 2 days

Quasimaximal energy of protons in the event – Eqm$_1$ = 470 MeV

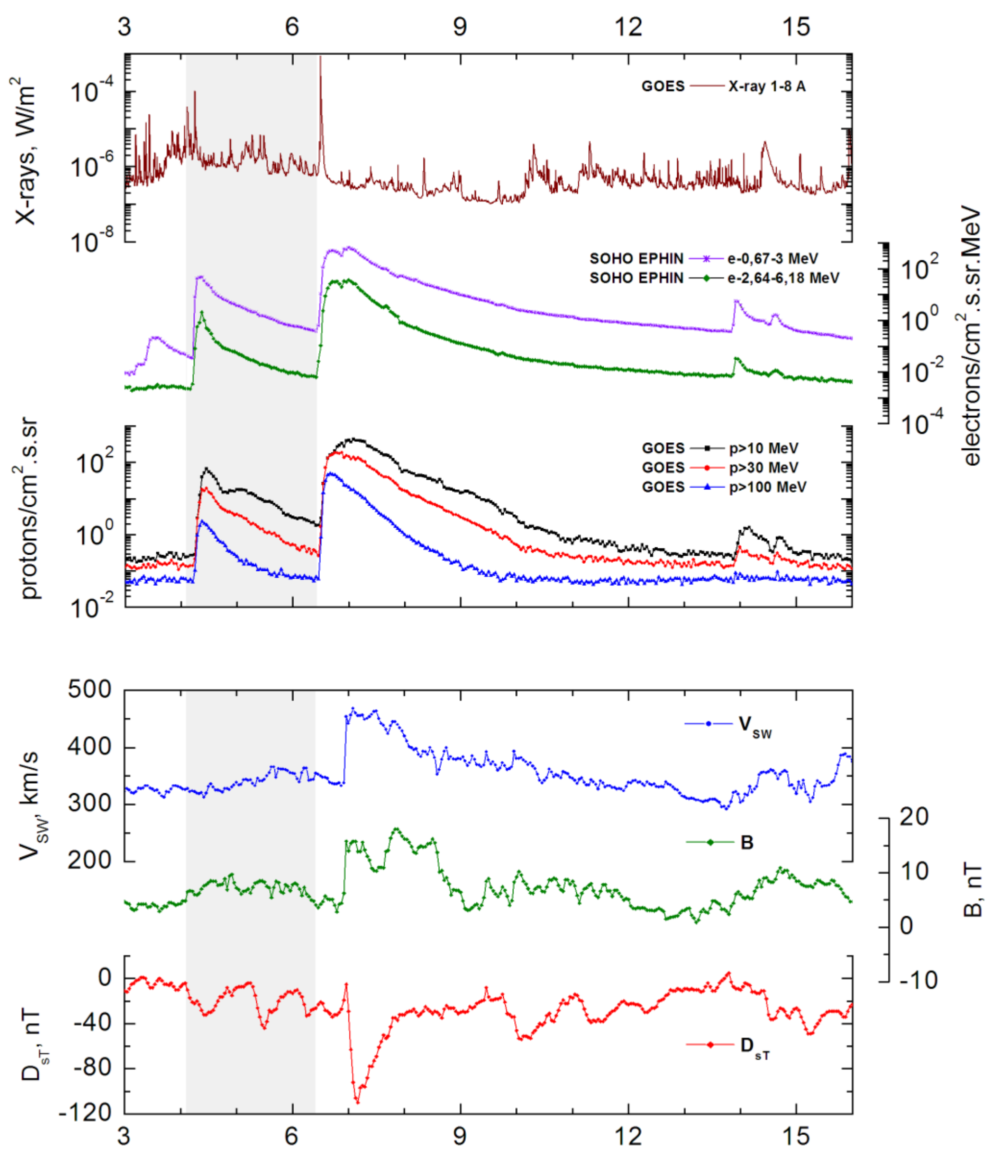
– Eqm$_2$ = 320 MeV

Sources: ● solar flare 04d05^{h}52^m, X2.1/3B, S14W34, AR8100

Main burst X-ray 1–8 Å: onset – 04d05^{h}52^m, max – 04d05^{h}58^m, Φ = 0.056 J/m^2

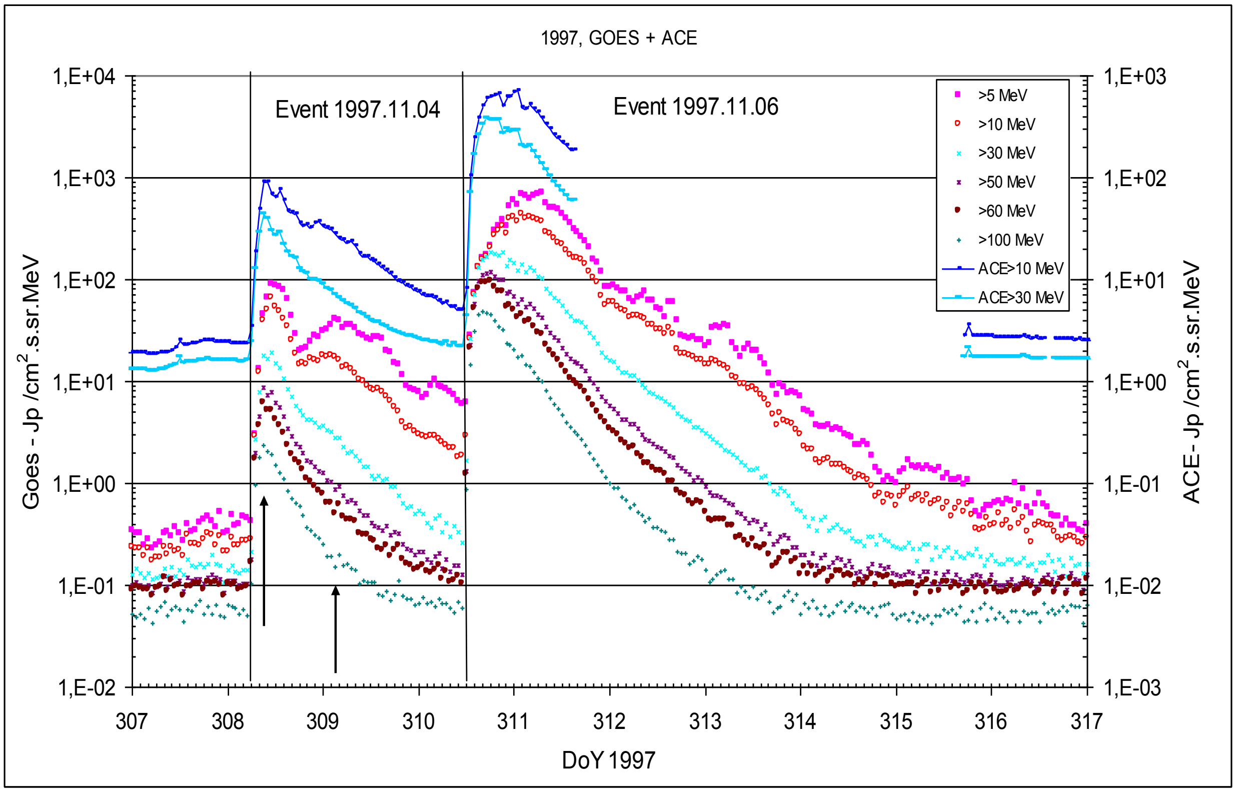
CME: 04d06^{h}10^m, V= 0785 km/s, Δφ = 360º, dA= 243º

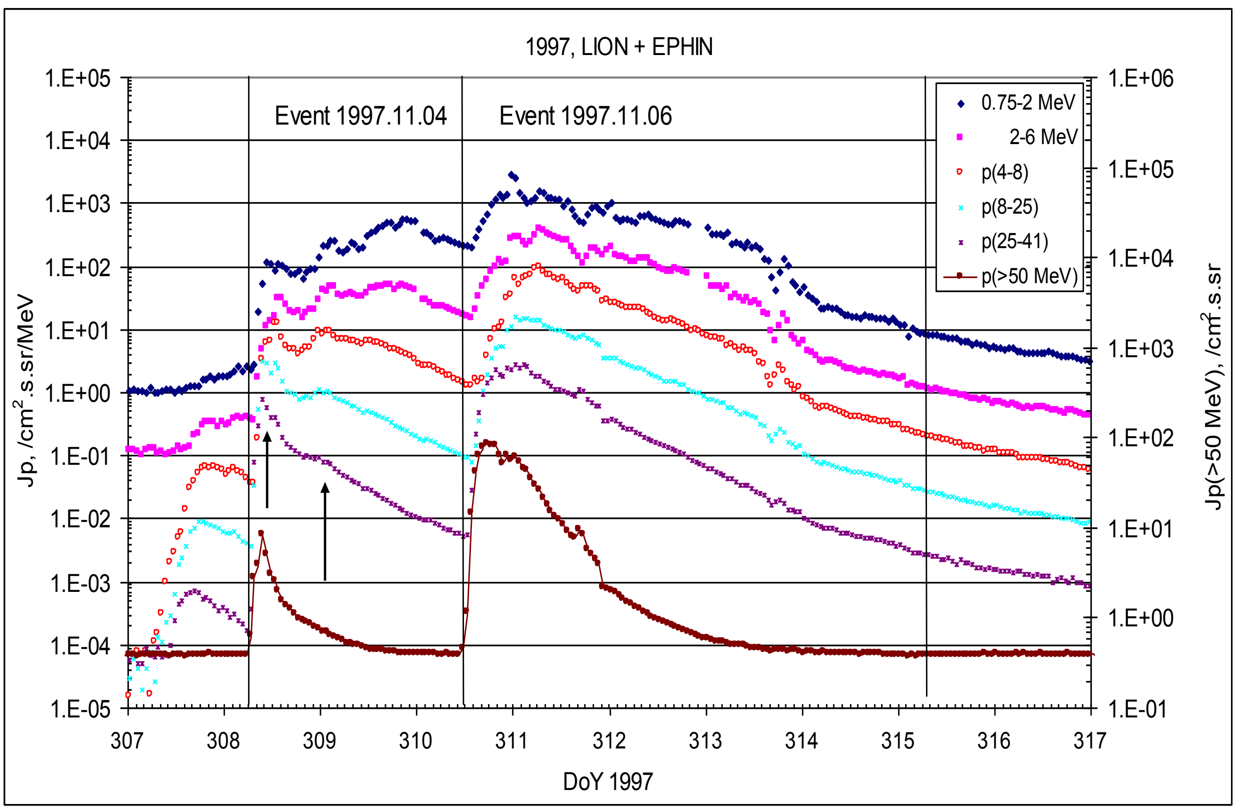
Particle fluxes and associated phenomena



November, 1997

Time profiles of the proton fluxes for the event of 1997 November 04





Arrows on the profiles of the events indicate the time of the proton flux maxima, taken to build the proton spectra (see below)

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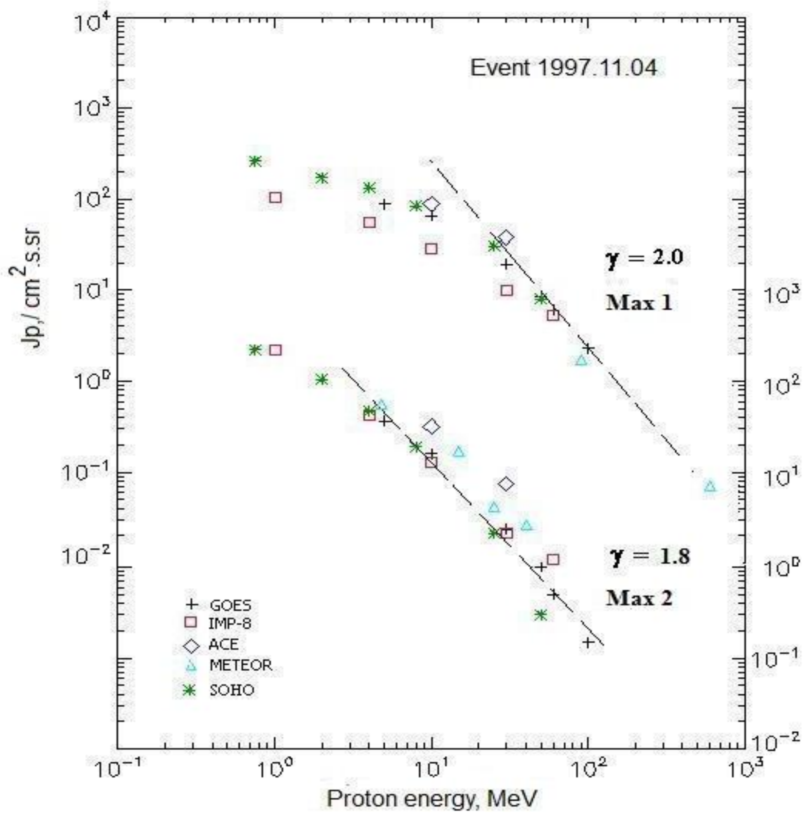
Integral time-of-maximum proton spectrum



Integral fluxes of protons for the event of 1997 November 04

S/c, instruments	Ep, MeV	To	Tmax	Jmax, /cm^2.s.sr	Dura-tion	Comments
GOES-9						
EPS	>5	07^h	11^h/5d03^h	89/40	2d	
EPS	>10	07^h	11^h/5d02^h	66/17.5	2d	
EPS	>30	07^h	11^h/5d02^h	19.1/2.6	2d	
EPS	>50	07^h	09^h/5d02^h	8.6/ 1	2d	
EPS	>60	07^h	09^h/5d02^h	6.0/0.5	2d	
EPS	>100	07^h	09^h/5d02^h	2.3/0.15	2d	
METEOR-2						
CBM	>5	-	- /<5d01^h	- />52	-	
CBM	>15	-	- /<22^h	- />13	-	
CBM	>25	-	- /<21^h	- />3.4	-	
CBM	>40	-	- /<20^h	- />2.4	-	
BP	>90	06^h	09^h/ -	1.7/ -	21h	
ChD	>600	06^h	08^h/ -	0.07/ -	13h	
IMP-8						
CPME	>1	>06^h	13^h/5d06^h	105/244	2d	
CPME	>4	>06^h	13^h/5d04^h	56/46	2d	
CPME	>10	>06^h	12^h/5d03^h	29/14	2d	
CPME	>30	>06^h	<10^h/5d02^h	10/2.4	2d	
CPME	>60	>06^h	<10^h/5d02^h	5.3/1.2	2d	

ACE						
SIS	>10	05^h	09^h/ -	88/35	2d	
SIS	>30	05^h	08^h/ -	38/8.2	2d	
SOHO						
EPHIN (INT)	>50	06^h	11^h/05d03^h	8/0.3	2d	

Differential fluxes of protons for the event of 1997 November 04

S/c, instruments	ΔE, MeV	To	Tmax	Jmax. /cm^2.s.sr.MeV	Dura-tion	Comments
IMP-8						
CPME	1-2	06^h	18^h/05d21^h	17,9/371	2d	
CPME	2-4.6	06^h	14^h/05d14^h	15.1/42.1	2d	
CPME	4.6-15	06^h	14^h05d00^h	2.9/3	2d	
CPME	15-25	06^h	13^h/05d00^h	1.1/0.6	-	
CPME	25-48	06^h	11^h/ -	0.2/ -	-	
CPME	48-96	06^h	11^h/ -	0.07/ -	-	
CPME	96-145	06^h	11^h/ -	0.05/ -	-	
CPME	145-440	06^h	11^h/ -	0.005/ -	-	
SOHO						
LION	0.75-2	08^h	14^h/05d02^h	103/261	2d	
LION	2-6	08^h	14^h/05d02^h	32/46	2d	
EPHIN	4-8	06^h	12^h/05d03^h	12.3/9.3	2d	
EPHIN	8-25	06^h	11^h/05d03^h	3/1.1	2d	
EPHIN	25-41	06^h	10^h/05d03^h	0.8/0,07	2d	
EPHIN	41-53	- “ -	- “ -	- “ -	- “ -	

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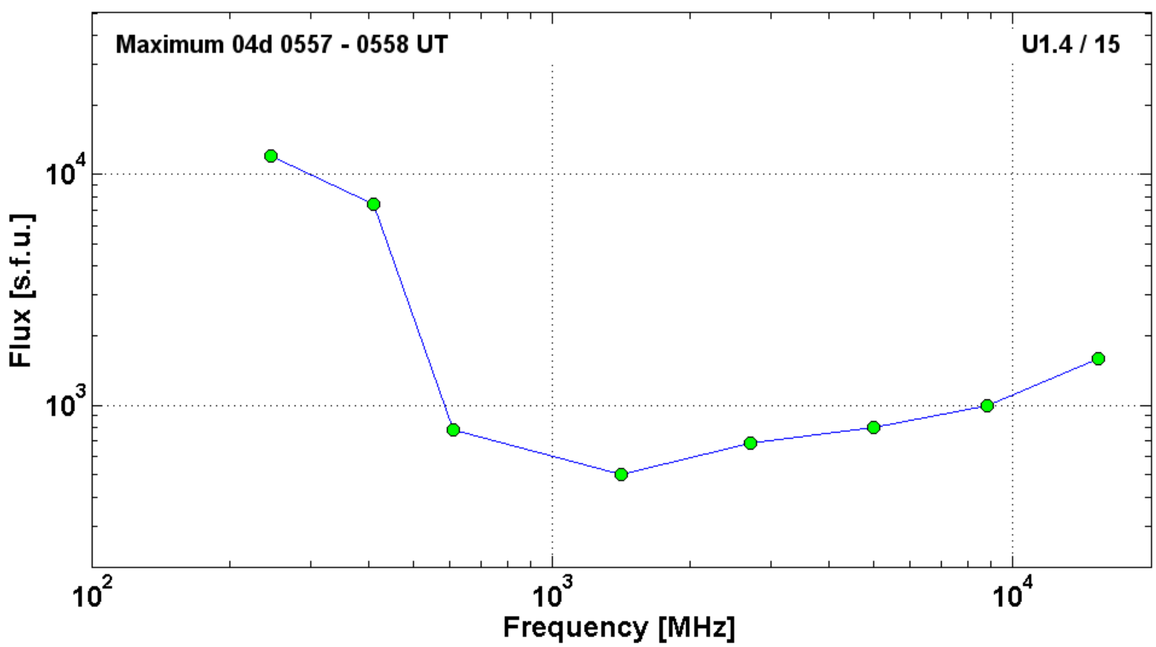
Electromagnetic and other phenomena that are sources and/or accompanying for the event of 1997 November 04

1997 November 04 ● AR 8100 To event 335

H_α	6563 Å	0554	0559	0648	S14 W34	3B	CF
1 – 12	keV	0552	0558	0648		X2.1	5.6E-2
52.7 – 92.8	keV	<060958	~063020	064148		9	HXT Y

15.4	GHz	0556.0	0557.0	0607.0	U1.4 / 15	3.20	
8.8	GHz	0555.0	0557.0	0602.0		3.00	
5	GHz	0555.0	0557.0	0604.0		2.90	
2.7	GHz	0555.0	0557.0	0604.0		2.84	
1.4	GHz	0556.0	0557.0	0604.0		2.70	
610	MHz	0556.0	0557.0	0610.0		2.89	
410	MHz	0556.0	0558.0	0611.0		3.87	
245	MHz	0555.0	0558.0	0611.0		4.08	
DS II	30-230	0558		0607	SH	3	
DS II	30-50	0559		0606		3	
DS II	18-60	0600		0607	FN	3	
DS II	18-34	0607		0615	FN	3	
DS II	25-75	0608		0617	SH	3	
DS II	50-73	0608		0611		3	
DS IV	20-200	0606		>0709	FS	3	
DS III	25-410	0556		0558	G	3	
DS III	100-1200	0557		0602	G	2	
DS III	2000-4315	0817		0818	B	1	
DS V	35-85	0556		0614		3	
DS DCIM	1000-1525	0817		0822	G	1	
CME	WL	0610	0785km/s	-22.1 km/s^2	360º	243º	

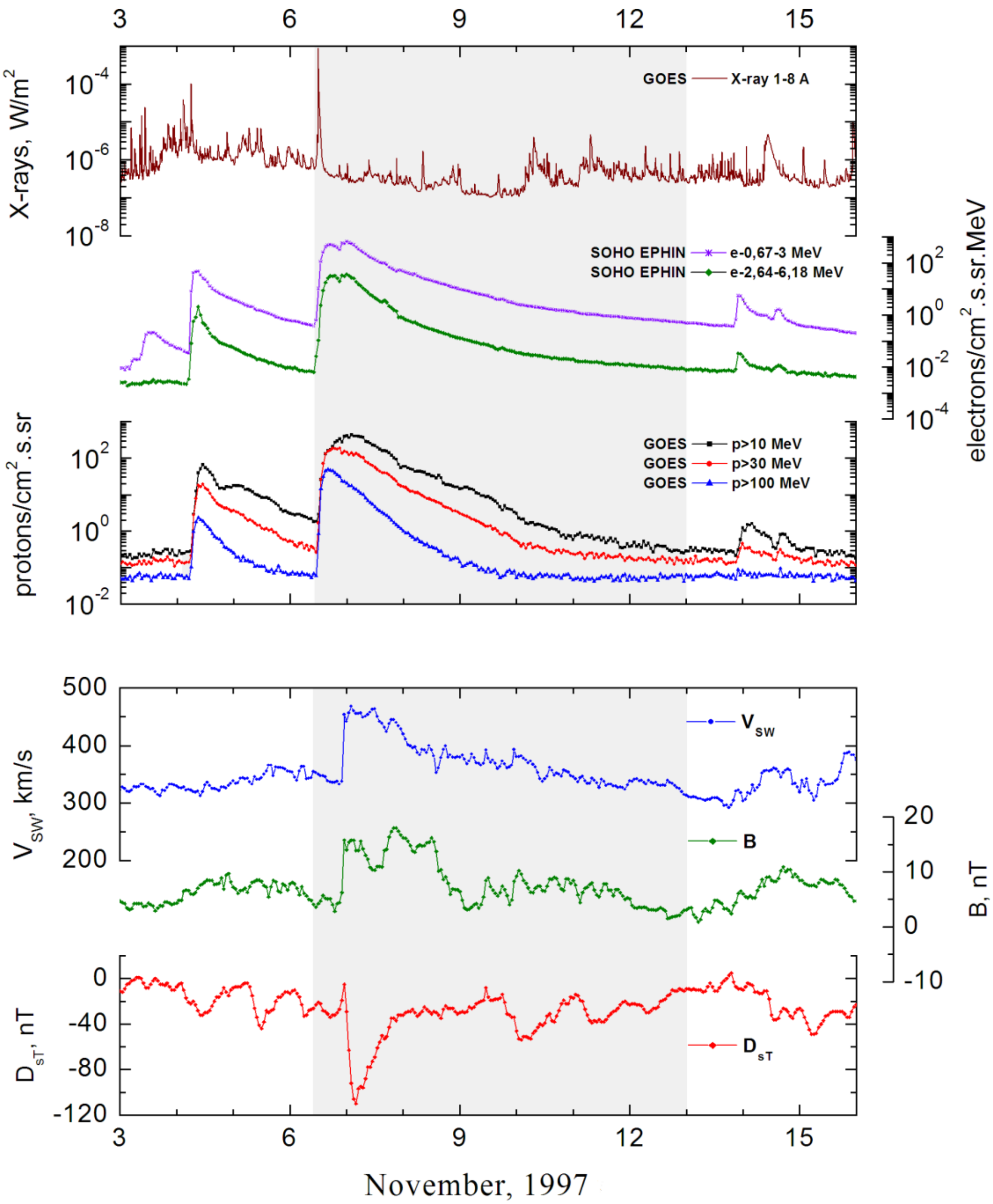


Event 1997.11.06 – (1997-310) - GLE **№ 336**

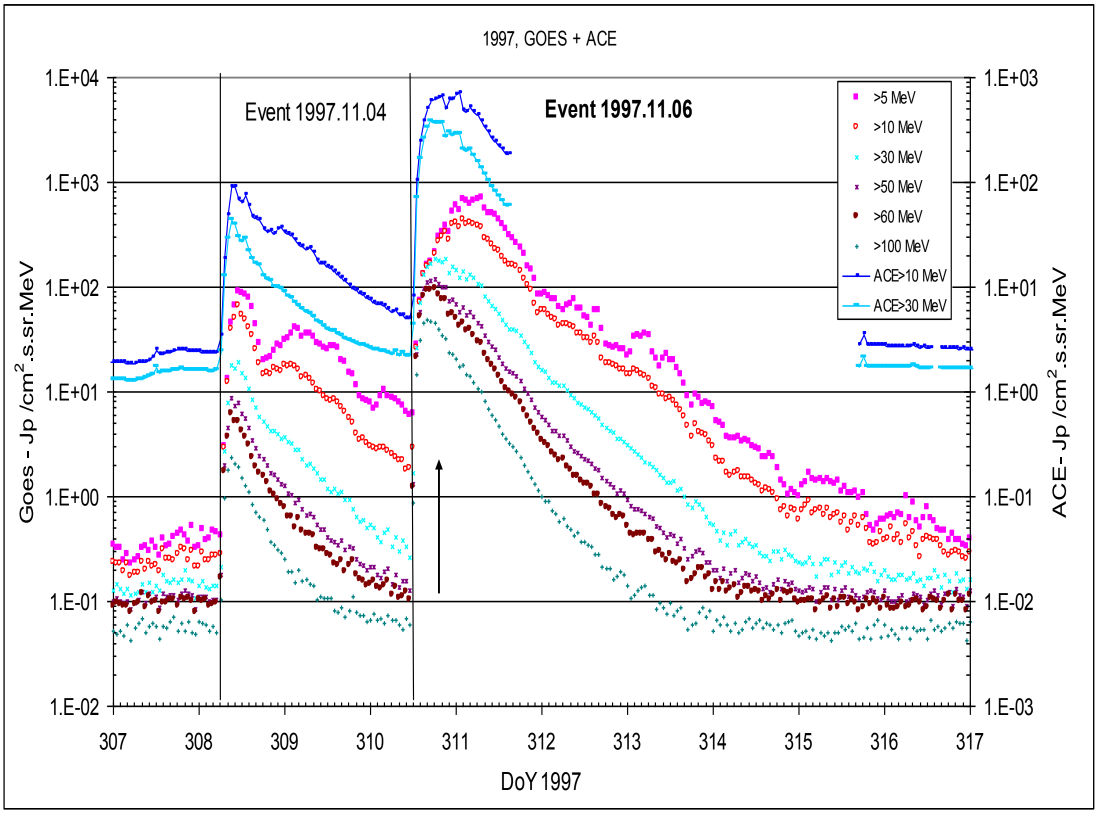
Particle event: To(Ep>10 MeV) – 06d13^h
Tmax(Ep>10 MeV) – 7d02^h, Jmax(Ep>10 MeV) – 430 /cm^2.s.sr
Duration of the event – 7 days
Quasimaximal energy of protons in the event – Eqm = 2900 MeV

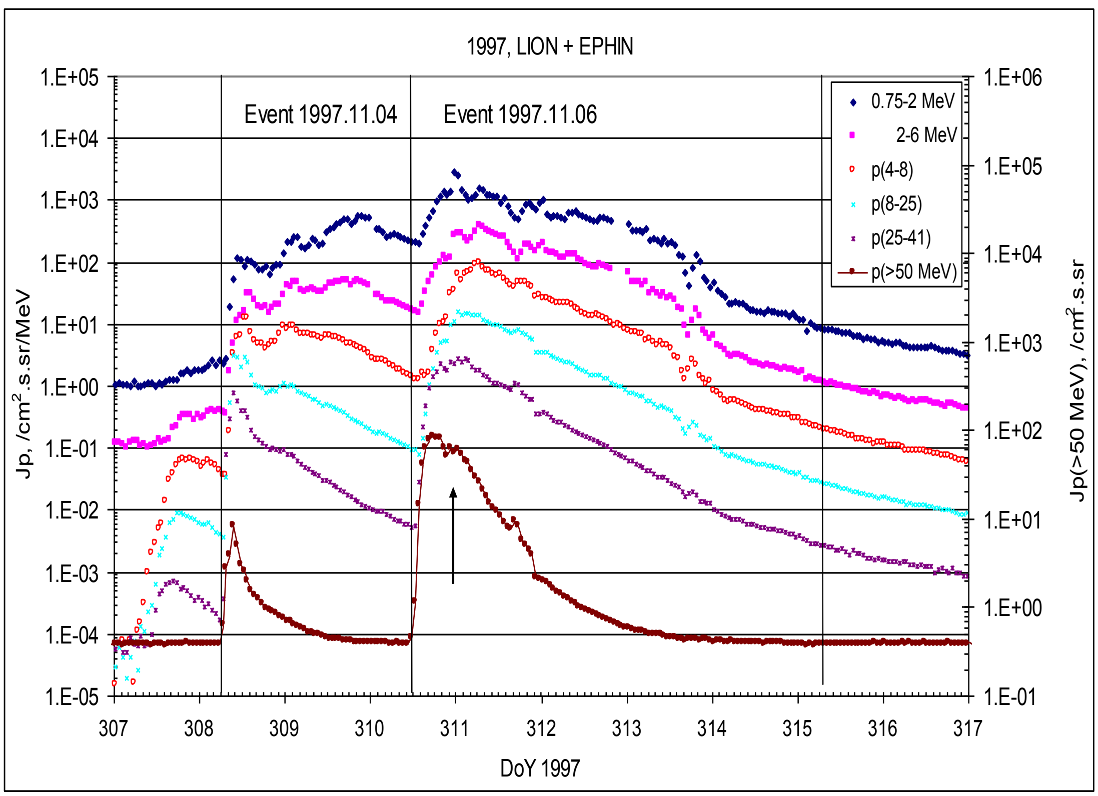
Sources: ● solar flare <06d11^{h}22^m, 2B/X9.4, S18W63, AR8100
Main burst X-ray 1-8 Å: onset – 06d11^{h}49^m, max – 06d11^{h}55^m, Jmax = 0.036 J/m^2
CME: 06d12^{h}10^m, V= 1556 km/s, Δφ = 360º, dA = 262º
▲SC 06d22^{h}52^m

Particle fluxes and associated phenomena



Time profiles of the proton fluxes for the event of 1997 November 06





Arrows on the profiles of the events indicate the time of the proton flux maxima, taken to build the proton spectra (see below)

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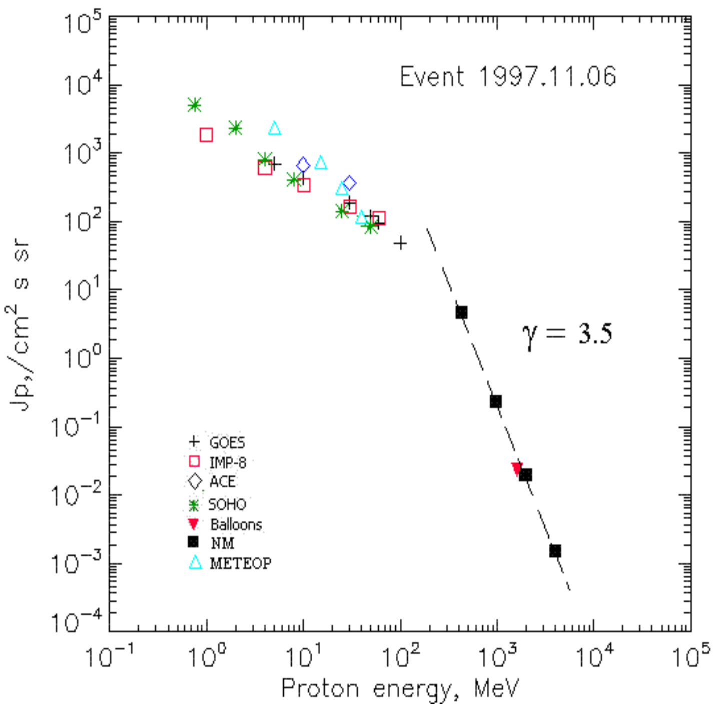
Integral time-of-maximum proton spectrum



Integral fluxes of protons for the event of 1997 November 06

S/c, instruments	Ep, MeV	To	Tmax	Jmax, $/cm^2.s.sr$	Dura-tion	Comments
GOES 9						
EPS	>5	13^h	$7d07^h$	704	7d	
EPS	>10	13^h	$7d02^h$	432	7d	
EPS	>30	13^h	21^h	187	7d	
EPS	>50	13^h	18^h	119	4d	
EPS	>60	13^h	18^h	95	4d	
EPS	>100	13^h	16^h	49	3d	
METEOR-2						
CBM	>5	$<13^h$	$7d00^h$	2360	7d	
CBM	>15	$<13^h$	$7d00^h$	740	7d	
CBM	>25	$<13^h$	$7d00^h$	315	6d	
CBM	>40	$<13^h$	$7d00^h$	119	4d	
BP	>90	11^h	-	-	-	
ChD	>600	11^h	-	-	-	
IMP-8						
CPME	>1	12^h	$7d07^h$	1840	6d	
CPME	>4	12^h	$7d06^h$	620	6d	
CPME	>10	11^h	23^h	348	6d	
CPME	>30	11^h	18^h	165	6d	
CPME	>60	11^h	18^h	110	6d	
ACE						
SIS	>10	12^h	21^h	670	6d	
SIS	>30	12^h	18^h	370	6d	
SOHO						
EPHIN (INT)	>50	13^h	18^h	84	6d	

BALLOONS						
Mo	>1630		16^h	0.023		
NM						
Network	>433		14^h	4.6		
Network	>1000		14^h	0.23		
Network	>2000		14^h	0.019		
Network	>3700		14^h	0.002		

Differential fluxes of protons for the event of 1997 November 06

S/c, instruments	ΔE, MeV	To	Tmax	Jmax. /cm^2.s.sr.MeV	Dura-tion	Comments
IMP-8						
CPME	1-2		$07d09^h$	700	6d	
CPME	2-4.6		$07d07^h$	250	6d	
CPME	4.6-15		$07d01^h$	30	6d	
CPME	15-25		$07d01^h$	11	6d	
CPME	25-48		$07d00^h$	3	6d	
CPME	48-96		$07d00^h$	0.8	6d	
CPME	96-145		$07d01^h$	0.5	6d	
CPME	145-440		$07d01^h$	0.12	6d	
SOHO						
LION	0.75-2	19^h	$07d06^h$	1560	6d	
LION	2-6	19^h	$07d06^h$	392	6d	
EPHIN	4-8	19^h	$07d06^h$	97	6d	
EPHIN	8-25	19^h	$07d02^h$	16	6d	
EPHIN	25-41	19^h	$07d02^h$	2.8	6d	
EPHIN	41-53	- “ -	- “ -	- “ -	- “ -	

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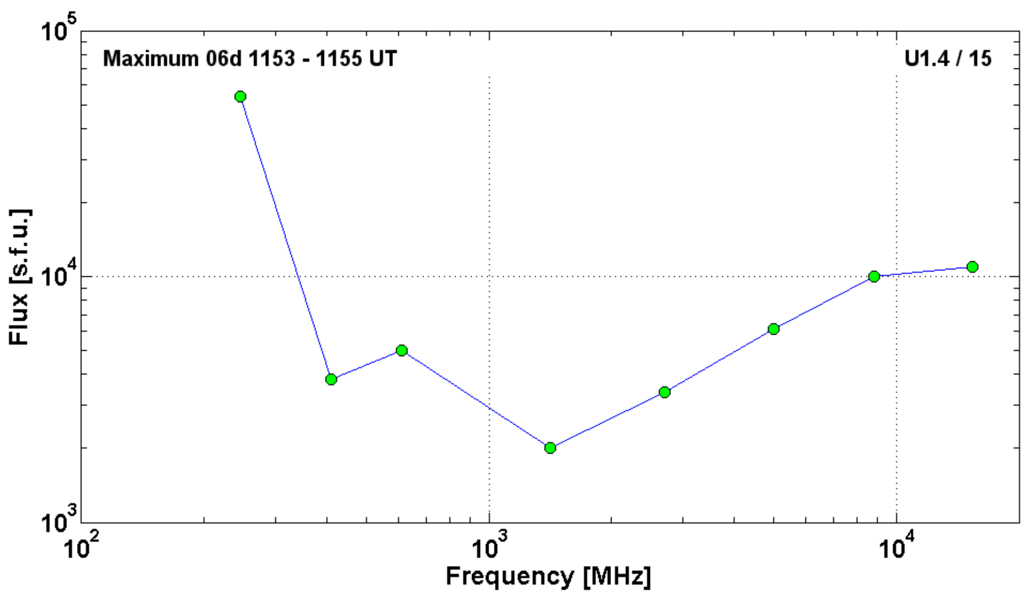
Electromagnetic and other phenomena that are sources and/or accompanying for the event of 1997 November 06

1997 November 06 ● AR 8100 To event 336

Hα	6563 Å	<1122	1156	1244	S18 W63	2B	FH
1 – 12	keV	1149	1155	1201		X9.4	3.6E-1
53 – 93	keV	1151:12	~1154	1213		1E+9	HXT2 Y
15.4	GHz	1151	1153	1209	U1.4 / 15	4.04	
8.8	GHz	1151	1153	1212		4	
5	GHz	1151	1153	1210		3.79	
2.7	GHz	1151	1153	1216		3.53	
1.4	GHz	1152	1153	1219		3.3	
610	MHz	1151	1154	1217		3.7	
410	MHz	1149	1155	1216		3.58	
245	MHz	1149	1153	1220		4.73	
DS II	45-245	1153		1216		2	
DS IV	30-80	1152		1728		3	
DS IV	35-85	1152		1446		3	
DS IV	40-800	1152		~1418	FS	3	
DS III	40-325	1134		1141	G	3	
DS III	40-800	1151		1152	G	3	
DS III	45-270	1151		1159	GG	3	
DS CONT	45-270	1152		>1308		3	
DS DCIM	2000-4295	1151		1220	GG	3	
DS DCIM	1000-2000	1152		1217	GG	3	
DS DCIM	800-1000	1152		1216		3	
CME	WL	1210	1556 km/s	-44.1km/s	360˚	262˚	



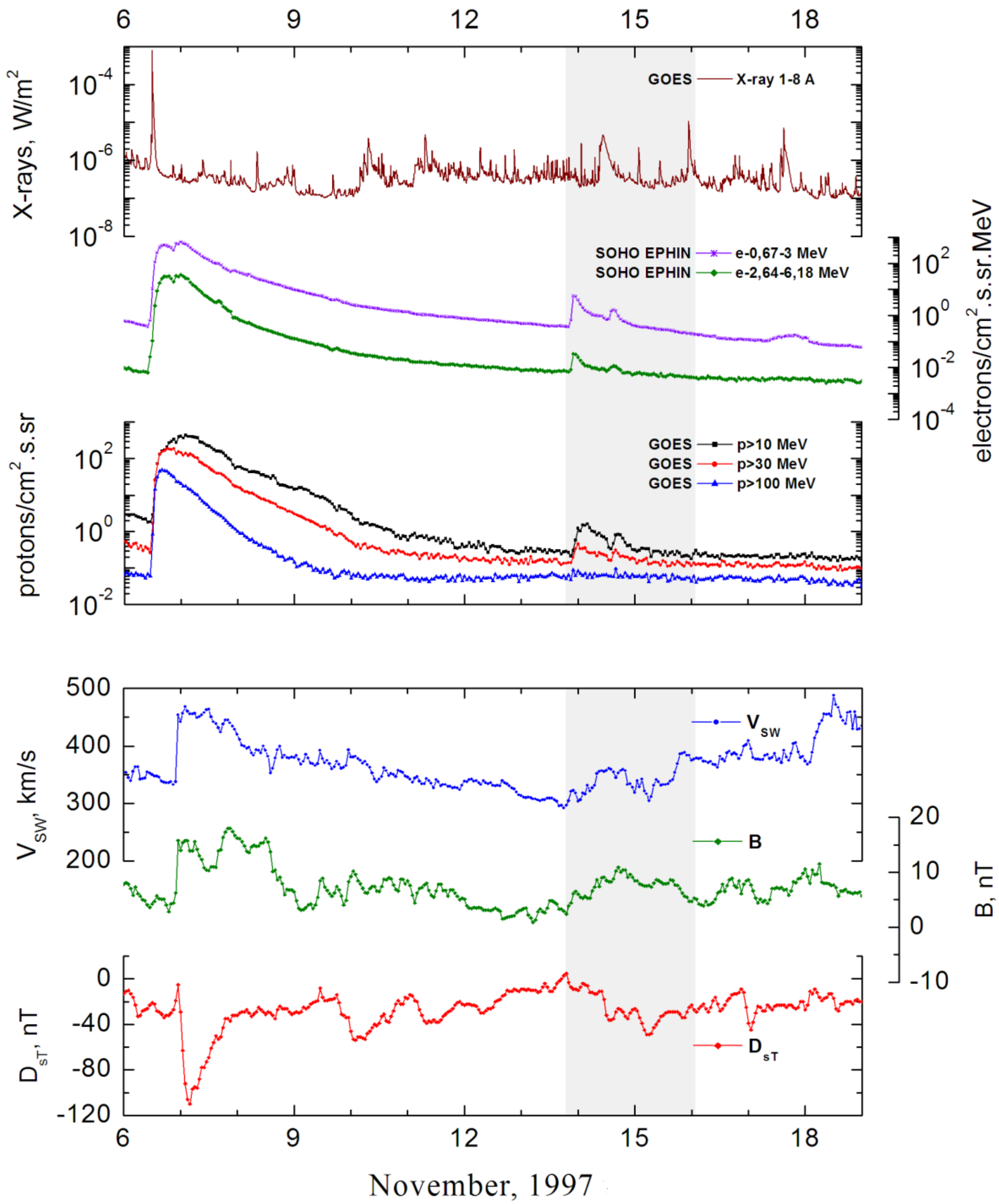
Список 1997 г.

Event 1997.11.13 – (1997-317) **№ 337**

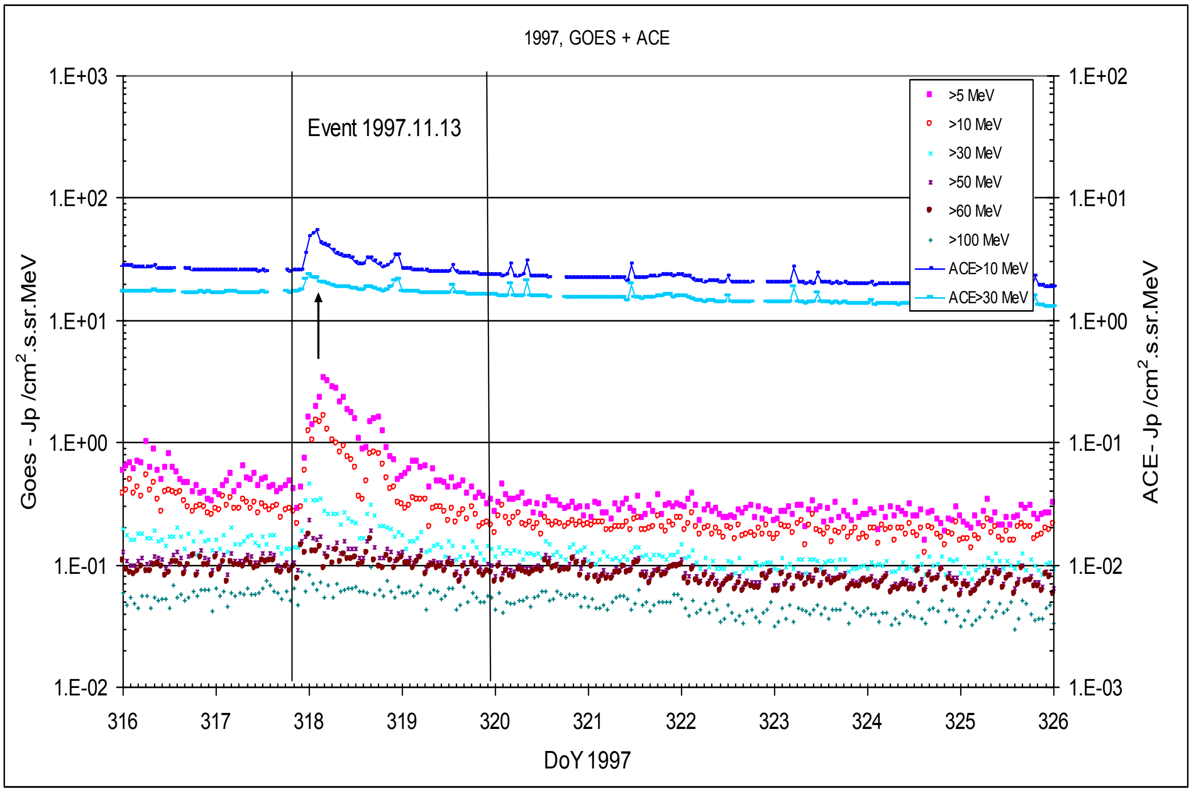
Particle event: To(Ep>10 MeV) – 13d23^{h}
Tmax(Ep>10 MeV) – 14d04^{h}, Jmax (Ep>10 MeV) – 1.3 /cm^{2}.s.sr
Duration of the event – 2 days
Quasimaximal energy of protons in the event – Eqm = 170 MeV

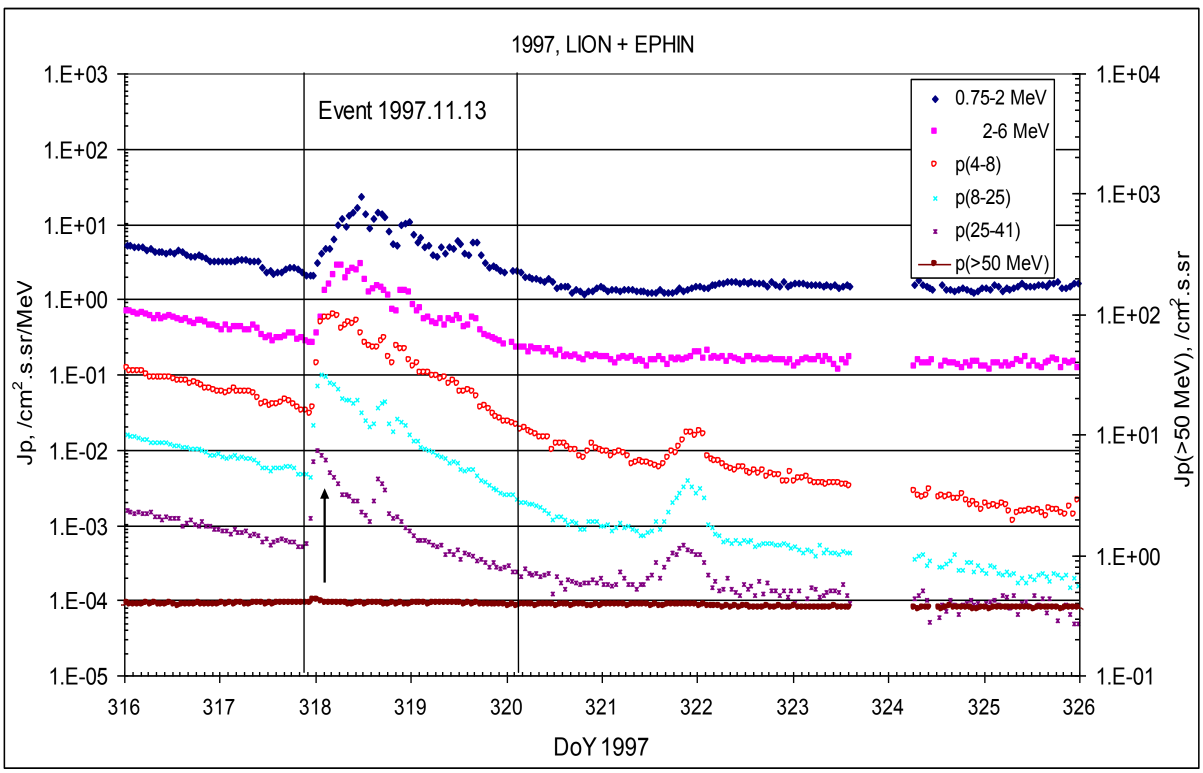
Sources: ⊡ back side solar flare event < 13d22^{h}26^{m}, AR8100, 5d behind W-limb
CME: 13d22^{h}26^{m}, V = 546 km/s, $\Delta\varphi = 288^{o}$; dA = 310^{o}

Particle fluxes and associated phenomena



Time profiles of the proton fluxes for the event of 1997 November 13

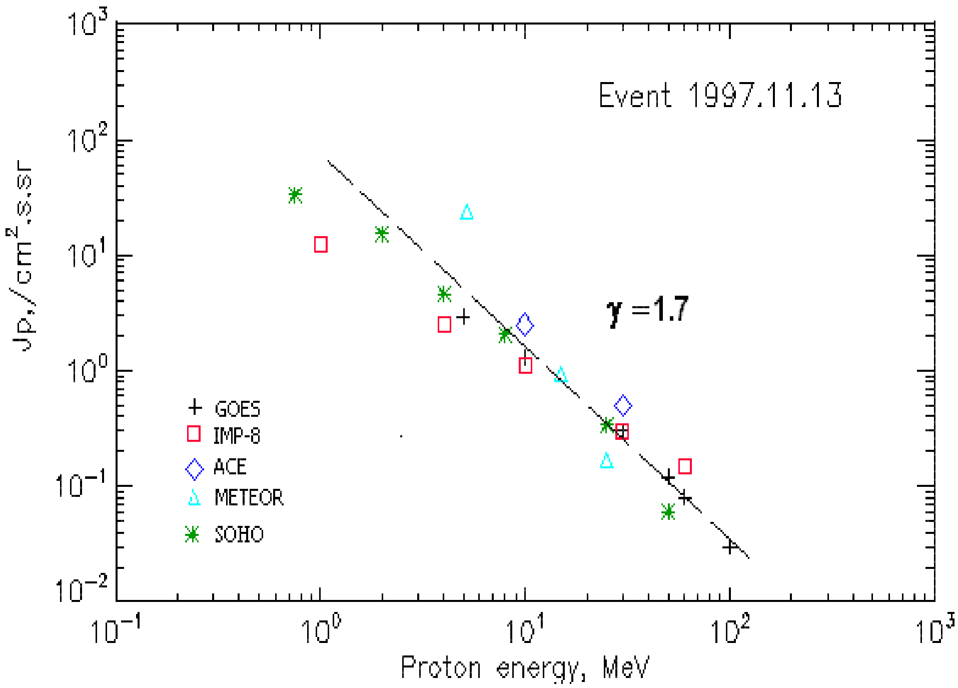




Arrows on the profiles of the events indicate the time of the proton flux maxima, taken to build the proton spectra (see below)

Список 1997 г.

Integral time-of-maximum proton spectrum



Integral fluxes of protons for the event of 1997 November 13

S/c, instruments	Ep, MeV	To	Tmax	Jmax, /cm^2.s.sr	Dura-tion	Comments
GOES-9						
EPS	>5	23^h	14d04^h	2.9	2d	
EPS	>10	23^h	14d04^h	1.3	2d	
EPS	>30	23^h	14d00^h	0.3	2d	
EPS	>50	23^h	14d00^h	0.12	2d	
EPS	>60	-	14d00^h	0.08	2d	
EPS	>100	-	22^h	0.03	2d	
METEOR-2						
CBM	>5	21^h	22^h	23,7	2d	
CBM	>15	22^h	14d00^h	0.95	1d	
CBM	>25	22^h	14d00^h	0.17	1d	
CBM	>40	-	-	-	-	
BP	>90	-	-	-	-	
ChD	>600	-	-	-	-	
IMP-8						
CPME	>1	23^h	14d06^h	12.5	2d	
CPME	>4	23^h	14d03^h	2.5	2d	
CPME	>10	23^h	14d02^h	1.1	2d	
CPME	>30	23^h	14d01^h	0.3	2d	
CPME	>60	22^h	14d00^h	0.15	2d	
ACE						
SIS	>10	21^h	14d02^h	2.5	2d	
SIS	>30	22^h	14d00^h	0.5	2d	
SOHO						
EPHIN (INT)	>50	23^h	14d00^h	0.06	-	

Differential fluxes of protons for the event of 1997 November 13

S/c, instrument	ΔE, MeV	To	Tmax	Jmax. /cm^2.s.sr.MeV	Dura-tion	Comments
IMP-8						
CPME	1-2	23^h	$14d11^h$	8	~3d	
CPME	2-4.6	23^h	$14d06^h$	2.2	~3d	
CPME	4.6-15	21^h	$14d02^h$	1.8	~3d	
CPME	15-25	22^h	$14d01^h$	0.05	~3d	
CPME	25-48	18^h	$14d01^h$	0.01	~3d	
CPME	48-96	22^h	23^h	0.004	~3d	
CPME	96-145	20^h	$14d01^h$	0.003	~3d	
CPME	145-440	21^h	23^h	0.002	~3d	
SOHO						
LION	0.75-2	$14d01^h$	$14d06^h$	11	~3d	1.1
LION	2-6	23^h	$14d05^h$	2.5	~3d	0.2
EPHIN	4-8	23^h	$14d06^h$	0.6	~3.5d	<<
EPHIN	8-25	23^h	$14d01^h$	0.1	~3.5d	<<
EPHIN	25-41	23^h	$14d00^h$	0.01	~3.5d	<<
EPHIN	41-53	- “-	- “ -	- “ -	- “ -	- “ -

References

Lario D., R.G. Marsden, T.R. Sanderson et al., 1998.
Krucker S. and R.P. Lin, 2000.

Electromagnetic and other phenomena that are sources and/or accompanying for the event of 1997 November 13

1997 November 13 ⊙ AR 8100 To event 337

Electromagnetic and corpuscular radiation it was not observed							
CME	WL	2226	546km/s	-7.4km/s	288˚	310˚	

События 1998 г.

			Стр.
1.	Event 1998.04.20 – (1998-110)	№ 338	52
2.	Event 1998.04.30 – (1998-120)	№ 339	56
3.	Event 1998.05.02 – (1998-122)	№ 340	61
4.	Event 1998.05.06 – (1998-126) – GLE	№ 341	66
5.	Event 1998.05.09 – (1998-129)	№ 342	71
6.	Event 1998.06.16 – (1998-167)	№ 343	76
7.	Event 1998.08.22 – (1998-234)	№ 344	80
8.	Event 1998.08.24 – (1998-236)	№ 345	84
9.	Event 1998.09.23 – (1998-266)	№ 346	88
10.	Event 1998.09.30 – (1998-273)	№ 347	92
11.	Event 1998.10.18 – (1998-291)	№ 348	96
12.	Event 1998.11.06 – (1998-310)	№ 349	100
13.	Event 1998.11.07 – (1998-311)	№ 350	105
14.	Event 1998.11.14 – (1998-318)	№ 351	109
15.	Event 1998.11.22 – (1998-326)	№ 352	113
16.	Event 1998.11.24 – (1998-328)	№ 353	118

Event 1998.04.20 – (1998-110) **№ 338**

Particle event: To(Ep>10 MeV) – 20d11^h

Tmax$_1$(Ep>10 MeV) – 21d06^h, Jmax$_1$(Ep>10 MeV) – 860 /cm^2.s.sr

Tmax$_2$(Ep>10 MeV) – 21d12^h, Jmax$_2$(Ep>10 MeV) – 1600 /cm^2.s.sr

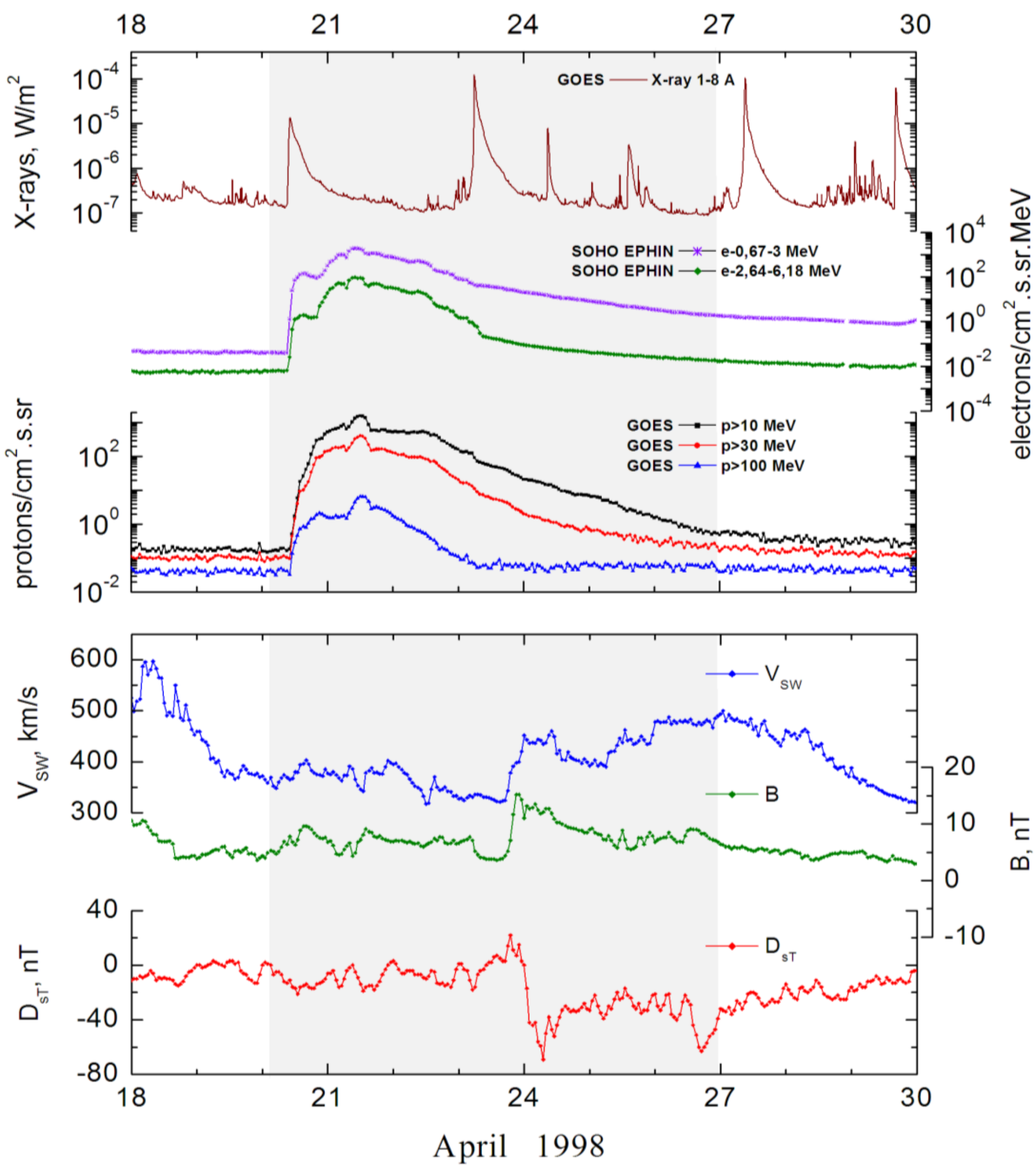
Duration of the event – 7 days

Quasimaximal energy of protons in the event – Eqm$_1$ = 440 MeV

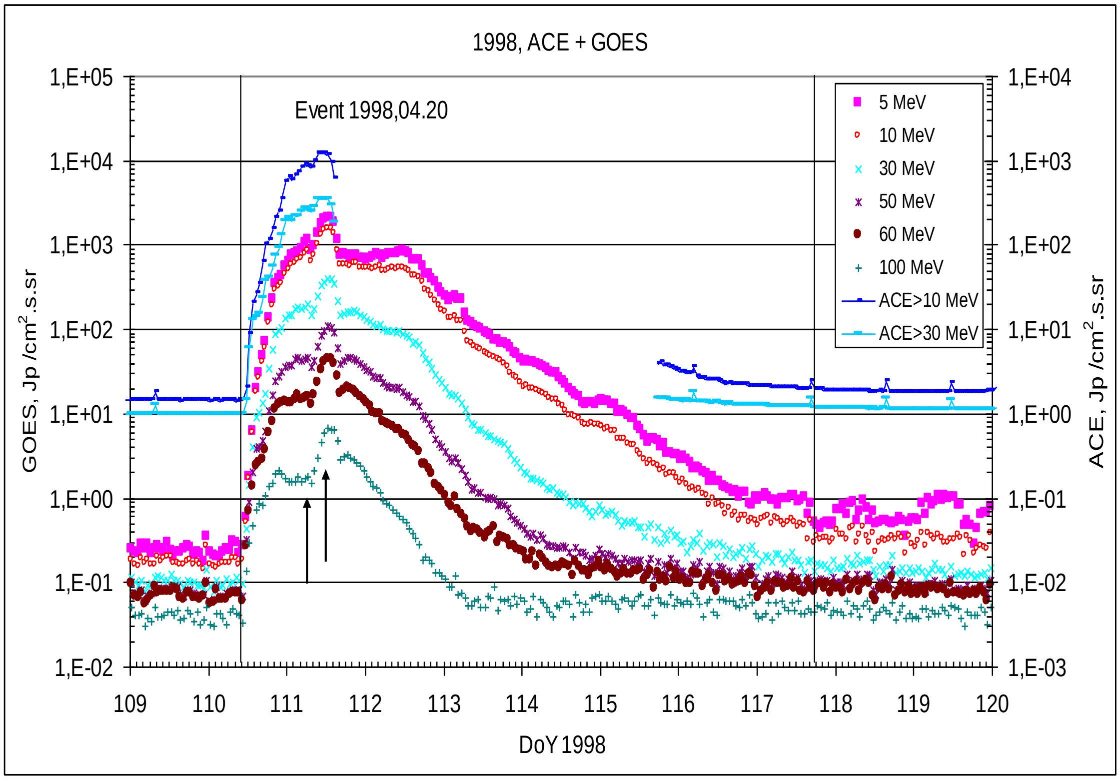
– Eqm$_2$ = 600 MeV

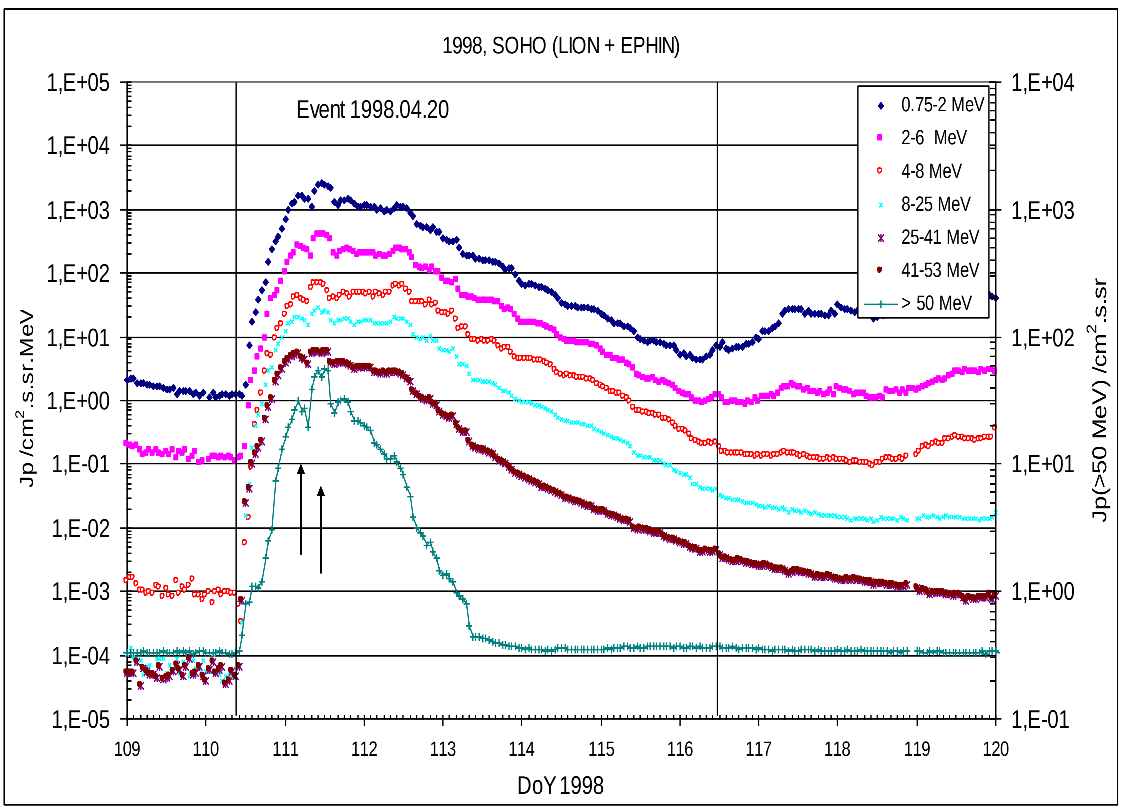
Sources: ■ solar flare 20d09^{h}38^m, M1.4/EPL, s20w90, AR8194 ~2 days behind the W-limb.
Main burst X-ray 1-8 Å: onset – 20d09^{h}38^m, max – 20d10^{h}21^m, Φ = 0.061 J/m^2
CME: 20d10^{h}07^m, V = 1863 km/s, Δφ = 165^o; dA = 284^o;
ΔSC 23d18^{h}25^m

Particle fluxes and associated phenomena



Time profiles of the proton fluxes for the event of 1998 April 20

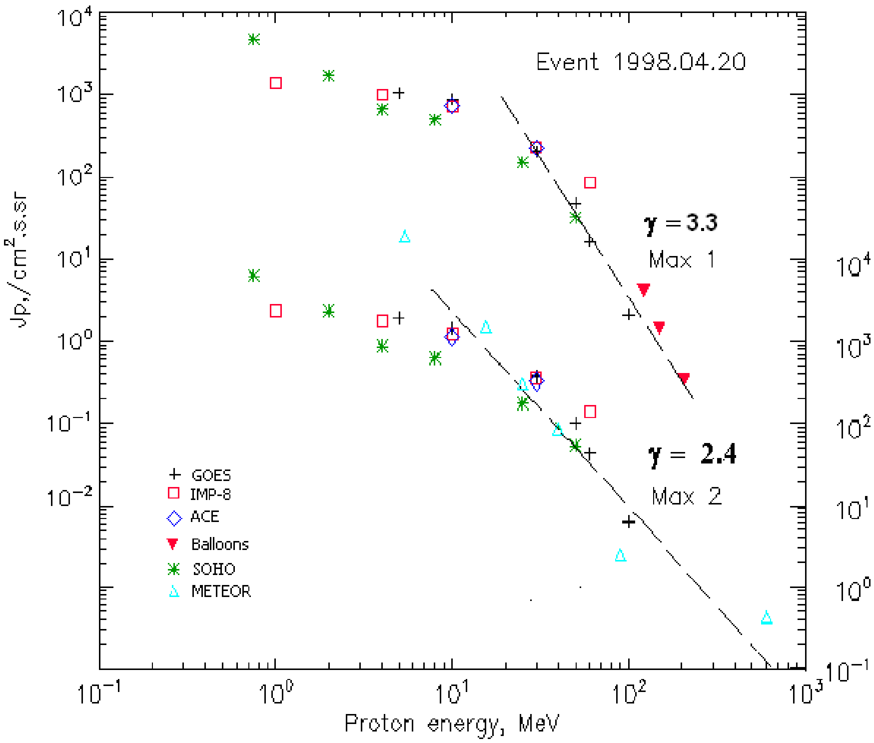




Arrows on the profiles of the events indicate the time of the proton flux maxima, taken to build the proton spectra (see below)

Список 1998 г.

Integral time-of-maximum proton spectrum



Integral fluxes of protons for the event of 1998 April 20

S/c, instruments	Ep, MeV	To	Tmax	Jmax /cm^2.s.sr	Dura-tion	Comments
GOES-9						
EPS	>5	11^h	$21d06^h/21d12^h$	1040/2120	7d	
EPS	>10	11^h	$21d06^h/21d12^h$	860/1600	7d	
EPS	>30	11^h	$21d06^h/21d12^h$	202/405	5d	
EPS	>50	11^h	$21d06^h/21d12^h$	47/108	4d	
EPS	>60	11^h	$21d03^h/21d12^h$	16.3/45	4d	
EPS	>100	11^h	$21d00^h/21d12^h$	2.1/6.6	3d	
METEOR-2						
CBM	>5	11^h	- /$21d14^h$	- /19040	7.5d	
CBM	>15	11^h	- /$21d14^h$	- /1640	5.5d	
CBM	>25	11^h	- /$21d14^h$	- /207	4.2d	
CBM	>40	11^h	- /$21d14^h$	- /90	3.4d	
BP	>90	11^h	- /$21d12^h$	- /2.5	2.2d	
ChD	>600	-	- /$21d12^h$	- /0.43	>6 h	
IMP-8						
CPME	>1	10^h	$21d06^h/21d13^h$	1360/2620	6d	
CPME	>4	10^h	$21d06^h/21d13^h$	1000/1910	6d	
CPME	>10	10^h	$21d06^h/21d13^h$	726/1300	6d	
CPME	>30	10^h	$21d06^h/21d13^h$	227/375	5d	
CPME	>60	10^h	$21d06^h/21d13^h$	86/150	4d	
ACE						
SIS	>10	10^h	$21d03^h/21d10^h$	725/1223	6d	
SIS	>30	10^h	$21d03^h/21d11^h$	220/351	5d	

Список 1998 г.

SOHO						
EPHIN (INT)	>50	11^h	$21d04^h/21d12^h$	32/56	3.5d	
BALLOONS						
Mi	>122		$21d(06^h-06^h)$	4.1		
Mi	>149		$21d(06^h-06^h)$	1.41		
Mi	>206		$21d(06^h-06^h)$	0.34		

Differential fluxes of protons for the event of 1998 April 20

S/c, instruments	ΔE, MeV	To	Tmax	Jmax. /cm^2.s.sr.MeV	Dura -tion	Comments
IMP-8						
CPME	1-2	11^h	$21^h/21d13^h$	144/269	6d	
CPME	2-4.6	11^h	$21d06^h/21d13^h$	89/203	6d	
CPME	4.6-15	11^h	$21d06^h/21d13^h$	33/72	7d	
CPME	15-25	11^h	$21d06^h/21d13^h$	33/60.6	7d	
CPME	25-48	11^h	$21d06^h/21d13^h$	7.5/11.5	7d	
CPME	48-96	11^h	$21d06^h/21d13^h$	1.1/1.9	7d	
CPME	96-145	11^h	$21d06^h/21d13^h$	0.9/1.71	7d	
CPME	145-440	11^h	$21d06^h/21d11^h$	0.09/0.125	7d	
SOHO						
LION	0.75-2		$21d05^h/21d11^h$	1670/2540	6d	
LION	2-6		$21d04^h/21d11^h$	261/406	6d	
EPHIN	4-8	11^h	$21d04^h/21d11^h$	43/66	7d	
EPHIN	8-25	11^h	$21d04^h/21d11^h$	21/29	7d	
EPHIN	25-41	11^h	$21d04^h/21d12^h$	5.5/6	7d	
EPHIN	41-53	- “ -	- “ -	- “ -	- “ -	

References

Timofeev V.E. and S.A. Starodubtsev, 1999.
Dietrich W. and C. Lopate, 1999.

Electromagnetic and other phenomena that are sources and/or accompanying for the event of 1998 April 20

1998 April 20 ■ AR8194 To event 338

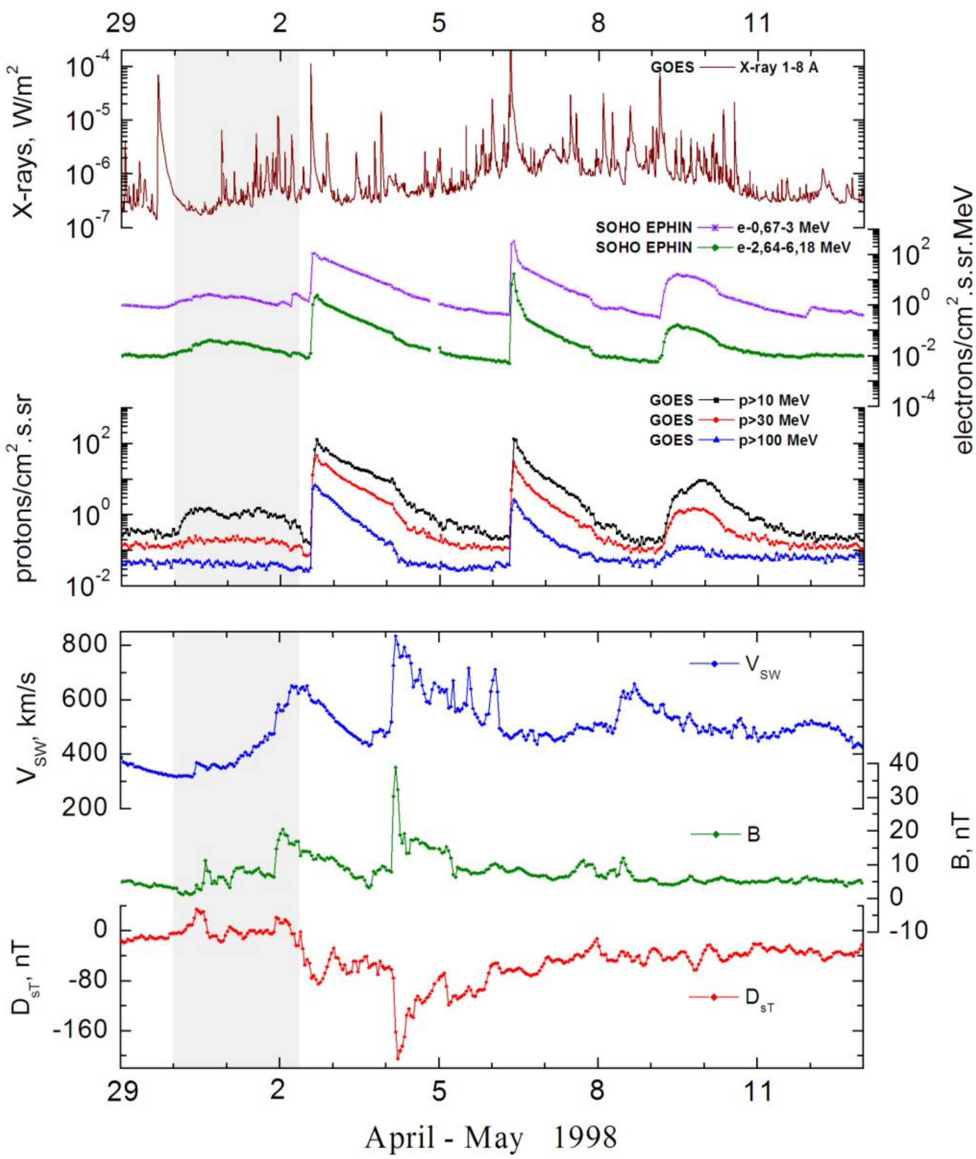
Hα	6563 Å	No	Flare	Patrol			
EPL	6563 Å	<0931		>1000	S43 W90	3	
1 – 12	keV	0938	1021	1118		M1.4	6.1E-2
23 – 33	keV	095035	095035	095037		71	HXT Y
DS II	40-60	0956		~0959	UE		
DS III	140-170	0937		0937	G		
DS III	110-140	0950		0955	G		
DS III	40-65	1007		1012	G		
DS CONT	45-55	0957		0958			
DS CONT	55-90	1003		~1012			
DS UNCLF	110-140	0955		1001			
CME	WL	1007	1863 km/s	43.5 km/s	165˚	284˚	

Event 1998.04.30 – (1998-120) **№ 339**

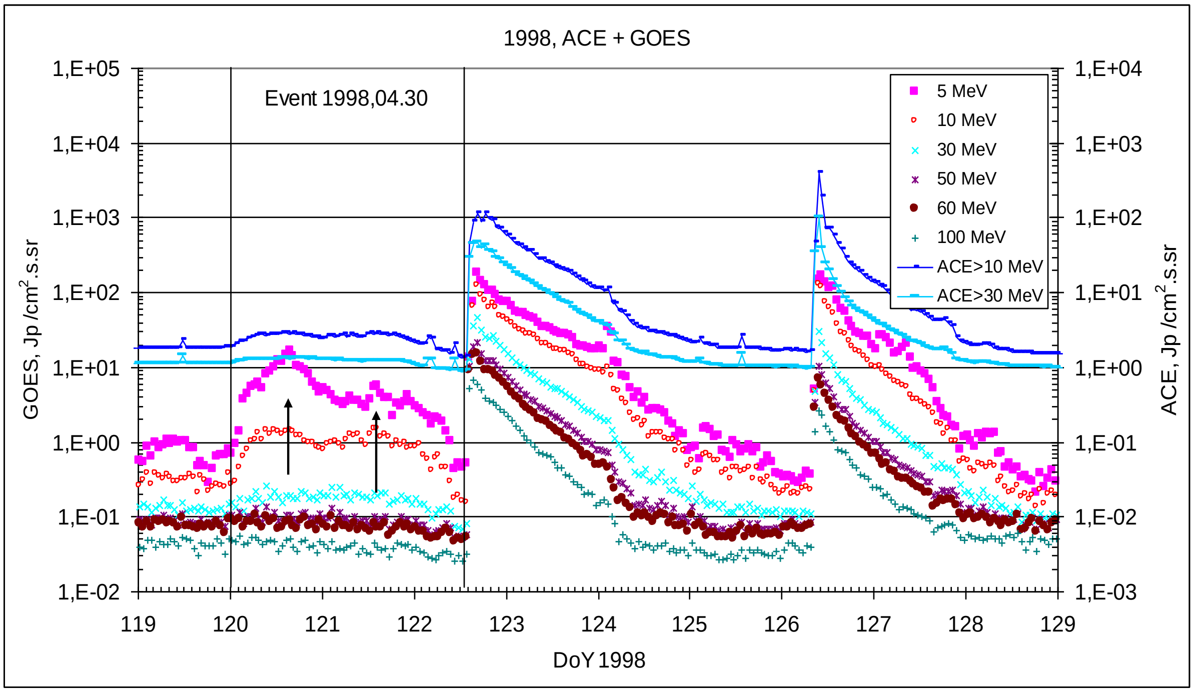
Particle event: To(Ep>10 MeV) – 30d02^h
Tmax$_1$(Ep>10 MeV) – 30d15^h, Jmax (Ep>10 MeV) – 1.3 /cm^2.s.sr
Tmax$_2$(Ep>10 MeV) – 01d15^h, Jmax (Ep>10 MeV) – 1.2 /cm^2.s.sr *)
Duration of the event – 2 days
Quasimaximal energy of protons in the event – Eqm$_1$ = 65 MeV
– Eqm$_2$ = 75 MeV
*) Data from IMP-8 (CPME)

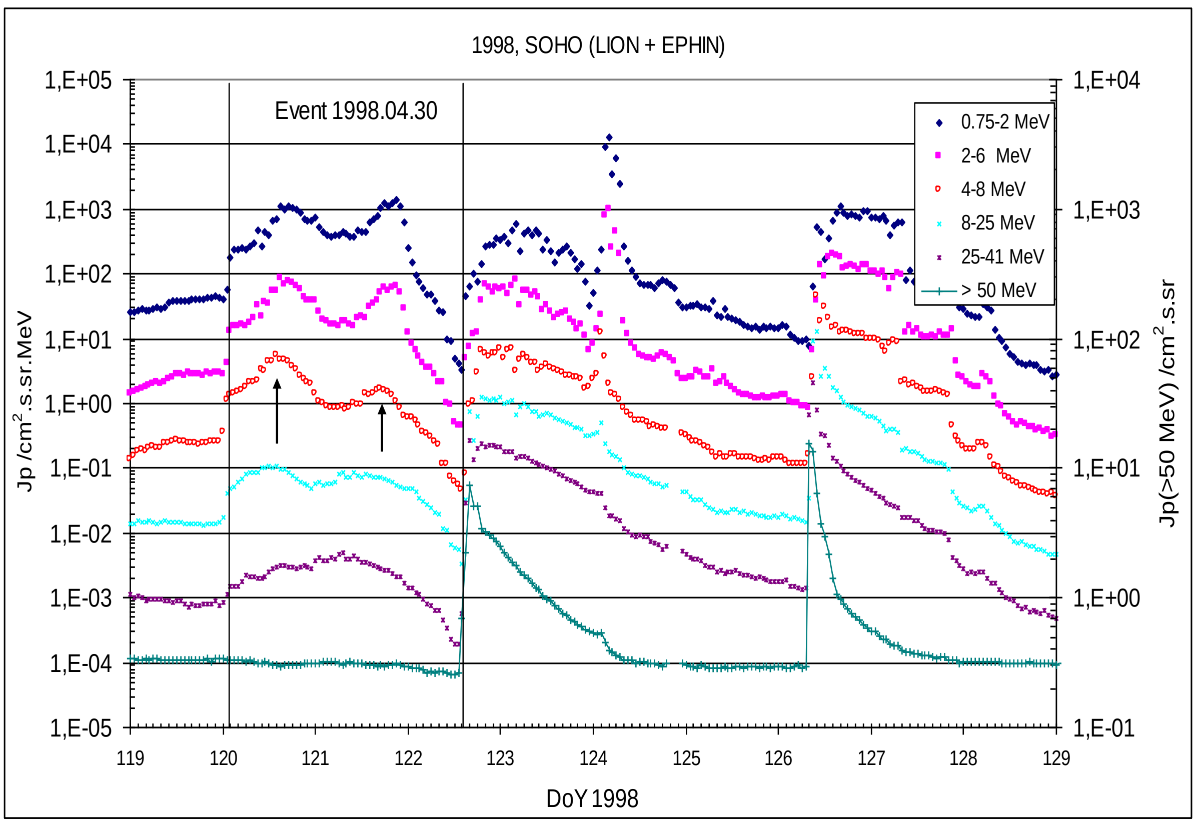
Sources: ● solar flare 29d16^{h}00^m, M6.8/3B, S16E22, AR8210
Main burst X-ray 1-8 Å: onset – 29d16^{h}00^m, max – 29d16^{h}37^m, Φ = 0.1 J/m^2
CME: 30d16^{h}58^m, V = 1374 km/s, Δφ = 360^o, dA = 336^o
ΔSC 01d21^{h}56^m

Particle fluxes and associated phenomena



Time profiles of the proton fluxes for the event of 1998 April 30

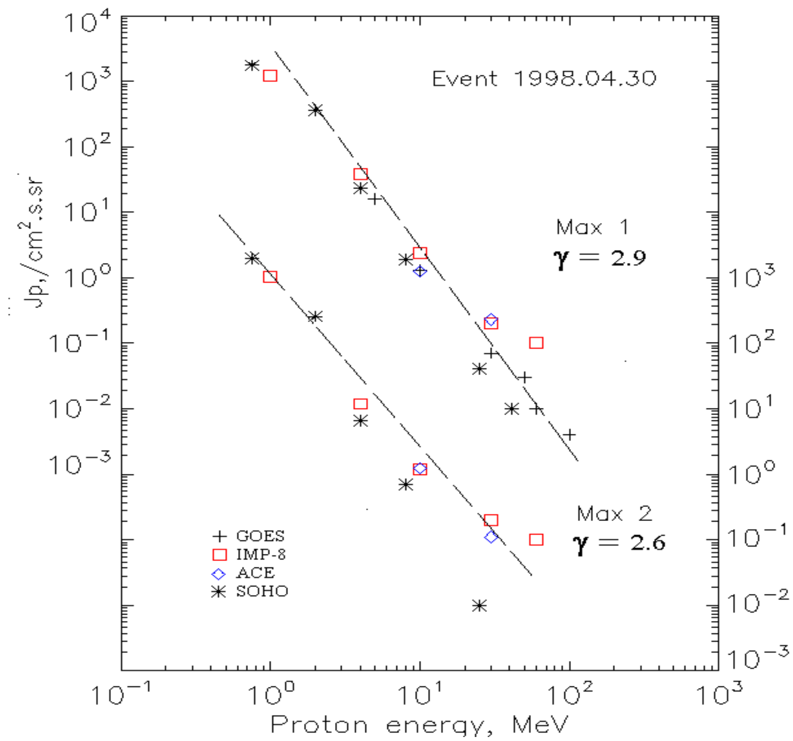




Arrows on the profiles of the events indicate the time of the proton flux maxima, taken to build the proton spectra (see below)

Список 1998 г.

Integral time-of-maximum proton spectrum



Integral fluxes of protons for the event of 1998 April 30

S/c, instruments	Ep, MeV	To	Tmax	Jmax, /cm2.s.sr	Dura-tion	Comments
GOES-9						
EPS	>5	01^h	15^h/ -	16/ -	>2d	
EPS	>10	01^h	15^h/ -	1.3/ -	>2d	
EPS	>30	-	15^h/ -	0.07/ -	-	
EPS	>50	-	15^h/ -	0.03/ -	-	
EPS	>60	-	15^h/ -	0.01/ -	-	
EPS	>100	-	15^h/ -	0.004/ -	-	
IMP-8						
CPME	>1	01^h	15^h/01d21^h	1210/1050	2.5d	
CPME	>4	01^h	15^h/01d19^h	38/11.9	2.5d	
CPME	>10	01^h	15^h/01d15^h	2.4/1.2	2.5d	
CPME	>30	01^h	17^h/01d09^h	0.2/0.2	2.5d	
CPME	>60	01^h	17^h/01d12^h	0.1/0.1	2.5d	
ACE						
SIS	>10	01^h	16^h/01d12^h	1.24/1.25	2.5d	
SIS	>30	01^h	16^h/01d13^h	0.23/0.11	2.5d	
SOHO						
EPHIN (INT)	>50	-	-	-	-	

Differential fluxes of protons for the event of 1998 April 30

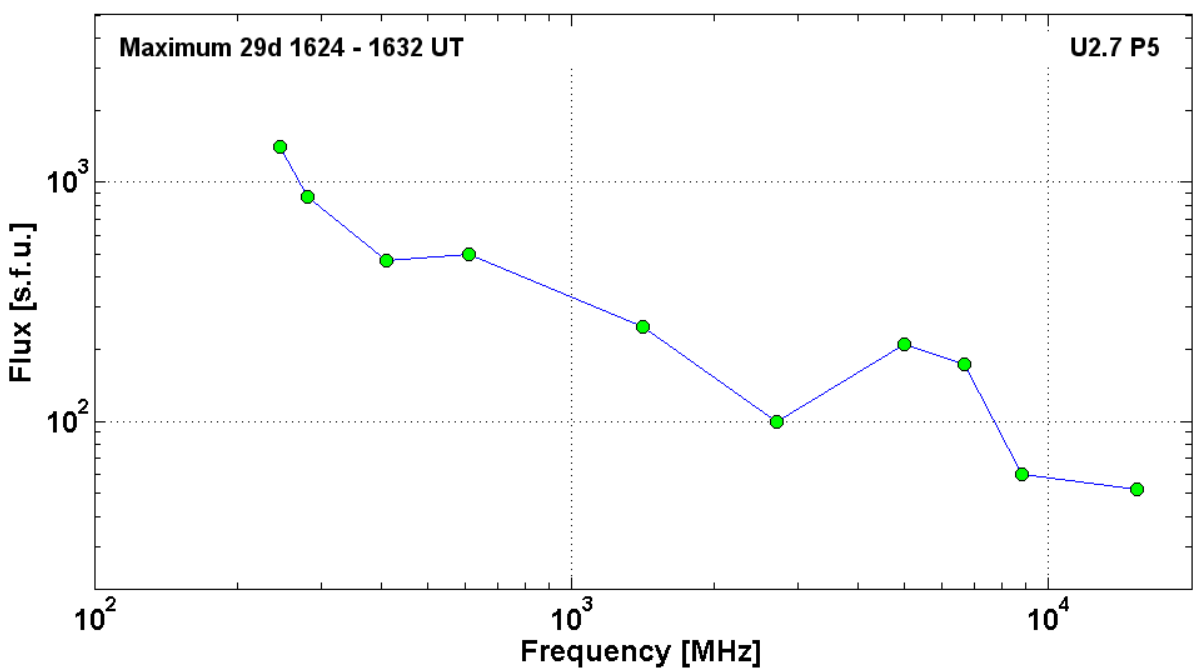
S/c, instruments	ΔE, MeV	To	Tmax	Jmax. /cm^2.s.sr.MeV	Dura-tion	Comments
IMP-8						
CPME	1-2	00^h	15^h/01d21^h	930/1040	2.5d	
CPME	2-4.6	01^h	15^h/01d21^h	112/480	2.5d	
CPME	4.6-15	01^h	15^h/01d19^h	2,4/0,6	2.5d	
CPME	15-25	01^h	17^h/01d08^h	0,03/0,05	2.5d	
CPME	25-48	-	-	-	-	
CPME	48-96	-	-	-	-	
CPME	96-145	-	-	-	-	
CPME	145-440	-	-	-	-	
SOHO						
LION	0.75-2	01^h	15^h/01d21^h	1110/1360	2.5d	
LION	2-6	01^h	15^h/01d21^h	83/63	2.5d	
EPHIN	4-8	01^h	14^h/01d18^h	5.3/1.5	2.5d	
EPHIN	8-25	01^h	14^h/01d15^h	0.11/0.04	2.5d	
EPHIN	25-41	01^h	14^h/01d12^h	0.002/0.0005	2.5d	
EPHIN	41-53	- “ -	- “ -	- “ -	- “ -	

Electromagnetic and other phenomena that are sources and/or accompanying for the event of 1998 April 30

1998 April 29 ● AR8210 To event 339

H_α	6563 Å	1605	1630	2104	S16 E22	3B	FTUZ
1 – 12	keV	1606	1637	1659		M6.8	1.0E-1
50 – 100	keV	<163927	~163931	1702		334	HXT Y

5.4	GHz	1631	1631	1632		1.72	
8.8	GHz	1630	1631	1631		1.78	
6.7	GHz	1612.7	1630	1638.9		2.24	
5	GHz	1629	1630	1636	U2.7 P5	2.32	
2.7	GHz	1629	1630	1636		2	
1.4	GHz	1619	1624	1636		2.4	
610	MHz	1624	1626	1636		2.7	
410	MHz	1624	1632	1636		2.67	
280	MHz	1623.4	1632	1710		2.94	
245	MHz	1627	1630	1636		3.15	
DS II	40-90	1622		1632	SH,H	3	
DS II	40-90	1637		1700	UE,H	3	
DS IV	40-800	1613		1702		3	
DS IV	35-85	1702		1720		3	
DS III	40-400	1607		1614	GG	3	
DS III	40-170	1700		1701	G	3	
DS V	30-80	1613		1619		2	
DS DCIM	450-750	1610		1610		2	
DS DCIM	800-2000	1613		1653	GG,FS	3	
DS DCIM	2000-4395	1613		1630	GG	2	
CME	WL	1658	1374 km/s	-44.8rm/s^2	360˚	336˚	



Event 1998.05.02 – (1998-122) **№ 340**

Particle event: To(Ep>10 MeV) – 02d14^h

Tmax(Ep>10 MeV) – 02d16^h, Jmax (Ep>10 MeV) – 130 /cm^2.s.sr

Duration of the event – 3 days

Quasimaximal energy of protons in the event – Eqm = 800 MeV

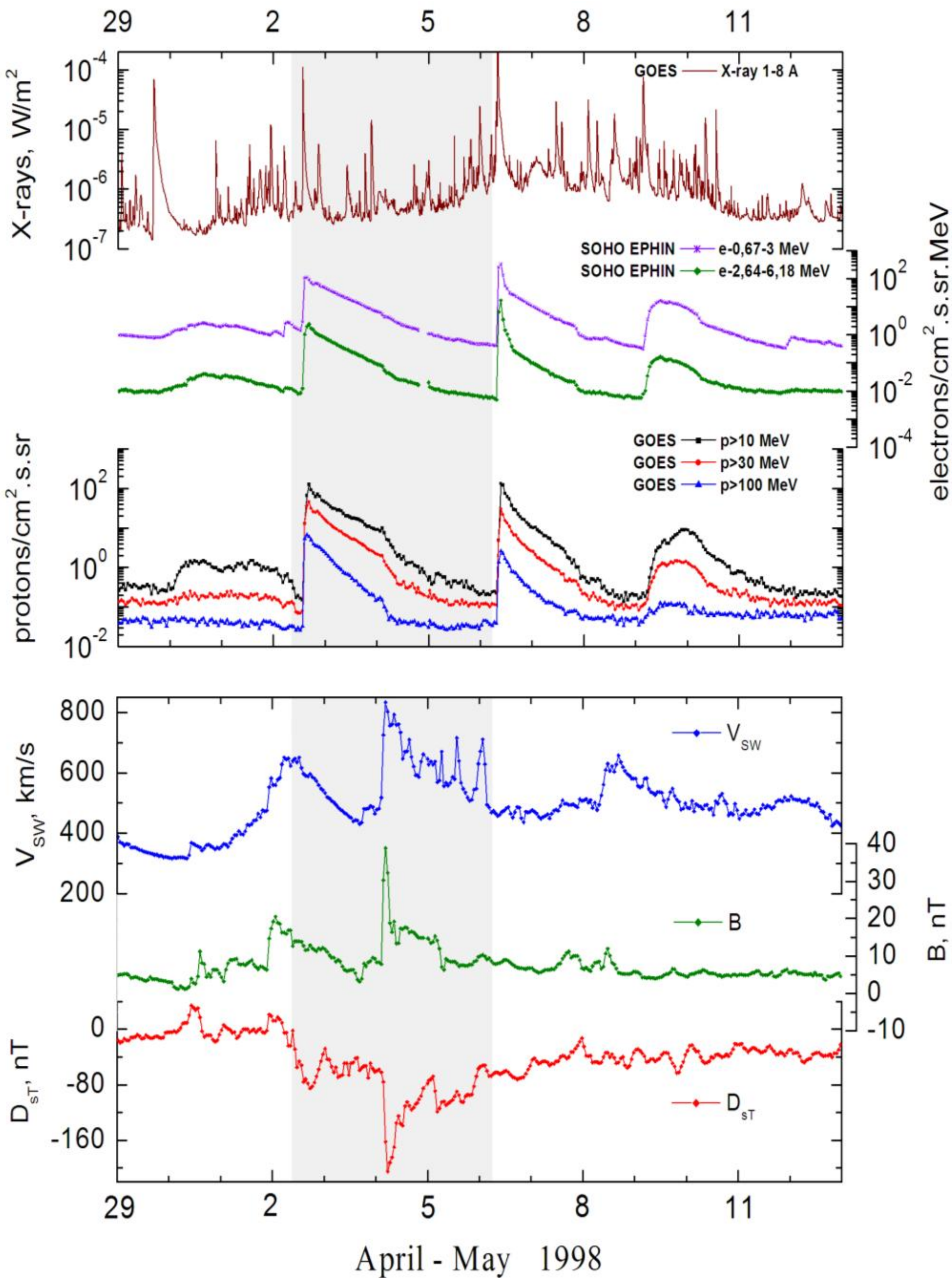
Sources: ● solar flare 02d13^{h}31^m, X1.1/3B, S15W15, AR8210

Main burst X-ray 1-8 Å: onset – 02d13^{h}31^m, max – 02d13^{h}42^m, Φ = 0.067 J/m^2

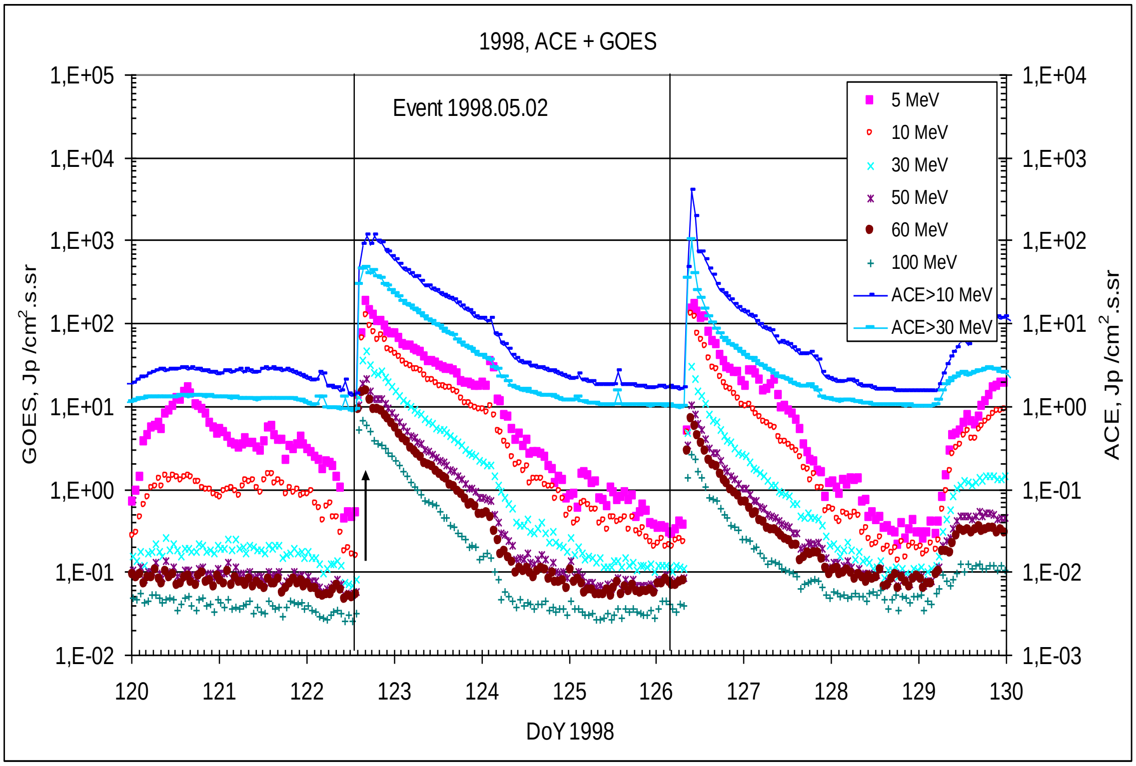
CME: 02d14^{h}06^m, V = 0938 km/s, Δφ = 360^o, dA = 331^o

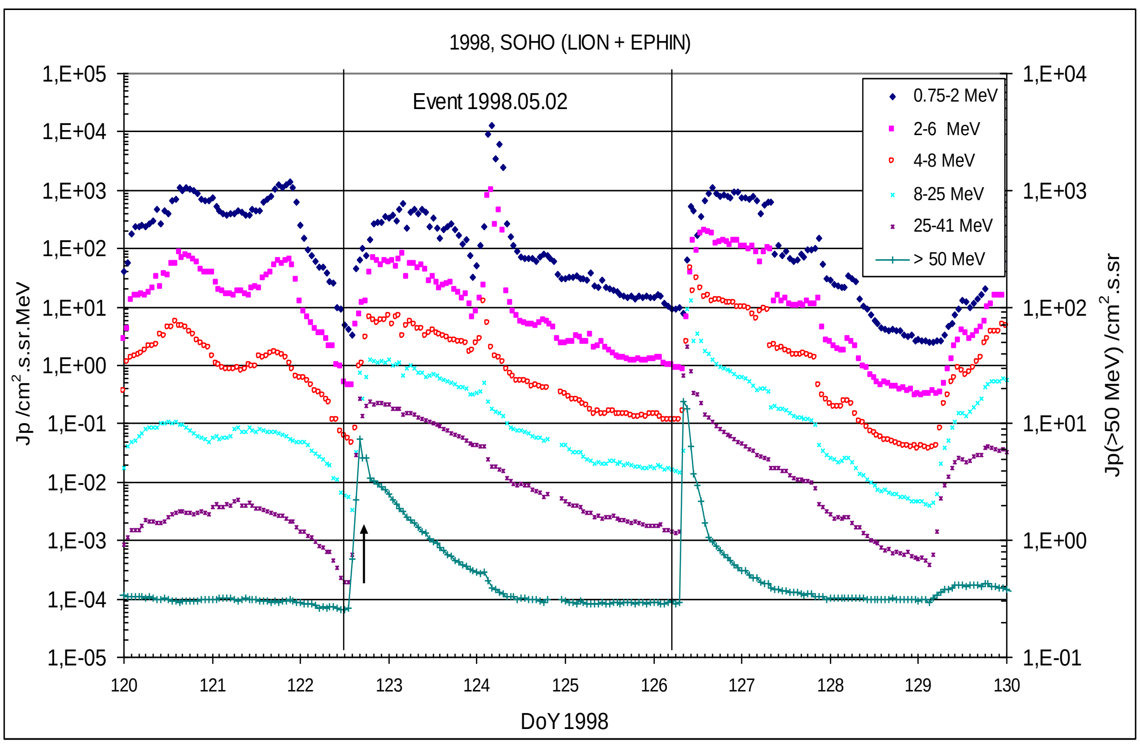
ΔSC 03d17^{h}43^m

Particle fluxes and associated phenomena



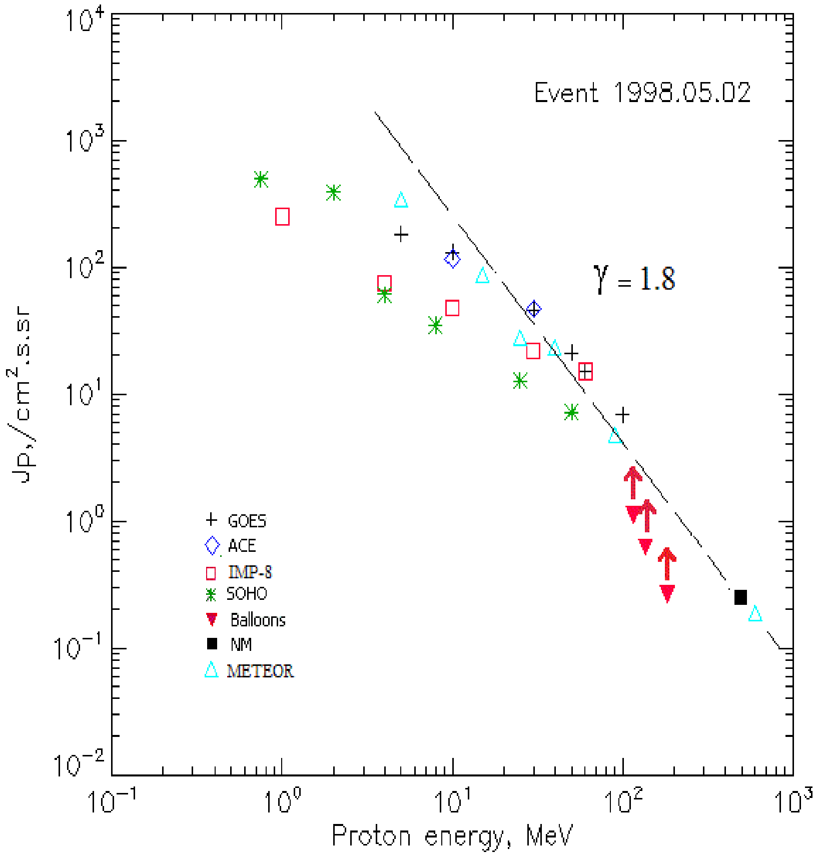
Time profiles of the proton fluxes for the event of 1998 May 02





Arrows on the profiles of the events indicate the time of the proton flux maxima, taken to build the proton spectra (see below)

Integral time-of-maximum proton spectrum



Integral fluxes of protons for the event of 1998 May 02

S/c, instruments	Ep, MeV	To	Tmax	Jmax, /cm^2.s.sr	Dura-tion	Comments
GOES-9						
EPS	>5	14^h	16^h	181	3d	
EPS	>10	14^h	16^h	130	3d	
EPS	>30	14^h	16^h	46	3d	
EPS	>50	14^h	16^h	21	3d	
EPS	>60	14^h	16^h	15	3d	
EPS	>100	14^h	15^h	6.8	2d	
METEOR-2						
CBM	>5	14^h	16^h	343	2.9d	
CBM	>15	14^h	17^h	87	2.4d	
CBM	>25	14^h	17^h	28	2d	
CBM	>40	14^h	15^h	23	1.9d	
BP	>90	14^h	15^h	>4.7	1.7d	
ChD	>600	14^h	$<17^h$	0.19	1.1d	
IMP-8						
CPME	>1	14^h	21^h	250	4d	
CPME	>4	14^h	19^h	75	3d	
CPME	>10	14^h	18^h	47	3d	
CPME	>30	14^h	17^h	22	3d	
CPME	>60	14^h	16^h	15	3d	

ACE						
SIS	>10	14^h	17^h	116	3d	
SIS	>30	14^h	16^h	47	3d	
SOHO						
EPHIN (INT)	>50	14^h	16^h	7.2	2,5d	
BALLOONS						
Mi	>116		3d(07^h-08^h)	1.1		After
Mi	>136		3d(07^h-08^h)	0.61		maximum
Mi	>183		3d(07^h-08^h)	0.26		
NM						
Network	>500		15^h	0.25		

Differential fluxes of protons for the event of 1998 May 02

S/c, instrument	ΔE, MeV	To	Tmax	Jmax. /cm^2.s.sr.MeV	Dura-tion	Comments
IMP-8						
CPME	1-2	14^h	$03d04^h$	131	3d	
CPME	2-4.6	15^h	21^h	29	3d	
CPME	4.6-15	14^h	18^h	2,9	3d	
CPME	15-25	15^h	20^h	1,4	3d	
CPME	25-48	15^h	17^h	0,8	3d	
CPME	48-96	14^h	18^h	0,5	2,8d	
CPME	96-145	14^h	16^h	0,08	2,8d	
CPME	145-440	14^h	15^h	0,03	2,8d	
SOHO						
LION	0.75-2	15^h	21^h	280	3,5d	
LION	2-6	15^h	21^h	67	4d	
EPHIN	4-8	14^h	20^h	6.5	3,5d	
EPHIN	8-25	15^h	19^h	1.3	3,5d	
EPHIN	25-41	14^h	16^h	0.22	3,5d	
EPHIN	41-53	- " -	- " -	- " -	- " -	

References

Timofeev V.E. and S.A. Starodubtsev, 1999.
Danilova O.A., M.I. Tyasto, E.V. Vashenyuk et al., 1999.
Danilova O.A., M.I. Tyasto, E.V. Vashenyuk et al., 2002.
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Dietrich W. and C. Lopate, 1999.
Skoug R.M., S.J. Bame, W.C. Feldman et al., 1999.
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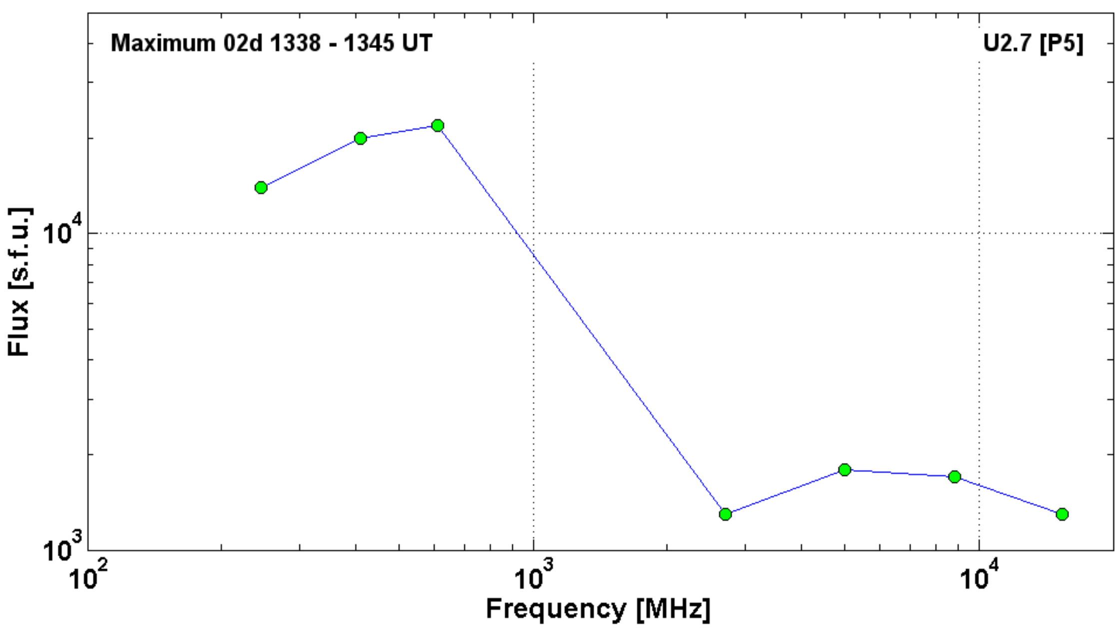
Electromagnetic and other phenomena that are sources and/or accompanying for the event of 1998 May 02

1998 May 02 ● AR8210 To event 340

H_α	6563 Å	1334	1342	1540	S15 W15	3B	FZ
1 – 12	keV	1331	1342	1351		X1.1	6.7E-2
57 – 100	keV	133422	133730	>133742		524	HXT Y
15.4	GHz	1337	1341	1513		3.11	
8.8	GHz	1337	1341	1513		3.23	
5	GHz	1335	1338	1513	U2.7 [P5]	3.26	
2.7	GHz	1337	1338	1513		3.11	
610	MHz	1334	1344	1513		4.34	
410	MHz	1334	1345	1505		4.3	
245	MHz	1333	1338	1511		4.15	
DS IV	35-85	1338		1723		3	
DS DCIM	800-2000	1334		1355	GG,FS,SP	3	
DS DCIM	2000-4395	1336		1348	GG,FS	3	
CME	WL	1406	0938 km/s	-28.8km/s^2	360˚	331˚	

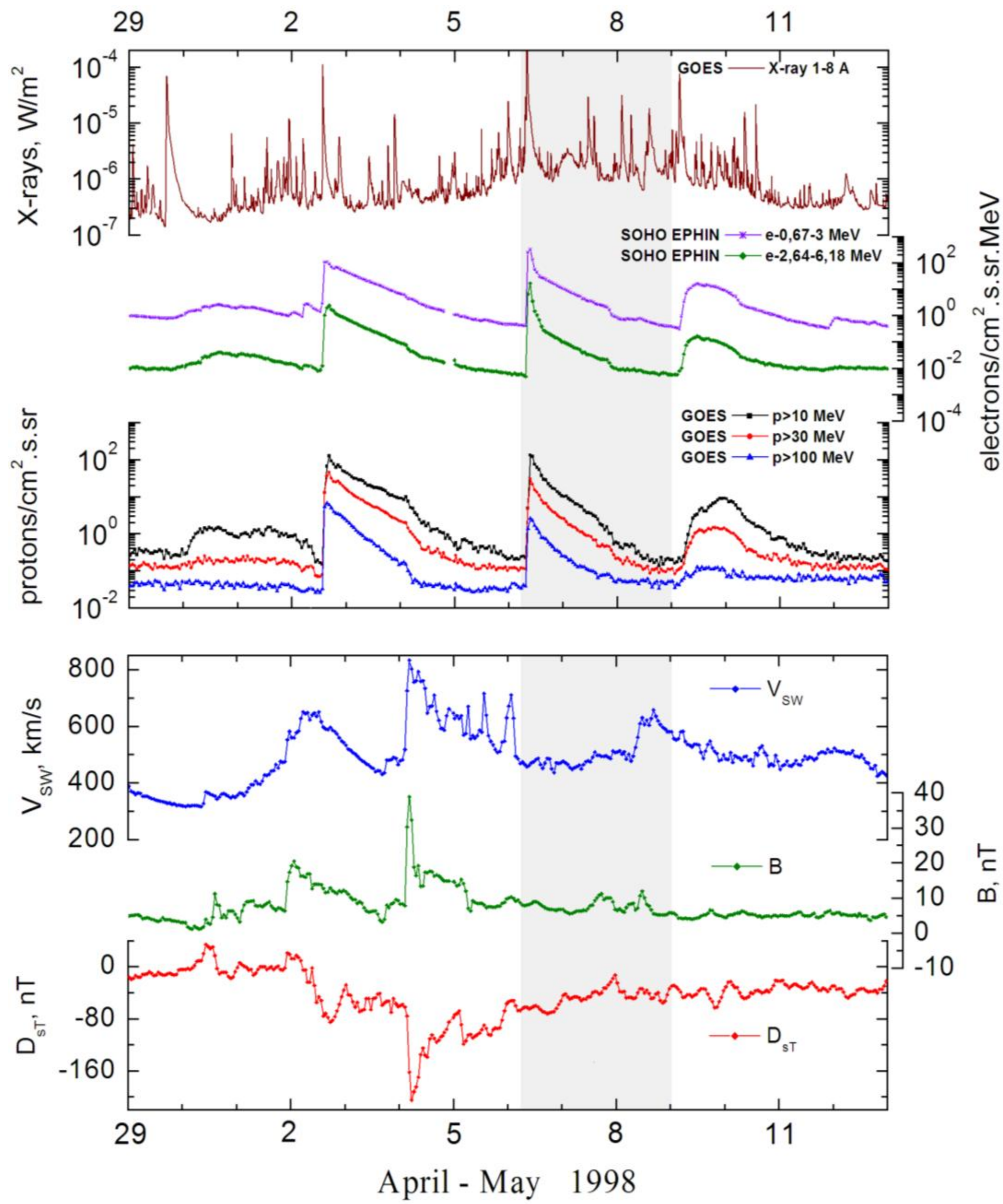


Event 1998.05.06 – (1998-126) – GLE **№ 341**

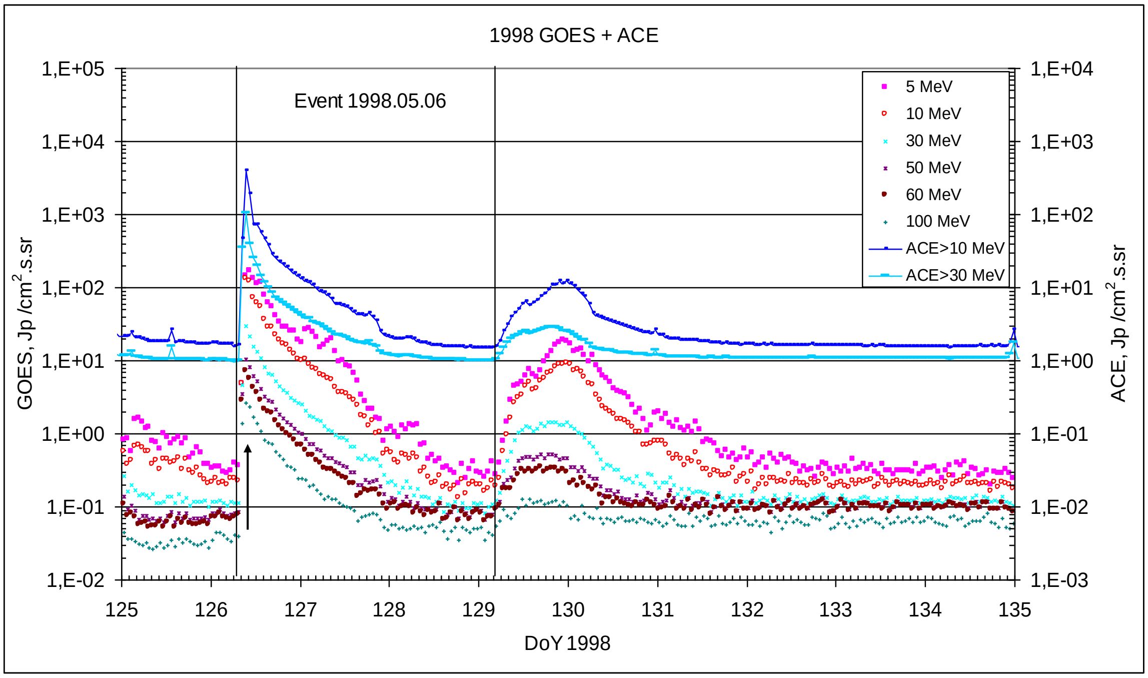
Particle event: To(Ep>10 MeV) – 06d08^h
Tmax(Ep>10 MeV) – 06d09^h, Jmax (Ep>10 MeV) – 120 /cm^2.s.sr
Duration of the event – 2 days
Quasimaximal energy of protons in the event – Eqm = 575 MeV

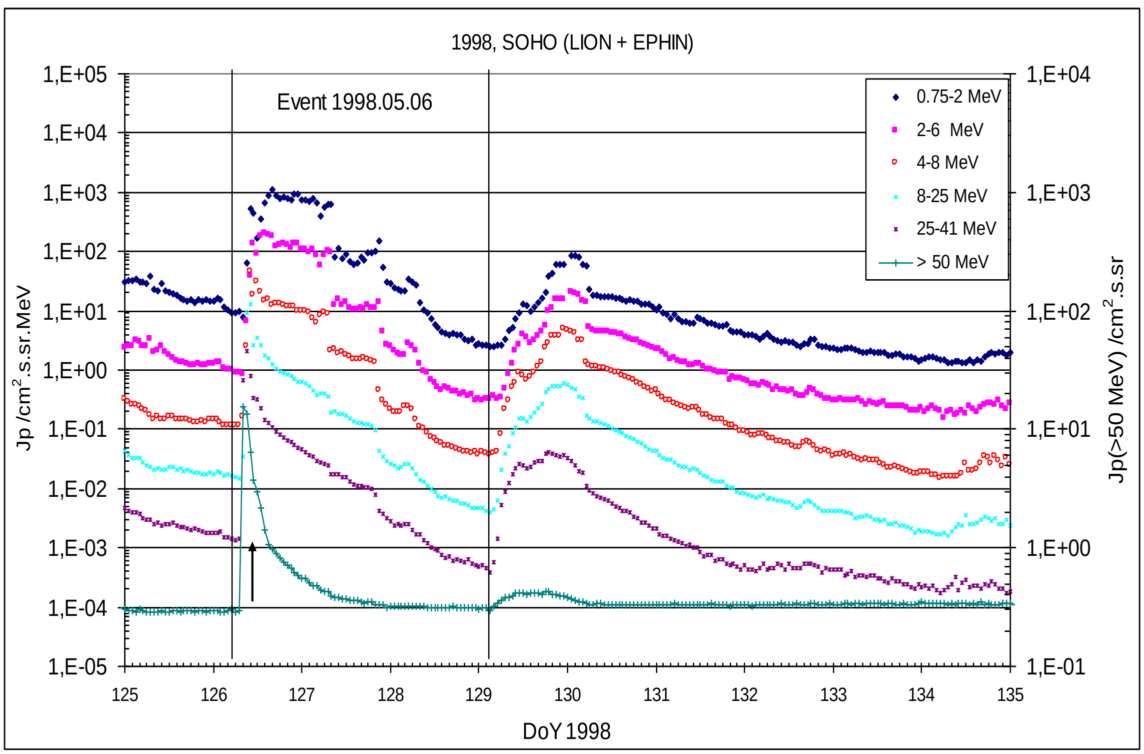
Sources: ● solar flare 06d07^{h}58^m, X2.7/1N, S15W64, AR8210
Main burst X-ray 1-8 Å: onset – 06d07^{h}58^m, max – 06d08^{h}09^m, Φ = 0.21 J/m^2
CME: 06d08^{h}29^m, V = 1099 km/s, Δφ = 190^o, dA=309^o;
ΔSC 08d09^{h}52^m

Particle fluxes and associated phenomena



Time profiles of the proton fluxes for the event of 1998 May 06

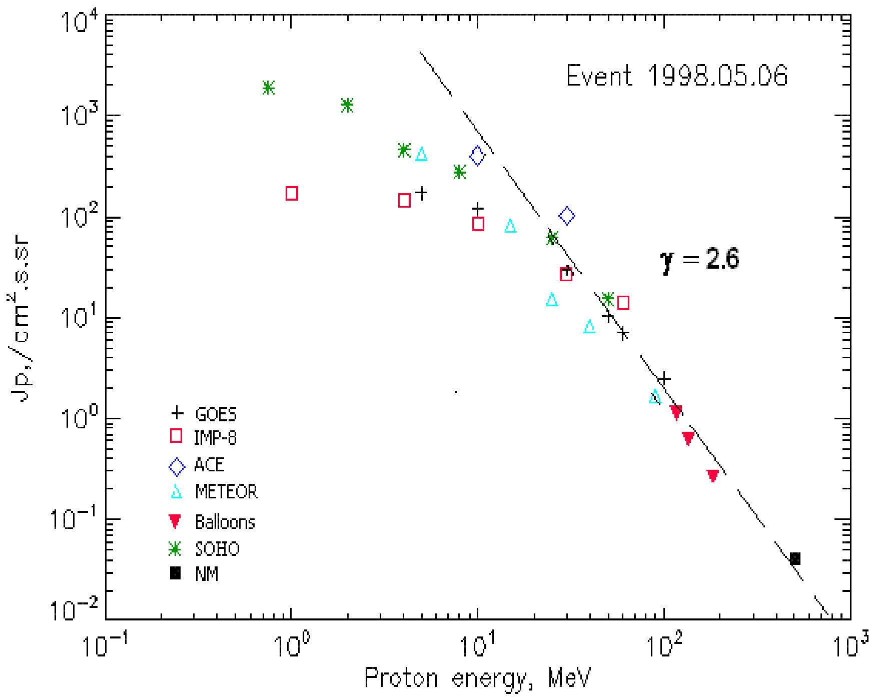




Arrows on the profiles of the events indicate the time of the proton flux maxima, taken to build the proton spectra (see below)

Список 1998 г.

Integral time-of-maximum proton spectrum



Integral fluxes of protons for the event of 1998 May 06

S/c, instruments	Ep, MeV	To	Tmax	Jmax, /cm^2.s.sr	Duration	Comments
GOES-9						
EPS	>5	08^h	10^h	171	2d	
EPS	>10	08^h	09^h	120	2d	
EPS	>30	08^h	09^h	30.1	2d	
EPS	>50	08^h	09^h	10.3	2d	
EPS	>60	08^h	09^h	7.0	2d	
EPS	>100	08^h	09^h	2.5	2d	
METEOR-2						
CBM	>5	08^h	09^h	414	3d	
CBM	>15	08^h	09^h	82	2d	
CBM	>25	08^h	09^h	15	1.5d	
CBM	>40	08^h	09^h	8,4	1d	
BP	>90	08^h	09^h	1,7	1d	
ChD	>600	-	-	-	-	
IMP-8						
CPME	>1	08^h	11^h	170	2.5d	
CPME	>4	08^h	10^h	146	2.5d	
CPME	>10	08^h	09^h	84	2.5d	
CPME	>30	08^h	09^h	26.9	2.5d	
CPME	>60	08^h	09^h	13.8	2.5d	
ACE						
SIS	>10	08^h	09^h	402	2.5d	
SIS	>30	08^h	09^h	103	2.5d	
SOHO						
EPHIN (INT)	>50	09^h	09^h	15,4	2d	

BALLOONS						
Mi	>116		3d(07^h-08^h)	1.1		
Mi	>136		3d(07^h-08^h)	0.61		
Mi	>183		3d(07^h-08^h)	0.26		
NM						
Network	>500		09^h	0.039		

Differential fluxes of protons for the event of 1998 May 06

S/c, instrument	ΔE, MeV	To	Tmax	Jmax. /cm^2.s.sr.MeV	Dura-tion	Comments
IMP-8						
CPME	1-2	11^h	15^h	187	3d	
CPME	2-4.6	08^h	11^h	27	3d	
CPME	4.6-15	08^h	10^h	9.3	3d	
CPME	15-25	08^h	09^h	4.65	3d	
CPME	25-48	08^h	09^h	0.65	3d	
CPME	48-96	08^h	09^h	0.12	3d	
CPME	96-145	08^h	09^h	0.15	3d	
CPME	145-440	08^h	09^h	0.02	2.5d	
SOHO						
LION	0,75-2	09^h	16^h	1140	3d	
LION	2-6	09^h	14^h	204	2.5d	
EPHIN	4-8	09^h	11^h	46	2.5d	
EPHIN	8-25	09^h	11^h	12.5	2.5d	
EPHIN	25-41	08^h	10^h	2,1	2.5d	
EPHIN	41-53	- “ -	- “ -	- “ -	- “ -	

References

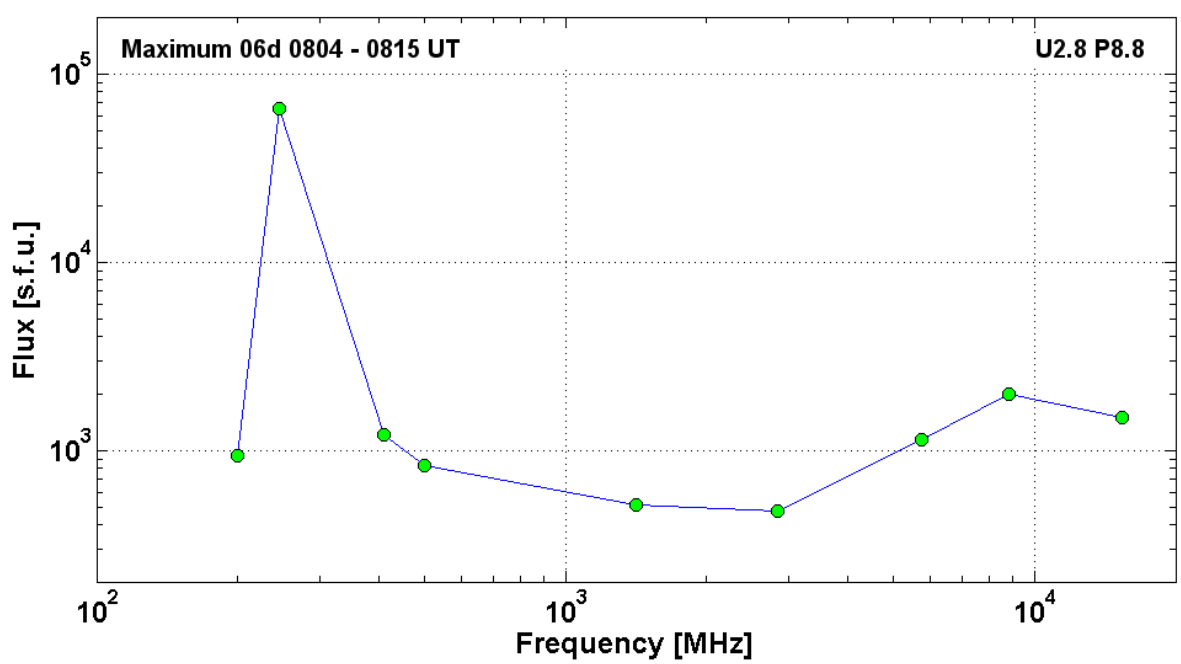
Dietrich W. and C. Lopate, 1999.
Reames D.V., C.K. Ng, and A.J. Tylka, 2000.
Struminsky A.B., 2003.
Miroshnichenko L.I. and J. Perez-Peraza, 2008.

Electromagnetic and other phenomena that are sources and/or accompanying for the event of 1998 May 06

1998 May 06 ● AR8210 To event 341

H_α	6563 Å	0801	0805	>0918	S15 W64	1N	
1 – 12	keV	0758	0809	0820		X2.7	2.1E-1
57 – 100	keV	075728	080610	>090818		1020	HXT Y
200 – 10000	keV	0808					GRS Y

15.4	GHz	801	807	824		3.18	
8.8	GHz	801	807	822	U2.8 P8.8	3.3	
5.7	GHz	646.1	809.2	<1030.1		3.06	
2.8	GHz	711	804	957		2.68	
1.4	GHz	801	804	828		2.71	
500	MHz	800	815	905		2.92	
410	MHz	801	811	828		3.08	
245	MHz	800	806	806		4.81	
200	MHz	803	806	811		2.97	
DS II	45-270	805		819	HARM	3	
DS IV	300-1100	810		817		2	
DS III	25-160	801		804	G	3	
DS CONT	45-65	801		802		2	
DS DCIM	800-2000	800		821	GG,FS,SP	3	
DS DCIM	2000-4395	801		828	GG,FS	3	
CME	WL	0829	1099 km/s	24.5km/s^2	190°	294°	



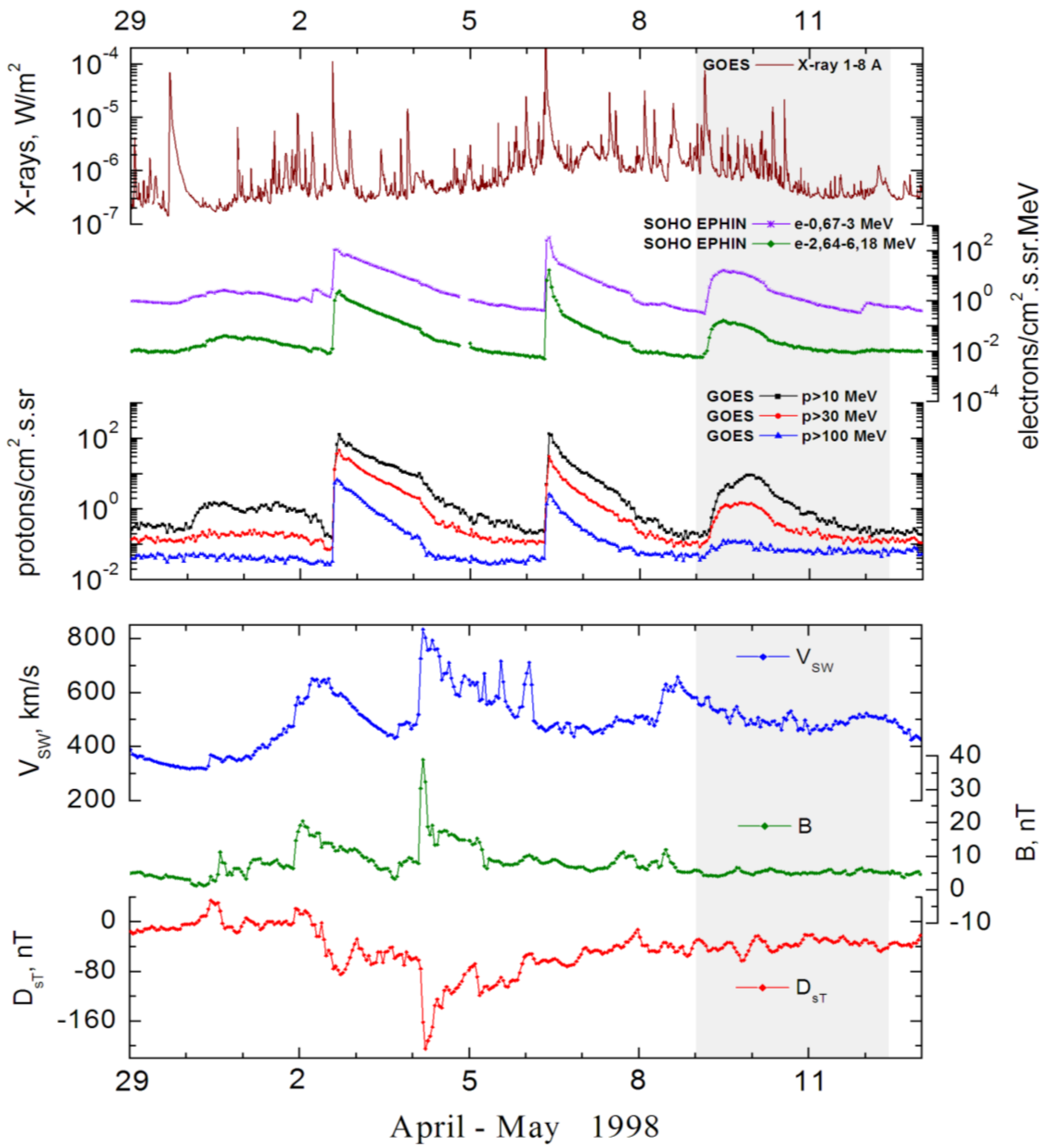
Список 1998 г.

Event 1998.05.09 – (1998-129) **№ 342**

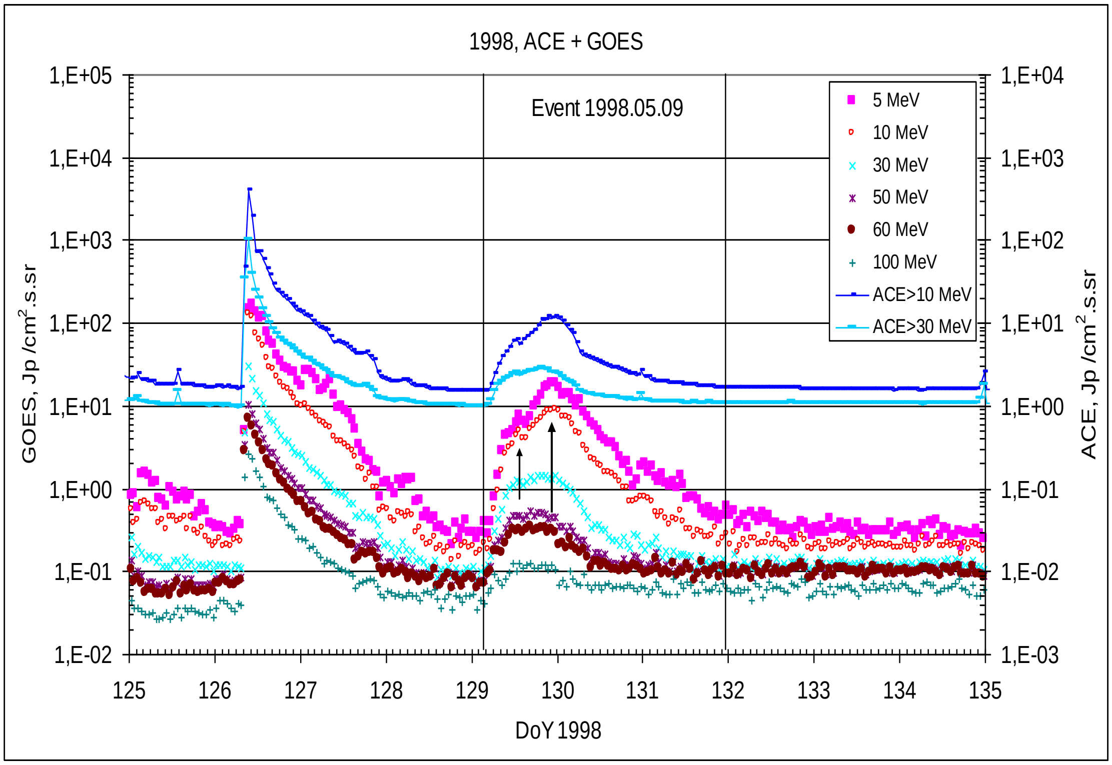
Particle event: To(Ep>10 MeV) – 09d06^h
Tmax$_1$(Ep>10 MeV) – 09d13^h, Jmax$_1$ (Ep>10 MeV) – 4.7 /cm^2.s.sr
Tmax$_2$(Ep>10 MeV) – 09d23^h, Jmax$_2$ (Ep>10 MeV) – 8.9 /cm^2.s.sr
Duration of the event – 2.5 days
Quasimaximal energy of protons in the event – Eqm$_1$ = 230 MeV
– Eqm$_2$ = 230 MeV

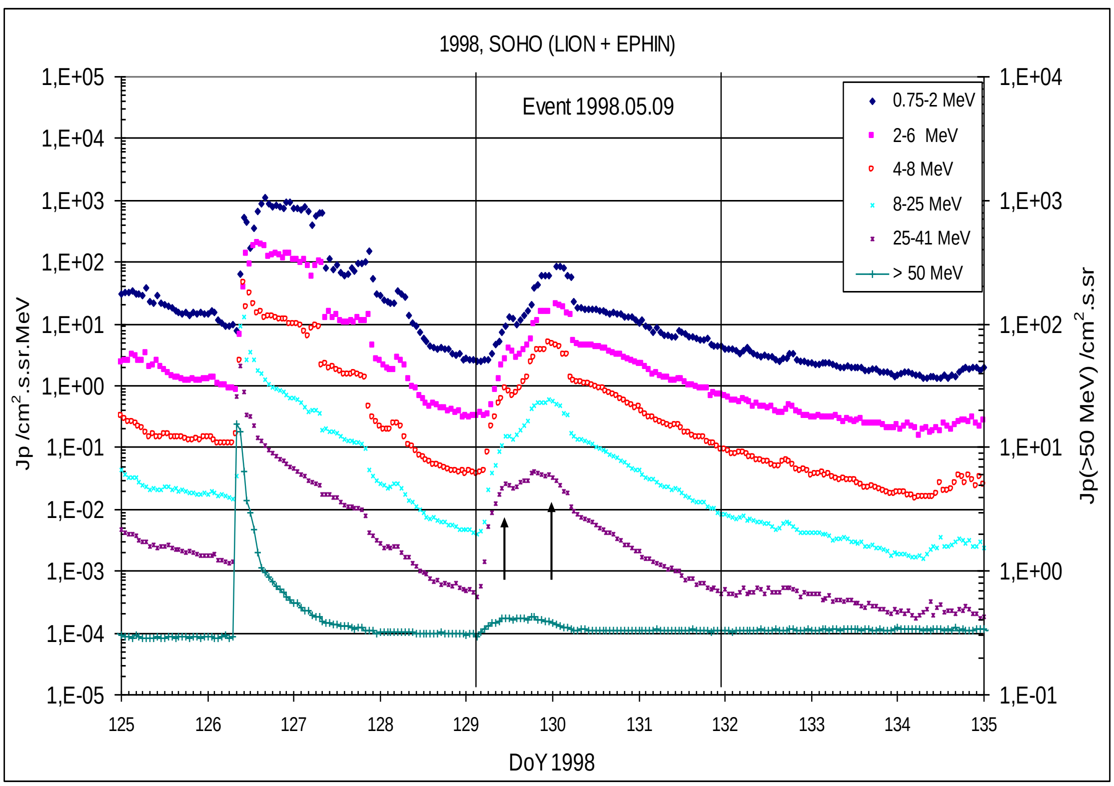
Sources: ■ solar flare 09d03^{h}04^m, M7.7/-, s15w90*, AR8210 ~ 1 day behind the W-limb; Main burst X-ray 1-8 Å: onset – 09d03^{h}04^m, max – 09d03^{h}40^m, Φ = 0.11 J/m^2
CME: 09d03^{h}35^m, V = 2331 km/s, Δφ = 178°, dA = 262°;
* − probable localization of the flare event

Particle fluxes and associated phenomena



Time profiles of the proton fluxes for the event of 1998 May 09

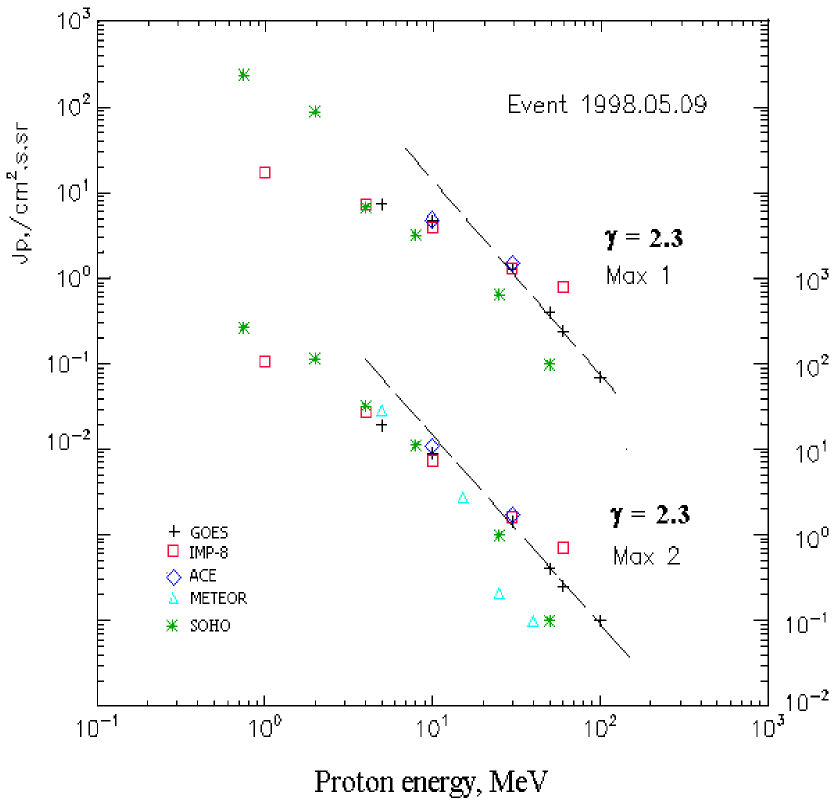




Arrows on the profiles of the events indicate the time of the proton flux maxima, taken to build the proton spectra (see below)

Список 1998 г.

Integral time-of-maximum proton spectrum



Integral fluxes of protons for the event of 1998 May 09

S/c, instruments	Ep, MeV	To	Tmax	Jmax, $/cm^2$.s.sr	Duration	Comments
GOES-9						
EPS	>5	06^h	$13^h/23^h$	7.3/19	2.5d	
EPS	>10	06^h	$13^h/23^h$	4.7/8.9	2.5d	
EPS	>30	06^h	$13^h/22^h$	1.3/1.4	2.5d	
EPS	>50	06^h	$12^h/20^h$	0.4/0.4	2.5d	
EPS	>60	08^h	$12^h/20^h$	0.24/0.25	2d	
EPS	>100	08^h	$11^h/20^h$	0.07/0.1	2d	
METEOR-2						
CBM	>5	$<17^h$	- $/18^h$	- /28	3d	
CBM	>15	$<17^h$	- $/18^h$	- /2.9	2d	
CBM	>25	$<17^h$	- $/17^h$	- /0.18	1d	
CBM	>40	$<17^h$	- $/17^h$	- /0.09	1d	
BP	>90	-	-	-	-	
ChD	>600	-	-	-	-	
IMP-8						
CPME	>1	05^h	$12^h/10d01^h$	17.2/105	5d	
CPME	>4	05^h	$12^h/10d01^h$	7.2/27	3.5d	
CPME	>10	05^h	$12^h/10d00^h$	4.0/7.3	3.5d	
CPME	>30	05^h	$12^h/21^h$	1.3/1.6	3.5d	
CPME	>60	05^h	$12^h/20^h$	0.8/0.7	3.5d	
ACE						
SIS	>10	05^h	$12^h/23^h$	4.8/10.7	2d	
SIS	>30	05^h	$12^h/19^h$	1.3/1.7	2d	

SOHO						
EPHIN (INT)	>50	04^h	$11^h/21^h$	0.1/0.1	1d	

Differential fluxes of protons for the event of 1998 May 09

S/c, instruments	ΔE, MeV	To	Tmax	Jmax. /cm^2.s.sr.MeV	Dura-tion	Comments
IMP-8						
CPME	1-2	08^h	- /$10d01^h$	- /45	3.5d	
CPME	2-4,6	07^h	- /$10d01^h$	- /16	3.5d	
CPME	4,6-15	06^h	- /$10d00^h$	- /1.74	3d	
CPME	15-25	06^h	- /$10d00^h$	- /0.3	3d	
CPME	25-48	05^h	- /21^h	- /0.04	2.5d	
CPME	48-96	06^h	- /17^h	- /0.01	2.5d	
CPME	96-145	05^h	- /21^h	- /0.01	1.5d	
CPME	145-440	05^h	- /11^h	- /0.003	1.5d	
SOHO						
LION	0,75-2	05^h	$12^h/10d01^h$	13/85	4d	
LION	2-6	06^h	$12^h/10d01^h$	4/20	4d	
EPHIN	4-8	05^h	$11^h/23^h$	0.9/5	4d	
EPHIN	8-25	05^h	$11^h/21^h$	0.15/0.6	4d	
EPHIN	25-41	05^h	$11^h/21^h$	0.026/0.04	3d	
EPHIN	41-53	- “ -	- “ -	- “ -	- “ -	

References

Dietrich W. and C. Lopate, 1999.

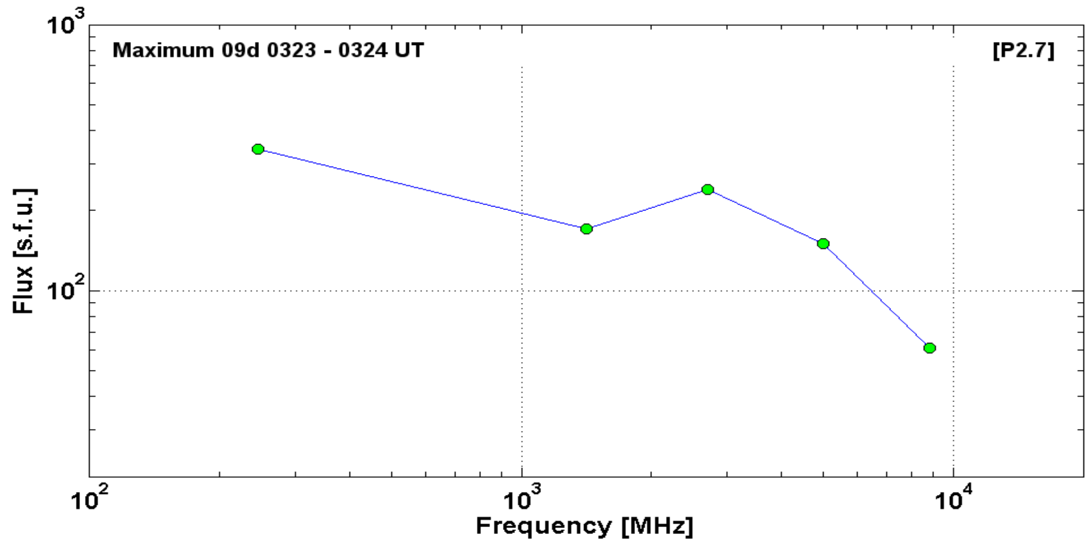
Electromagnetic and other phenomena that are sources and/or accompanying for the event of 1998 May 09

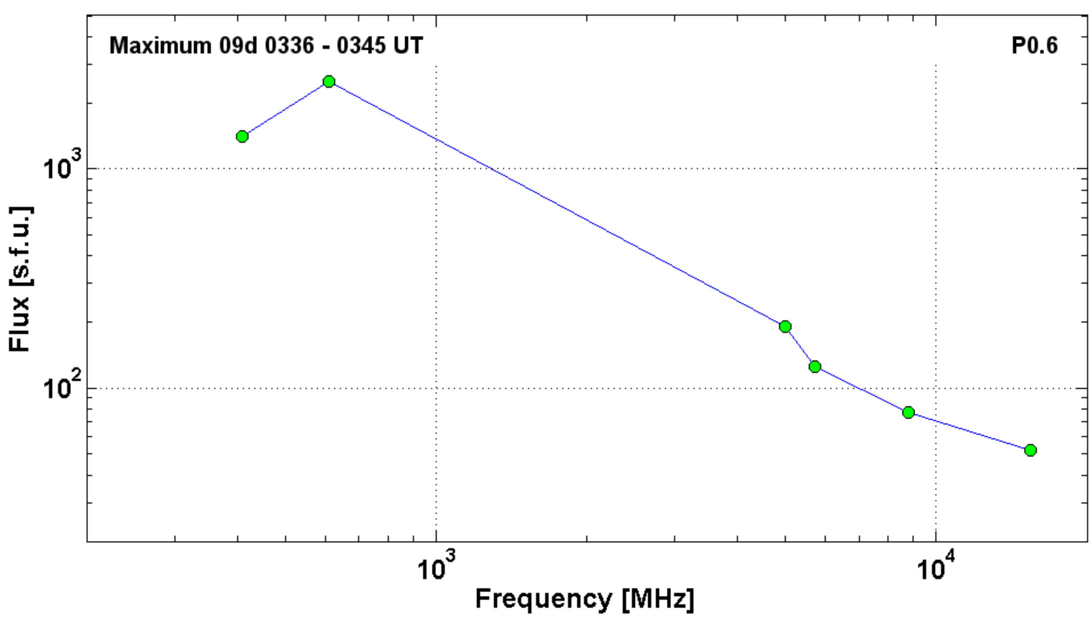
1998 May 09 ■ AR8210 To event 342

H_α	6563 Å	No Flare Patrol			s15w90*		
1 – 12.5	keV	0304	0340	0355		M7.7	1.1E-1
57 – 100	keV	031733	032641	045755		673	HXT, Y
57 – 100	keV	031733	032641	045755		243	HXT Y
8.8	GHz	0323	0323	0325		1.79	
5	GHz	0323	0323	0332		2.18	
2.7	GHz	0322	0323	0347	[P2.7]	2.38	
1.4	GHz	0322	0324	0346		2.23	
245	MHz	0323	0324	0330		2.53	
DS II	23-75	0326		0329	FN	3	
DS II	50-150	0326		0329	SH	3	
DS III	30-80	0314		0331		3	
DS III	18-310	0322		0328	G	2	

15.4	GHz	0335	0336	0339		1.72	
8.8	GHz	0335	0337	0339		1.89	
5.7	GHz	0310	0337	0353		2.1	
5	GHz	0323	0337	0347		2.28	
610	MHz	0323	0345	0352	P0.6	3.4	
410	MHz	0323	0345	0352		3.15	
DS II	20-75	0331		0341	FN	3	
DS II	40-150	0331		0342	SH	3	
DS IV	200-1000	0323		0350		2	
DS IV	30-80	0331		0413		3	
DS III	25-75	0320		0348	N	2	
CME	WL	0335	2331km/s	-140.5km/s^2	178˚	275˚	

* − probable localization of the flare event





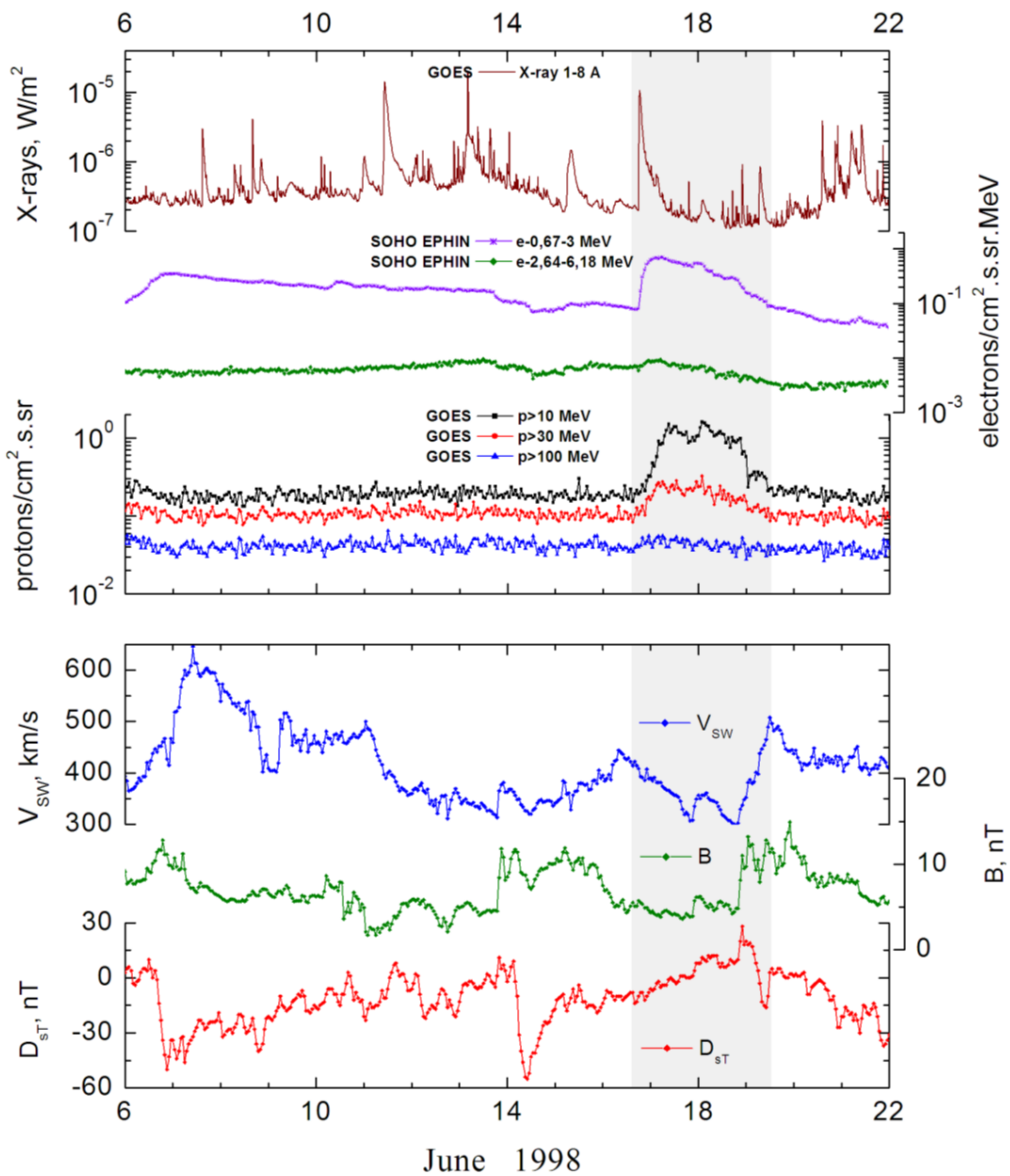
Список 1998 г.

Event 1998.06.16 – (1998-167) **№ 343**

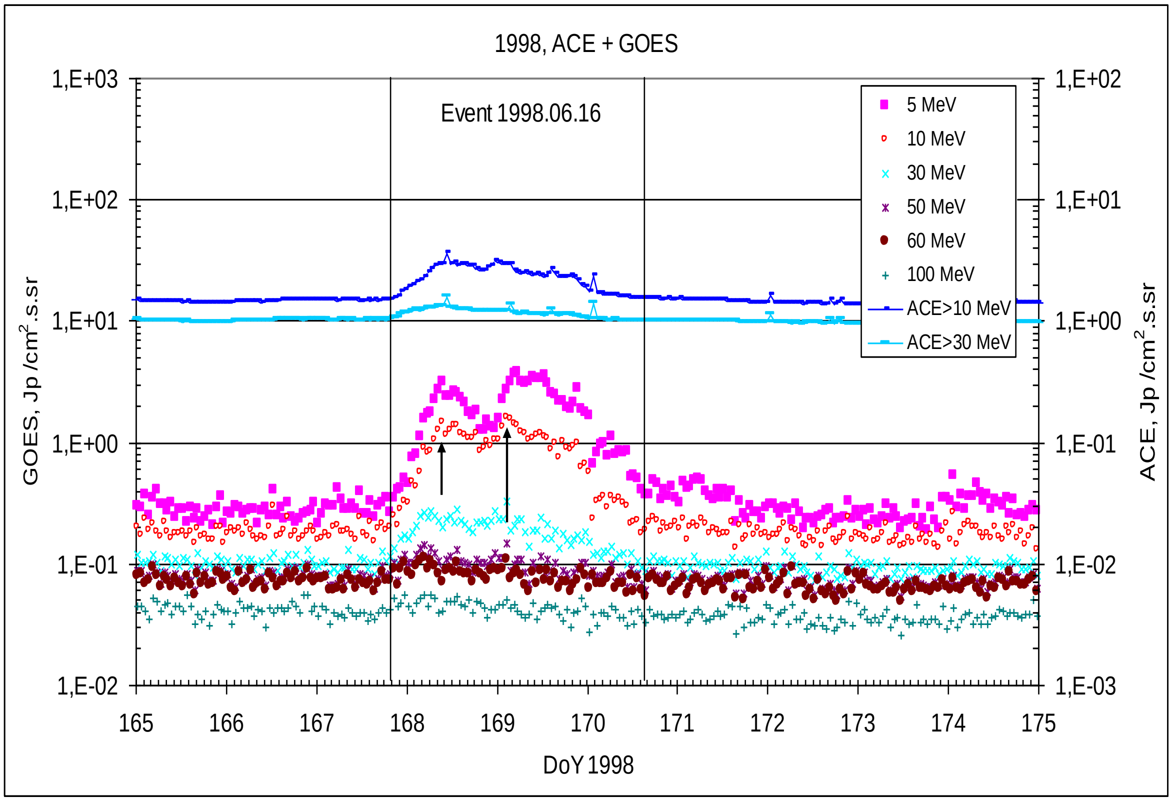
Particle event: To(Ep>10 MeV) – 16d21^h
Tmax$_1$(Ep>10 MeV) –17d09^h, Jmax$_1$ (Ep>10 MeV) – 1.3 /cm^2.s.sr
Tmax$_2$(Ep>10 MeV) –18d02^h, Jmax$_2$ (Ep>10 MeV) – 1.4 /cm^2.s.sr
Duration of the event – 3 days
Quasimaximal energy of protons in the event – Eqm$_1$ = 80 MeV
– Eqm$_2$ = 75 MeV

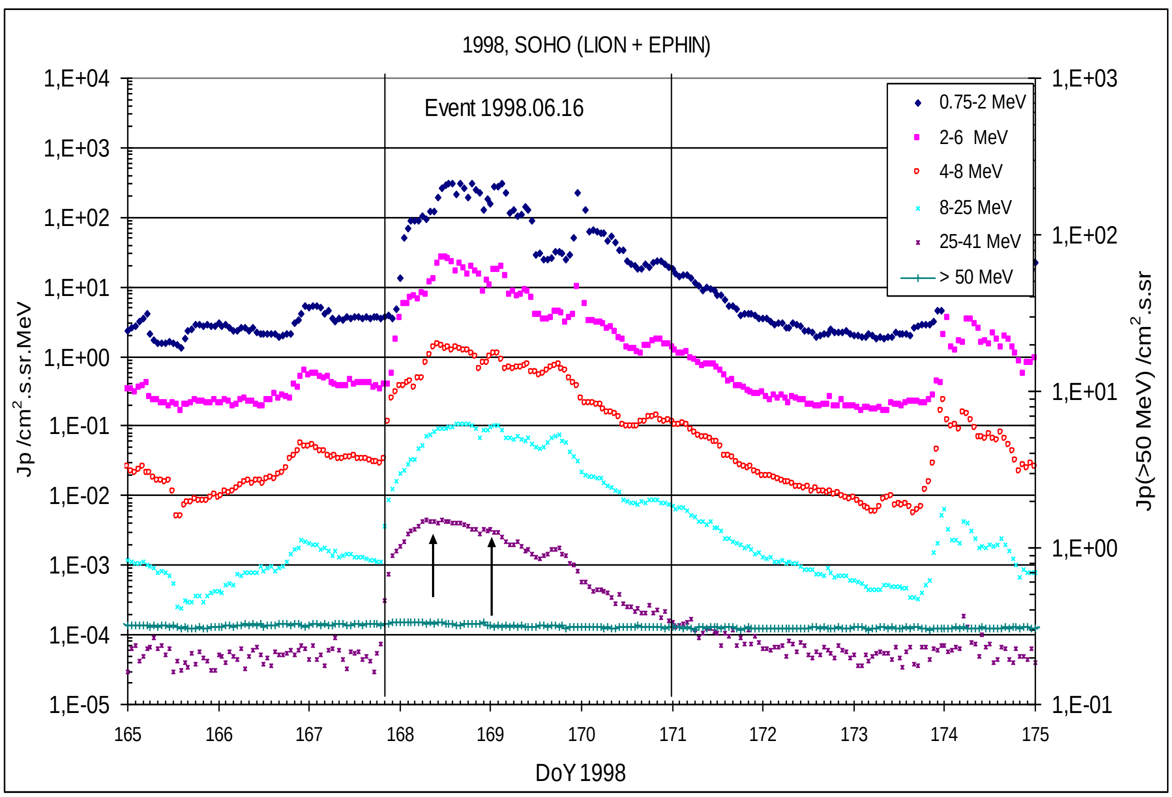
Sources: ■ solar flare 16d18^{h}03^m, M1.0/ -, s22w90*, AR8232 ~ 1 day behind the W-limb; Main burst X-ray 1-8 Å: onset – 16d18^h 03^m, max – 16d18^h 42^m, Φ = 0.037 J/m^2
CME: 16d18^{h}27^m, V = 1484 km/s, Δφ = 281^o, dA = 278^o;
* − probable localization of the flare event

Particle fluxes and associated phenomena



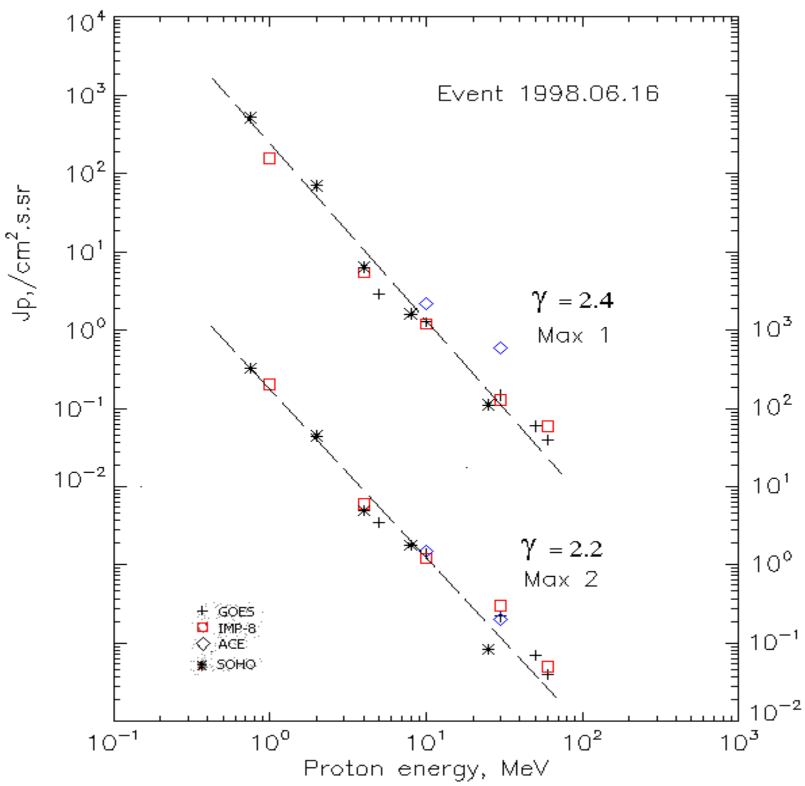
Time profiles of the proton fluxes for the event of 1998 June 16





Arrows on the profiles of the events indicate the time of the proton flux maxima, taken to build the proton spectra (see below)

Integral time-of-maximum proton spectrum



Integral fluxes of protons for the event of 1998 June 16

S/c, instruments	Ep, MeV	To	Tmax	Jmax, /cm^2.s.sr	Dura-tion	Comments
GOES-9						
EPS	>5	-	17d09^h/18d05^h	2.9/3.5	3d	
EPS	>10	-	17d09^h/18d02^h	1.3/1.4	3d	
EPS	>30	-	17d09^h/18d02^h	0.15/0.22	2d	
EPS	>50	-	17d04^h/18d02^h	0.06/0.07	2d	
EPS	>60	-	17d04^h/18d02^h	0.04/0.04	-	
EPS	>100	-	-	-	-	
IMP-8						
CPME	>1	20^h	17d10^h/18d01^h	157/200	6d	
CPME	>4	20^h	17d10^h/18d01^h	5.5/6	5d	
CPME	>10	20^h	17d10^h/18d01^h	1.2/1.2	5d	
CPME	>30	20^h	17d10^h/18d01^h	0.13/0.3	2d	
CPME	>60	20^h	17d09^h/18d01^h	0.06/0.05	2d	
ACE						
SIS	>10	20^h	17d10^h/18d01^h	2.2/1.5	2d	
SIS	>30	20^h	17d10^h/18d01^h	0,6/0.2	2d	
SOHO						
EPHIN (INT)	>50	-	-	-	-	

Differential fluxes of protons for the event of 1998 June 16

S/c, instruments	ΔE, MeV	To	Tmax	Jmax. /cm^2.s.sr.MeV	Dura-tion	Comments
IMP-8						
CPME	1-2	23^h	$18d01^h/18d23^h$	178/184	4.5d	
CPME	2-4.6	23^h	$17d11^h/18d23^h$	12.5/8.6	4.5d	
CPME	4.6-15	21^h	$18d01^h$/ -	0.3/ -	4.5d	
CPME	15-25	23^h	$17d15^h$/ -	0.05/ -	4.5d	
CPME	25-48	23^h	$17d23^h$/ -	0.01/ -	4.5d	
CPME	48-96					
CPME	96-145					
CPME	145-440					
SOHO						
LION	0,75-2	23^h	$17d16^h/18d23^h$	330/225	5d	
LION	2-6	23^h	$17d16^h/18d23^h$	26/9.8	5d	
EPHIN	4-8	21^h	$17d10^h/18d03^h$	1.2/0.8	5d	
EPHIN	8-25	20^h	$17d10^h/18d03^h$	0.09/0.1	5d	
EPHIN	25-41	20^h	$17d10^h/18d03^h$	0.004/0.003	5d	
EPHIN	41-53	- " -	- " -	- " -	- " -	

Electromagnetic and other phenomena that are sources and/or accompanying for the event of 1998 June 16

1998 June 16 ■ AR8232 To event 343

Hα	6563 Å	No Flare					
LPS	6563 Å	1956		2202	S17 W90		
1 – 12	keV	1803	1842	1928	s22w90*	M1.0	3.7E-2
CME	WL	1827	1484 km/s	-74.7km/s^2	341°	278°	

* − probable localization of the flare event

Event 1998.08.22 – (1998-234) **№ 344**

Particle event: To(Ep>10 MeV) – 22d06^h

Tmax$_1$(Ep>10 MeV) – 23d00^h, Jmax$_1$(Ep>10 MeV) – 1.7 /cm^2.s.sr

Tmax$_2$(Ep>10 MeV) – 23d08^h, Jmax$_1$(Ep>10 MeV) – 1.5 /cm^2.s.sr

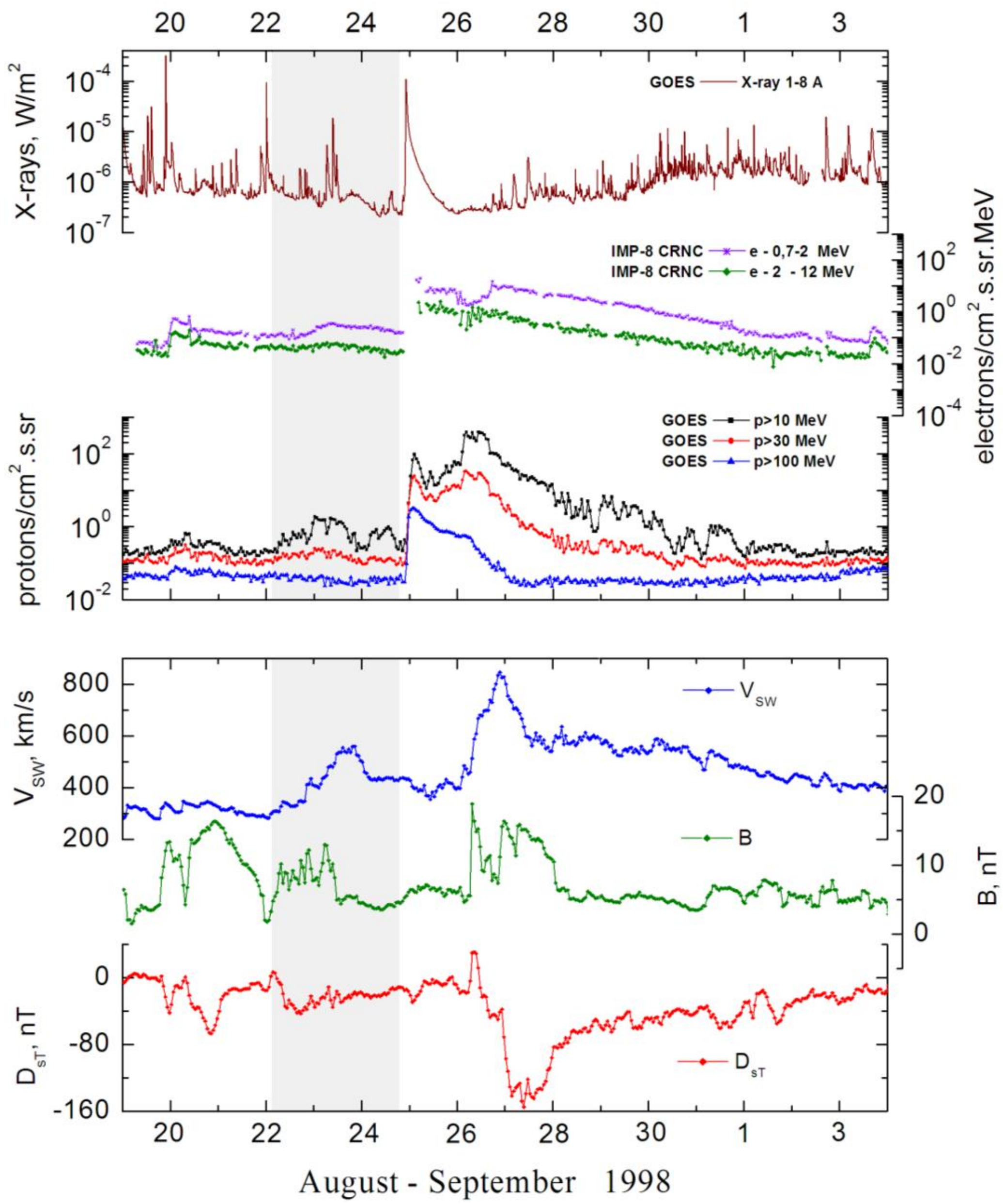
Duration of the event – 2 days

Quasimaximal energy of protons in the event – Eqm$_1$ = 80 MeV

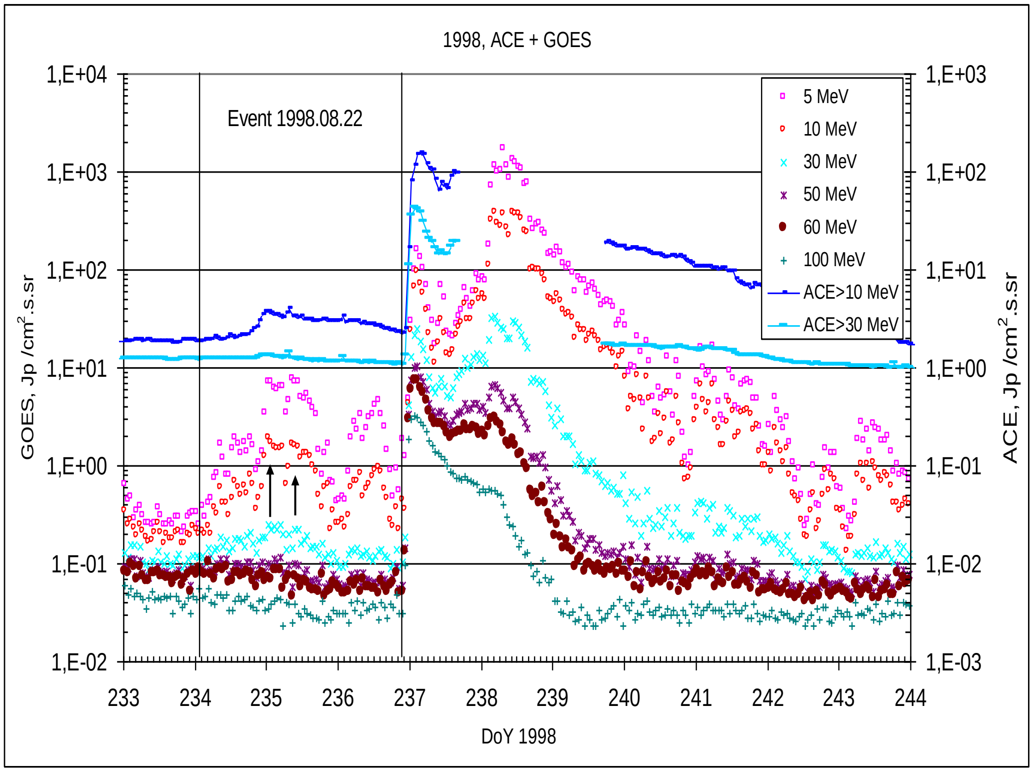
– Eqm$_2$ = 85 MeV

Sources: ● solar flare 21d23^{h}57^m, M9.0/2B, N42E51, AR8307
Main burst X-ray 1-8 Å: onset – 21d23^{h}57^m, max – 22d00^{h}09^m, Φ = 0.061 J/m^2
CME: gap

Particle fluxes and associated phenomena

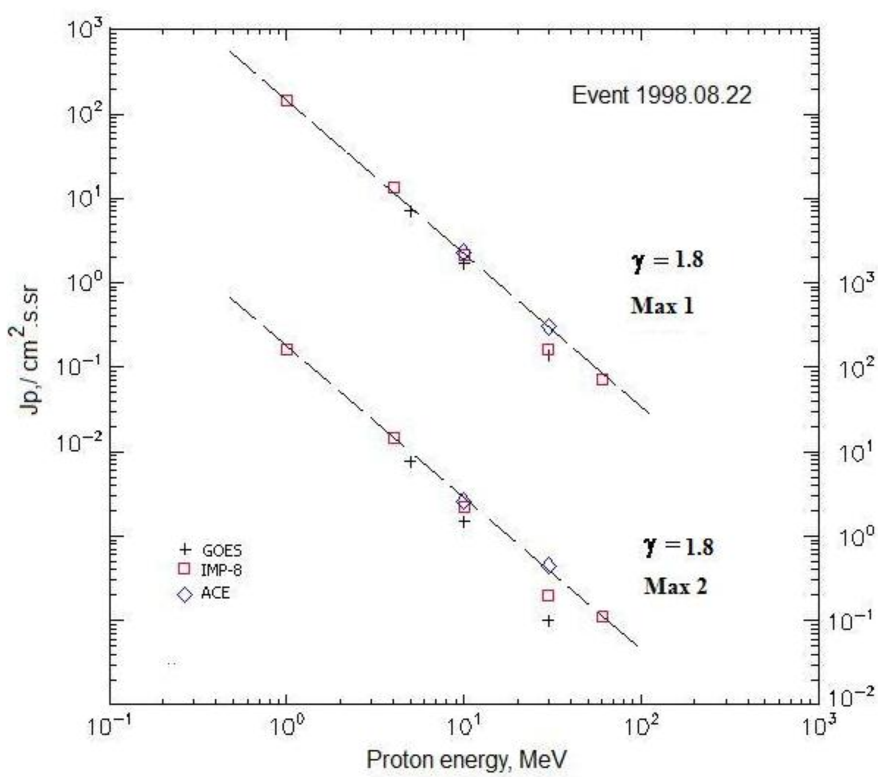


Time profiles of the proton fluxes for the event of 1998 August 22



Arrows on the profiles of the events indicate the time of the proton flux maxima, taken to build the proton spectra (see below)

Integral time-of-maximum proton spectrum



Список 1998 г.

Integral fluxes of protons for the event of 1998 August 22

S/c, instruments	Ep, MeV	To	Tmax	Jmax, /cm^2.s.sr	Dura-tion	Comments
GOES-10						
EPS	>5	06^h	23d00^h/23d08^h	7/7.6	2d	
EPS	>10	06^h	23d00^h/23d08^h	1.7/1.5	2d	
EPS	>30	06^h	23d00^h/23d09^h	0.14/0.1	1d	
EPS	>50	-	-	-	-	
EPS	>60	-	-	-	-	
EPS	>100	-	-	-	-	
IMP-8						
CPME	>1	06^h	23d00^h/23d08^h	146/165	3d	
CPME	>4	06^h	23d00^h/23d08^h	13.6/14.4	3d	
CPME	>10	06^h	23d00^h/23d08^h	2.15/2.25	3d	
CPME	>30	06^h	23d00^h/23d08^h	0.16/0.2	2d	
CPME	>60	06^h	23d00^h/23d08^h	0.07/0.11	2d	
ACE						
SIS	>10	06^h	23d00^h/23d08^h	2.3/2.6	2d	
SIS	>30	06^h	23d01^h/23d08^h	0.3/0.45	2d	

Differential fluxes of protons for the event of 1998 August 22

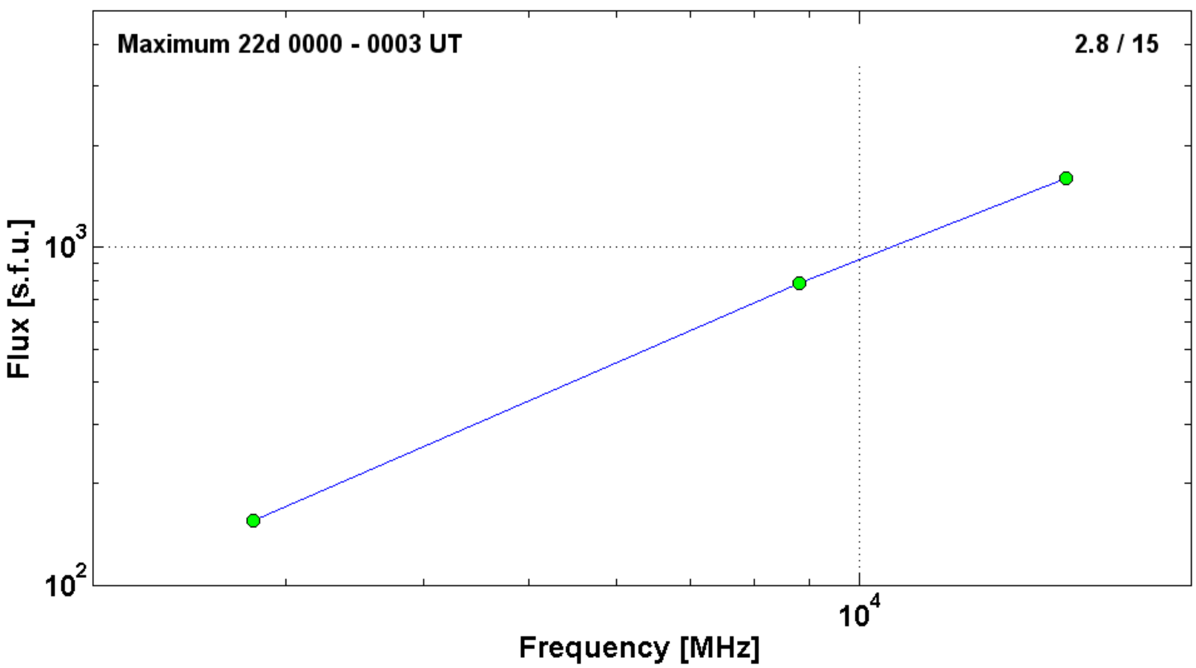
S/c, instruments	ΔE, MeV	To	Tmax	Jmax. /cm^2.s.sr.MeV	Dura-tion	Comments
IMP-8						
CPME	1-2	-	- /23d08^h	- /110	-	
CPME	2-4.6	-	- /23d08^h	- /18.5	-	
CPME	4.6-15	-	- /23d07^h	- /0.9	-	
CPME	15-25	-	- /23d07^h	- /0.06	-	
CPME	25-48	-	-	-	-	
CPME	48-96	-	-	-	-	
CPME	96-145	-	-	-	-	
CPME	145-440	-	-	-	-	
SOHO		No	data			

Electromagnetic and other phenomena that are sources and/or accompanying for the event of 1998 August 22

1998 August 22 ● AR8307 To event 344

Hα	6563 Å	<0009	0016	>0140	N42 E51	2B	
1 – 12	keV	2357	0009	0016		M9.0	6.1E-2

15.4	GHz	2359.0	0003.0	0017.0	2.8 / 15	3.20	
8.8	GHz	2359.0	0003.0	0013.0		2.89	
2.8	GHz	2358.0	0000.0	0100.0		2.19	
DS II	20-120	0005		0023	FN	3	
DS II	40-280	0005		0017	SH	3	
DS IV	30-80	0004		0129		2	
DS III	18-300	0007		0009	G	2	
CME	WL						gap



Список 1998 г.

Event 1998.08.24 – (1998-236) **№ 345**

Particle event: To(Ep>10 MeV) – 24d23^h

Tmax$_1$(Ep>10 MeV) – 25d02^h, Jmax$_1$(Ep>10 MeV) – 96 /cm^2.s.sr

Tmax$_2$(Ep>10 MeV) – 26d07^h, Jmax$_2$(Ep>10 MeV) – 320 /cm^2.s.sr

Duration of the event – 6 days

Quasimaximal energy of protons in the event – Eqm$_1$ = 720 MeV

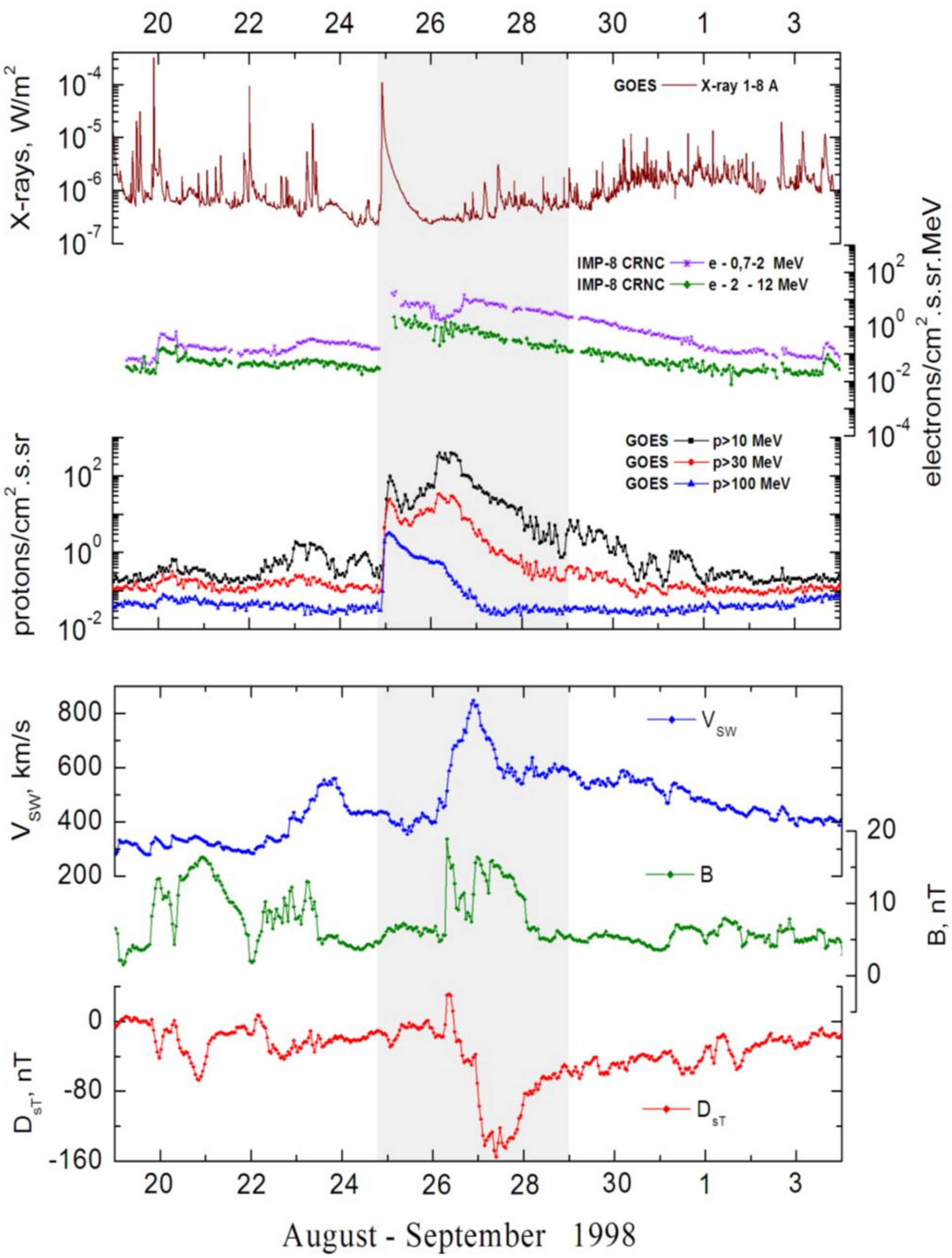
– Eqm$_2$ = 310 MeV

Sources: ● solar flare 24d21^{h}48^m, 3B/X1.0, N35E09, AR8307

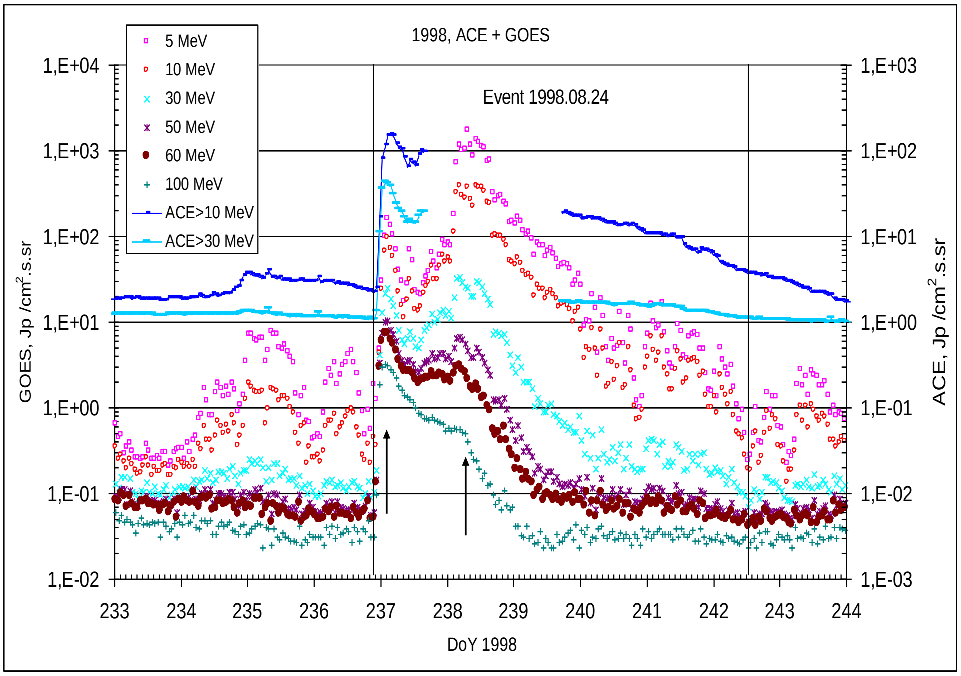
Main burst X-ray 1-8 Å: onset – 24d21^{h}50^m, max – 24d22^{h}12^m, Φ = 0.16 J/m^2

CME: gap

Particle fluxes and associated phenomena

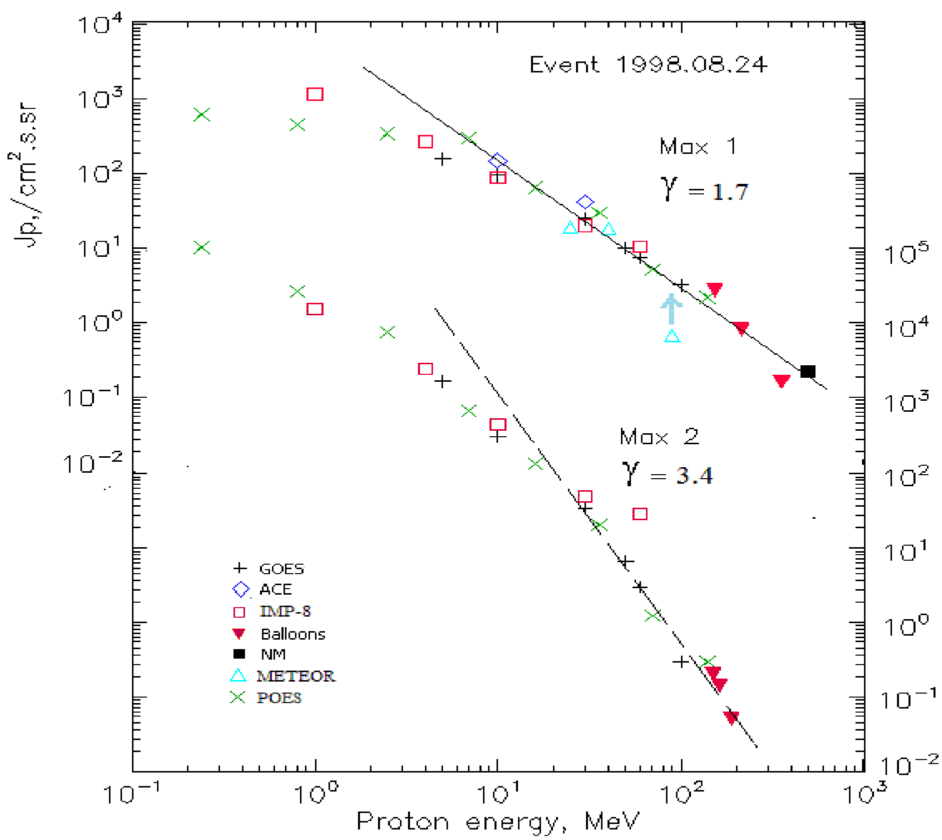


Time profiles of the proton fluxes for the event of 1998 August 24



Arrows on the profiles of the events indicate the time of the proton flux maxima, taken to build the proton spectra (see below)

Integral time-of-maximum proton spectrum



Список 1998 г.

Integral fluxes of protons for the event of 1998 August 24

S/c, instruments	Ep, MeV	To	Tmax	Jmax, /cm^2.s.sr	Dura-tion	Comments
GOES-10						
EPS	>5	23^h	25d02^h/26d07^h	158/1730	6d	
EPS	>10	23^h	25d02^h/26d07^h	96/320	6d	
EPS	>30	23^h	25d02^h/26d04^h	25/34	3d	
EPS	>50	23^h	25d02^h/26d04^h	10/6.7	2d	
EPS	>60	23^h	25d02^h/26d04^h	7.5/3	2d	
EPS	>100	23^h	25d01^h/26d04^h	3.2/0.3	2d	
METEOR-2						
CBM	>5	-	-	-	-	
CBM	>15	-	-	-	-	
CBM	>25	23^h	25d < 22^h/-	>19/ -	5d	
CBM	>40	23^h	25d < 21^h/-	>18.5/ -	3d	
BP	>90	-	25d < 21^h/-	>0.7/ -	-	
ChD	>600	-	-	-	-	
POES-15						
MEPED	>0.24	23^h	25d00^h/26d07^h	630/108600	-	
MEPED	>0.8	23^h	25d00^h/26d07^h	460/28000	-	
MEPED	>2.5	23^h	25d00^h/26d07^h	350/8000	-	
MEPED	>6.9	23^h	25d00^h/26d07^h	300/700	-	
MEPED	>16	23^h	25d00^h/26d07^h	65.1/135.1	-	
MEPED	>36	23^h	25d00^h/26d07^h	30/20.5	-	
MEPED	>70	23^h	25d00^h/26d07^h	5.23/1.25	-	
MEPED	>140	23^h	25d00^h/26d07^h	2.24/0.28	-	
IMP-8						
CPME	>1	>20^h	25d08^h/26d07 ^{h}	1180/16000	7d	
CPME	>4	>20^h	25d08^h/26d07 ^{h}	270/2590	7d	
CPME	>10	>20^h	25d08^h/26d07 ^{h}	90/455	5d	
CPME	>30	>20^h	25d08^h/26d07 ^{h}	20,3/50,	4d	
CPME	>60	>20^h	25d08^h/26d07 ^{h}	10.5/29	4d	
ACE						
SIS	>10	23^h	25d03^h/ -	150/ -	-	
SIS	>30	23^h	25d01^h/ -	42/ -	-	
BALLOONS						
Mi	>154		25d(08^h-09^h)/ -	2.7/ -		
Mi	>215		25d(08^h-09^h)/ -	0.8/ -		
Mi	>357		25d(08^h-09^h)/ -	0.16/ -		
Mi	>150		- /26d(07^h-07^h)	- /0.2		
Mi	>164		- /26d(07^h-07^h)	- /0.14		
Mi	>189		- /26d(07^h-07^h)	- /0.05		
NM						
Network	>500		25d01^h/ -	0.22/ -		

Differential fluxes of protons for the event of 1998 August 24

S/c, instruments	ΔE, MeV	To	Tmax	Jmax. /cm^2.s.sr.MeV	Dura-tion	Comments
IMP-8						

CPME	1-2	>20^h	25d08^h/26d07^h	479/8340	6d	
CPME	2-4.6	>20^h	25d08^h/26d07^h	192/2220	6d	
CPME	4.6-15	>20^h	25d08^h/26d07^h	17,4/179	6d	
CPME	15-25	>20^h	<25d04^h/26d07^h	3,4/14,7	2d	
CPME	25-48	>20^h	<25d04^h/26d07^h	0,5/1,0	2d	
CPME	48-96	>20^h	<25d04^h/26d07^h	0,14/0,6	2d	
CPME	96-145	>20^h	<25d04^h/26d07^h	0,09/0,12	2d	
CPME	145-440	>20^h	<25d04^h/26d07^h	0,01/0,003	2d	
SOHO		No	data			

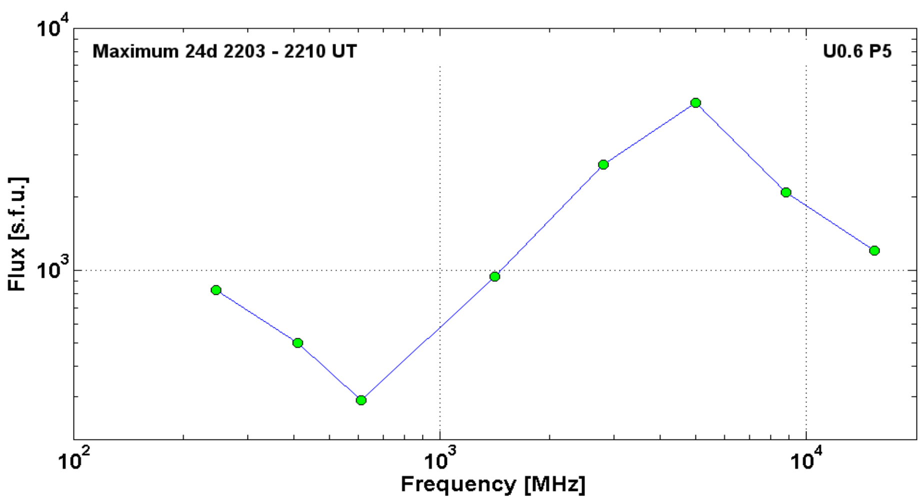
References

Dietrich W. and C. Lopate, 1999.
Leske R.A., R.A. Mewaldt, .C. Cummings et al., 2001.
Struminsky A.B, 2003.
Miroshnichenko L.I. and J. Perez-Peraza. 2008.

Electromagnetic and other phenomena that are sources and/or accompanying for the event of 1998 August 24

1998 August 24 ● AR8307 To event 345

Hα	6563 Å	2148	2204	>25^d 0108	N35 E09	3B	T
1 – 12	keV	2150	2212	2235		X1.0	1.6E-1
53 – 93	keV	<2218	~2218	2248		894	HXT Y
15.4	GHz	2200.0	2203.0	2302.0		3.08	
8.8	GHz	2200.0	2203.0	2302.0		3.32	
5	GHz	2159.0	2203.0	2231.0	U0.6 P5	3.69	
2.8	GHz	2150.0	2205.0	>2232.0		3.43	
1.4	GHz	2157.0	2210.0	2231.0		2.97	
610	MHz	2159.0	2203.0	2235.0		2.46	
410	MHz	2158.0	2203.0	2236.0		2.70	
245	MHz	2158.0	2203.0	2302.0		2.92	
DS II	18-140	2203		2218	SH,H	3	
DS IV	20-200	2203		>2400	FS	2	
DS III	70-700	2158		2205	G	2	
CME	WL						gap



Event 1998.09.23 – (1998-266) **№ 346**

Particle event: To(Ep>10 MeV) – 23d13^h

Tmax(Ep>10 MeV) – 25d01^h, .Jmax (Ep>10 MeV) – 22 /cm^2.s.sr

Duration of the event – 3 days

Quasimaximal energy of protons in the event – Eqm = 75 MeV

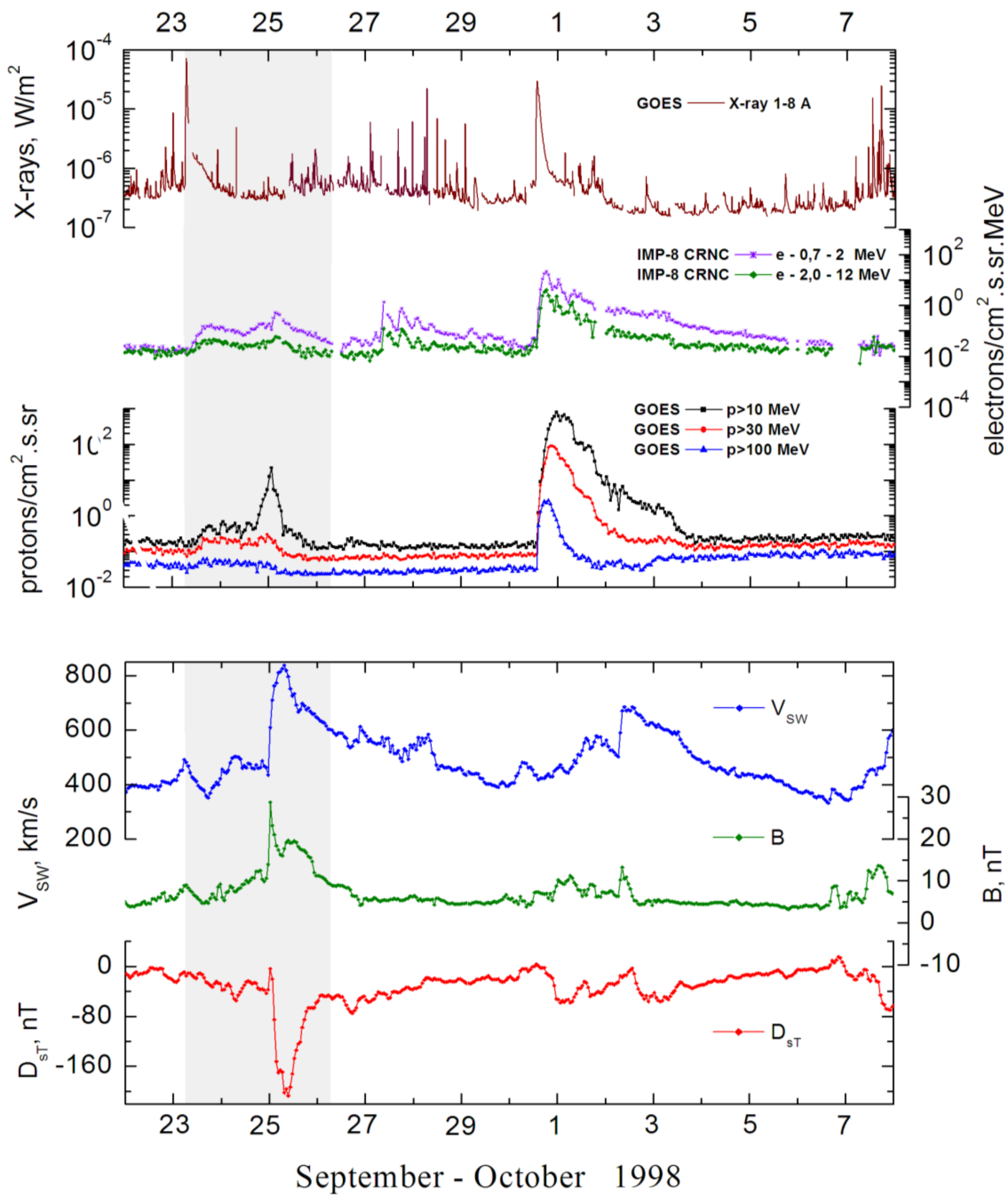
Sources: ● solar flare 23d06^{h}40^m, M7.1/3B , N19E09, AR8340

Main burst X-ray 1-8 Å: onset – 23d06^{h}40^m, max – 23d07^h 13^m, Φ = 0.12 J/m^2

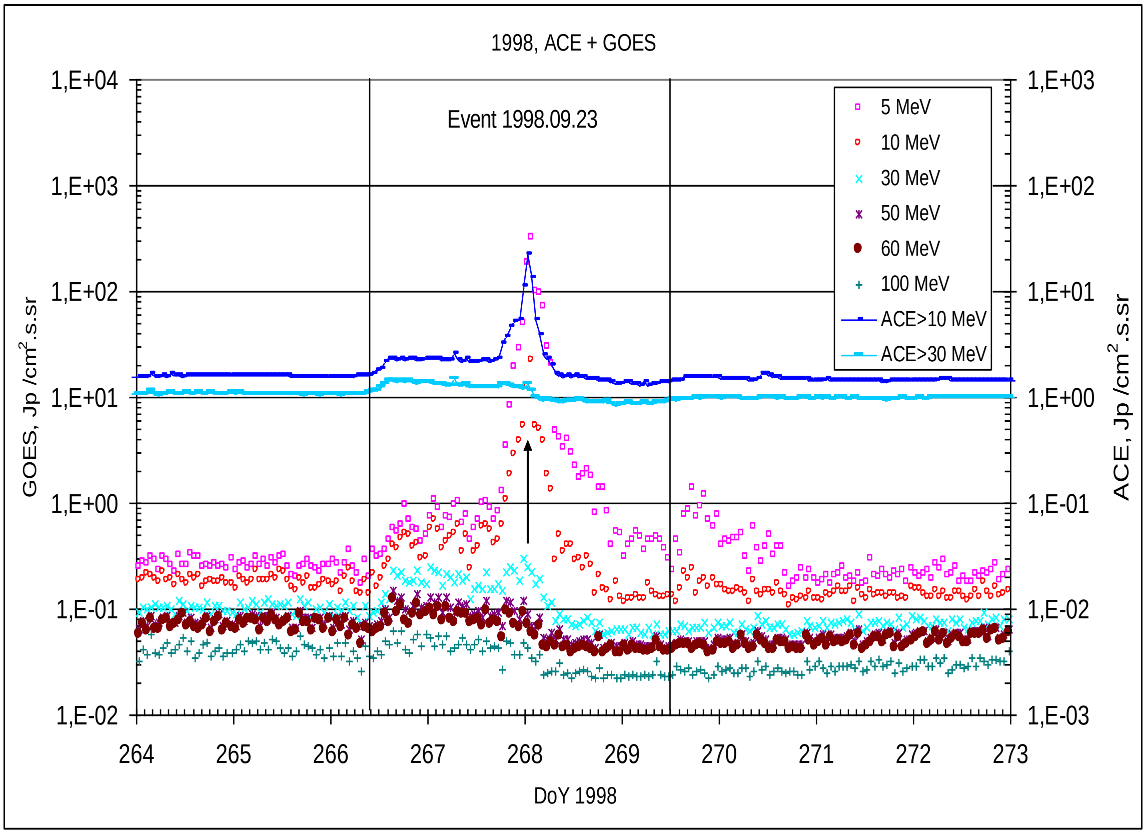
CME: gap

▲SC 24d23^{h}45^m

Particle fluxes and associated phenomena

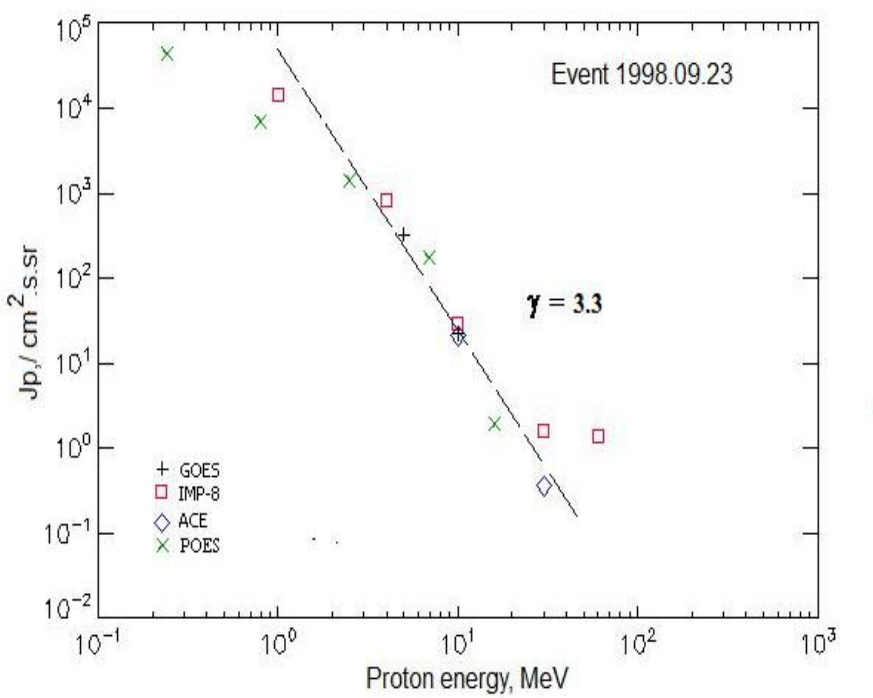


Time profiles of the proton fluxes for the event of 1998 September 23



Arrows on the profiles of the events indicate the time of the proton flux maxima, taken to build the proton spectra (see below)

Integral time-of-maximum proton spectrum



Список 1998 г.

Integral fluxes of protons for the event of 1998 September 23

S/c, instruments	Ep, MeV	To	Tmax	Jmax, /cm^2.s.sr	Dura-tion	Comments
GOES-10						
EPS	>5	13^h	25d01^h	324	3d	
EPS	>10	13^h	25d01^h	22	3d	
EPS	>30	-	-	-	-	
EPS	>50	-	-	-	-	
EPS	>60	-	-	-	-	
EPS	>100	-	-	-	-	
POES-15						
MEPED	>0.24		25d01^h	43280		
MEPED	>0.8		25d01^h	6880		
MEPED	>2.5		25d01^h	1290		
MEPED	>6.9		25d01^h	40		
MEPED	>16		25d01^h	1.9		
MEPED	>36		-	-		
MEPED	>70		-	-		
MEPED	>140		-	-		
IMP-8						
CPME	>1	13^h	25d01^h	14100	6d	
CPME	>4	13^h	25d01^h	826	6d	
CPME	>10	13^h	25d01^h	29	6d	
CPME	>30	13^h	25d01^h	1.6	6d	
CPME	>60	13^h	25d01^h	1.4	6d	
ACE						
SIS	>10	13^h	25d00^h	21	3d	
SIS	>30	13^h	24d19^h	0.36	3d	
SOHO						
EPHIN (INT)	>50	-	-	-	-	

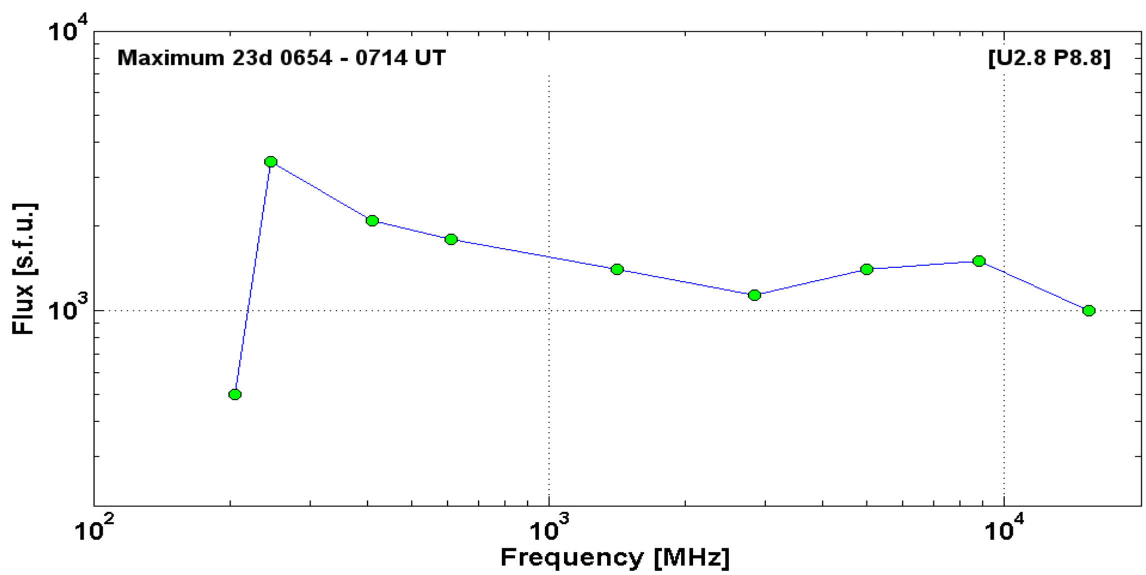
Differential fluxes of protons for the event of 1998 September 23

S/c, instruments	ΔE, MeV	To	Tmax	Jmax. /cm^2.s.sr.MeV	Dura-tion	Comments
IMP-8						
CPME	1-2	24d15^h	25d00^h	$9.4 \cdot 10^3$	7d	
CPME	2-4.6	24d15^h	25d01^h	$1.6 \cdot 10^3$	7d	
CPME	4.6-15	24d16^h	25d01^h	54.8	7d	
CPME	15-25	24d17^h	25d01^h	0.4	-	
CPME	25-48	24d18^h	26d00^h	0.007	-	
CPME	48-96	-	-	-	-	
CPME	96-145	-	-	-	-	
CPME	145-440	-	-	-	-	
SOHO		No	data			

Electromagnetic and other phenomena that are sources and/or accompanying for the event of 1998 September 23

1998 September 23 ● AR8340 To event 346

Hα	6563 Å	0643	0701	0937	N19E09	3B	CEFHU
1 – 12	keV	0640	0713	0731		M7.1	1.2E-1
53 – 93	keV	>070434	~070436	>112234		697	HXT Y
15.4	GHz	0652.0	0656.0	0723.0		3.00	
8.8	GHz	0651.0	0656.0	0741.0		3.18	
5	GHz	0649.0	0656.0	0755.0		3.15	
2.8	GHz	0620.0	0701.0	0809.0	[U2.8 P8.8]	3.05	
1.4	GHz	0647.0	0654.0	0743.0		3.15	
610	MHz	0652.0	0656.0	0747.0		3.26	
410	MHz	0652.0	0709.0	0748.0		3.32	
245	MHz	0655.0	0711.0	0747.0		3.53	
204	MHz	0653.5	0714.0	0724.5		2.70	
DS II	40-280	0656		~0719	SH,H	3	
DS II	18-50	0704		0714	FN	2	
DS IV	30-900	0653		>0725		2	
DS III	200-800	0722		0723	B	2	
DS DCIM	800-2000	0643		0737	GG,SP	3	
DS DCIM	2000-4395	0717		0742	GG	2	
410	MHz	0814.0	0818.0	0820.0		3.11	
245	MHz	0815.0	0818.0	0820.0		3.57	
DS DCIM	800-2000	0801		0835	GG	3	
CME	WL						gap

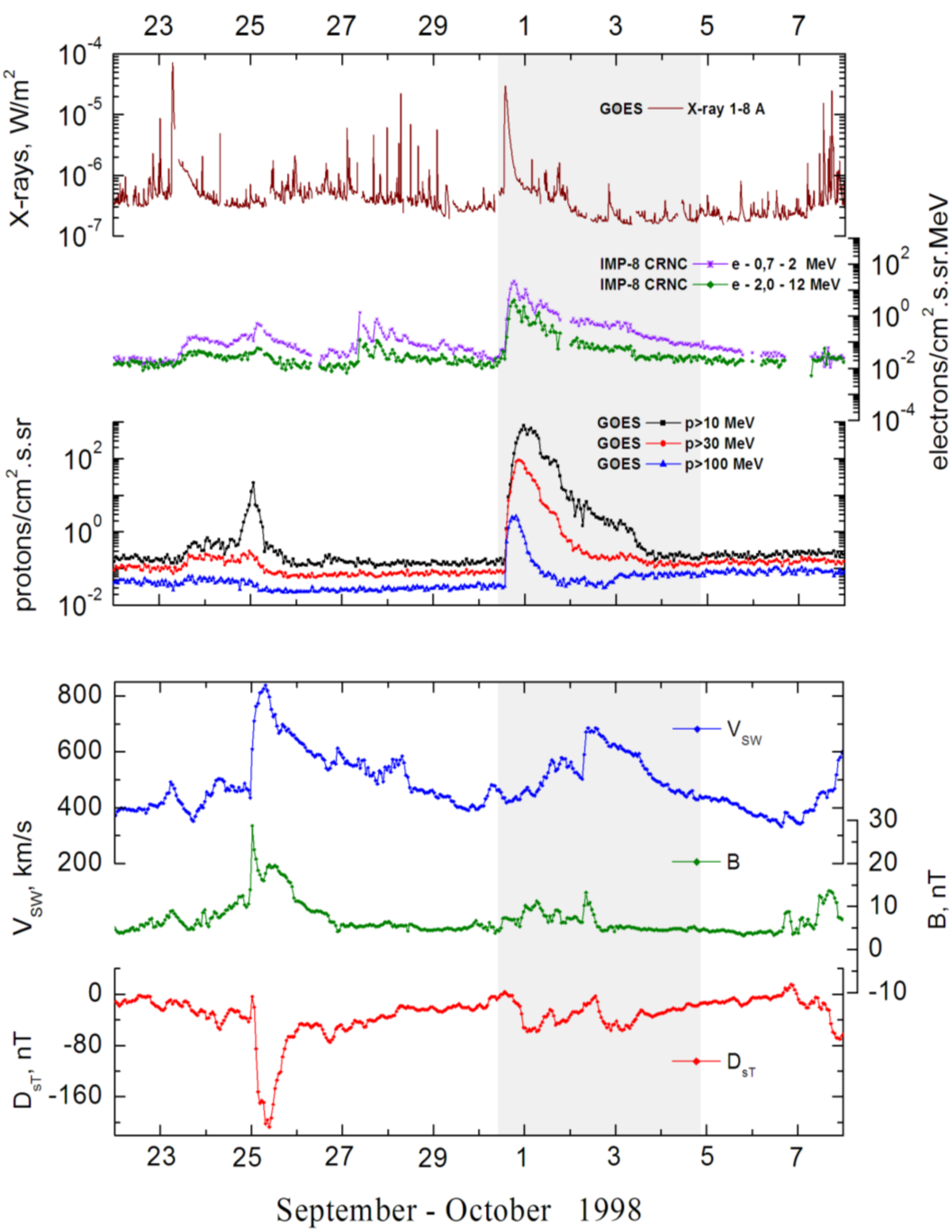


Event 1998.09.30 – (1998-273) **№ 347**

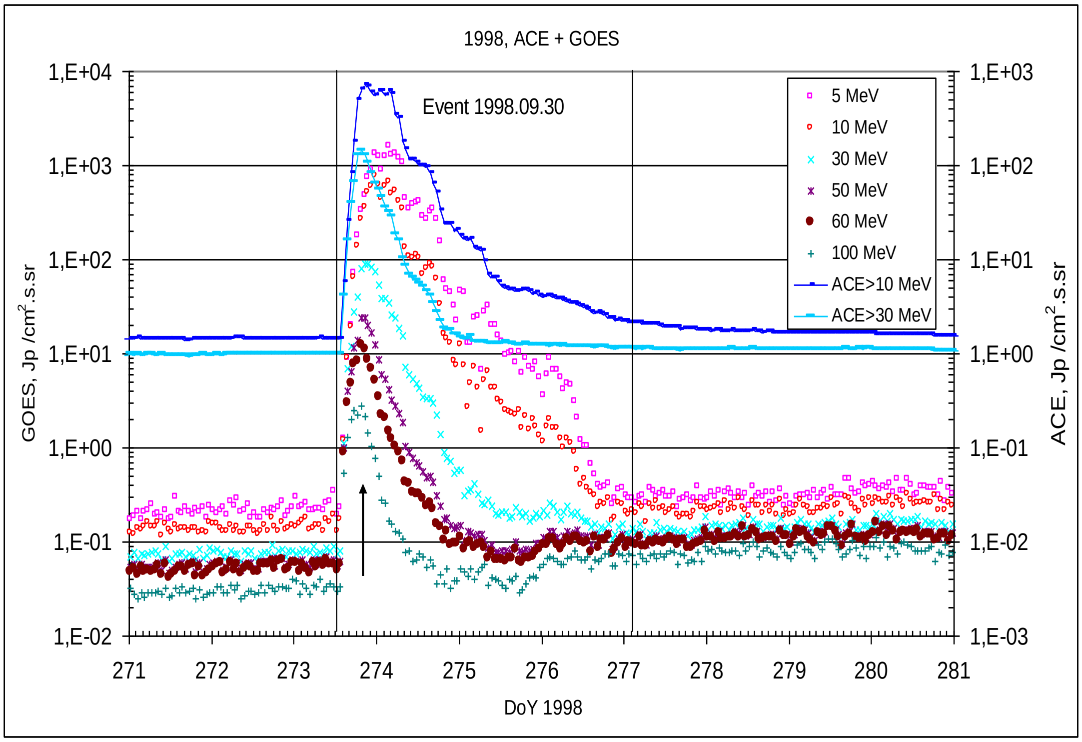
Particle event: To(Ep>10 MeV) – 30d14^h
Tmax(Ep>10 MeV) – 30d23^h, Jmax (Ep>10 MeV) – 785 /cm^2.s.sr
Duration of the event – 3 days
Quasimaximal energy of protons in the event – Eqm = 600 MeV

Sources: ● solar flare 30d13^{h}08^m, M2.8/2N, N23W78, AR8340
Main burst X-ray 1-8Å: onset – 30d13^{h}08^m, max – 30d13^{h}50^m, Φ = 0.11 J/m^2
CME: gap

Particle fluxes and associated phenomena

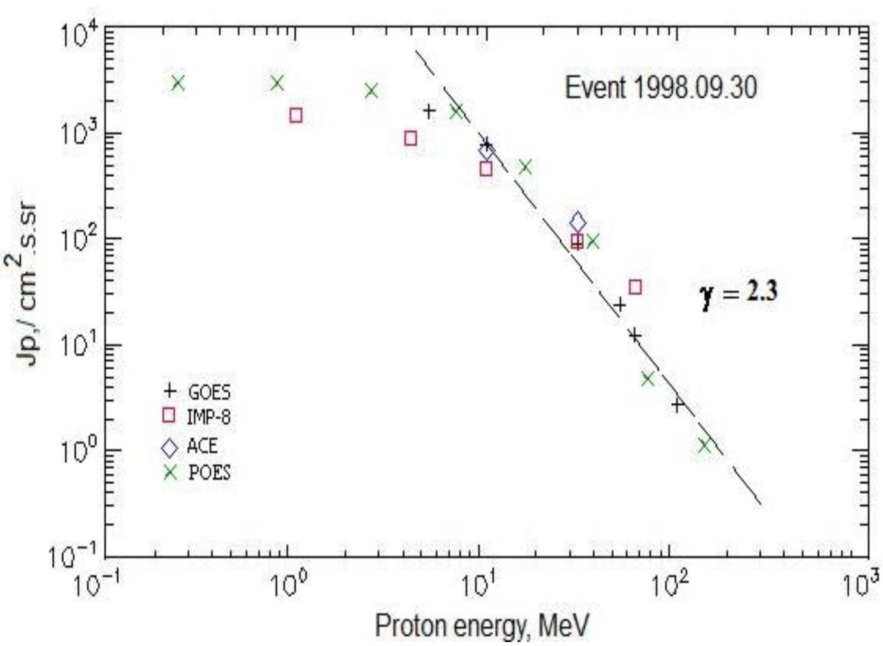


Time profiles of the proton fluxes for the event of 1998 September 30



Arrows on the profiles of the events indicate the time of the proton flux maxima, taken to build the proton spectra (see below)

Integral time-of-maximum proton spectrum



Список 1998 г.

Integral fluxes of protons for the event of 1998 September 30

S/c, instruments	Ep, MeV	To	Tmax	Jmax, /cm^2.s.sr	Dura-tion	Comments
GOES-10						
EPS	>5	14^h	$01d03^h$	1620	3d	
EPS	>10	14^h	23^h	785	3d	
EPS	>30	14^h	20^h	90	3d	
EPS	>50	14^h	19^h	24	2d	
EPS	>60	14^h	19^h	12.5	2d	
EPS	>100	14^h	19^h	2.7	1d	
POES-15						
MEPED	>0.24	-	21^h	3050	-	
MEPED	>0.8	-	20^h	2970	-	
MEPED	>2.5	-	19^h	2500	-	
MEPED	>6.9	-	18^h	1590	-	
MEPED	>16	-	18^h	480	-	
MEPED	>36	-	17^h	97	-	
MEPED	>70	-	17^h	4.8	-	
MEPED	>140	-	16^h	1.15	-	
IMP-8						
CPME	>1	14^h	21^h	1500	5d	
CPME	>4	14^h	21^h	910	5d	
CPME	>10	14^h	21^h	460	5d	
CPME	>30	14^h	20^h	95	3d	
CPME	>60	14^h	20^h	36	3d	
ACE						
SIS	>10	14^h	20^h	685	3d	
SIS	>30	14^h	19^h	144	3d	
SOHO						
EPHIN (INT)	>50	-	-	-	-	

Differential fluxes of protons for the event of 1998 September 30

S/c, instruments	ΔE, MeV	To	Tmax	Jmax /cm^2.s.sr.MeV	Dura-tion	Comments
IMP-8						
CPME	1-2	15^h	$01d15^h$	2000	~7d	
CPME	2-4.6	15^h	$01d15^h$	603	~7d	
CPME	4.6-15	15^h	21^h	48	~7d	
CPME	15-25	15^h	21^h	23	~4d	
CPME	25-48	15^h	20^h	3.1	~3d	
CPME	48-96	15^h	19^h	0.37	~2d	
CPME	96-145	-	-	-	-	
CPME	145-440	-	-	-	-	
SOHO		Data	absent			

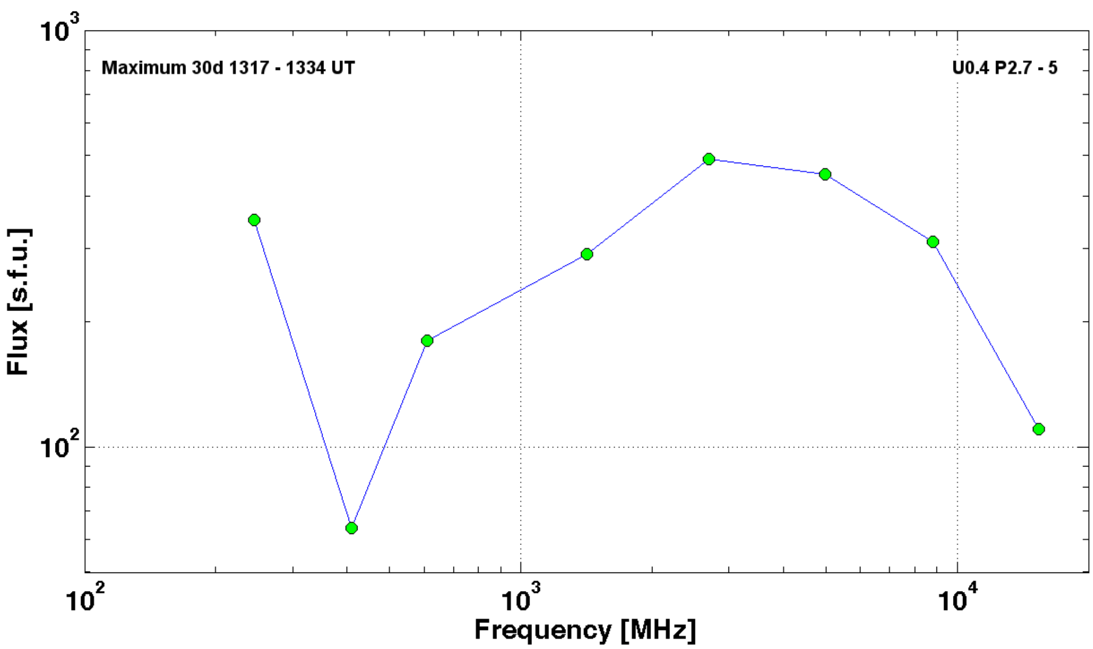
References

Dietrich W. and C. Lopate, 1999.
Reames D.V., C.K. Ng, and A.J. Tylka, 2000.
Leske R.A., R.A. Mewaldt, C. Cummings et al., 2001.

Electromagnetic and other phenomena that are sources and/or accompanying for the event of 1998 September 30

1998 September 30 ● AR8340 To event 347

Hα	6563 Å	1402	1434	1542	N23 W78	2N	FY
1 – 12	keV	1308	1350	1448		M2.8	1.1E–1
57-100	keV	<1314	~1343	>1344		354	HXT Y
15.4	GHz	1327.0	1331.0	0000.0		2.04	
8.8	GHz	1325.0	1331.0	1350.0		2.49	
5	GHz	1317.0	1334.0	1405.0	U0.4 P2.7 - 5	2.65	
2.7	GHz	1312.0	1330.0	1405.0		2.69	
1.4	GHz	1317.0	1332.0	1405.0		2.46	
610	MHz	1312.0	1317.0	0000.0		2.26	
410	MHz	1312.0	1317.0	1410.0		1.81	
245	MHz	1310.0	~1329.0	1405.0		2.54	
245	MHz	1251.0	1329.0	0000.0		2.54	
DS II	35-85	1322		1330		3	
DS IV	40-800	1310		~1500		3	
DS III	40-90	1307		1312	G	2	
DS V	30-63	1308		1315		2	
DS DCIM	800-2000	1308		1355	GG	3	
DS DCIM	2000-4400	1309		1355	GG	3	
CME	WL						gap



Event 1998.10.18 – (1998-291) **№ 348**

Particle event: To(Ep>10 MeV) – 18d22^h

Tmax$_1$(Ep>10 MeV) – 19d02^h Jmax$_1$(Ep>10 MeV) – 1.8 /cm^2.s.sr

Tmax$_2$(Ep>10 MeV) – 19d06^h Jmax$_2$(Ep>10 MeV) – 2.3 /cm^2.s.sr

Duration of the event – 2 days

Quasimaximal energy of protons in the event – Eqm$_1$ = 140 MeV

– Eqm$_2$ = 80 MeV

Sources: o DSF 15d<10^{h}05^m, N19E10, 27^o

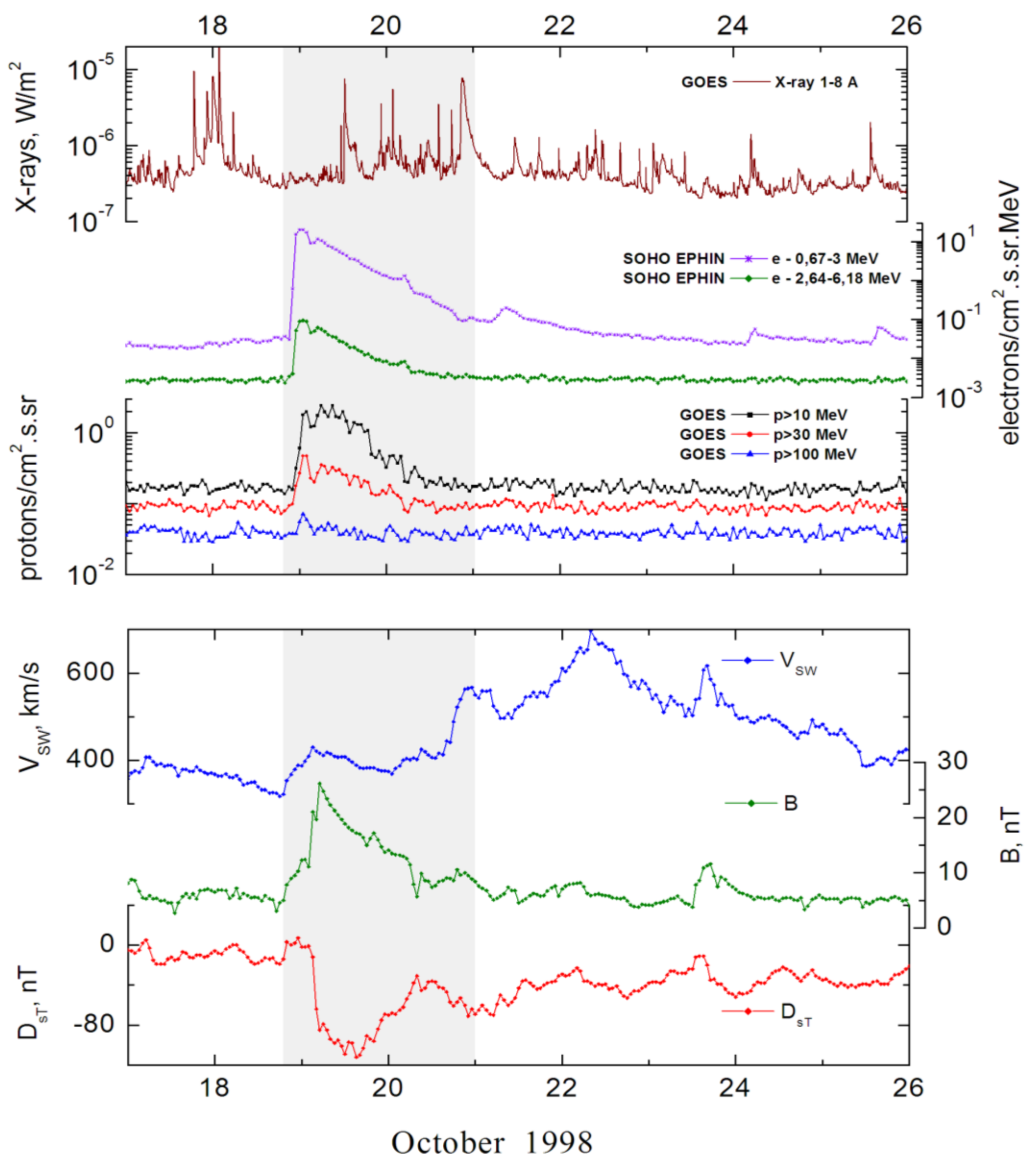
o solar flare 18d01^{h}38^m, M2.4/2B, N16W53, AR8358

Main burst X-ray 1-8Å: onset – 18d01^{h}38^m, max – 18d01^{h4}5^m, Φ = 0.001 J/m^2

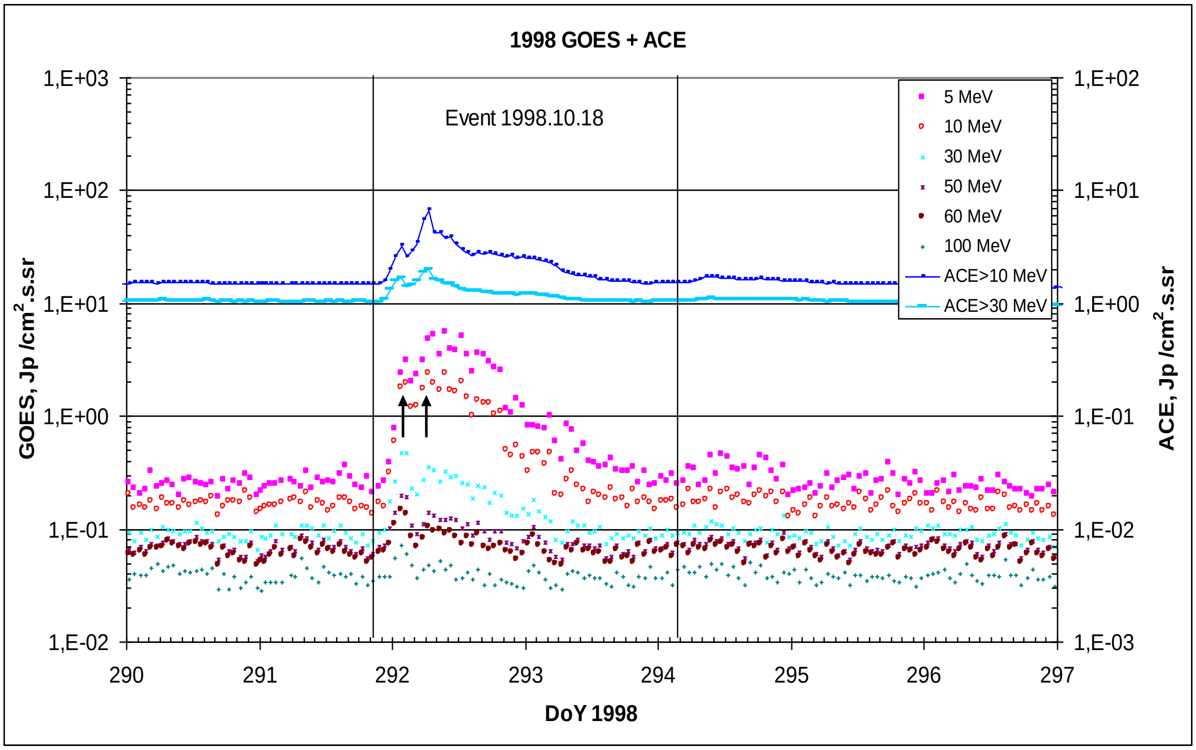
CME: 15d10^{h}05^m, V = 199 km/s, Δφ = 360^o, dA = 264^o

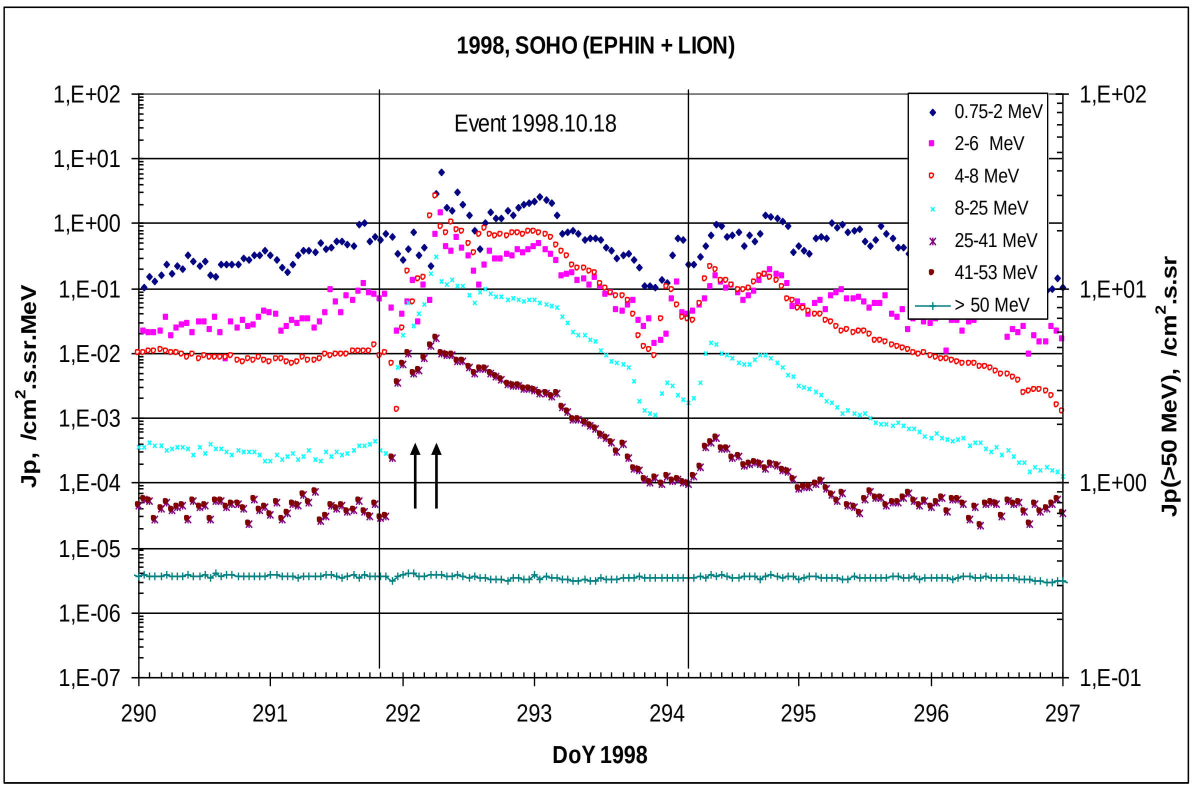
▲SC 18d19^{h}52^m

Particle fluxes and associated phenomena



Time profiles of the proton fluxes for the event of 1998 October 18

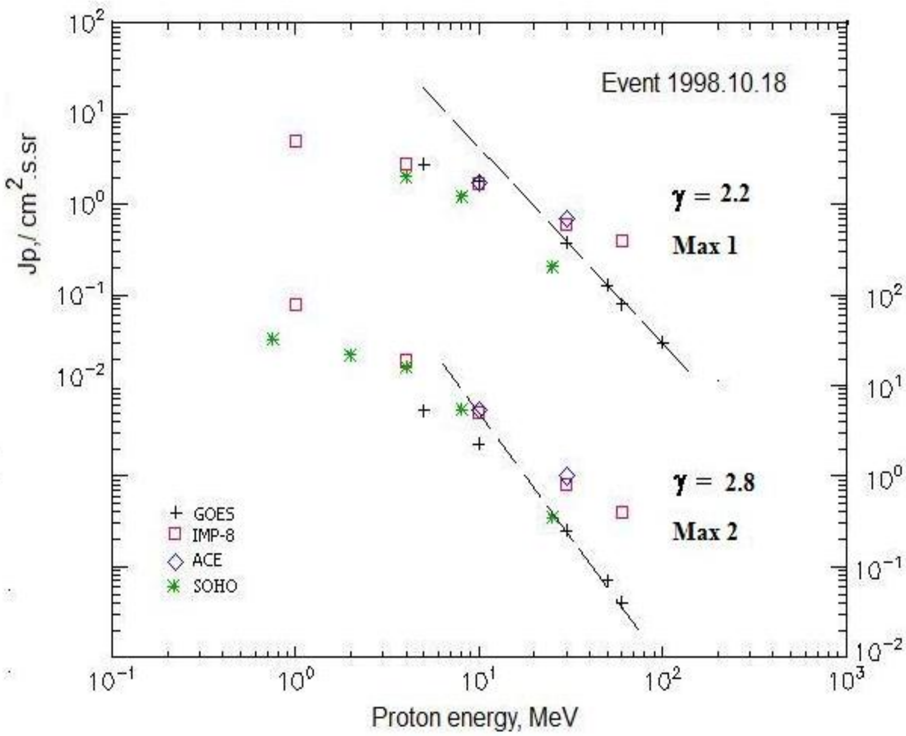




Arrows on the profiles of the events indicate the time of the proton flux maxima, taken to build the proton spectra (see below)

Список 1998 г.

Integral time-of-maximum proton spectrum



Integral fluxes of protons for the event of 1998 October 18

S/c, instrument	Ep, MeV	To	Tmax	Jmax, /cm^2.s.sr	Dura-tion	Comments
GOES-10						
EPS	>5	22^h	$19d02^h/19d09^h$	2.8/5.3	2d	
EPS	>10	22^h	$19d02^h/19d06^h$	1.8/2.3	2d	
EPS	>30	22^h	$19d02^h/19d06^h$	0.38/0.25	1d	
EPS	>50	23^h	$19d01^h/19d06^h$	0.13/0.07	1d	
EPS	>60	23^h	$19d01^h/19d06^h$	0.08/0.04	1d	
EPS	>100	23^h	$19d01^h$/ -	0.03/ -	1d	
IMP-8						
CPME	>1	22^h	$19d02^h/19d09^h$	5/77	2d	
CPME	>4	22^h	$19d02^h/19d06^h$	2.8/18.8	2d	
CPME	>10	22^h	$19d02^h/19d06^h$	1.7/5.1	2d	
CPME	>30	22^h	$19d01^h/19d06^h$	0.6/0.8	2d	
CPME	>60	22^h	$19d01^h/19d06^h$	0.4/0.4	2d	
ACE						
SIS	>10	22^h	$19d01^h/19d06^h$	1.75/5.3	2d	
SIS	>30	22^h	$19d01^h/19d06^h$	0.7/1	2d	
SOHO						
EPHIN (INT)	>50	-	-	-	-	

Differential fluxes of protons for the event of 1998 October 18

S/c, instruments	ΔE, MeV	To	Tmax	Jmax. /cm^2.s.sr.MeV	Dura-tion	Comments
IMP-8						
CPME	1-2	19d06^h	- /19d06^h	- /33	~2d	
CPME	2-4.6	19d03^h	- /19d06^h	- /12	~2d	
CPME	4.6-15	21^h	19d02^h/19d06^h	0.1/1.2	~2d	
CPME	15-25	22^h	19d02^h/19d06^h	0.07/0.2	~2d	
CPME	25-48	21^h	19d01^h/19d06^h	0.02/0.02	~2d	
CPME	48-96	-	-	-	-	
CPME	96-145	-	-	-	-	
CPME	145-440	-	-	-	-	
SOHO						
LION	0,75-2	19d05^h	- /19d07^h	- /6.1	1.5d	
LION	2-6	19d05^h	- /19d07^h	- /1.4	1.5d	
EPHIN	4-8	23^h	19d01^h/19d06^h	0.2/2.6	2.5d	
EPHIN	8-25	22^h	19d01^h/19d06^h	0.06/0.3	2.5d	
EPHIN	25-41	22^h	19d01^h/19d06^h	0.01/0.017	2.5d	
EPHIN	41-53	- “ -	- “ -	- “ -	- “ -	

Electromagnetic and other phenomena that are sources and/or accompanying for the event of 1998 October 18

1998 October 15 ○ AR To event 348

DSF	6562 Å	<1005		<1101	N19E10	27^o	*
1 – 12	keV						
CME	WL	15^d 1004	0199 km/s	3.2 km/s	360^o	264^o	

The spacecraft detected an interplanetary shock passage at 18/1902UT related to a halo-CME produced by a large filament disappearance on 15 October – PRF1207, 1208.

1998 October 18 ○ AR8358 To event 348

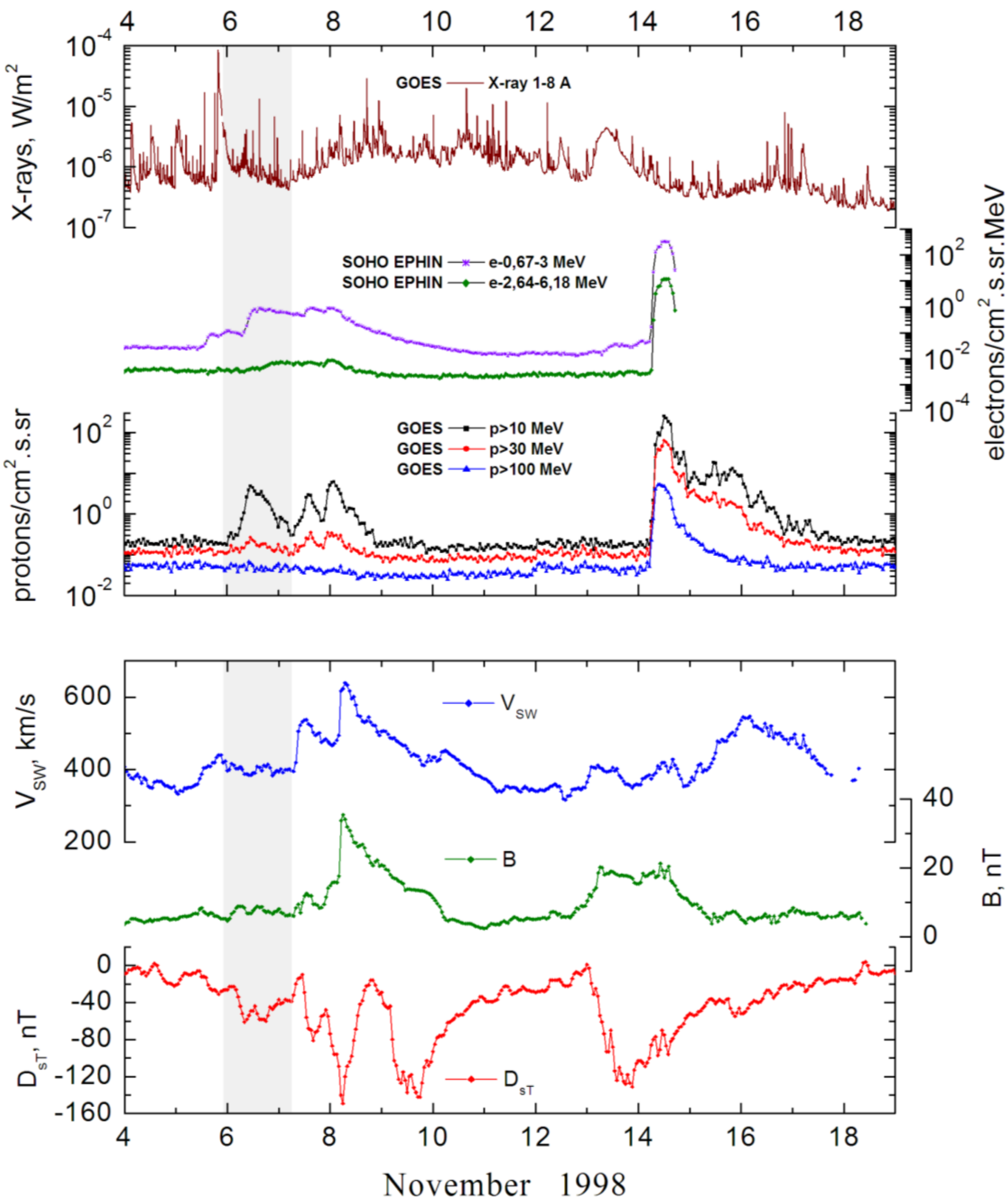
Hα	6563 Å	0142	0144	0202	N16 W53	2B	EFH
1 – 12	keV	0138	0145	0152		M2.4	9.9E–3
410	MHz	0158	0318		85	110	
CME	WL						gap

Event 1998.11.06 – (1998-310) **№ 349**

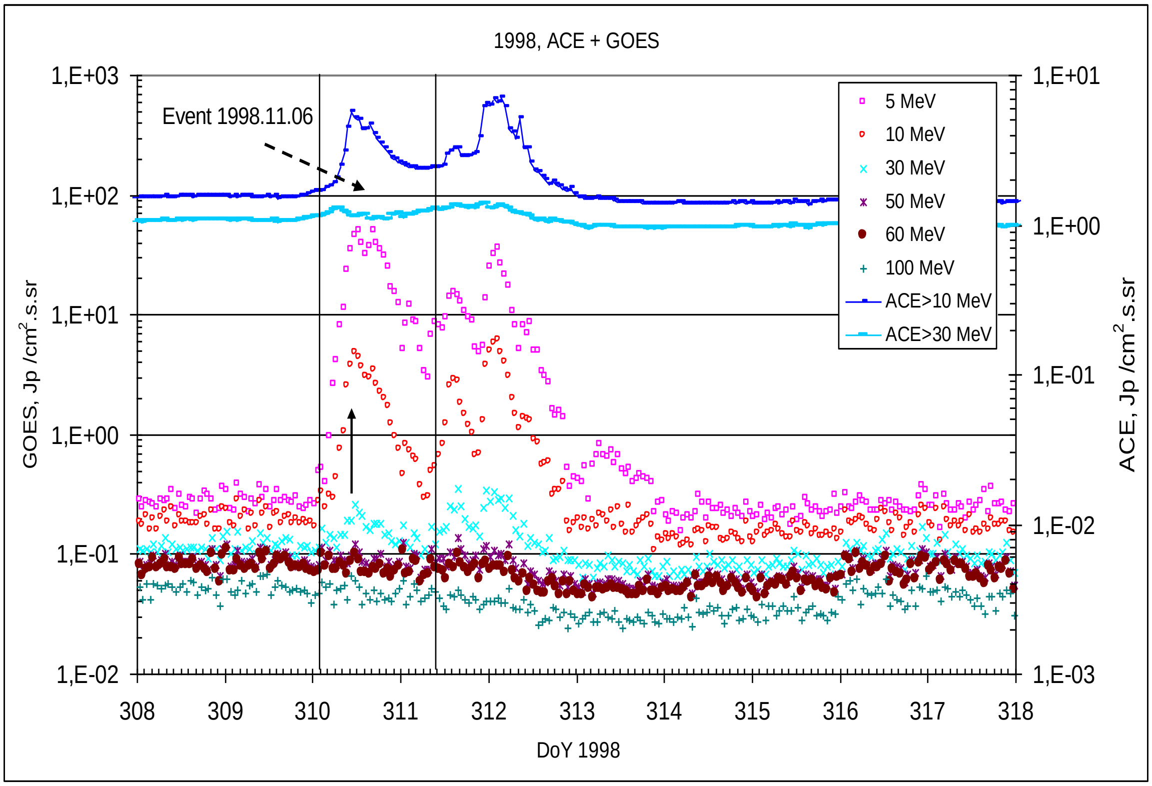
Particle event: To(Ep>10 MeV) – 06d03^h
Tmax(Ep>10 MeV) – 06d12^h, Jmax(Ep>10 MeV) – 4.6 /cm^2.s.sr
Duration of the event – 2 days
Quasimaximal energy of protons in the event – Eqm = 75 MeV

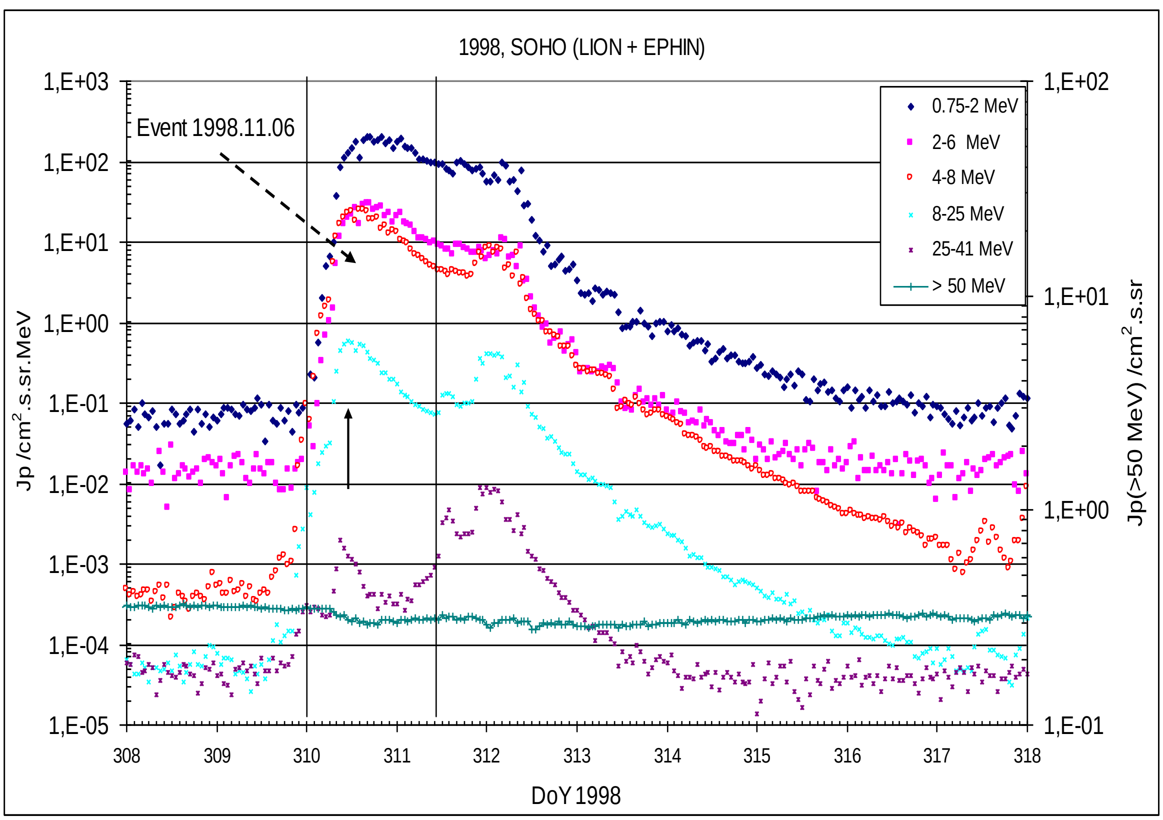
Sources: ● solar flare 05d19^{h}00^m, M8.4/2B, N22W18, AR8375
Main X-ray burst 1-8 Å: onset – 05d19^h 00^m, max – 05d19^{h}55^m, Φ = 0.11 J/m^2
CME:05d20^{h}44^m, V = 1118 km/s , $\Delta\varphi$ = 360^o, dA = 300^o
ΔSC 07d08^{h}15^m

Particle fluxes and associated phenomena



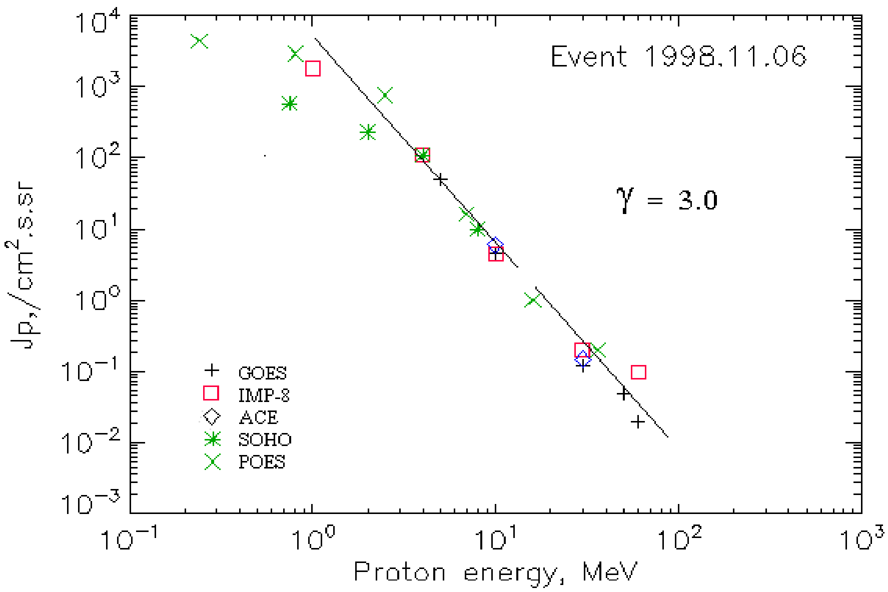
Time profiles of the proton fluxes for the event of 1998 November 06





Arrows on the profiles of the events indicate the time of the proton flux maxima, taken to build the proton spectra (see below)

Integral time-of-maximum proton spectrum



Integral fluxes of protons for the event of 1998 November 06

S/c, instrument	Ep, MeV	To	Tmax	Jmax, /cm^2.s.sr	Dura-tion	Comments
GOES-10						
EPS	>5	03^h	12^h	50.5	1.5d	
EPS	>10	03^h	12^h	4.6	1.5d	
EPS	>30	03^h	12^h	0.12	1.5d	
EPS	>50	03^h	11^h	0.05	1.5d	
EPS	>60	03^h	11^h	0.02	1.5d	
EPS	>100	-	-	-	-	
POES-15						
MEPED	>0.24	-	12^h	4360	1.5d	
MEPED	>0.8	-	12^h	2890	1.5d	
MEPED	>2.5	-	12^h	760	1.5d	
MEPED	>6.9	-	12^h	16	1.5d	
MEPED	>16	-	12^h	1	1.5d	
MEPED	>36	-	12^h	0.2	1.5d	
MEPED	>70	-	-	-	-	
MEPED	>140	-	-	-.	-	
IMP-8						
CPME	>1	01^h	12^h	1790	1.5d	
CPME	>4	01^h	12^h	110	1.5d	
CPME	>10	01^h	12^h	4.5	1.5d	
CPME	>30	01^h	12^h	0.2	1.5d	
CPME	>60	01^h	12^h	0.1	-	
ACE						
SIS	>10	07^h	10^h	6	1.5d	
SIS	>30	07^h	08^h	0.15	1.5d	
SOHO						
EPHIN (INT)	>50	-	-	-	-	

Differential fluxes of protons for the event of 1998 November 06

S/c, instruments	ΔE, MeV	To	Tmax	Jmax. /cm^2.s.sr.MeV	Dura-tion	Comments
IMP-8						
CPME	1-2	01^h	12^h	754	1.5d	
CPME	2-4.6	01^h	12^h	173	1.5d	
CPME	4.6-15	01^h	12^h	6.7	1.5d	
CPME	15-25	01^h	12^h	0.05	1.5d	
CPME	25-48	-	-	-	-	
CPME	48-96	-	-	-	-	
CPME	96-145	-	-	-	-	
CPME	145-440	-	-	-	-	
SOHO						
LION	0.75-2	02^h	17^h	200	2d	
LION	2-6	01^h	17^h	30.2	2d	
EPHIN	4-8	00^h	16^h	24.8	1.5d	
EPHIN	8-25	00^h	12^h	0.58	1.5d	
EPHIN	25-41	-	-	-	-	
EPHIN	41-53	- “ -	- “ -	- “ -	- “ -	

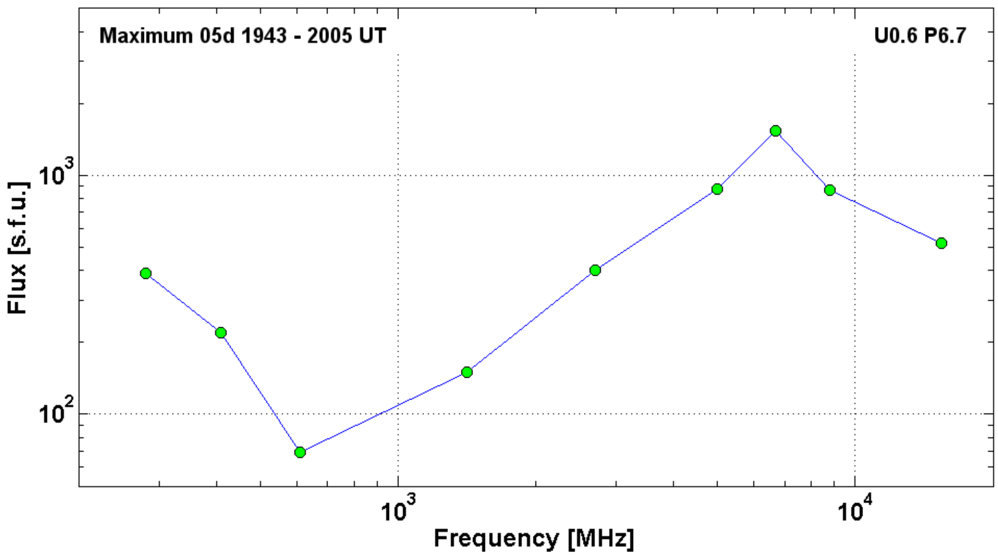
Electromagnetic and other phenomena that are sources and/or accompanying for the event of 1998 November 06

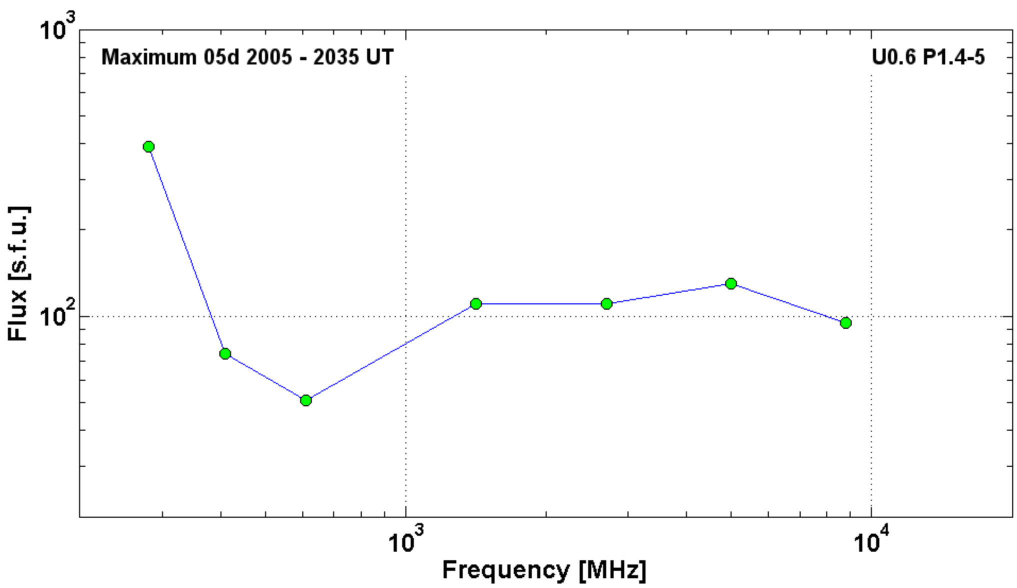
1998 November 05 ● AR8375 To event 349

Hα	6563 Å	<1839*	1950	>2334	N22 W18	2B	T
1 – 12	keV	1900	1955	2012		M8.4	1.1E–1
>300 keV	keV	193749	194343	201520		742.61	BATS C
15.4	GHz	1941.0	1944.0	2048.0		2.72	
8.8	GHz	1941.0	1943.0	2006.0		2.94	
6.7	GHz	1937.9	1952.2	2046.9	U0.6 P6.7	3.19	
5	GHz	1941.0	1952.0	2053.0		2.94	
2.7	GHz	1941.0	1952.0	2055.0		2.60	
1.4	GHz	1942.0	1946.0	2055.0		2.18	
610	MHz	1945.0	1954.0	2055.0		1.84	
410	MHz	1944.0	1945.0	2053.0		2.34	
280	MHz	1951.0	2005.2			2.59	
DS II	25-75	1951		1957		2	

8.8	GHz	2026.0	2027.0	2045.0		1.98	
5	GHz	2016.0	2026.0	2047.0	U0.6 P1.4-5	2.11	
2.7	GHz	2016.0	2035.0	2047.0		2.04	
1.4	GHz	2015.0	2026.0	2047.0		2.04	
610	MHz	2025.0	2027.0	2047.0		1.71	
410	MHz	2015.0	2015.0	2047.0		1.87	
280	MHz	1951.0	2005.2			2.59	
DS IV	25-300	<2015		2142		2	
DS III	18-180	2017		2037	N	2	
DS CONT	25-55	2010		0337		1	
CME	WL	2044	1118 km/s	-24.0 km/s^2	360˚	300˚	

* – No Flare Patrol 5^d 1729 – 1839





Список 1998 г.

Event 1998.11.07 – (1998-311) **№ 350**

Particle event: To(Ep>10 MeV) – 07d12^h

Tmax$_1$(Ep>10 MeV) – 07d14^h, Jmax$_1$ (Ep>10 MeV) – 2.8 /cm^2.s.sr

Tmax$_2$(Ep>10 MeV) – 08d02^h, Jmax$_2$ (Ep>10 MeV) – 6 /cm^2.s.sr

Duration of the event – 3 days

Quasimaximal energy of protons in the event – Eqm$_1$ = 75 MeV

– Eqm$_2$ = 80 MeV

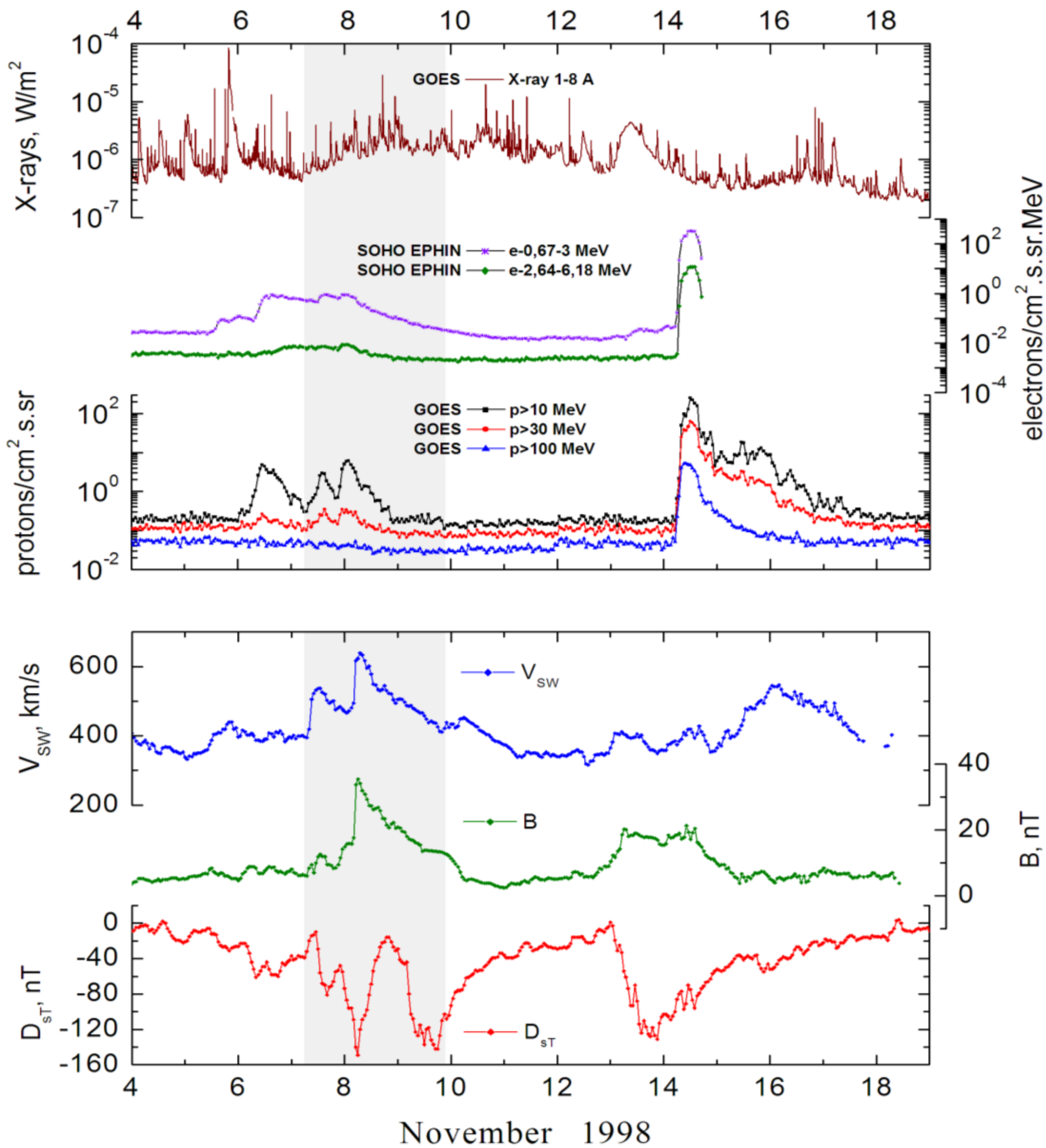
Sources: ● solar flare 07d11^{h}06^m, M2.4/SN, N14W43, AR8375

Main X-ray burst 1-8 Å: onset – 07d11^{h}02^m, max – 07d11^{h}06^m, Φ = 0.005 J/m^2

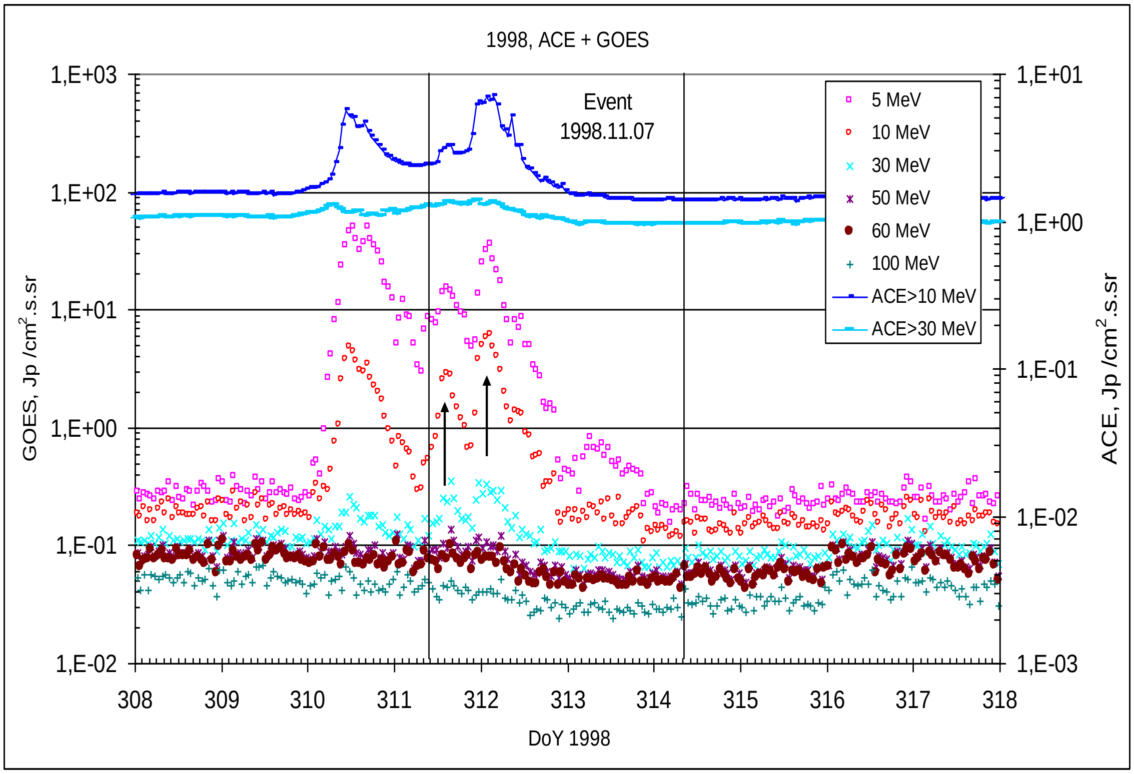
CME: 07d11^{h}54^m, V = 0632 km/s, Δφ = 360˚, dA = 258˚

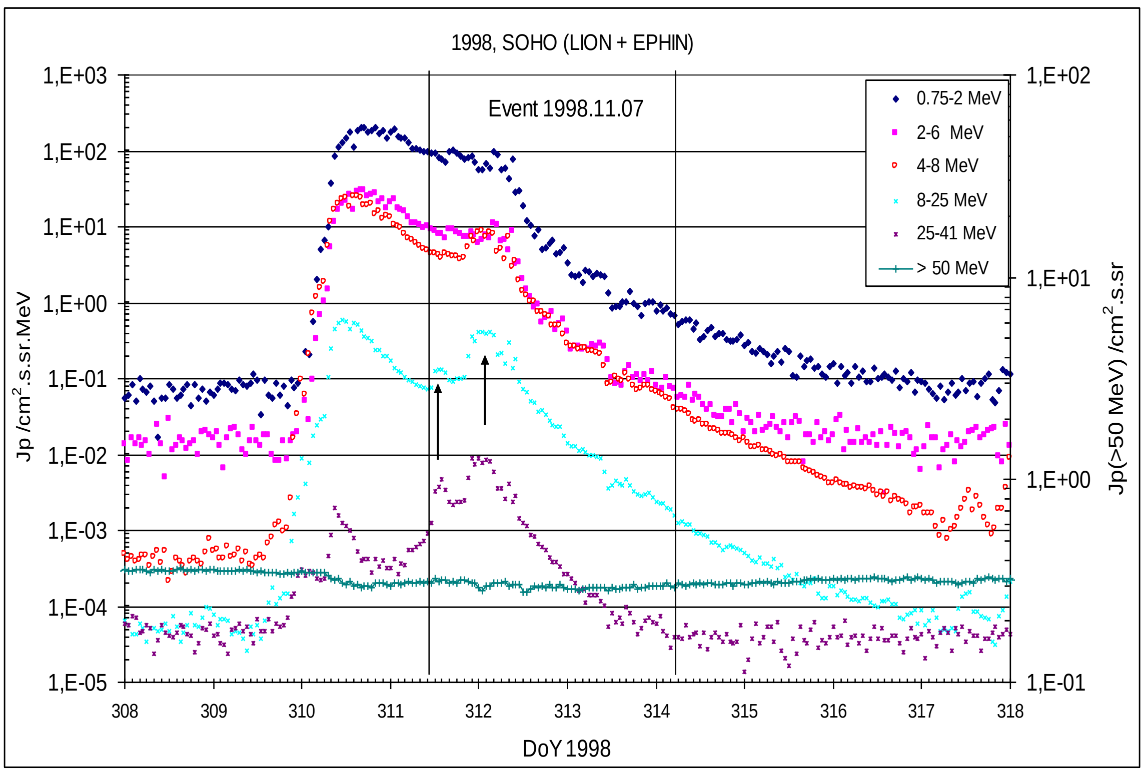
▲SC 08d04^{h}51^m

Particle fluxes and associated phenomena



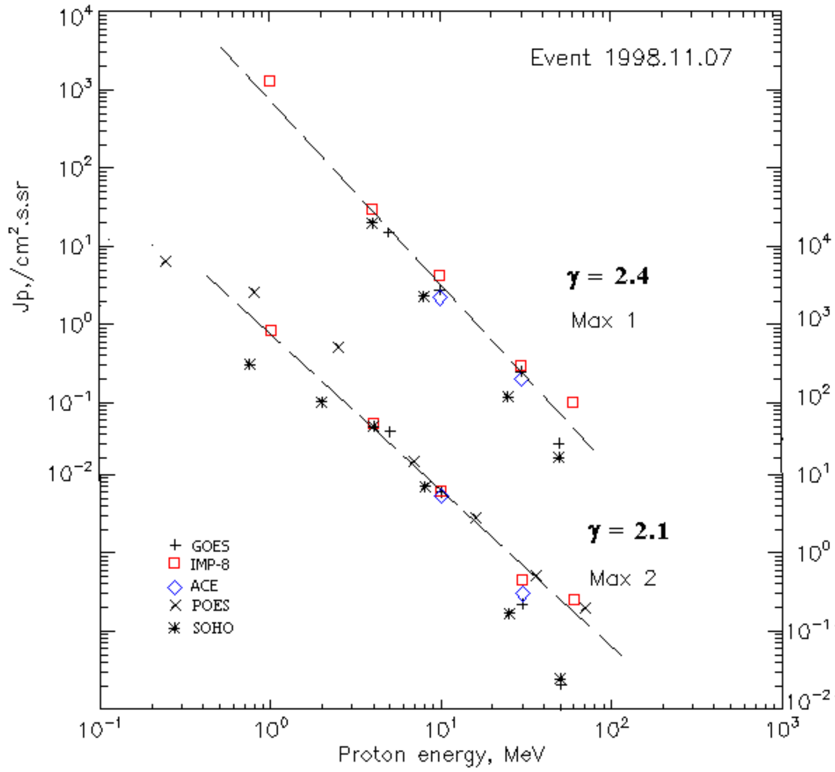
Time profiles of the proton fluxes for the event of 1998 November 07





Arrows on the profiles of the events indicate the time of the proton flux maxima, taken to build the proton spectra (see below)

Integral time-of-maximum proton spectrum



Integral fluxes of protons for the event of 1998 November 07

S/c, instruments	Ep, MeV	To	Tmax	Jmax, /cm^2.s.sr	Dura-tion	Comments
GOES-10						
EPS	>5	12^h	14^h/08d02^h	15.3/36	3d	
EPS	>10	12^h	14^h/08d02^h	2.8/6	3d	
EPS	>30	12^h	14^h/08d01^h	0.25/0.22	3d	
EPS	>50	12^h	14^h/ -	0.03/0.02	2d	
EPS	>60	-	-	-	-	
EPS	>100	-	-	-	-	
POES-15						
MEPED	>0.24	-	- /08d03^h	- /5338	3d	
MEPED	>0.8	-	- /08d03^h	- /2078	3d	
MEPED	>2.5	-	- /08d03^h	- /329	3d	
MEPED	>6.9	-	- /08d03^h	- /10.5	2d	
MEPED	>16	-	- /08d03^h	- /2.85	2d	
MEPED	>36	-	- /08d03^h	- /0.51	2d	
MEPED	>70	-	- /08d03^h	- /0.2	2d	
MEPED	>140	-	-	-	-	
IMP-8						
CPME	>1	12^h	13^h/8d01^h	1310/686	3d	
CPME	>4	12^h	13^h/8d01^h	30/45	3d	
CPME	>10	12^h	13^h/8d01^h	4.3/6.1	2d	
CPME	>30	12^h	13^h/8d01^h	0.3/0.45	1.5d	
CPME	>60	12^h	13^h/8d01^h	0.1/0.25	1.5d	

ACE						
SIS	>10	12^h	13^h/8d01^h	2.2/5.4	1.5d	
SIS	>30	12^h	13^h/8d01^h	0.2/0.3	1d	
SOHO						
EPHIN (INT)	>50	-	14^h/08d01^h	0.02/0.025	-	

Differential fluxes of protons for the event of 1998 November 07

S/c, instruments	ΔE, MeV	To	Tmax	Jmax /cm^2.s.sr.MeV	Dura-tion	Comments
IMP-8						
CPME	1-2	-	13^h/ -	1130/ -	5d	
CPME	2-4.6	-	13^h/ -	84/ -	5d	
CPME	4.6-15	-	13^h/ -	1.8/ -	5d	
CPME	15-25	-	13^h/ -	0.08/ -	5d	
CPME	25-48	-	13^h/ -	0,008/ -	5d	
CPME	48-96	-	-	-	-	
CPME	96-145	-	-	-	-	
CPME	145-440	-	-	-	-	
SOHO						
LION	0.75-2	-	- /08d04^h	- /99	5d	
LION	2-6	-	- /08d04^h	- /11	5d	
EPHIN	4-8	14^h	15^h/08d01^h	4.4/8.5	5d	
EPHIN	8-25	12^h -	14^h/08d01^h	0.13/0.4	5d	
EPHIN	25-41	12^h -	14^h/08d01^h	0.005/0.008	3d	
EPHIN	41-53	- “ -	- “ -	- “ -	- “ -	

Electromagnetic and other phenomena that are sources and/or accompanying for the event of 1998 November 07

1998 November 07 ● AR8375 To event 350

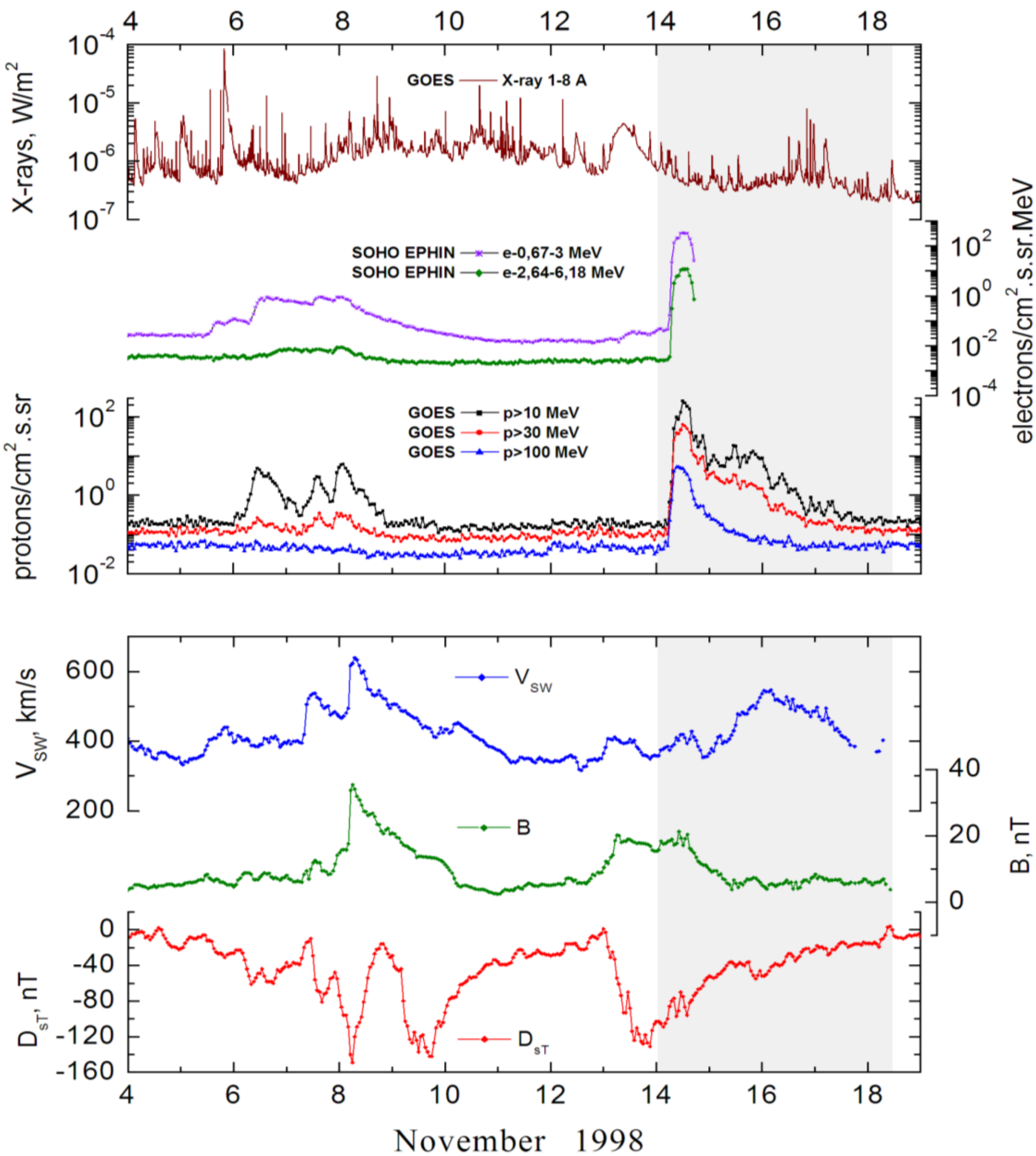
Hα	6563 Å	1104	1108	1116	N14 W43	SN	C
1 – 12.5	keV	1102	1106	1116		M2.4	4.9E-3
53 – 93	keV	<110522	110558	111100		788	HXT Y
>300	MeV	110410	110556	110934			BATS C
3	GHz	1104.5	1106.0	1108.3		1.70	
204	MHz	1104.6	1104.8	1107.8		4.51	
DS DCIM	2000-4375	1104		1106	G	2	
DS DCIM	800-2000	1104		1107	G	2	
CME	WL	1154	0632 km/s	1.3 km/s	360˚	258˚	

Event 1998.11.14 – (1998-318) **№ 351**

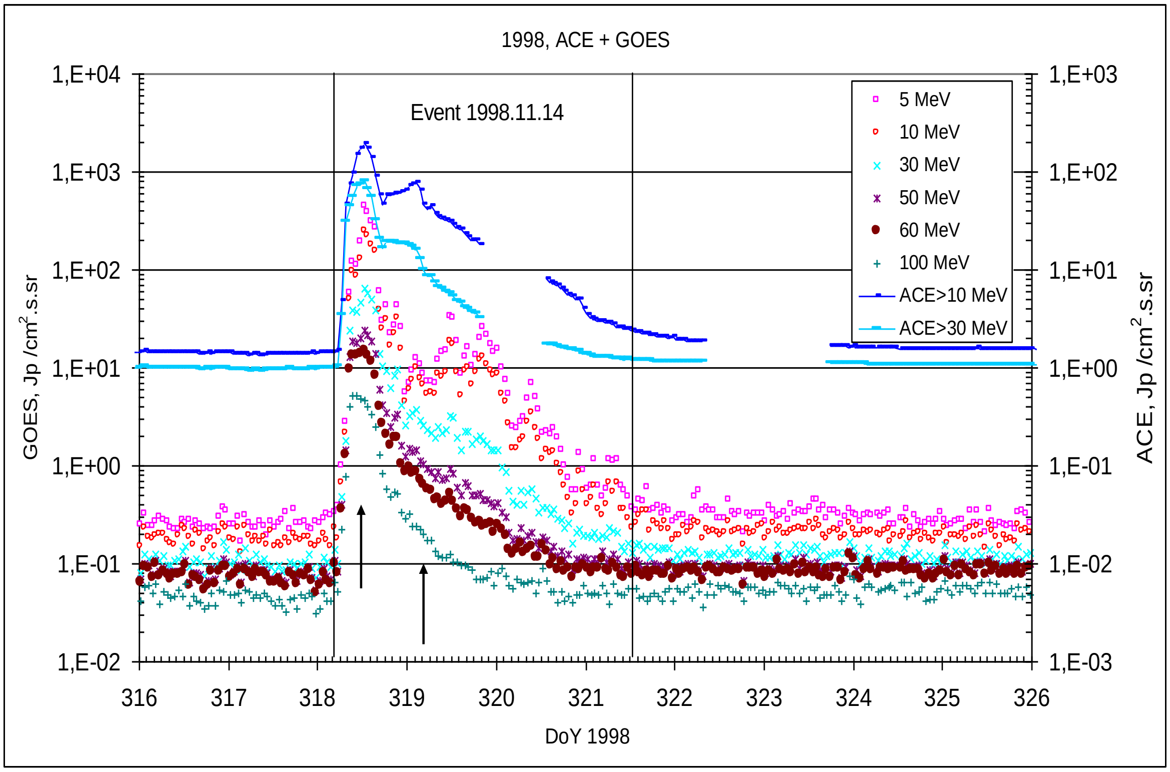
Particle event: To(Ep>10 MeV) – 14d06^h
Tmax$_1$(Ep>10 MeV) –14d12^h, Jmax$_1$ (Ep>10 MeV) – 250 /cm^2.s.sr
Tmax$_2$(Ep>10 MeV) –15d06^h, Jmax$_2$ (Ep>10 MeV) – 10 /cm^2.s.sr
Duration of the event – 3 days
Quasimaximal energy of protons in the event – Eqm$_1$ = 580 MeV
– Eqm$_2$ = 190 MeV

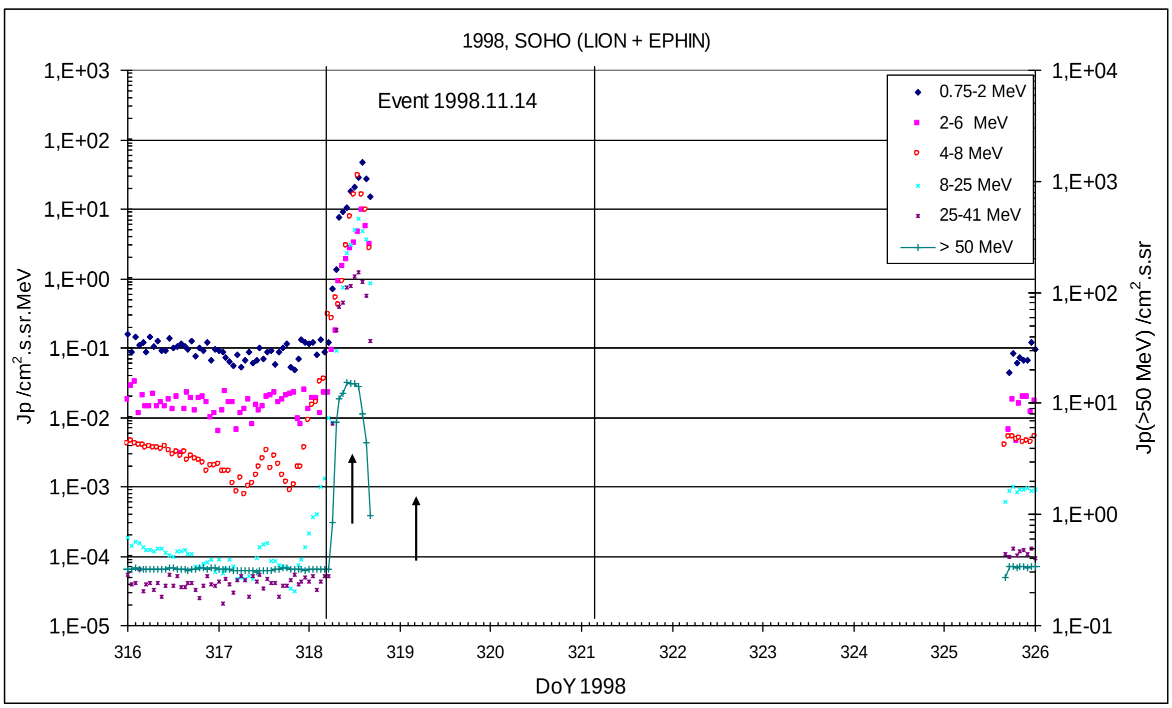
Sources: ⊡ solar flare 14d05^{h}00^m, C1.3/, N28W90*, AR8375 ~ 2 days behind W-limb;
Main X-ray burst 1-8 Å: onset – 14d05^{h}00^m, max – 14d05^{h}08^m, Φ = 0.013 J/m^2
CME: gap
* – localization on BSL

Particle fluxes and associated phenomena



Time profiles of the proton fluxes for the event of 1998 November 14





Arrows on the profiles of the events indicate the time of the proton flux maxima, taken to build the proton spectra (see below)

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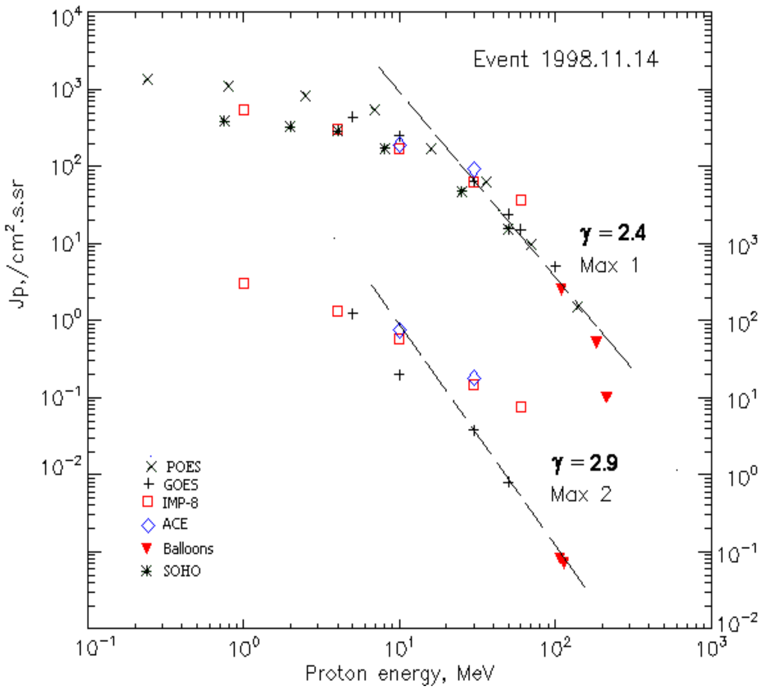
Integral time-of-maximum proton spectrum



Integral fluxes of protons for the event of 1998 November 14

S/c, instruments	Ep, MeV	To	Tmax	Jmax, /cm^2.s.sr	Dura-tion	Comments
GOES-10						
EPS	>5	06^h	12^h/15d02^h	442/12.5	3.5d	0.35
EPS	>10	06^h	12^h/15d02^h	250/10	3d	0.21
EPS	>30	06^h	12^h/15d02^h	64/3.8	2d	0.12
EPS	>50	06^h	12^h/15d02^h	24/0.8	2d	0.09
EPS	>60	06^h	12^h/ -	15/ -	2d	0.08
EPS	>100	06^h	09^h/ -	5.1/ -	2d	0.05
POES-15						
MEPED	>0.24	-	(11-14)^h/ -	1375/ -	4d	
MEPED	>0.8	-	(11-14)^h/ -	1122/ -	4d	
MEPED	>2.5	-	(11-14)^h/ -	843/ -	3.5d	
MEPED	>6.9	-	(11-14)^h/ -	544/ -	3d	
MEPED	>16	-	(11-14)^h/ -	170/ -	2d	
MEPED	>36	-	(11-14)^h/ -	64.2/ -	2d	
MEPED	>70	-	(11-14)^h/ -	9.67/ -	2d	
MEPED	>140	-	(11-14)^h/ -	1.5/ -	2d	
IMP-8						
CPME	>1	05^h	14^h/15d03^h	550/305	>5d	
CPME	>4	05^h	14^h/15d03^h	305/134	>5d	
CPME	>10	05^h	14^h/15d03^h	173/58	5d	
CPME	>30	05^h	13^h/15d03^h	64/14.6	4d	
CPME	>60	05^h	13^h/15d03^h	37/7.6	4d	
ACE						
SIS	>10	05^h	12^h/15d02^h	192/75	2d	
SIS	>30	05^h	12^h/15d02^h	92/18	2d	

SOHO						
EPHIN (INT)	>50	06^h	10^h/ -	15.5/ -		
BALLOONS						
Mi	>110	-	08^h-12^h/ -	2.5/ -	-	
Mi	>184	-	08^h-12^h/ -	0.5/ -	-	
Mi	>214	-	08^h-12^h/ -	0.1/ -	-	
Mi	>107	-	- /15d(03^h-03^h)	- /0.08	-	
Mi	>114	-	- /15d(03^h-03^h)	- /0.07	-	

Differential fluxes of protons for the event of 1998 November 14

S/c, instruments	ΔE, MeV	To	Tmax	Jmax. /cm^2.s.sr.MeV	Dura-tion	Comments
IMP-8						
CPME	1-2	05^h	14^h/15d03^h	101/78	~2,5d	
CPME	2-4.6	05^h	14^h/15d03^h	65/43	~2,5d	
CPME	4.6-15	05^h	14^h/15d03^h	14.2/7.8	~2,5d	
CPME	15-25	05^h	14^h/15d03^h	6.4/2.4	~2,5d	
CPME	25-48	05^h	14^h/15d03^h	1.3/0.34	~2,5d	
CPME	48-96	05^h	14^h/15d03^h	0.3/0.075	~2,5d	
CPME	96-145	05^h	14^h/15d03^h	0.2/0.08	~2,5d	
CPME	145-440	05^h	14^h/15d03^h	0.05/0.01	~2,5d	
SOHO						
LION	0,75-2	05^h	14^h/ -	46/ -	-	
LION	2-6	05^h	14^h/ -	9.7/ -	-	
EPHIN	4-8	05^h	13^h/ -	30/ -	-	
EPHIN	8-25	05^h	13^h/ -	7.3/ -	-	
EPHIN	25-41	05^h	13^h/ -	1.25/ -	-	

References

Dietrich W. and C. Lopate, 1999.
Leske R.A., R.A. Mewaldt, C. Cummings et al., 2001.

Electromagnetic and other phenomena that are sources and/or accompanying for the event of 1998 November 14

1998 November 14 ⊡ AR8375 To event 351

Hα	6563 Å	No Flare					
BSL	6563 Å	0518		0543	N28 W90		
1 -12.5	keV	0500	0508	0515		C1.3	6.1E-04
33 – 53	keV	0503:11	0505:13	0506:23		339	HXT Y
5.7	GHz	0500.3	0505.1	0532.3		0.90	
245	MHz	0502.0	0502.0	0503.0		2.04	
DS II	35-160	0506		0524	SH	3	
DS II	18-70	0506		0528	FN	3	
DS IV	30-80	0501		0536		3	
DS III	18-230	0502		0506	G	2	
CME	WL						gap

Event 1998.11.22 – (1998-326) **№ 352**

Particle event: To(Ep>10 MeV) – 22d07^h

Tmax$_1$(Ep>10 MeV) – 22d09^h, Jmax$_1$ (Ep>10 MeV) – 1.1 /cm^2.s.sr

Tmax$_2$(Ep>10 MeV) – 22d14^h, Jmax$_2$ (Ep>10 MeV) – 0.6 /cm^2.s.sr

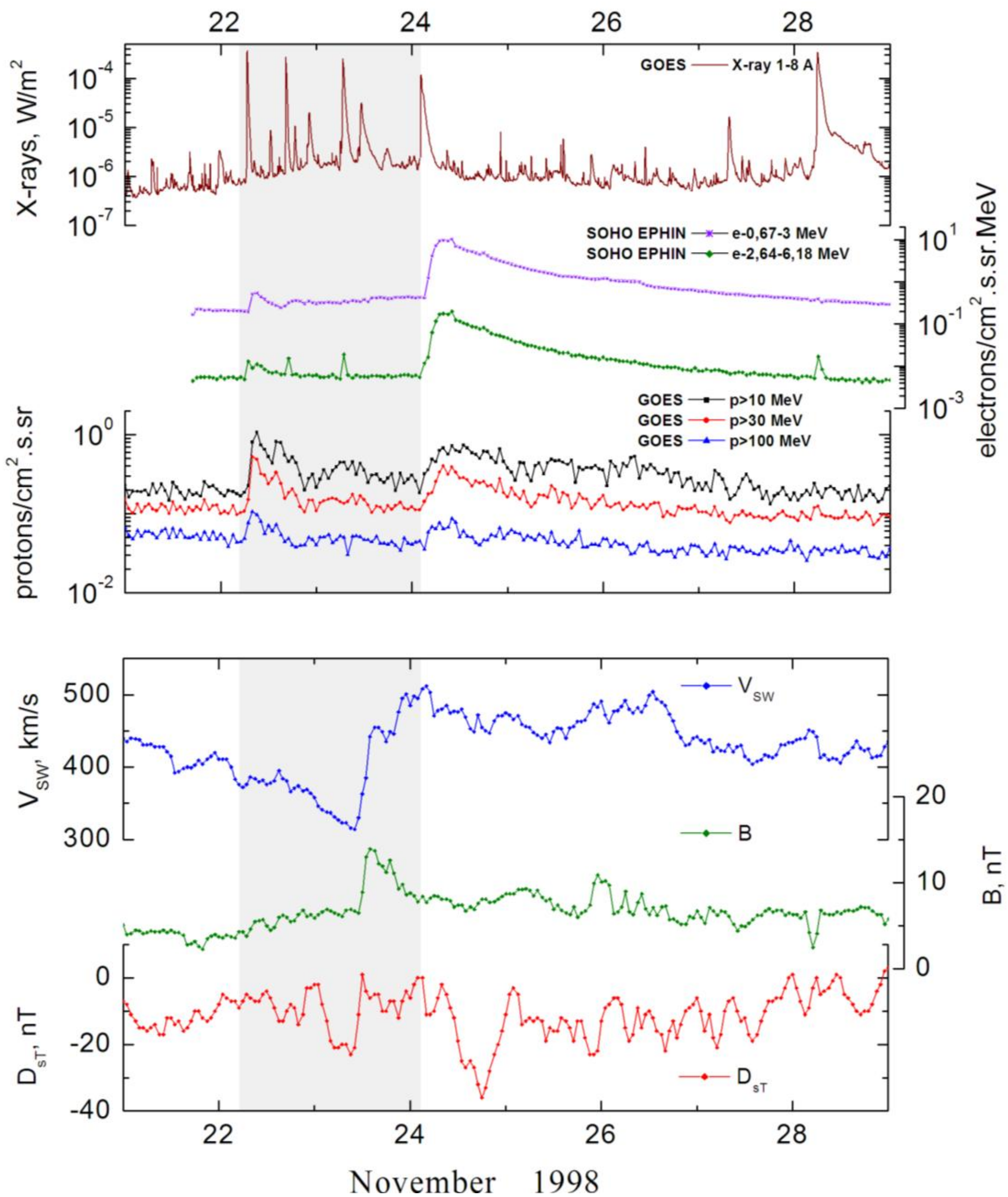
Duration of the event – 1.5 day

Quasimaximal energy of protons in the event – Eqm$_1$ = 285 MeV

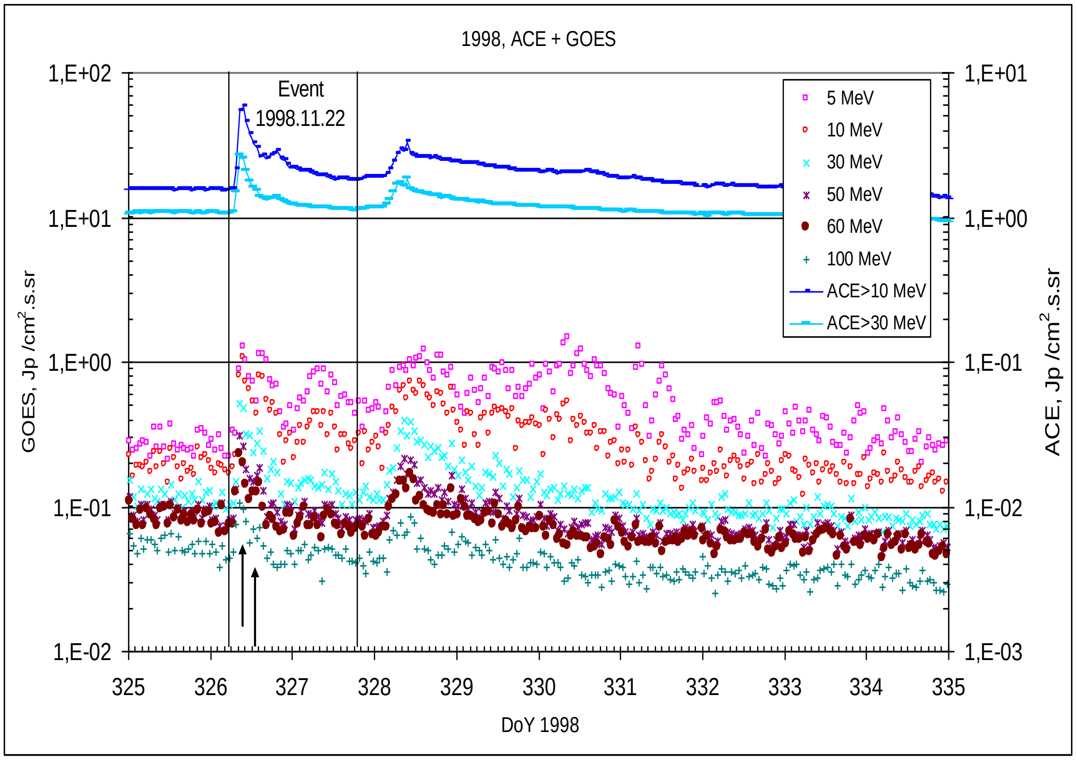
– Eqm$_2$ = 160 MeV

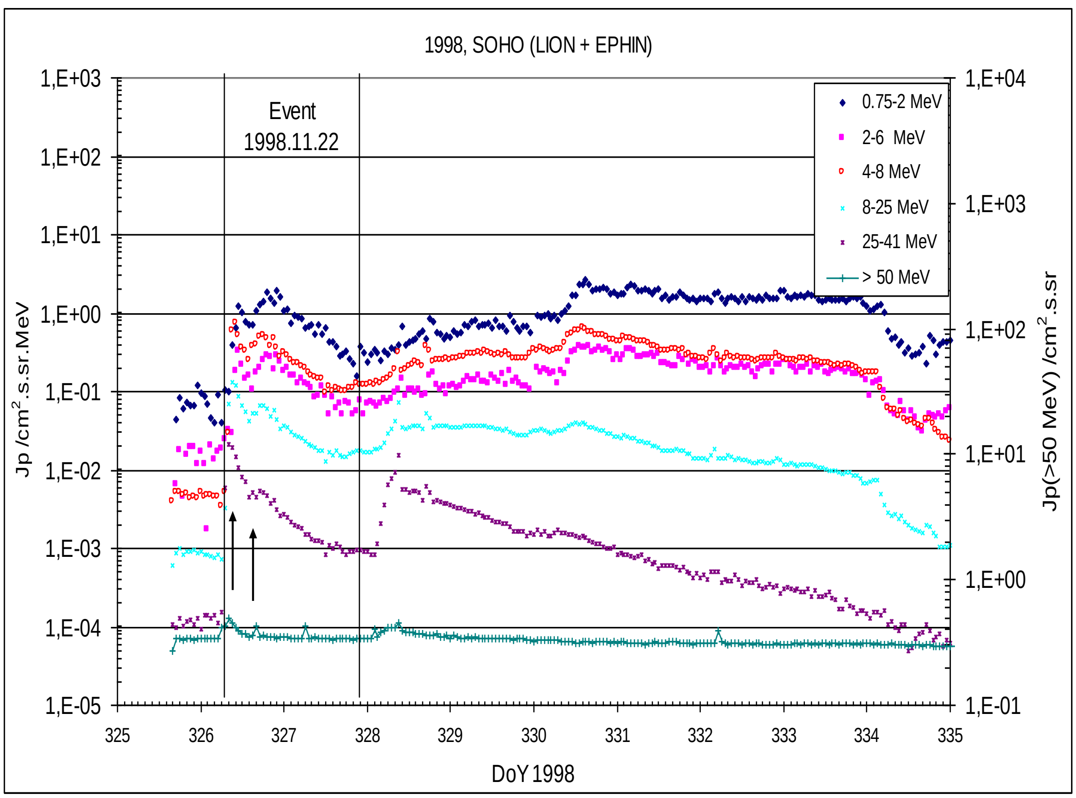
Sources: ● solar flare 22d06^{h}30^m, X3.7/1N, S27W82, AR8384
Main burst X-ray 1-8 Å: onset – 22d06^{h}30^m, max – 22d06^h 42^m, Φ = 0.2 J/m^2
CME: gap

Particle fluxes and associated phenomena



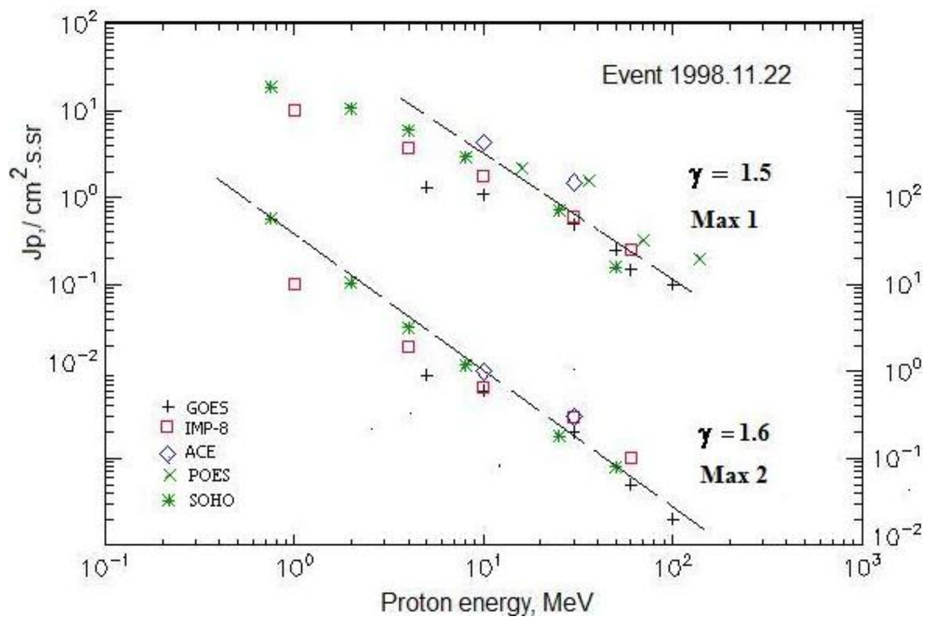
Time profiles of the proton fluxes for the event of 1998 November 22





Arrows on the profiles of the events indicate the time of the proton flux maxima, taken to build the proton spectra (see below)

Integral time-of-maximum proton spectrum



Integral fluxes of protons for the event of 1998 November 22

S/c, instruments	Ep, MeV	To	Tmax	Jmax, /cm^2.s.sr	Dura-tion	Comments
GOES-10						
EPS	>5	07^h	09^h/14^h	1.33/0.9	1d	
EPS	>10	07^h	09^h/14^h	1.1/0.6	1d	
EPS	>30	07^h	08^h/13^h	0.5/0.2	1d	
EPS	>50	07^h	08^h/13^h	0.25/0.08	-	
EPS	>60	07^h	08^h/13^h	0.15/0.05	-	
EPS	>100	07^h	08^h/13^h	0.1/0.02	-	
POES-15						
MEPED	>0.24	-	-	-	-	
MEPED	>0.8	-	-	-	-	
MEPED	>2.5	-	-	-	-	
MEPED	>6.9	-	-	-	-	
MEPED	>16	-	08^h/ -	2.2/ -	-	
MEPED	>36	-	08^h/ -	1.6/ -	-	
MEPED	>70	-	08^h/ -	0.33/ -	-	
MEPED	>140	-	08^h/ -	0.2/ -	-	
IMP-8						
CPME	>1	07^h	12^h/16^h	10/10.3	2d	
CPME	>4	07^h	10^h/16^h	3.8/1.9	2d	
CPME	>10	07^h	09^h/16^h	1.8/0.65	1,5d	
CPME	>30	07^h	09^h/16^h	0.6/0.3	1d	
CPME	>60	07^h	09^h/16^h	0.25/0.1	1d	
ACE						
SIS	>10	07^h	09^h/16^h	4.3/1.0	2d	
SIS	>30	07^h	08^h/16^h	1.5/0.3	2d	
SOHO						
EPHIN (INT)	>50	07^h	08^h/17^h	0.16/0.08		

Differential fluxes of protons for the event of 1998 November 22

S/c, instruments	ΔE, MeV	To	Tmax	Jmax. /cm^2.s.sr.MeV	Dura-tion	Comments
IMP-8						
CPME	1-2	08^h	$12^h/18^h$	4/6	~2d	
CPME	2-4.6	07^h	$12^h/18^h$	1.4/1.3	~2d	
CPME	4.6-15	07^h	$10^h/18^h$	0.2/0.1	~2d	
CPME	15-25	07^h	$109^h/18^h$	0.08/0.025	~2d	
CPME	25-48	07^h	$09^h/19^h$	0.021/0.009	~2d	
CPME	48-96	07^h	09^h/ -	0.006/ -	~1d	
CPME	96-145	06^h	09^h/ -	0.004/ -	~1d	
CPME	145-440					
SOHO						
LION	0,75-2	07^h	$10^h/19^h$	6.5/27	~1d	
LION	2-6	07^h	$11^h/19^h$	1.2/1.8	~1d	
EPHIN	4-8	08^h	$10^h/17^h$	0.75/0.5	~1d	
EPHIN	8-25	07^h	$09^h/17^h$	0.13/0.06	~1d	
EPHIN	25-41	07^h	$08^h/17^h$	0.02/0.005	~1d	
EPHIN	41-53	- “ -	- “ -	- “ -	- “ -	

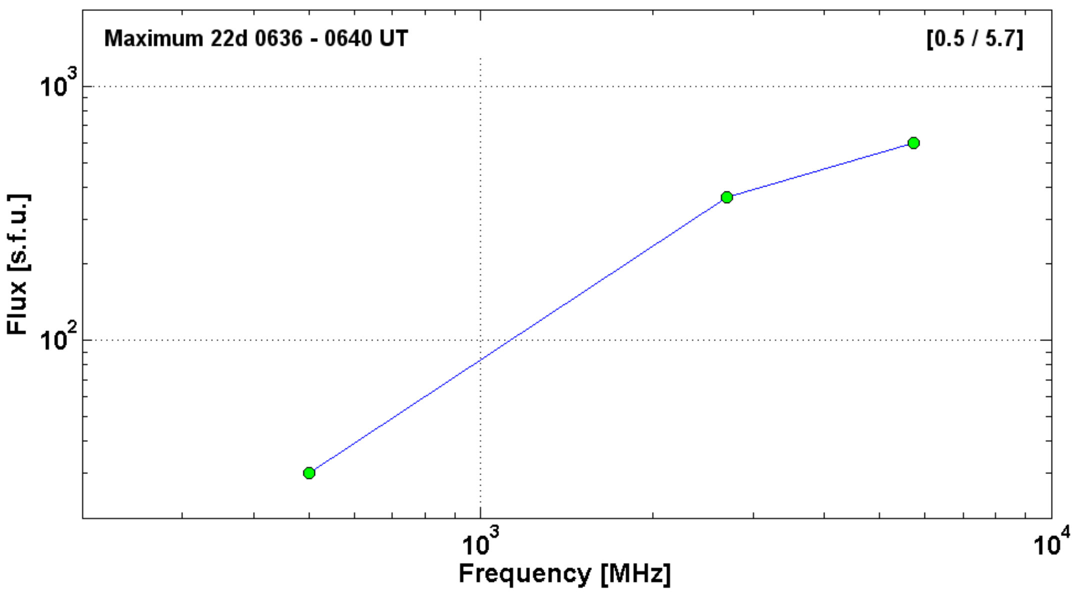
Electromagnetic and other phenomena that are sources and/or accompanying for the event of 1998 November 22

1998 November 22 ● AR8384 To event 352

Hα		0635	0645	0711	S27W82*	1N	
1 -12.5	keV	0630	0642	0649		X3.7	2.0E-1
53 – 93	keV	<063720	064014	081534		6689	HXT Y
>16	MeV		0639				OSSE C
>300	MeV	063336	063917	064837			BATS C

5.7	GHz	0630.8	~0640.0	0742.0	[0.5 / 5.7]	~2.78	5.7
2.7	GHz	0632.0	0636.0	0649.0		2.56	2.7
500	MHz	0636.2	0640.6	0646.2		1.48	
DS II	30-420	0638		0706	SH	3	
DS II	25-170	0639		~0650	FN	3	
CME	WL						gap

* – PRF1212



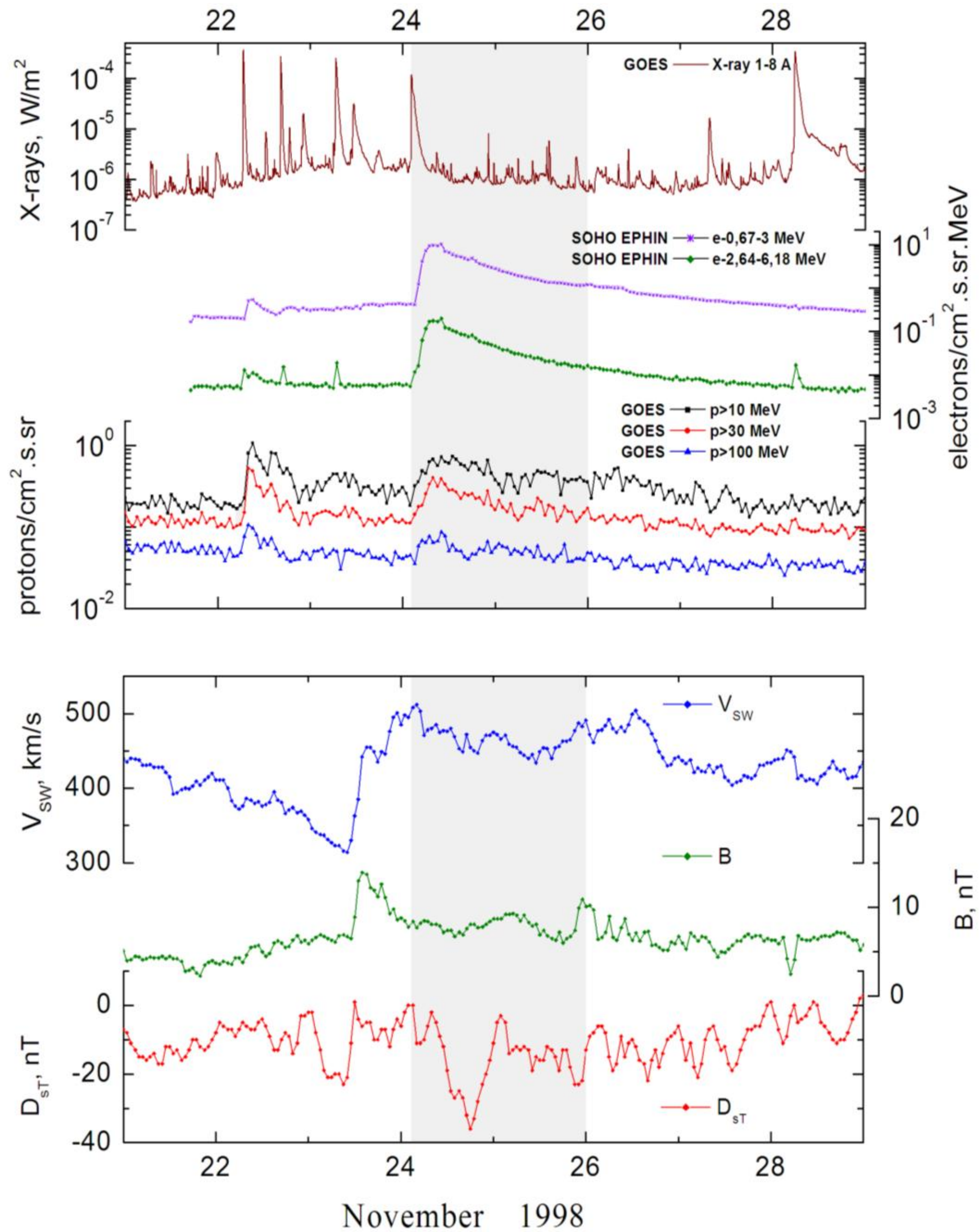
Список 1998 г.

Event 1998.11.24 – (1998-328) **№ 353**

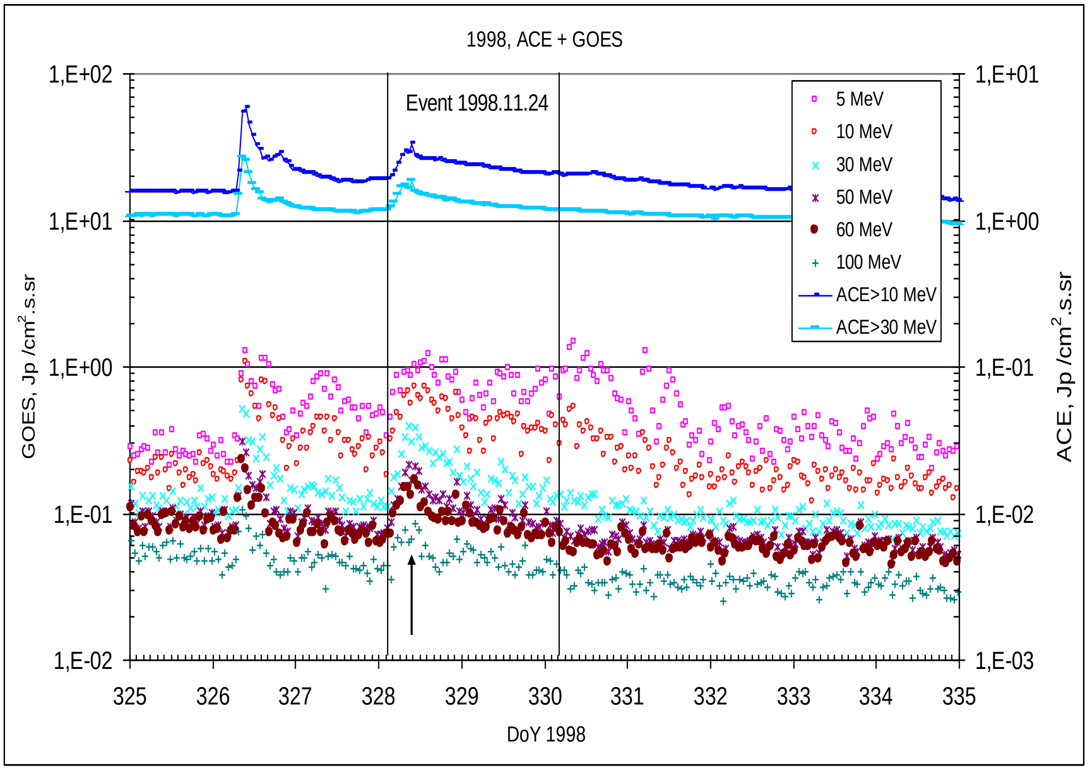
Particle event: To(Ep>10 MeV) – 24d03^h
Tmax(Ep>10 MeV) – 24d10^h, Jmax (Ep>10 MeV) – 1.25 /cm^2.s.sr *)
Duration of the event – 2 days *)
Quasimaximal energy of protons in the event – Eqm = 210 MeV
*) According to data IMP-8 (CPME)

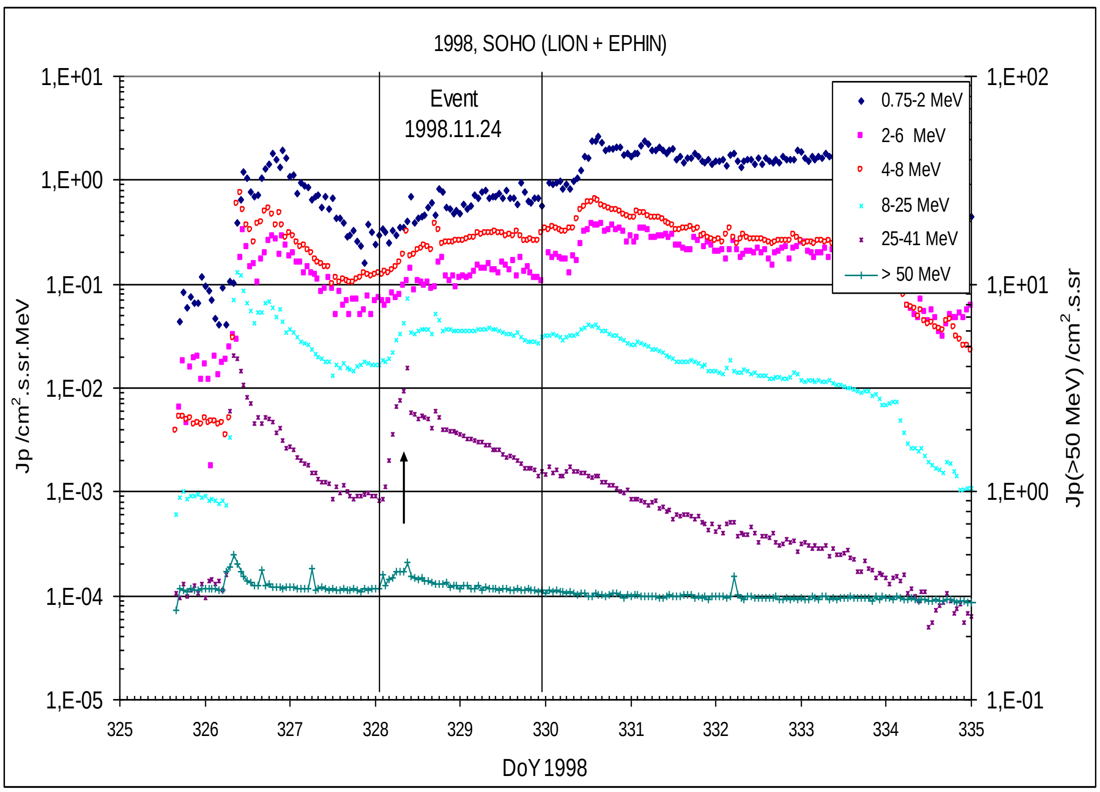
Sources: ● solar flare 24d02^{h}07^m, X1.0/SF, S30W81, AR8384
Main x-ray burst 1-8 Å: onset – 24d02^{h}07^m, max – 24d02^{h}20^m, Φ = 0.12 J/m^2
CME: 24d02^{h}30^m, V = 1798 km/s, $\Delta\varphi$ = 360˚, dA = 225˚

Particle fluxes and associated phenomena



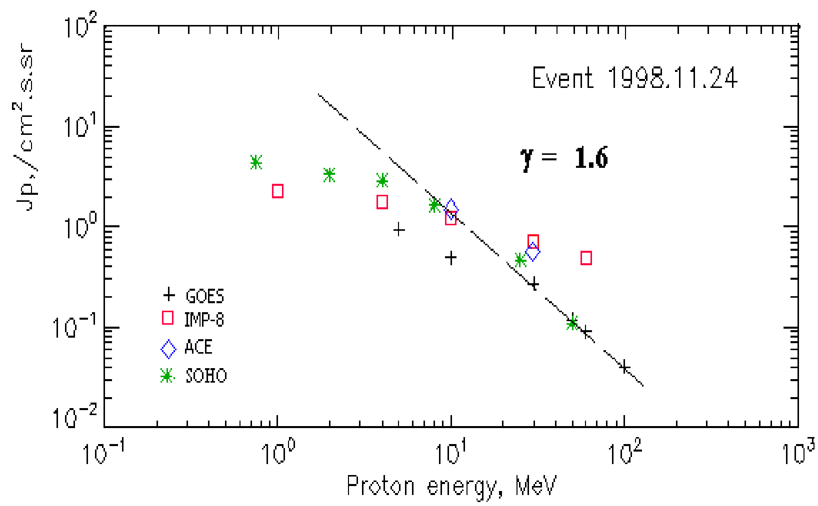
Time profiles of the proton fluxes for the event of 1998 November 24





Arrows on the profiles of the events indicate the time of the proton flux maxima, taken to build the proton spectra (see below)

Integral time-of-maximum proton spectrum



Integral fluxes of protons for the event of 1998 November 24

S/c, instruments	Ep, MeV	To	Tmax	Jmax, /cm^2.s.sr	Dura-tion	Comments
GOES-10						
EPS	>5	03 ^{h}	14^h	0.95	7d	
EPS	>10	03 ^{h}	14 ^{h}	0.5	6d	
EPS	>30	03 ^{h}	10 ^{h}	0.27	4d	
EPS	>50	03 ^{h}	10 ^{h}	0.12	4d	
EPS	>60	03 ^{h}	10 ^{h}	0.09	3d	
EPS	>100	03 ^{h}	10 ^{h}	0.04	2d	
IMP-8						
CPME	>1	03 ^{h}	10^h	2.3	2d	
CPME	>4	03 ^{h}	10^h	1.8	2d	
CPME	>10	03 ^{h}	10 ^{h}	1.25	2d	
CPME	>30	03 ^{h}	10^h	0.7	2d	
CPME	>60	03 ^{h}	10^h	0.5	2d	
ACE						
SIS	>10	03 ^{h}	09^h	1.5	2d	
SIS	>30	03 ^{h}	09^h	0.6	2d	
SOHO						
EPHIN (INT)	>50	03^h	09^h	0.11	1d	

Differential fluxes of protons for the event of 1998 November 24

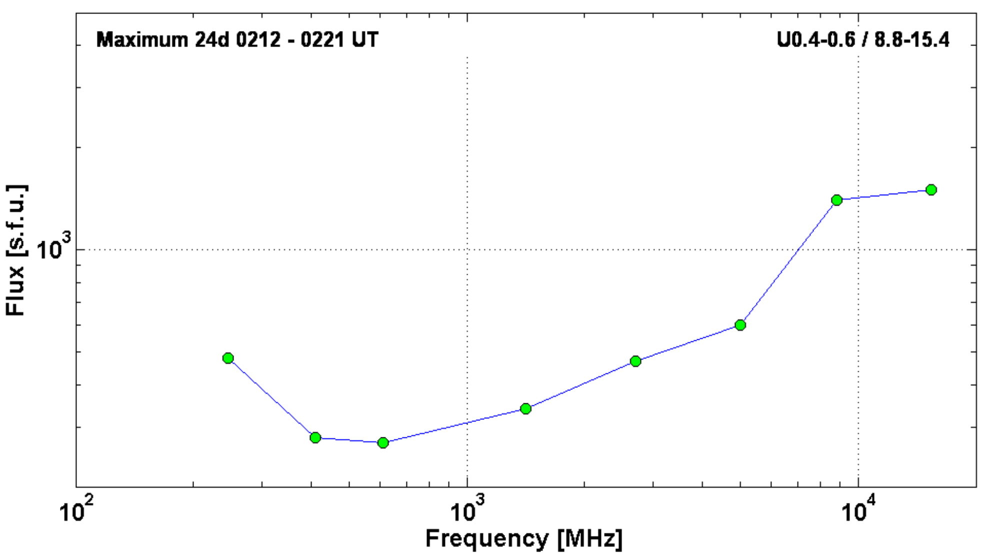
S/c, instruments	ΔE, MeV	To	Tmax	Jmax. /cm^2.s.sr.MeV	Dura-tion	Comments
IMP-8						
CPME	1-2	05^h	10^h	1.2	-	
CPME	2-4.6	05^h	10^h	0.5	-	
CPME	4.6-15	05^h	10^h	0.1	-	
CPME	15-25	05^h	10^h	0.04	2d	
CPME	25-48	05^h	10^h	0.01	2d	
CPME	48-96	05^h	10^h	0.0035	2d	
CPME	96-145	05^h	10^h	0.002	1d	
CPME	145-440	05^h	10^h	0.001	1d	

SOHO						
LION	0,75-2	02^h	10^h	0.6	6d	
LION	2-6	02^h	10^h	0.12	6d	
EPHIN	4-8	03^h	09^h	0.31	5d	
EPHIN	8-25	03^h	09^h	0.07	4d	
EPHIN	25-41	03^h	09^h	0.015	2d	
EPHIN	41-53	- " -	- " -	- " -	- " -	

Electromagnetic and other phenomena that are sources and/or accompanying for the event of 1998 November 24

1998 November 24 ● AR8384 To event 353

Hα		0256	0256	0259	S30 W81	SF	
1 -12.5	keV	0207	0220	0237		X1.0	1.2E-1
53 – 93	keV	<0217:19	~0217:19	0407:25		256	HXT Y
>300	keV	0206:04	0214:31	0244:37		0.00	BATS C
15.4	GHz	0209.0	0215.0	0221.0	U0.4-0.6/8.8-15.4	3.18	15.4
8.8	GHz	0208.0	0215.0	0225.0		3.15	8.8
5	GHz	0207.0	0214.0	0225.0		2.78	
2.7	GHz	0208.0	0214.0	0222.0		2.67	
1.4	GHz	0210.0	0214.0	0221.0		2.53	
610	MHz	0210.0	0212.0	0223.0		2.43	
410	MHz	0212.0	0221.0	0222.0		2.45	
245	MHz	0215.0	0215.0	0223.0		2.68	
DS II	60-150	0217		0222	SH,H	2	
DS II	35-60	0218		0220	FN,H	2	
DS III	18-270	0215		0216	G	3	
CME	WL	0230	1798 km/s	-12.5 km/s^2	360°	225°	



События 1999 г.

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1.	Event 1999.01.20 – (1999-020)	№ 354	. . . .	123
2.	Event 1999.01.22 – (1999-022)	№ 355	. . . .	127
3.	Event 1999.04.24 – (1999-114)	№ 356	. . . .	131
4.	Event 1999.05.04 – (1999-124)	№ 357	. . . .	135
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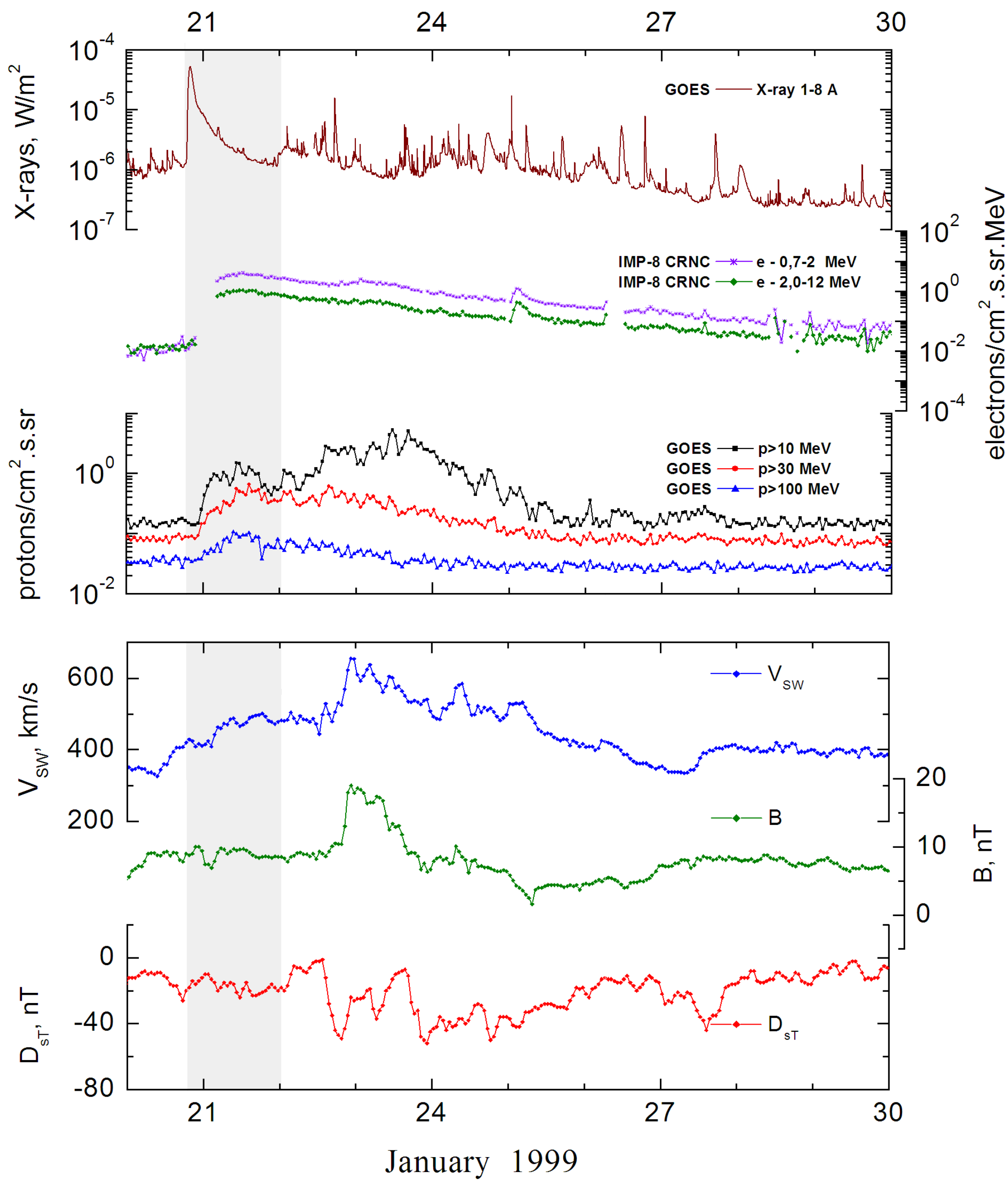
Event 1999.01.20 – (1999-020) **№ 354**

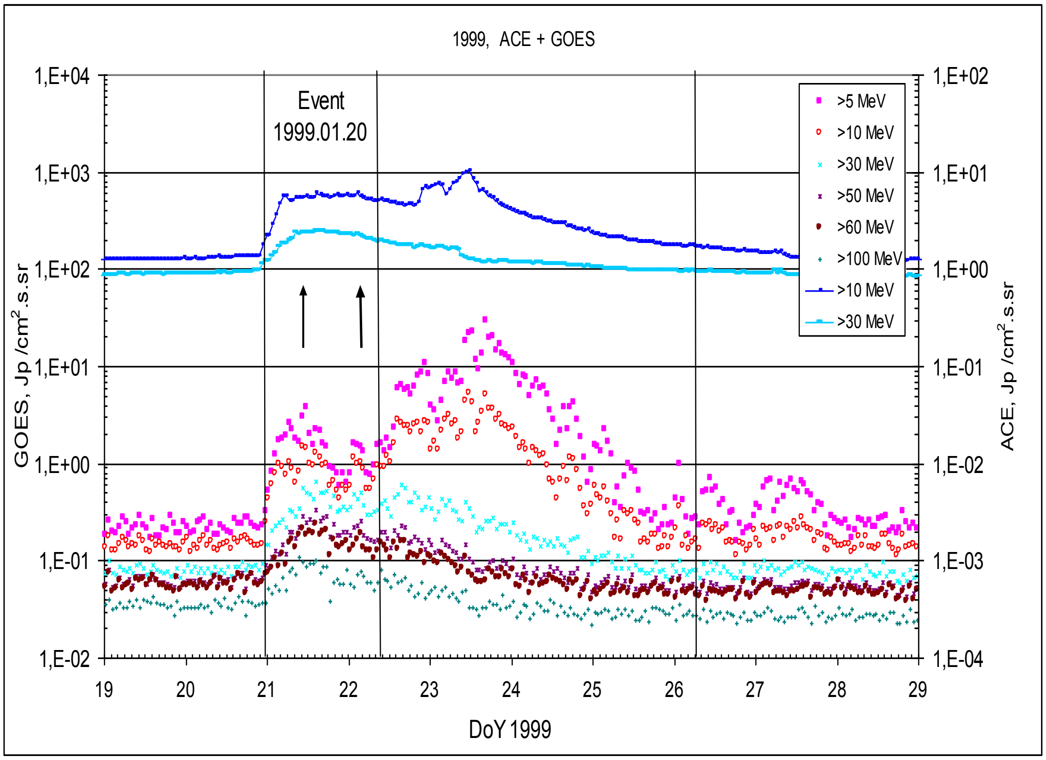
Particle event: To(Ep>10 MeV) – 20d23^h
Tmax$_1$(Ep>10 MeV) –21d11^h, Jmax$_1$ (Ep>10 MeV) – 1.3 /cm^2.s.sr
Tmax$_2$(Ep>10 MeV) –22d06^h, Jmax$_2$ (Ep>10 MeV) – 1 /cm^2.s.sr
Duration of the event – 1 day
Quasimaximal energy of protons in the event – Eqm$_1$ = 270 MeV
– Eqm$_2$ = 250 MeV

Sources: ⊡ solar flare 20d19^{h}06^m, M5.2/..., n27e90*, AR – unknown
Main X-ray burst 1-8 Å: onset – 20d19^{h}06^m, max – 20d20^{h}04^m, Φ = 0.25 J/m^2
CME: gap
* – probable localization of the flare event

Particle fluxes and associated phenomena

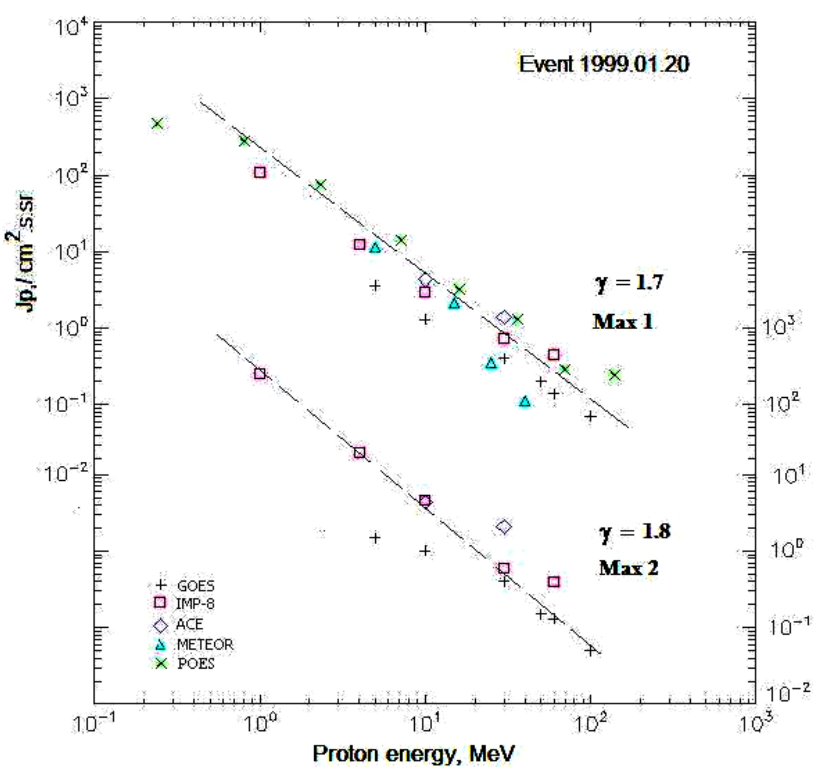


Temporary profiles of the proton fluxes for the event of 1999 January 20



Arrows on the profiles of the events indicate the time of the proton flux maxima, taken to build the proton spectra (see below)

Integral time-of-maximum proton spectrum



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Integral fluxes of protons for the event of 1999 January 20

S/c, instruments	Ep, MeV	To	Tmax	Jmax, /cm^2.s.sr	Dura-tion	Comments
GOES-10						
EPS	>5	-	21d11^h/22d06^h	3.6/1.5	1d	
EPS	>10	23^h	21d11^h/22d06^h	1.3/1	1d	
EPS	>30	23^h	21d11^h/22d06^h	0.4/0.4	1d	
EPS	>50	23^h	21d11^h/22d06^h	0.2/0.15	1d	
EPS	>60	23^h	21d11^h/22d06^h	0.14/0.13	1d	
EPS	>100	23^h	21d11^h/22d06^h	0.07/0.05	1d	
METEOR-2						
CBM	>5	22^h	21d17^h/ -	11,6/ -	1.5d	
CBM	>15	22^h	21d15^h/ -	2,15/ -	1.5d	
CBM	>25	22^h	21d14^h/ -	0,35/ -	1.5d	
CBM	>40	22^h	21d13^h/ -	0,11/ -	1.5d	
POES-15						
MEPED	>0.24	-	21d18^h/ -	460/ -	-	
MEPED	>0.8	-	21d18^h/ -	270/ -	-	
MEPED	>2.5	-	21d18^h/ -	82/ -	-	
MEPED	>6.9	-	21d18^h/ -	13/ -	-	
MEPED	>16	-	21d18^h/ -	3.16/ -	-	
MEPED	>36	-	21d18^h/ -	1.3/ -	-	
MEPED	>70	-	21d18^h/ -	0.29/ -	-	
MEPED	>140	-	21d18^h/ -	0.24/ -	-	
IMP-8						
CPME	>1	17^h	21d15^h/22d06^h	110/205	1d	
CPME	>4	<21d04^h	21d12^h/22d06^h	12.4/19.6	1d	
CPME	>10	<21d04^h	21d15^h/22d06^h	3/4.7	1d	
CPME	>30	<21d04^h	21d15^h/22d06^h	0.75/0.6	1d	
CPME	>60	<21d04^h	21d15^h/22d06^h	0.45/0.4	1d	
ACE						
SIS	>10	23^h	21d14^h/22d06^h	4.3/4.4	1d	
SIS	>30	23^h	21d14^h/22d06^h	1.4/ 2,1	1d	

Differential fluxes of protons for the event of 1999 January 20

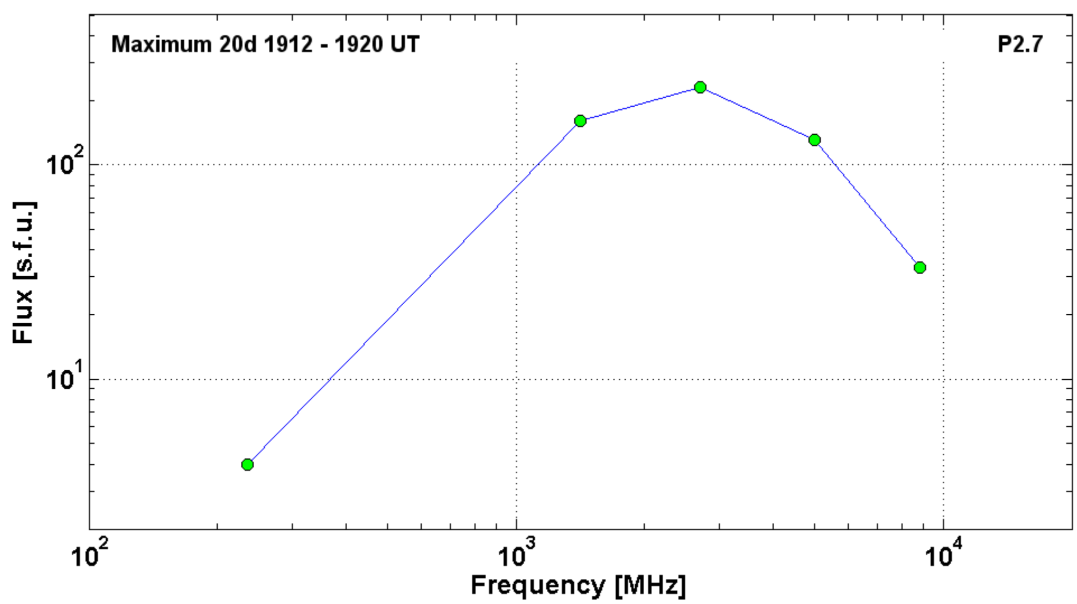
S/c, instruments	ΔE, MeV	To	Tmax	Jmax /cm^2.s.sr.MeV	Dura-tion	Comments
IMP-8						
CPME	1-2	07^h	21d15^h/22d04^h	72/124	1d	
CPME	2-4.6	08^h	21d15^h/22d04^h	13/23	1d	
CPME	4.6-15	<21d04^h	21d12^h/22d04^h	0.7/1.2	1d	
CPME	15-25	<21d04^h	21d12^h/22d04^h	0.07/0.12	1d	
CPME	25-48	<21d04^h	21d18^h/22d04^h	0.0180/02	1d	
CPME	48-96	<21d04^h	21d15^h/22d04^h	0.005/0.004	1d	
CPME	96-145	<21d04^h	21d18^h/22d03^h	0.0025/0.004	1d	
CPME	145-440	<21d04^h	21d12^h/22d03^h	0.001/0.0006	1d	
SOHO		No	Data			

Electromagnetic and other phenomena that are sources and/or accompanying for the event of 1999 January 20

1999 January 20 ⊡ ARXXXX To event 354

Hα	6563 Å	No Flare Patrol			n27e90*		
1 -12.5	keV	1906	2004	2100		M5.2	2.5E-1
33 – 53	keV	190511	191931	>192325		389	HXT Y
8.8	GHz	1911.0	1912.0	1912.0		1.52	
5	GHz	1911.0	1920.0	2130.0		2.11	
2.7	GHz	1909.0	1920.0	2029.0	P2.7	2.36	
1.4	GHz	1905.0	1919.0	2008.0		2.20	
235	MHz	1854.6	1919.0	1940.0		0.60	
DS II	25-55	1914		1923		1	
DS IV	25-45	1926		1944		2	
DS V	30-55	1926		1935		1	
CME	WL						gap

* − probable localization of the flare event



Event 1999.01.22 – (1999-022) **№ 355**

Particle event: To(Ep>10 MeV) – 22d02^h

Tmax$_1$(Ep>10 MeV) – 22d16^h, Jmax$_1$ (Ep>10 MeV) – 3 /cm^2.s.sr

Tmax$_2$(Ep>10 MeV) – 23d14^h, Jmax$_2$ (Ep>10 MeV) – 5 /cm^2.s.sr

Duration of the event – 4 days

Quasimaximal energy of protons in the event – Eqm$_1$ = 85 MeV

– Eqm$_2$ = 85 MeV

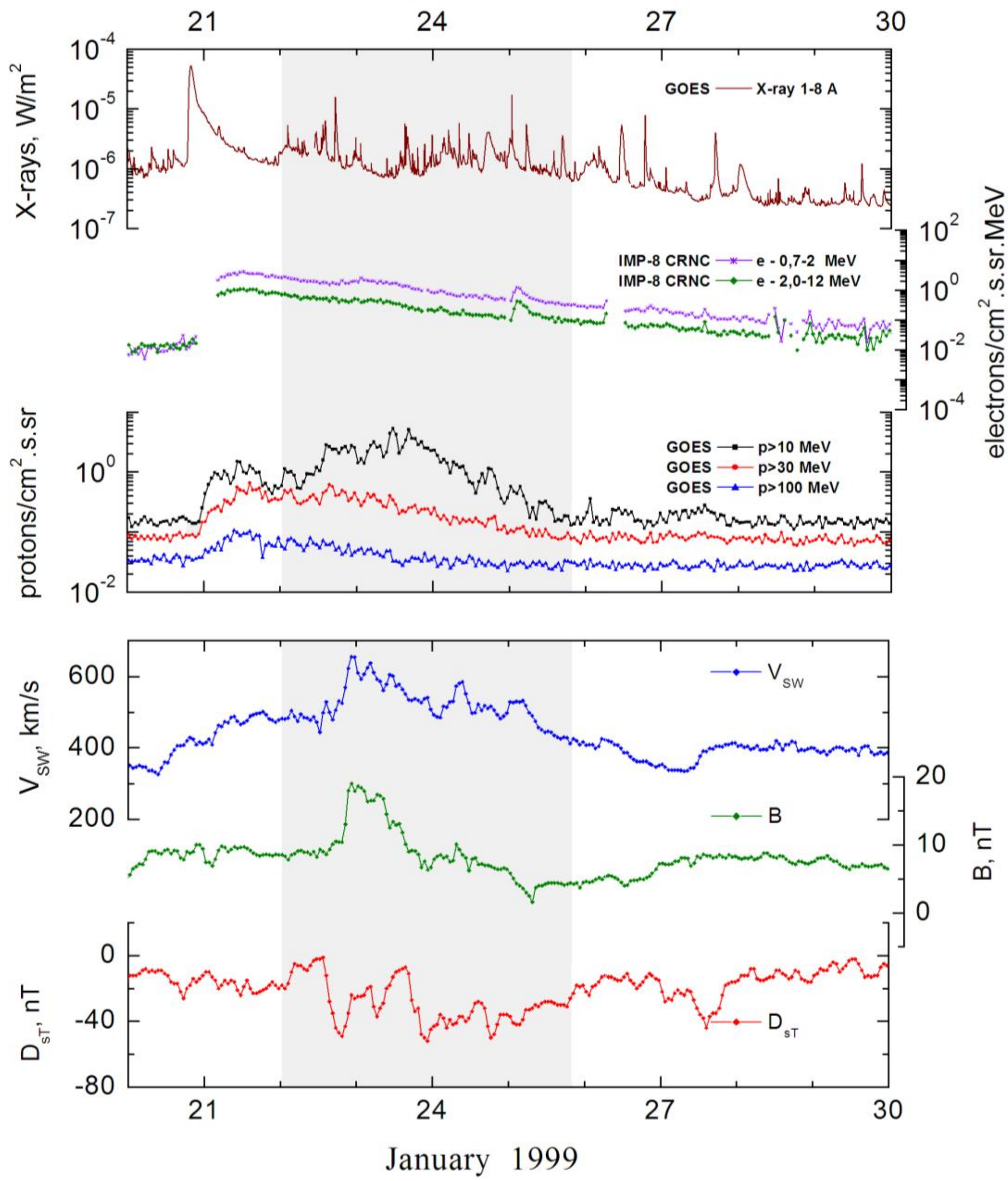
Sources: source unknown

Ø solar flare 22d17^{h}05^m, M1.4/SF, N19W44, AR8440

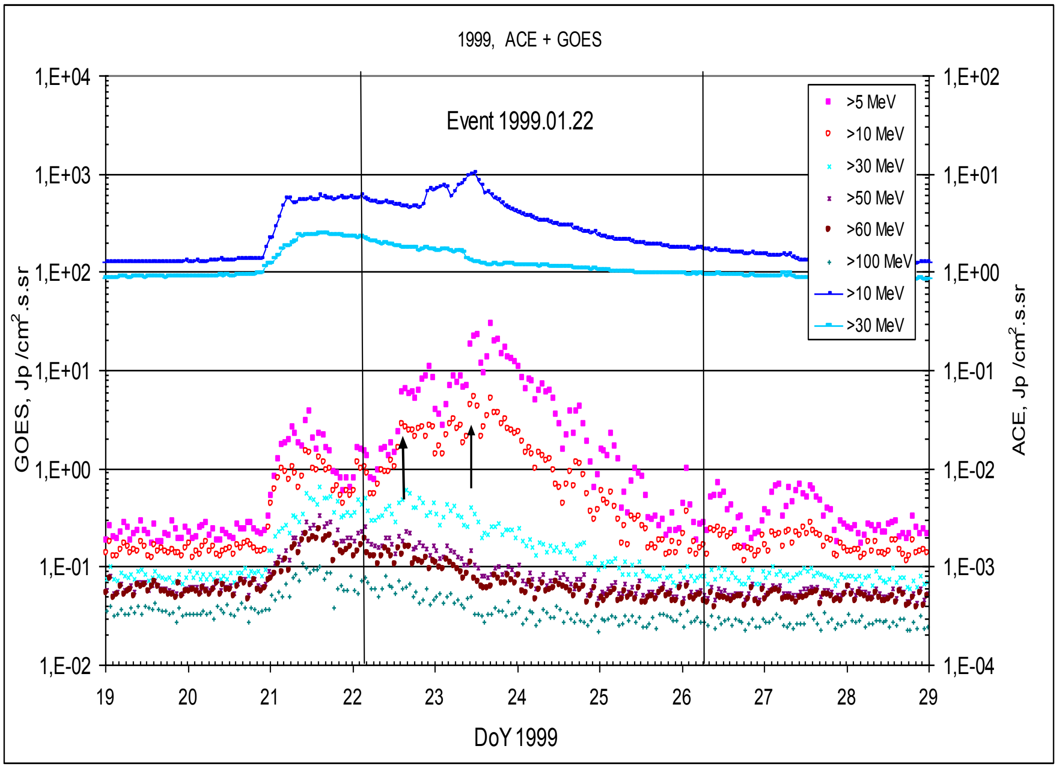
Main X-ray burst 1-8 Å: onset – 22d17^{h}05^m, max – 22d17^{h}24^m, Φ = 0.015 J/m^2

CME: gap

Particle fluxes and associated phenomena

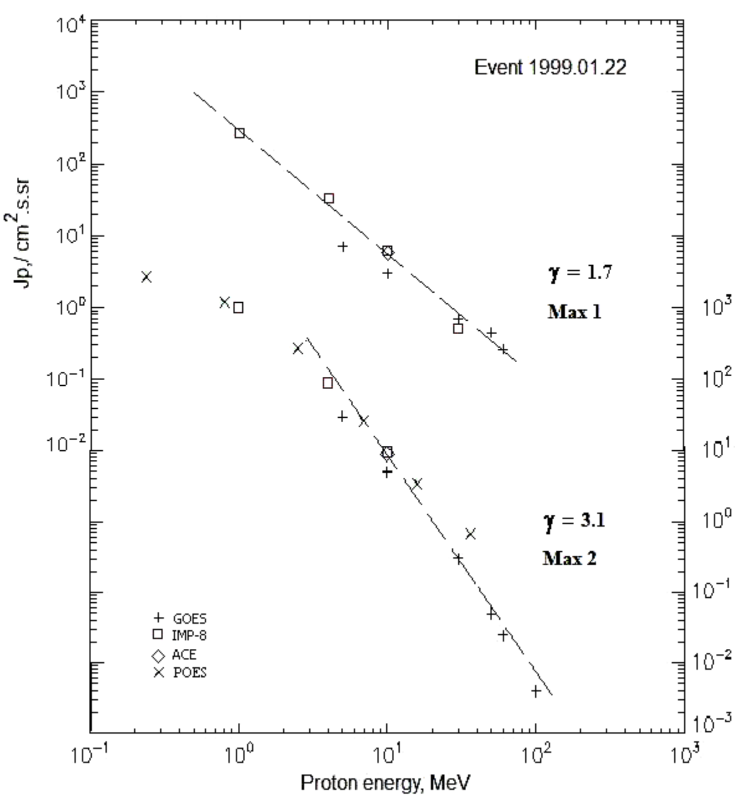


Temporary profiles of the proton fluxes for the event of 1999 January 22



Arrows on the profiles of the events indicate the time of the proton flux maxima, taken to build the proton spectra (see below)

Integral time-of-maximum proton spectrum



Integral fluxes of protons for the event of 1999 January 22

S/c, instruments	Ep, MeV	To	Tmax	Jmax, /cm^2.s.sr	Dura-tion	Comments
GOES-10						
EPS	>5	03^h	16^h/23d14^h	7/30	4d	
EPS	>10	03^h	16^h/23d14^h	3/5	4d	
EPS	>30	03^h	16^h/23d14^h	0.7/0.3	4d	
EPS	>50	-	16^h/23d12^h	0. 45/0.05	4d	
EPS	>60	-	16^h/23d12^h	0.26/0.025	-	
EPS	>100	-	- /23d12^h	- /0.004	-	
POES-15						
MEPED	>0.24	03^h	23d12^h	2820	4d	
MEPED	>0.8	03^h	23d12^h	1220	4d	
MEPED	>2.5	03^h	23d12^h	290	4d	
MEPED	>6.9	03^h	23d12^h	40	4d	
MEPED	>16	03^h	23d12^h	3.43	4d	
MEPED	>36	03^h	23d12^h	0.67	4d	
MEPED	>70	-	-	-	-	
MEPED	>140	-	-	-	-	
IMP-8						
CPME	>1	02^h	23^h/23d12^h	270/1030	6d	
CPME	>4	02^h	23^h/23d12^h	33/92	4d	
CPME	>10	02^h	23^h/23d12^h	6.1/9.5	4d	
CPME	>30	02^h	23^h/23d12^h	0.5/ -	-	
CPME	>60	-	- / -	- / -	-	
ACE						
SIS	>10	02^h	23^h/23d11^h	5.7/9	3d	
SIS	>30	-	- / -	- / -	-	

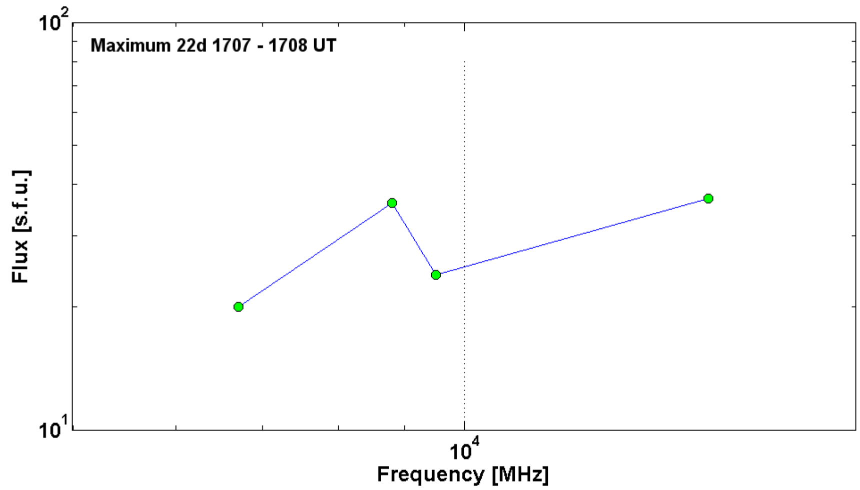
Differential fluxes of protons for the event of 1999 January 22

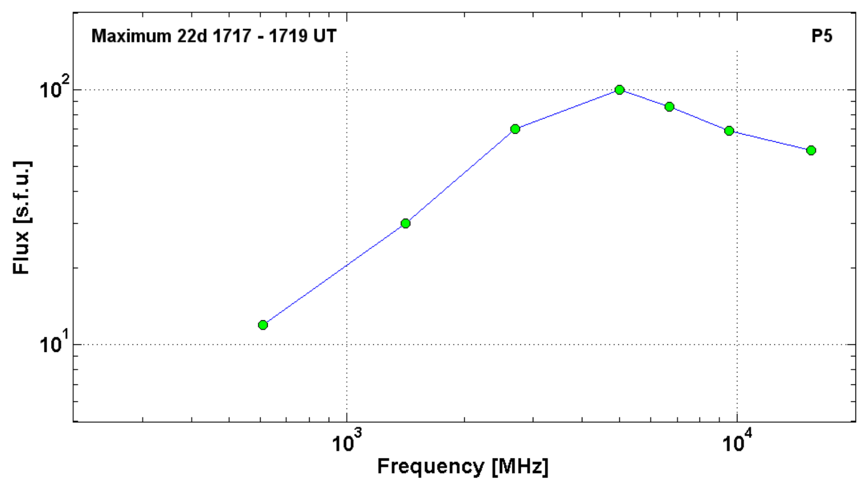
S/c, instruments	ΔE, MeV	To	Tmax	Jmax /cm^2.s.sr.MeV	Dura-tion)	Comments
IMP-8						
CPME	1-2	02^h	22d23^h/23d12^h	160/610	10d	
CPME	2-4.6	02^h	22d23^h/23d12^h	32.5/120	9d	
CPME	4.6-15	02^h	22d23^h/23d12^h	2.15/6.35	8d	
CPME	15-25	02^h	22d23^h/23d12^h	0.2/0.23	6d	
CPME	25-48	02^h	22d23^h/23d12^h	0.02/0.913	4d	
CPME	48-96	02^h	22d23^h/23d12^h	0.003//0.002	2d	
CPME	96-145	-	-	-	-	
CPME	145-440	-	-	-	-	
SOHO		No	Data			

Electromagnetic and other phenomena that are sources and/or accompanying for the event of 1999 January 22

1999 January 22 Ø AR8440 To event 355

Hα	6563 Å	1708	1708	1715	N20W44	SF	
1 -12.5	keV	1705	1724	1736		M1.4	1.5E-2
22 – 32	keV	170809	170809	170821		36	HXT Y
15.4	GHz	1707.0	1708.0	1709.0		1.57	
9.5	GHz	1706.9	1707.8	1709.3		1.38	
8.8	GHz	1707.0	1707.0	1709.0		1.56	
6.7	GHz	1706.9	1707.8	1709.4		1.30	
15.4	GHz	1717.0	1717.0	1722.0		1.76	
9.5	GHz	1717.0	1717.9	1721.0		1.84	
6.7	GHz	1716.7	1717.8	1723.3		1.93	
5	GHz	1716.0	1717.0	1722.0	P5	2.00	
2.7	GHz	1716.0	1717.0	1722.0		1.85	
1.4	GHz	1717.0	1717.0	1720.0		1.48	
610	MHz	1719.0	1719.0	1722.0		1.08	
CME	WL						gap



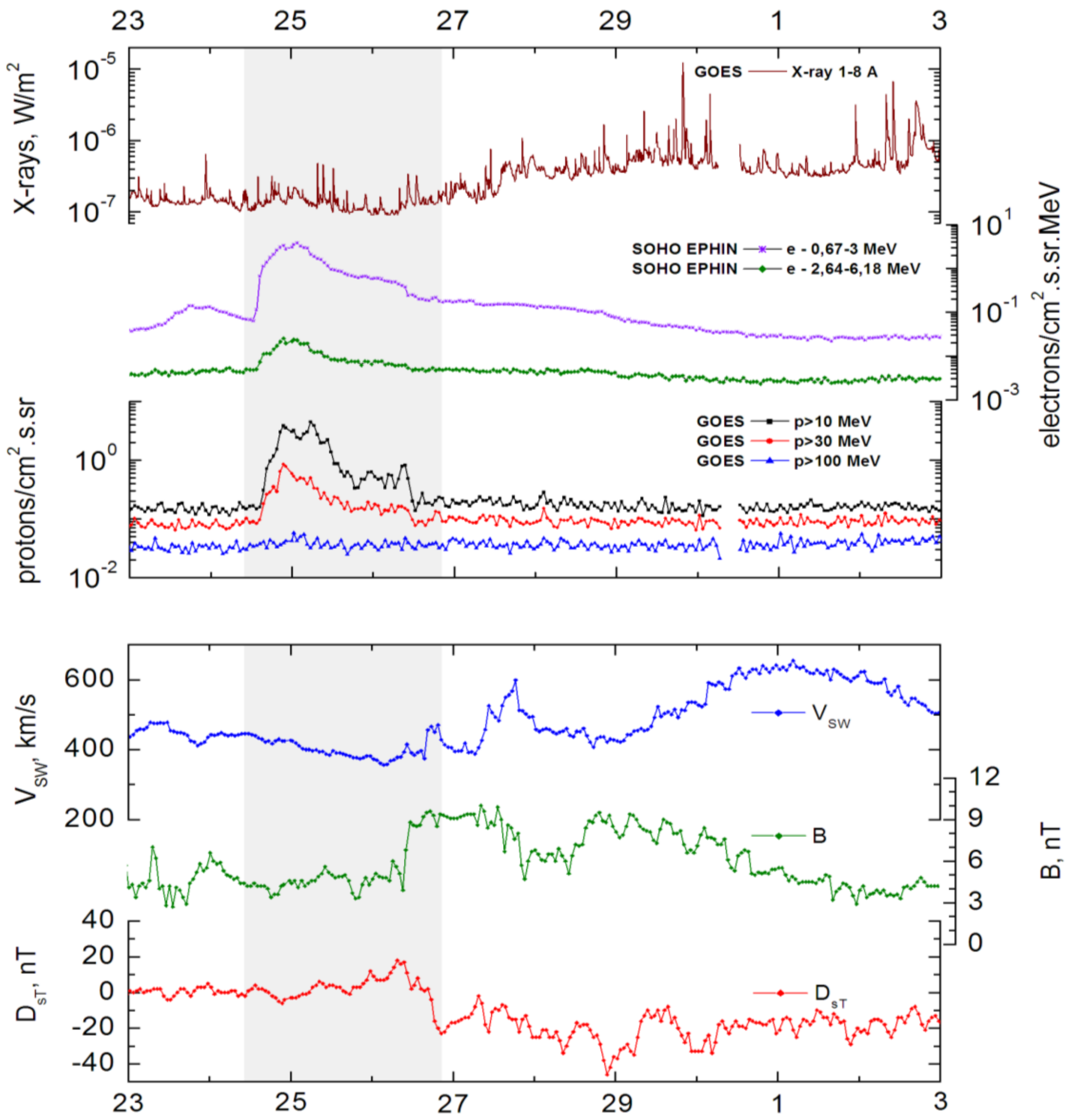


Event 1999.04.24 – (1999-114) **№ 356**

Particle event: To(Ep>10 MeV) – 24d15^h
Tmax$_1$(Ep>10 MeV) – 24d21^h, Jmax$_1$(Ep>10 MeV) – 3.7 /cm^2.s.sr
Tmax$_2$(Ep>10 MeV) – 25d06^h, Jmax$_1$(Ep>10 MeV) – 4.3 /cm^2.s.sr
Duration of the event – 2 days
Quasimaximal energy of protons in the event – Eqm$_1$ = 85 MeV
– Eqm$_2$ = 210 MeV

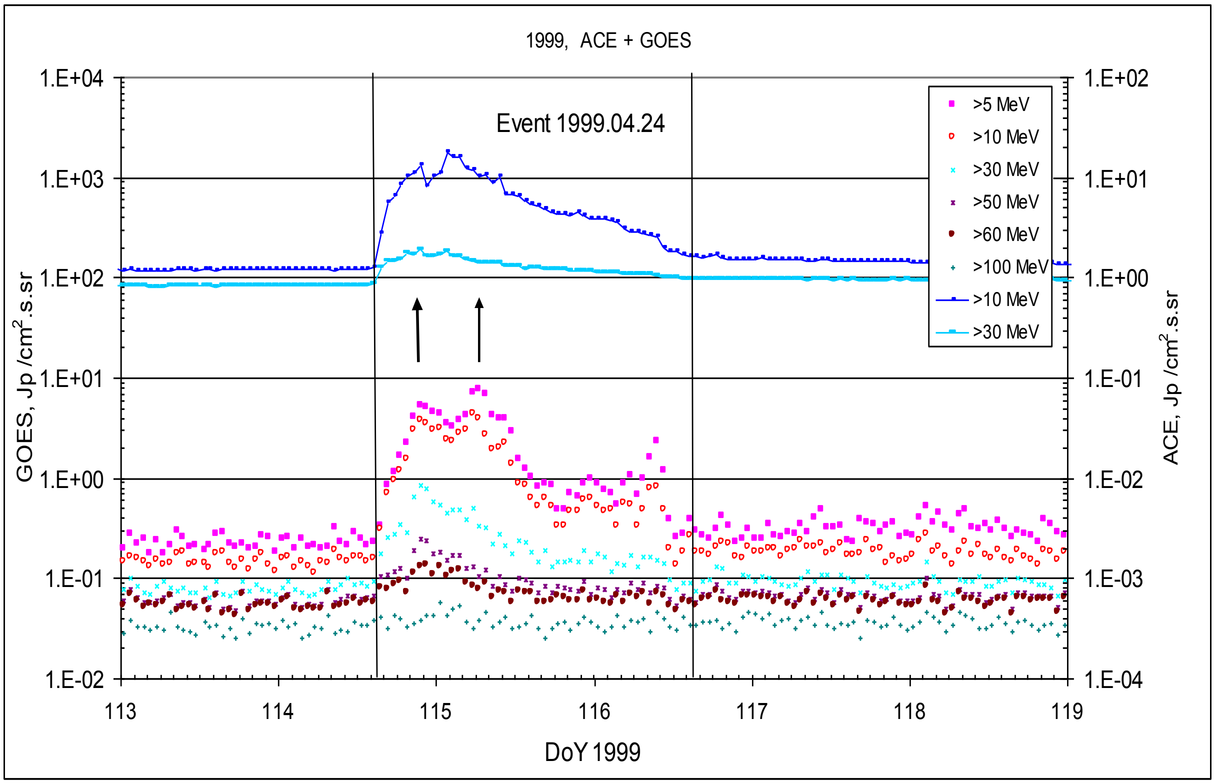
Sources: ⊡ solar flare event 24d<13^{h}31^m, n22w90*, AR8517 ~ 3 days behind W limb
CME:24d13^{h}31^m, V = 1495 km/s, Δφ = 360º, dA= 321º
* − probable localization of the flare event

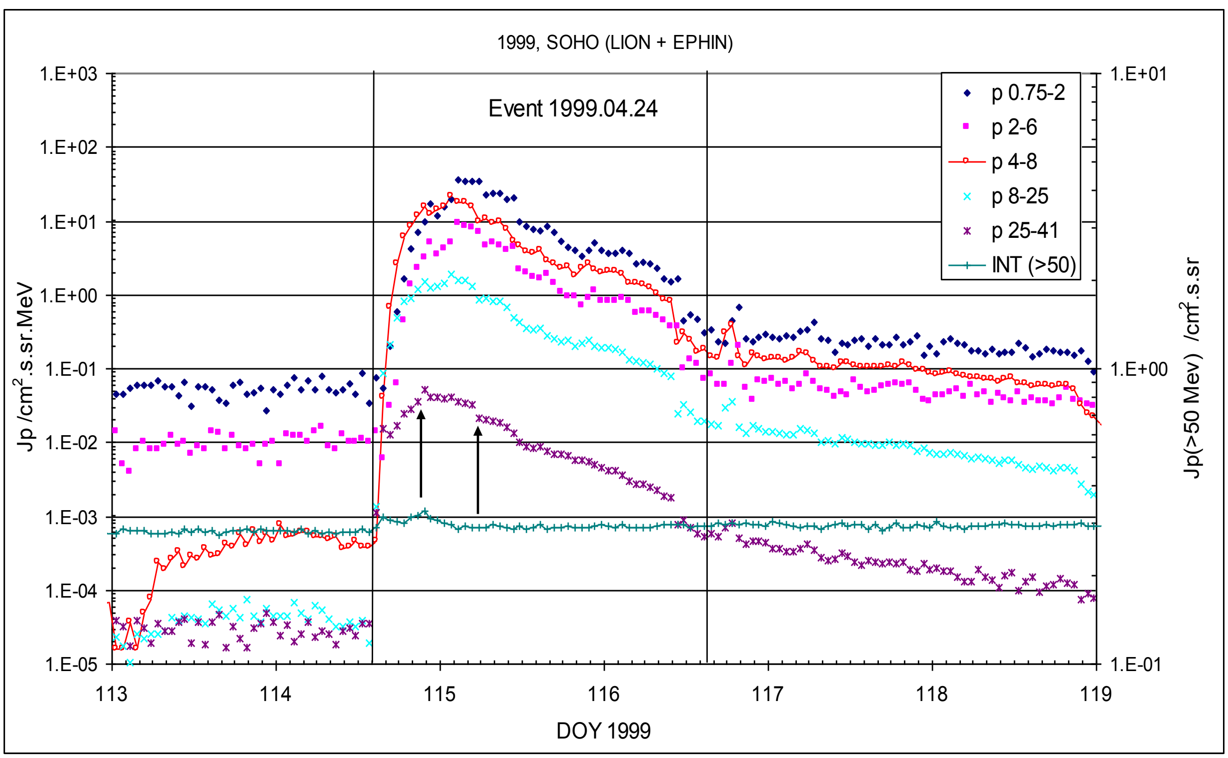
Particle fluxes and associated phenomena



April - May 1999

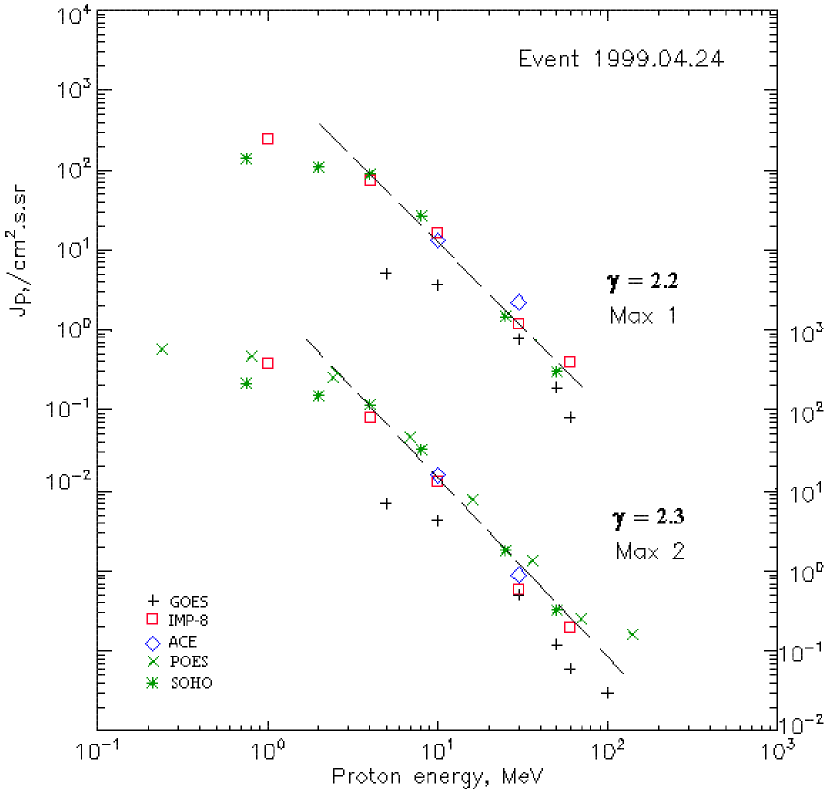
Time profiles of the proton fluxes for the event of 1999 April 24





Arrows on the profiles of the events indicate the time of the proton flux maxima, taken to build the proton spectra (see below)

Integral time-of-maximum proton spectrum



Integral fluxes of protons for the event of 1999 April 24

S/c, instruments	Ep, MeV	To	Tmax	Jmax, /cm^2.s.sr	Duration	Comments
GOES-10						
EPS	>5	15^h	$21^h/25d06^h$	5.1/7.0	2d	
EPS	>10	15^h	$21^h/25d06^h$	3.7/4.3	2d	
EPS	>30	15^h	$21^h/25d05^h$	0.77/ 0.5	2d	
EPS	>50	15^h	$21^h/25d05^h$	0.19/ 0.12	1d	
EPS	>60	15^h	$22^h/25d04^h$	0.08/ 0.06	1d	
EPS	>100	15^h	- $/25d00^h$	- /0.03	1d	
POES-15						
MEPED	>0.24	-	- $/25d01^h$	- /582	-	
MEPED	>0.8	-	- $/25d01^h$	- /480	-	
MEPED	>2.5	-	- $/25d01^h$	- /296	-	
MEPED	>6.9	-	- $/25d01^h$	- /70	-	
MEPED	>16	-	- $/25d01^h$	- /7.83	-	
MEPED	>36	-	- $/25d01^h$	- /1.36	-	
MEPED	>70	-	- $/25d01^h$	- /0.25	-	
MEPED	>140	-	- $/25d01^h$	- /0.16	-	
IMP-8						
CPME	>1	15^h	$23^h/25d04^h$	250/410	2.5d	
CPME	>4	15^h	$23^h/25d05^h$	75/85	2.5d	
CPME	>10	15^h	$22^h/25d05^h$	16.7/13.6	2.5d	
CPME	>30	15^h	$<22^h/25d05^h$	1.2/0.6	2.5d	
CPME	>60	16^h	$<22^h/25d05^h$	0.4/0.2	2.5d	

ACE						
SIS	>10	15^h	$21^h/25d02^h$	13.3/16	1.5d	
SIS	>30	15^h	$21^h/25d02^h$	1.1/0.9	1d	
SOHO						
EPHIN (INT)	>50	14^h	$17^h/23^h$	0.3/0.33	~0.5d	

Differential fluxes of protons for the event of 1999 April 24

S/c, instruments	ΔE, MeV	To	Tmax	Jmax /cm^2.s.sr.MeV	Dura-tion	Comments
IMP-8						
CPME	1-2	-	- /$25d04^h$	- /179	~2,8d	
CPME	2-4.6	-	- /$25d04^h$	- /64	~2,8d	
CPME	4.6-15	-	- /$25d04^h$	- /6,1	~2,8d	
CPME	15-25	-	- /$25d04^h$	- /0,5	~2,5d	
CPME	25-48	-	- /$25d04^h$	- /0,03	~2d	
CPME	48-96	-	- /$25d04^h$	- /0,01	~2d	
CPME	96-145	-	- / -	- / -	-	
CPME	145-440	-	- / -	- / -	-	
SOHO						
LION	0,75-2	16^h	$22^h/25d02^h$	17/37	~2d	
LION	2-6	16^h	$22^h/25d02^h$	5,1/9,3	~2d	
EPHIN	4-8	14^h	$22^h/25d02^h$	15.5/22	~2.5d	
EPHIN	8-25	14^h	$21^h/25d02^h$	1.5/1.9	~2.5d	
EPHIN	25-41	14^h	$21^h/25d02^h$	0.05/0.04	~2.5d	
EPHIN	41-53	- “ -	- “ -	- “ -	- “ -	

Electromagnetic and other phenomena that are sources and/or accompanying for the event of 1999 April 24

1999 April 24 ⊡ AR8517 To event 356

CME	WL	1331	1495 km/s	37.1 km/s	360º	321º	
Hα		No Flare			n22e90*		
1 - 12.5	keV	No	X-ray	Burst			

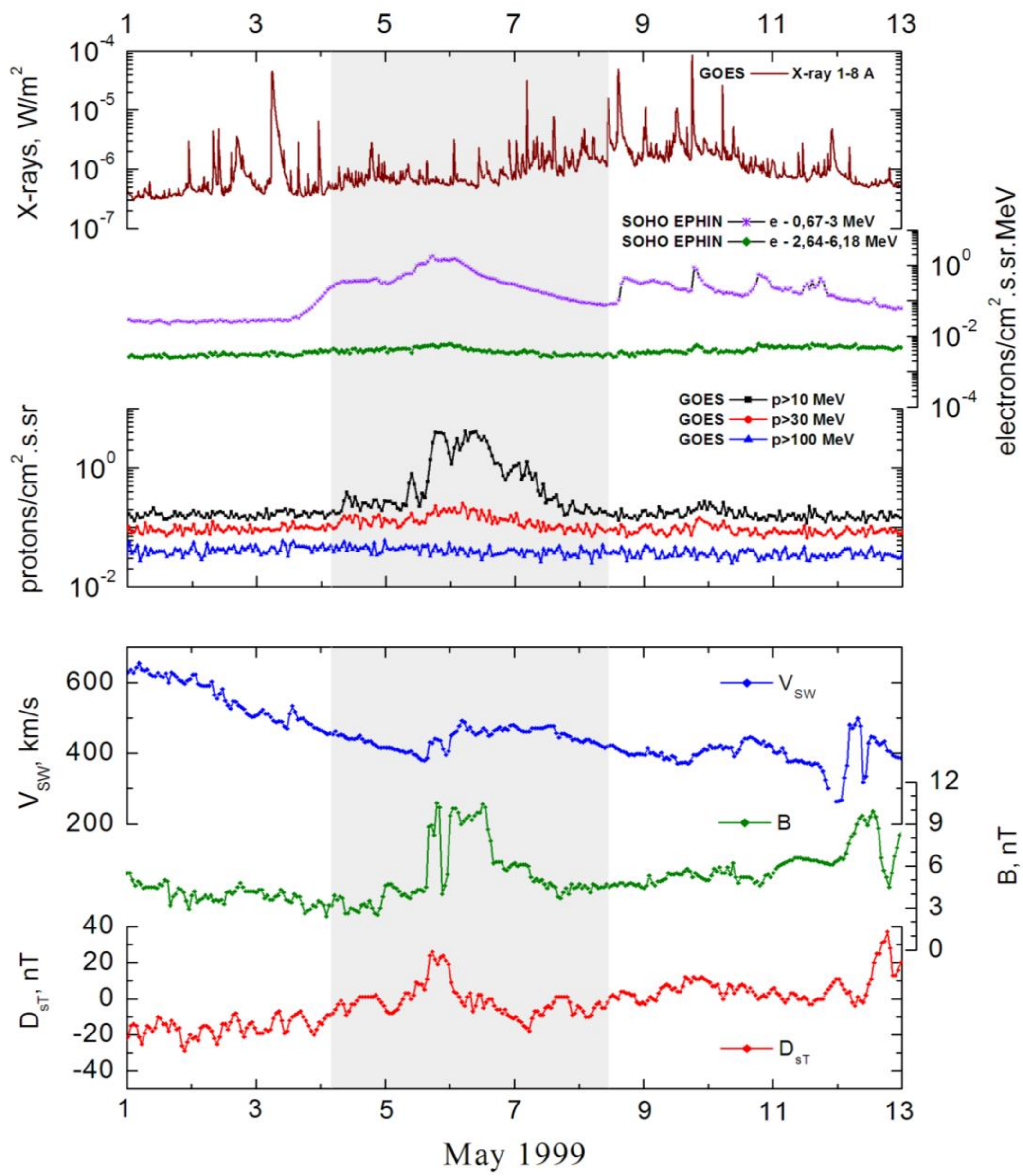
* − probable localization of the flare event

Event 1999.05.04 – (1999-124) **№ 357**

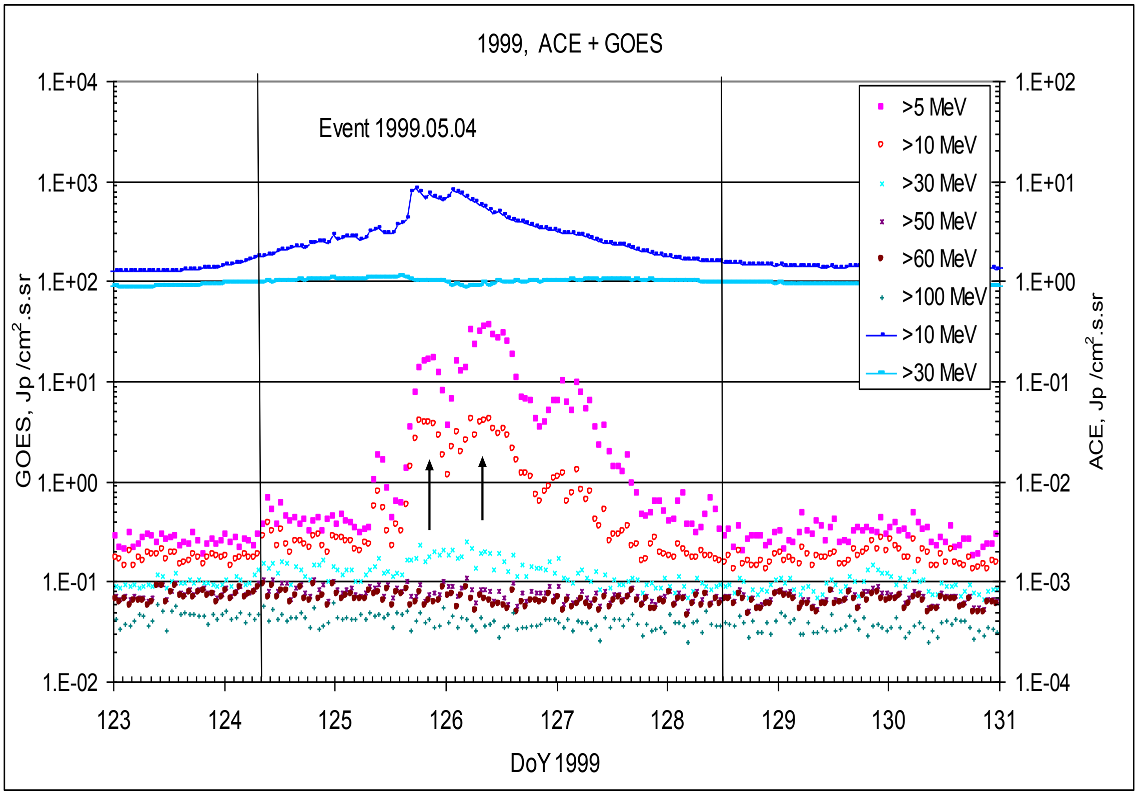
Particle event: To(Ep>10 MeV) – 04d08^h
Tmax$_1$(Ep>10 MeV) – 05d21^h, Jmax$_1$ (Ep>10 MeV) – 3.7 /cm^2.s.sr
Tmax$_2$(Ep>10 MeV) – 06d06^h, Jmax$_2$ (Ep>10 MeV) – 4 /cm^2.s.sr
Duration of the event – 4 days
Quasimaximal energy of protons in the event – Eqm$_1$ = 75 MeV
– Eqm$_2$ = 65 MeV

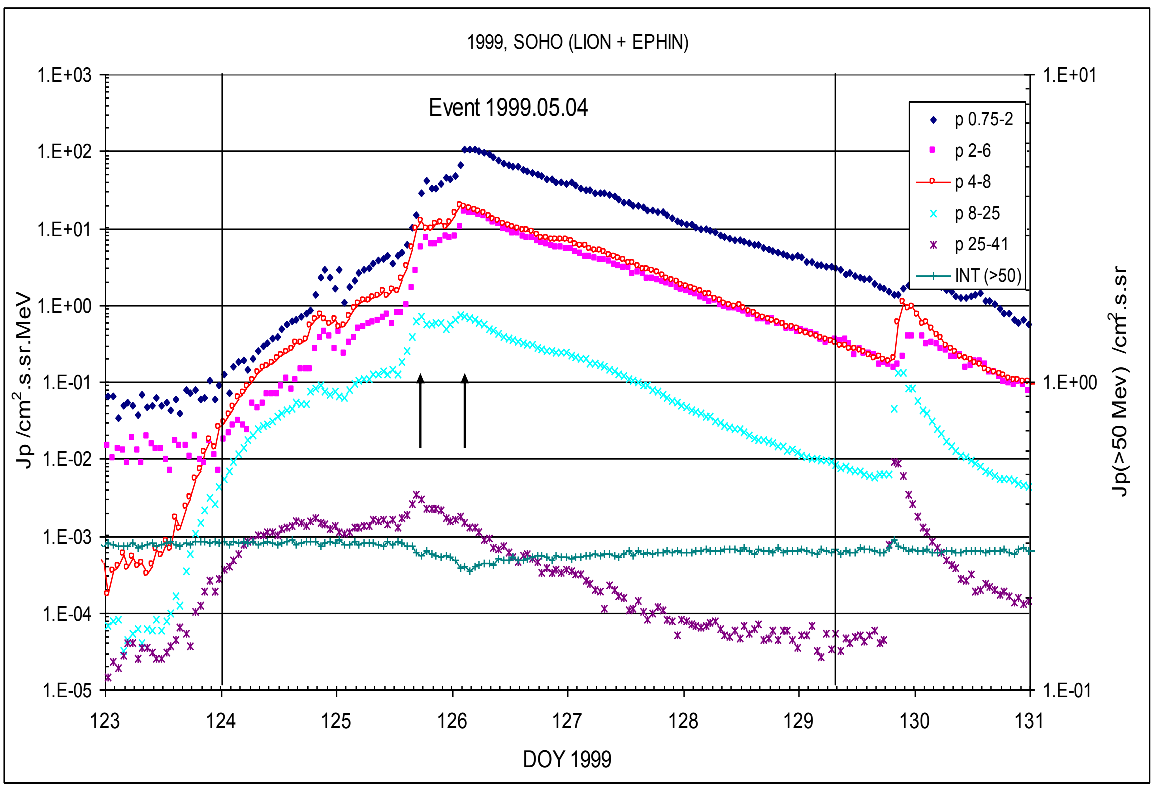
Sources: ☉ solar flare 03d05^{h}36^m, M4.4/2N, N15E32, AR8525
Main X-ray burst 1-8 Å: onset – 03d 05^{h}36^m, max – 03d 06^h 02^m, Φ = 0.099 J/m^2
CME: 03d06^{h}06^m, V = 1584 km/s, Δφ = 360º, dA = 088º
▲SC 05d15^h 43^m

Particle fluxes and associated phenomena



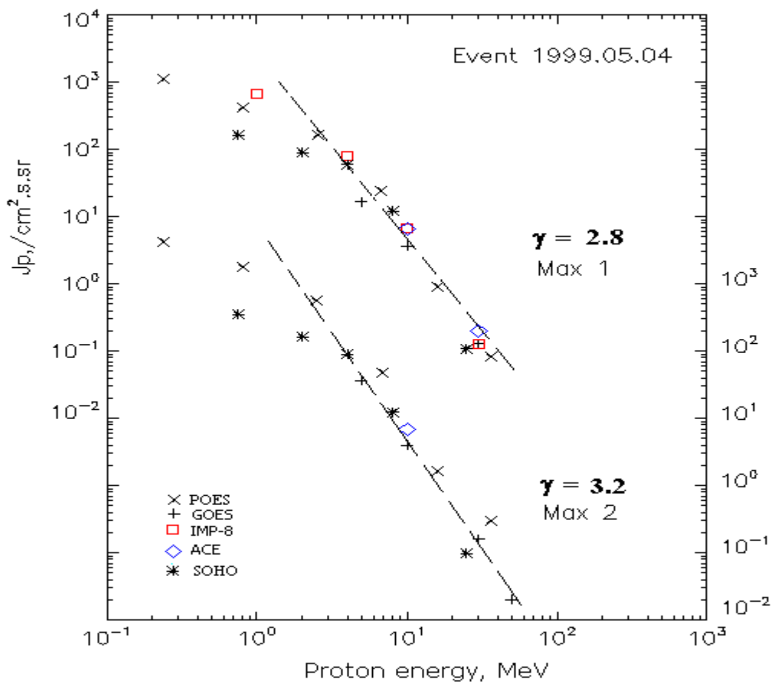
Time profiles of the proton fluxes for the event of 1999 May 04





Arrows on the profiles of the events indicate the time of the proton flux maxima, taken to build the proton spectra (see below)

Integral time-of-maximum proton spectrum



Integral fluxes of protons for the event of 1999 May 04

S/c, instruments	Ep, MeV	To	Tmax	Jmax, /cm^2.s.sr	Dura-tion	Comments
GOES-10						
EPS	>5	08^h	$05d21^h/06d09^h$	17/36	4d	
EPS	>10	08^h	$05d19^h/06d06^h$	3.7/4	4d	
EPS	>30	07^h	$05d18^h/06d04^h$	0.13 /0.16	3d	
EPS	>50	-	- $/06d04^h$	- /0.02	1d	
EPS	>60	-	-	-	-	
EPS	>100	-	-	-	-	
POES-15						
MEPED	>0.24	-	$05d16^h/06d03^h$	1120/4280	4d	
MEPED	>0.8	-	$05d16^h/06d03^h$	430/1940	4d	
MEPED	>2.5	-	$05d16^h/06d03^h$	190/570	4d	
MEPED	>6.9	-	$05d16^h/06d03^h$	25/48	4d	
MEPED	>16	-	$05d16^h/06d03^h$	0.9/1.6	3d	
MEPED	>36	-	$05d16^h/06d03^h$	0.08/0.3	1d	
MEPED	>70	-	-	-	-	
MEPED	>140	-	-	-	-	
IMP-8						
CPME	>1	02^h	$05d19^h$/ -	660/ -	7 d	
CPME	>4	02^h	$05d19^h$/ -	80/ -	7 d	
CPME	>10	02^h	$05d19^h$/ -	6.8/ -	6 d	
CPME	>30	01^h	$05d19^h$/ -	0.13/ -	-	
CPME	>60	-	-	- / -	-	
ACE						
SIS	>10	$03d18^h$	$05d19^h/06d02^h$	6.6/6.8	6d	
SIS	>30	$03d18^h$	$05d15^h$/ -	0.2/ -	3d	

SOHO						
EPHIN (INT)	>50	03d18	- “ -	- “ -	4d	

Differential fluxes of protons for the event of 1999 May 04

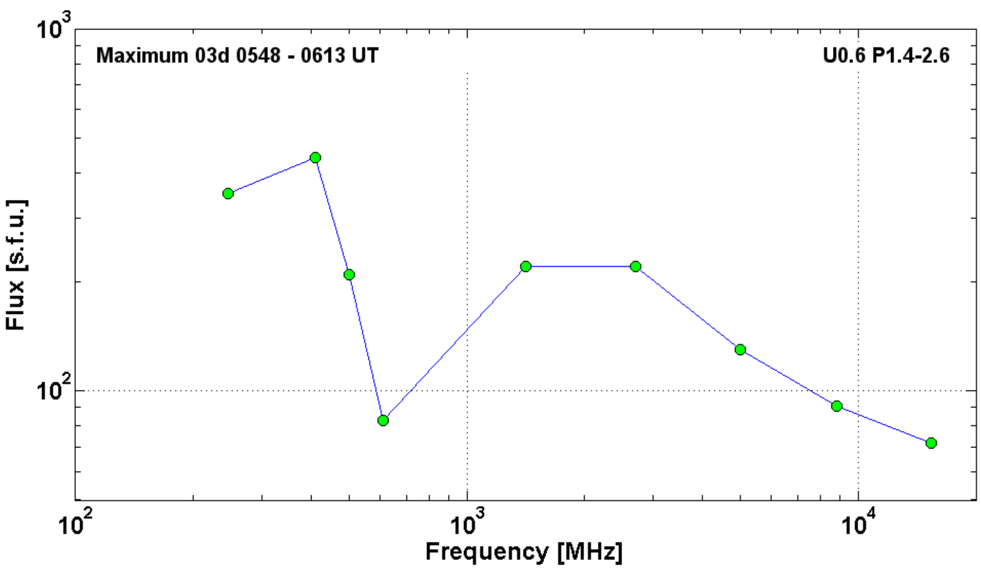
S/c, instruments	ΔE, MeV	To	Tmax	Jmax /cm^2.s.sr.MeV	Dura-tion	Comments
IMP-8						
CPME	1-2	03d12^h	05d15^h/ -	348/ -	7d	
CPME	2-4.6	03d16^h	05d15^h/ -	92/ -	7d	
CPME	4.6-15	03d20^h	05d19^h/ -	6,3/ -	5d	
CPME	15-25	01^h	05d19^h/ -	0,18/ -	~4d	
CPME	25-48	-	-	-	-	
CPME	48-96	-	-	-	-	
CPME	96-145	-	-	-	-	
CPME	145-440	-	-	-	-	
SOHO						
LION	0,75-2	03d22^h	05d18^h/06d04^h	42/106	6d	
LION	2-6	02^h	05d18^h/06d03^h	7.3/18	6d	
EPHIN	4-8	03d14^h	05d18^h/06d02^h	12/19	6d	
EPHIN	8-25	03d14^h	05d18^h/06d02^h	0.7/0.72	6d	
EPHIN	25-41	03d14^h	05d18^h/06d02^h	0.0035/0.0018	5d	
EPHIN	41-53	- “ -	- “ -	- “ -	- “ -	

Electromagnetic and other phenomena that are sources and/or accompanying for the event of 1999 May 04

1999 May 03 ☉ AR8525 To event 357

Hα	6563Å	0543	0551	0745	N15 E32	2N	U
1 -12.5	keV	0536	0602	0632		M4.4	9.9E-2
23 – 33	keV	0602		0605		290	HXT Y

15.4	GHz	0548.0	0608.0	0651.0		1.86	
8.8	GHz	0544.0	0607.0	0708.0		1.96	
5	GHz	0542.0	0607.0	0655.0		2.11	
2.7	GHz	0540.0	0548.0	0630.0		2.34	
1.4	GHz	0540.0	0548.0	0634.0		2.34	
610	MHz	0543.0	0551.0	0621.0		1.92	
500	MHz	0540.0	0552.0	0630.0		2.32	
410	MHz	0544.0	0551.0	0623.0		2.64	
245	MHz	0547.0	0613.0	0621.0	U0.6 P1.4-2.6	2.54	
DS II	35-85	0520		0606		3	
DS II	25-180	0543		0612	SH,H	2	
DS IV	40-800	<0551		~0710		2	
DS IV	35-85	0606		0709		3	
DS III	40-90	<0551		~1010	N	1	
DS DCIM	800-2000	0542		0641	GG	2	
CME	WL	0606	1584 km/s	15.8 km/s^2	360º	088º	



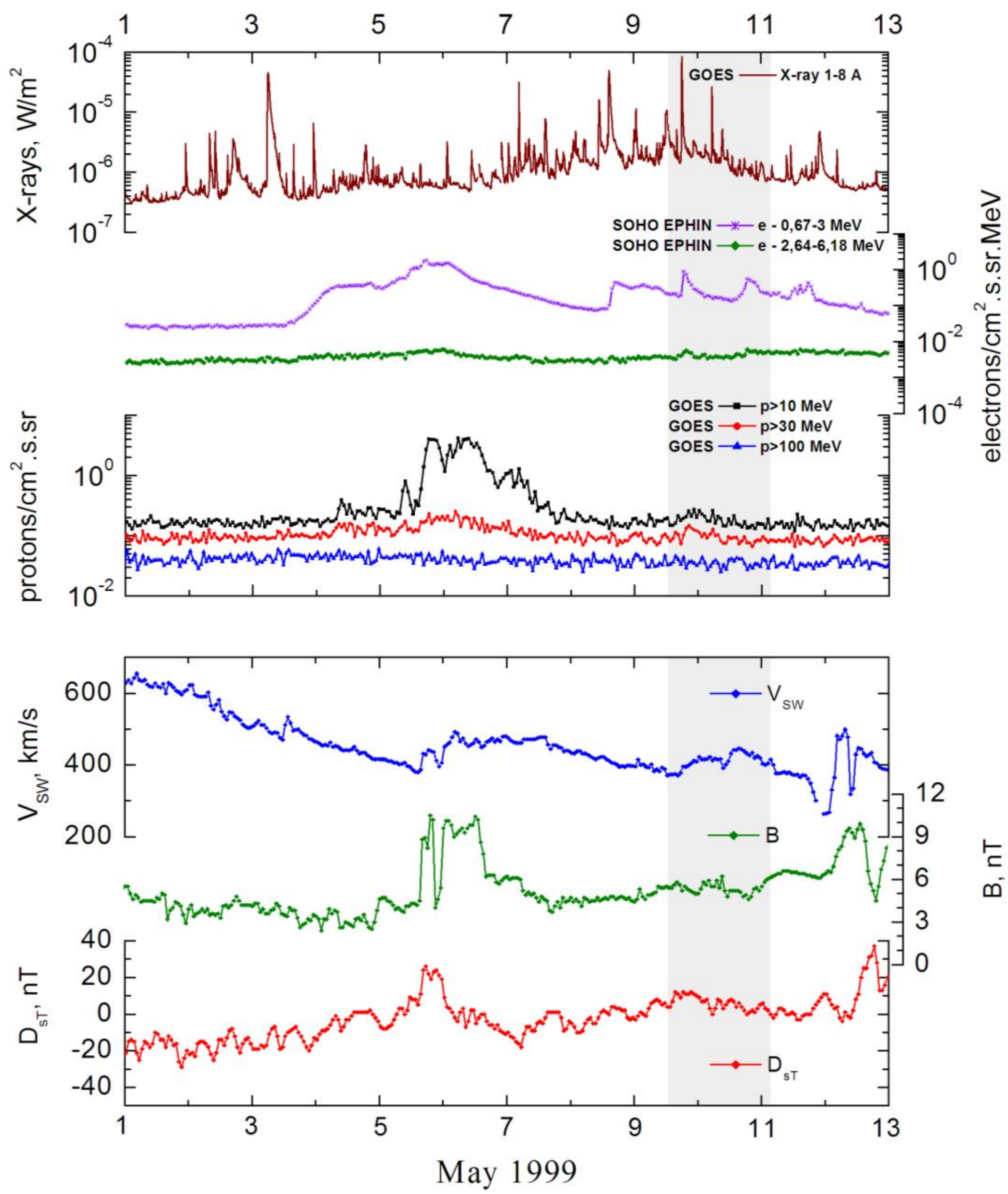
Список 1999 г.

Event 1999.05.09 – (1999-129) **№ 358**

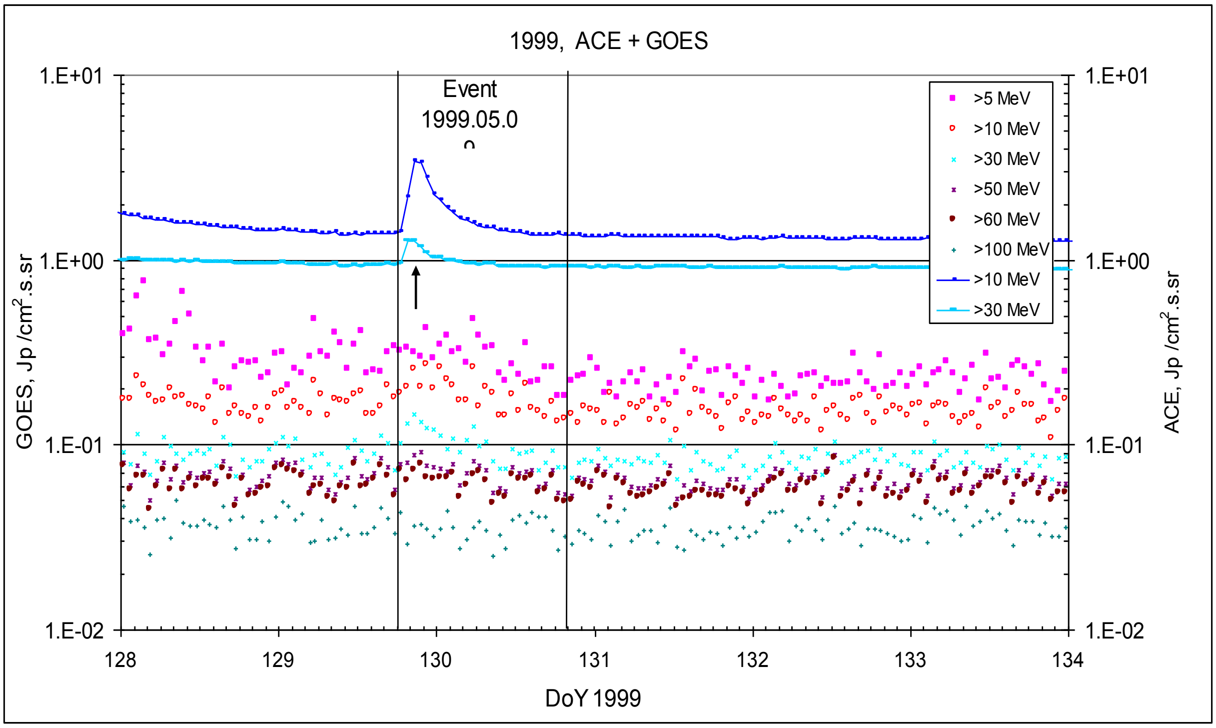
Particle event: To(Ep>10 MeV) – 09d19^h
Tmax(Ep>10 MeV) – 09d21^h, Jmax (Ep>10 MeV) – 1.2 /cm^2.s.sr *)
Duration of the event – 1 day
Quasimaximal energy of protons in the event = 75 MeV
*) The data from IMP-8

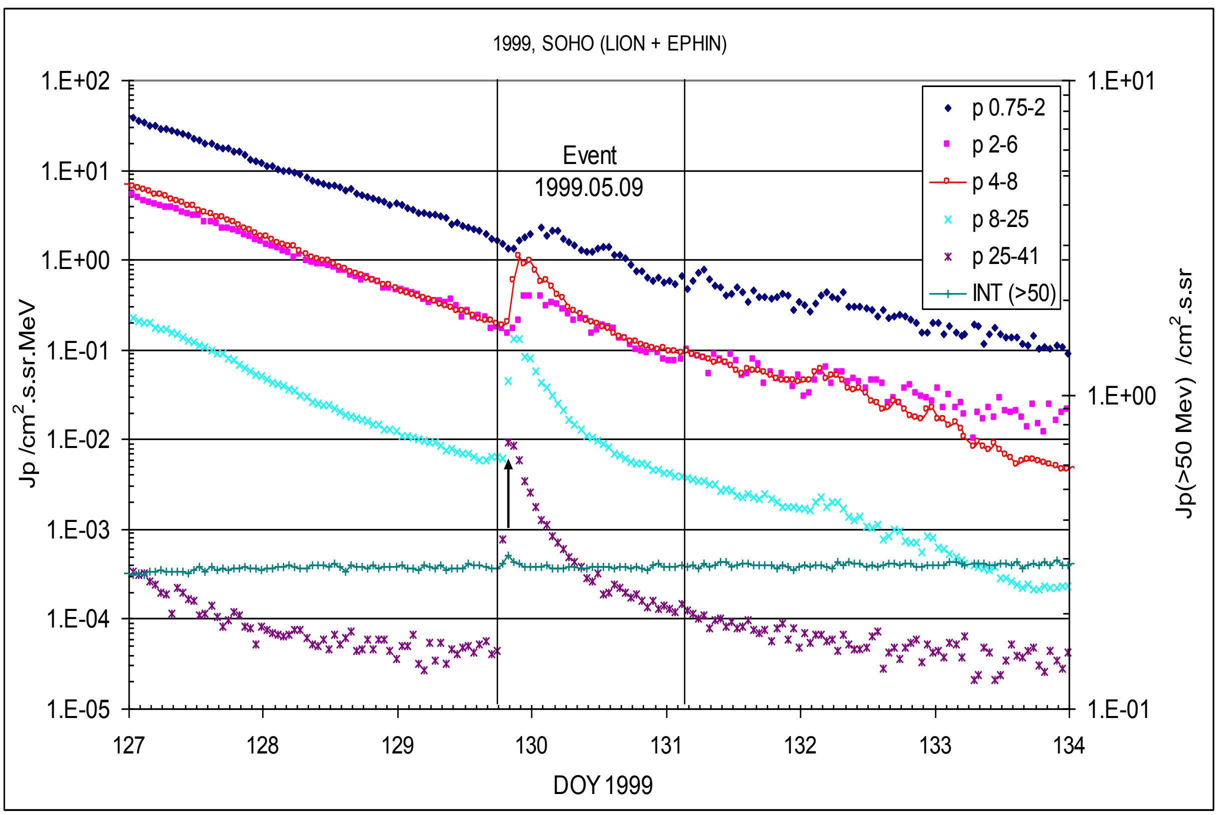
Sources: ■ solar flare 09d17^{h}53^m, M7.6/ …, n23w90*, AR8526 one day behind W limb;
Main X-ray burst 1-8 Å: onset – 09d17^{h}53^m, max – 09d18^{h}07^m, Φ = 0.061 J/m^2
CME: 09d18^{h}27^m, V = 0615 km/s, Δφ = 172º, dA = 316º
* − probable localization of the flare event

Particle fluxes and associated phenomena



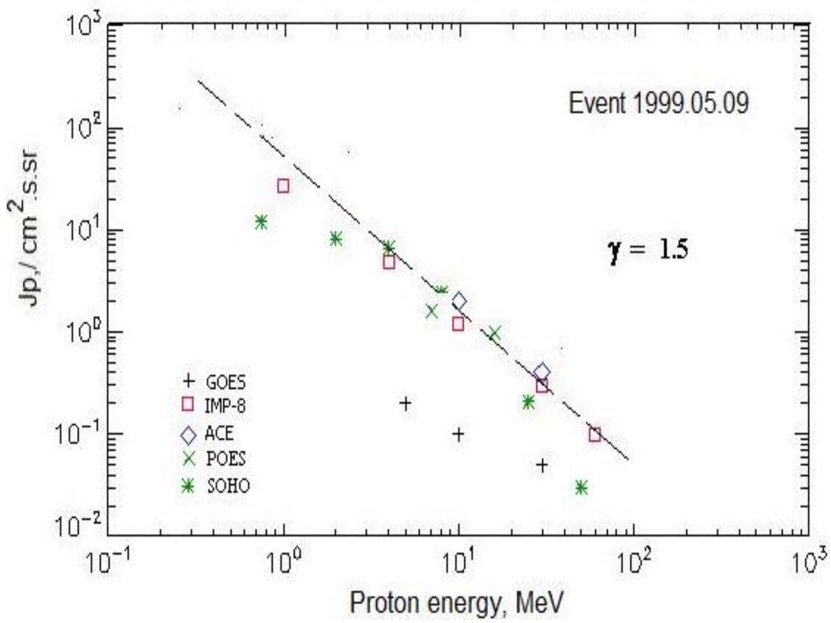
Time profiles of the proton fluxes for the event of 1999 May 09





Arrows on the profiles of the events indicate the time of the proton flux maxima, taken to build the proton spectra (see below)

Integral time-of-maximum proton spectrum



Integral fluxes of protons for the event of 1999 May 09

S/c, instruments	Ep, MeV	To	Tmax	Jmax, /cm^2.s.sr	Dura-tion	Comments
GOES-10						
EPS	>5	-	22^h	0.2	1d	
EPS	>10	-	22^h	0.1	1d	
EPS	>30	-	21^h	0.05	0.5d	
EPS	>50	-	-	-	-	
EPS	>60	-	-	-	-	
EPS	>100	-	-	-	-	
POES-15						
MEPED	>0.24	-	23^h	96	-	
MEPED	>0.8	-	23^h	56	-	
MEPED	>2.5	-	23^h	32	-	
MEPED	>6.9	-	23^h	8	-	
MEPED	>16	-	23^h	0.99	-	
MEPED	>36	-	23^h	0.61	-	
MEPED	>70	-	23^h	0.2	-	
MEPED	>140	-	23^h	0.22	-	
IMP-8						
CPME	>1	21^h	23^h	27.4	4d	
CPME	> 4	19^h	22^h	4.8	1d	
CPME	>10	19^h	21^h	1.2	1d	
CPME	>30	19^h	20^h	0.3	1d	
CPME	>60	19^h	20^h	0.1	1d	
ACE						
SIS	>10	18^h	21^h	2	1d	
SIS	>30	18^h	22^h	0.4	1d	
SOHO						
EPHIN (INT)	>50	18^h	20^h	0.03	0.5d	

Differential fluxes of protons for the event of 1999 May 09

S/c, instruments	ΔE, MeV	To	Tmax	Jmax /cm^2.s.sr.MeV	Dura-tion	Comments
IMP-8						
CPME	1-2	21^h	23^h	15.2	3d	
CPME	2-4.6	21^h	23^h	3.7	2d	
CPME	4.6-15	20^h	22^h	0,33	2d	
CPME	15-25	$<20^h$	22^h	0,04	1d	
CPME	25-48	$<20^h$	21^h	0,009	1d	
CPME	48-96	-	-	-	-	
CPME	96-145	-	-	-	-	
CPME	145-440	-	-	-	-	
SOHO						
LION	0,75-2	22^h	$10d02^h$	2.2	3d	
LION	2-6	21^h	23^h	0.387	3d	
EPHIN	4-8	20^h	22^h	1.05	5d	
EPHIN	8-25	19^h	21^h	0.13	3d	
EPHIN	41-53	- “ -	- “ -	- “ -	- “ -	

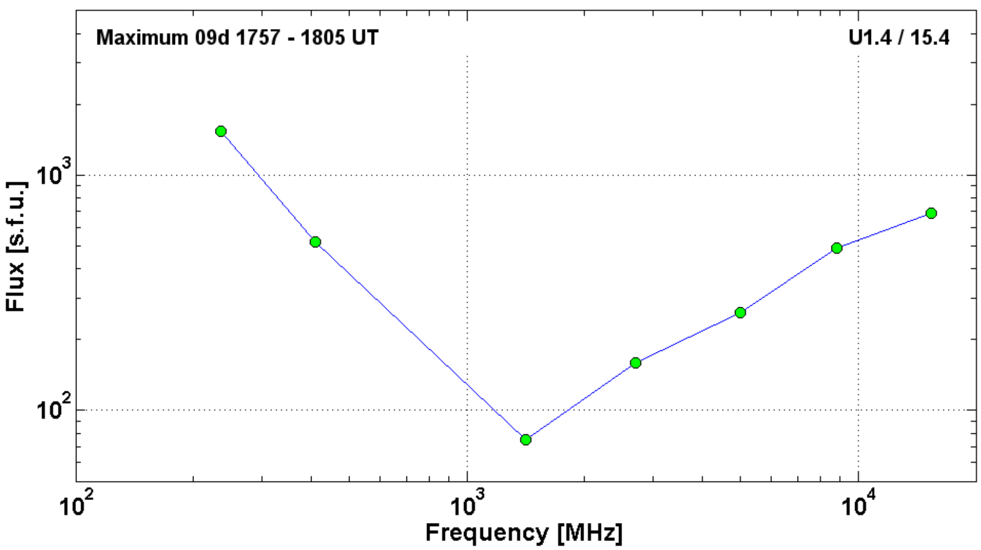
Electromagnetic and other phenomena that are sources and/or accompanying for the event of 1999 May 09

1999 May 09 ■ AR8526 To event 358

Hα	6563Å	No Flare			n23 w90*		
1 -12.5	keV	1753	1807	1815		M7.6	6.1E-2
23 – 33	keV	1804		1821		1740	HXT Y
>300	keV	175542	175751	180725		2204.41	BATS C
>300	keV					2.1+/–0.1	OSSE C

15.4	GHz	1757.0	1757.0	1802.0		2.84	
8.8	GHz	1756.0	1757.0	1802.0		2.69	
5	GHz	1756.0	1758.0	1811.0	U1.4 / 15.4	2.41	
2.7	GHz	1757.0	1759.0	1801.0		2.20	
1.4	GHz	1757.0	1758.0	1800.0		1.88	
410	MHz	1804.0	1805.0	1805.0		2.72	
235	MHz	1800.3	1802.0	1803.0		3.19	
DS III	25-75	1803		1803		1	
CME	WL	1827	0615 km/s	-3.0 km/s^2	172º	316º	

* − probable localization of the flare event

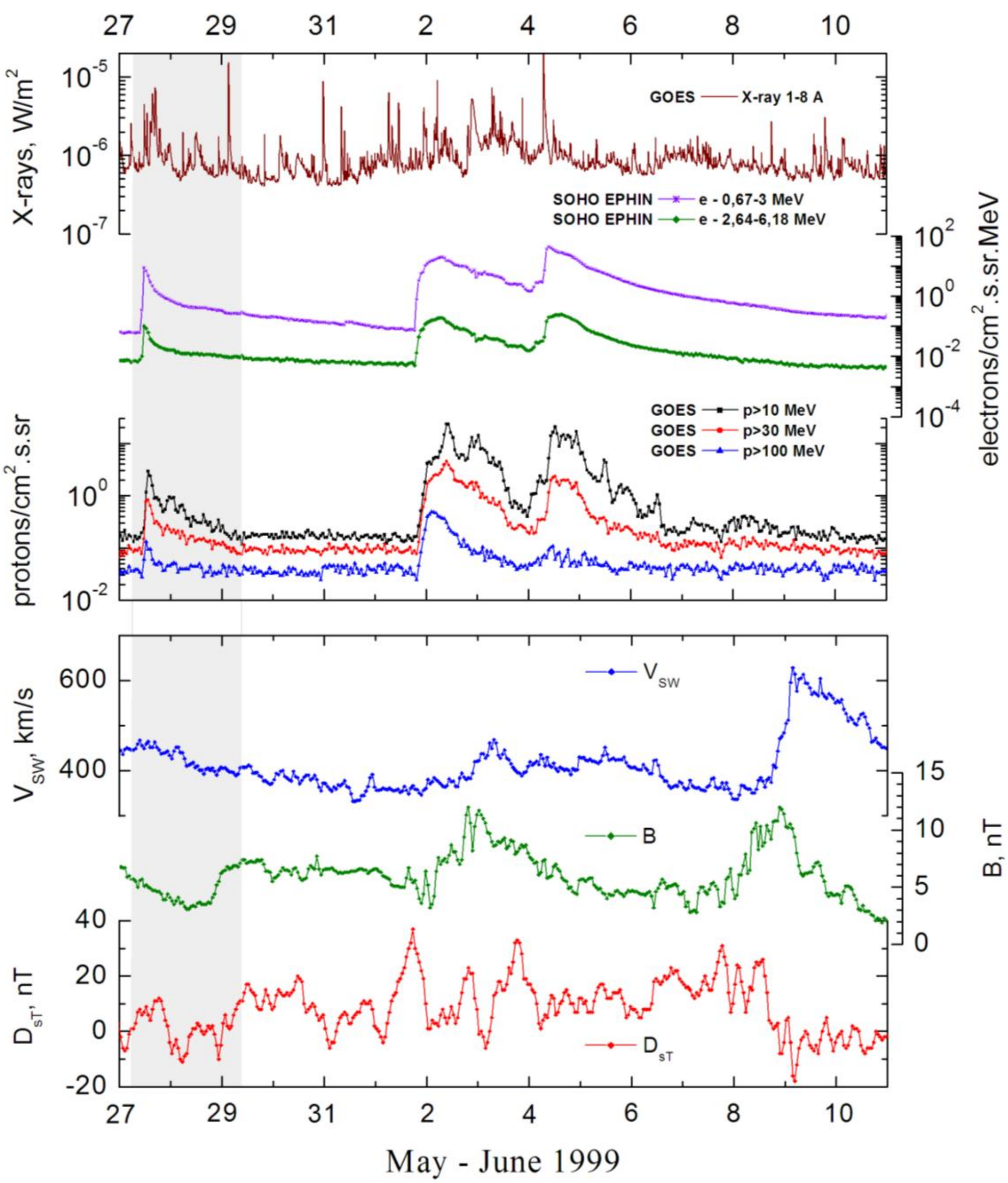


Event 1999.05.27 – (1999-147) **№ 359**

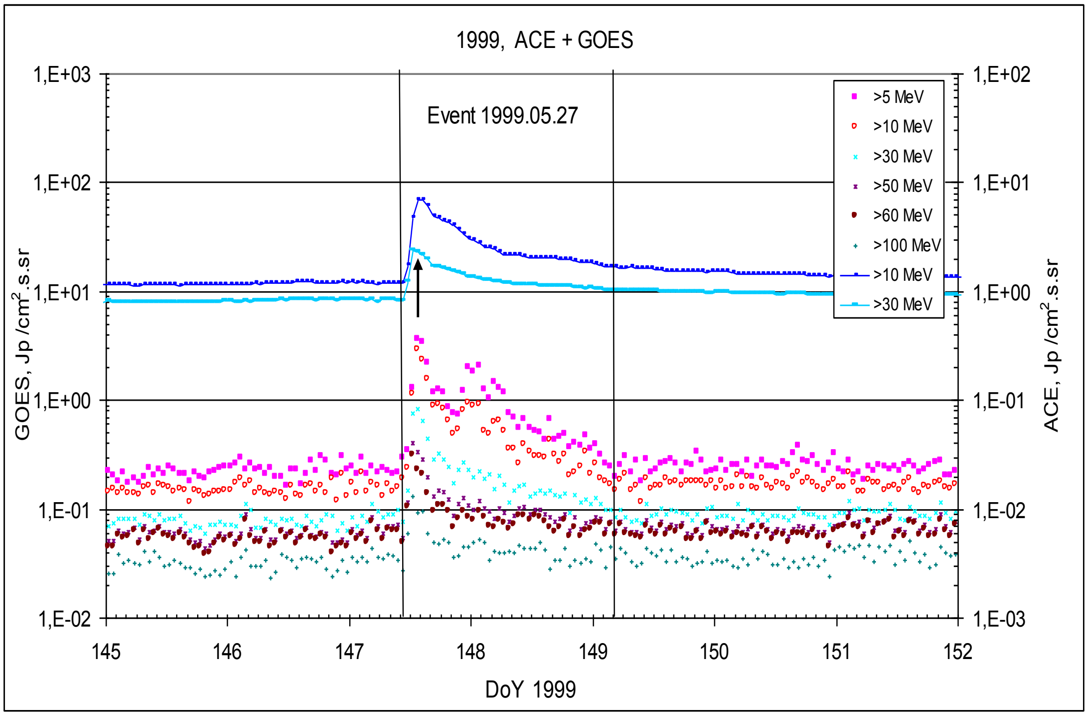
Particle event: To(Ep>10 MeV) – 27d12^h
Tmax(Ep>10 MeV) – 27d13^h, Jmax (Ep>10 MeV) – 2.75 /cm^2.s.sr
Duration of the event – 1.5 days
Quasimaximal energy of protons in the event – Eqm = 275 MeV

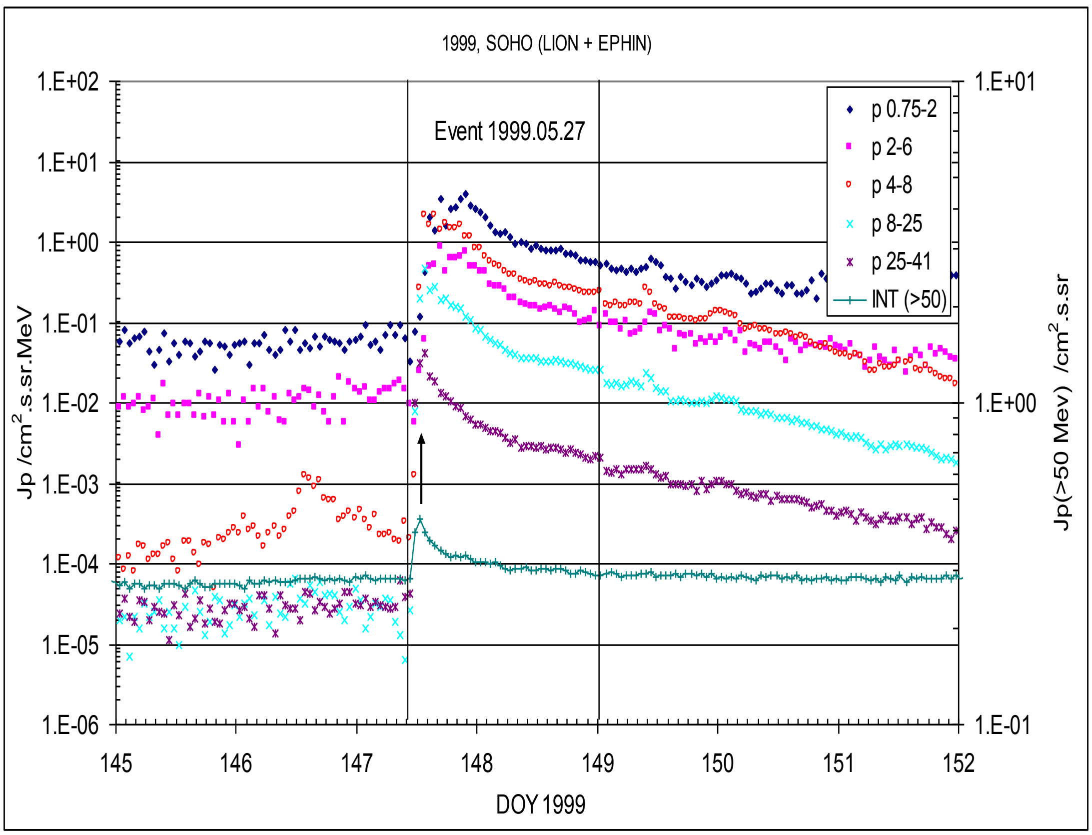
Sources: ⊡ back side solar flare event < 27d11^{h}06^m, AR unknown, behaind W_L
○ solar flare 26d19^{h}15^m, M1.2/2N, N17E46, AR8552
CME: 27d11^{h}06^m, V = 1691 km/s, Δφ = 360º, dA = 341º

Particle fluxes and associated phenomena



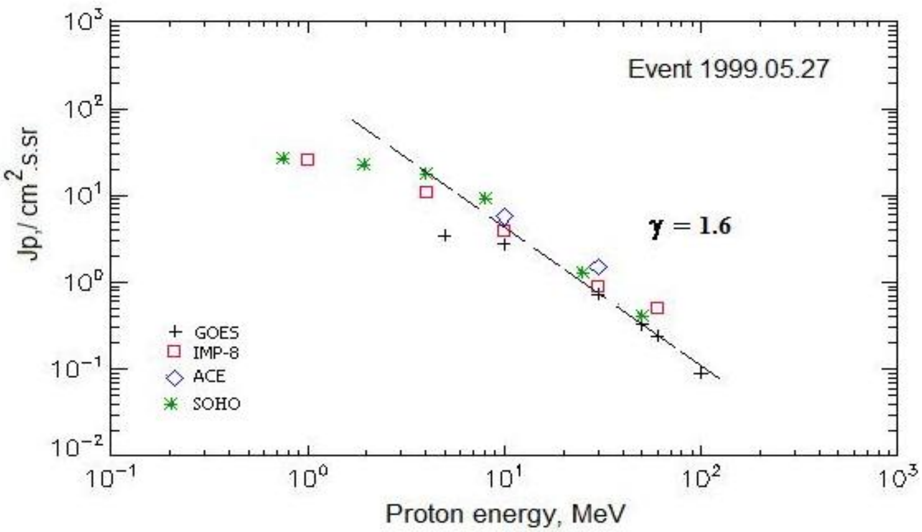
Time profiles of the proton fluxes for the event of 1999 May 27





Arrows on the profiles of the events indicate the time of the proton flux maxima, taken to build the proton spectra (see below)

Integral time-of-maximum proton spectrum



Integral fluxes of protons for the event of 1999 May 27

S/c, instruments	Ep, MeV	To	Tmax	Jmax, /cm^2.s.sr	Dura-tion	Comments
GOES-10						
EPS	>5	12^h	13^h	3.44	1.5d	
EPS	>10	12^h	13^h	2.75	1.5d	
EPS	>30	12^h	13^h	0.73	1.5d	
EPS	>50	12^h	12^h	0.33	1d	
EPS	>60	12^h	12^h	0.24	1d	
EPS	>100	-	12^h	0.09	1d	
IMP-8						
CPME	>1	12^h	15^h	25.6	2d	
CPME	>4	12^h	15^h	11	2d	
CPME	>10	12^h	14^h	3.9	1.5d	
CPME	>30	11^h	13^h	0.9	1d	
CPME	>60	11^h	12^h	0.5	1d	
ACE						
SIS	>10	11^h	14^h	5.7	1d	
SIS	>30	11^h	13^h	1.5	1d	
SOHO						
EPHIN (INT)	>50	11^h	13^h	0.41	1d	

Differential fluxes of protons for the event of 1999 May 27

S/c, instruments	ΔE, MeV	To	Tmax	Jmax /cm^2.s.sr.MeV	Dura-tion	Comments
IMP-8						
CPME	1-2	14^h	19^h	14.8	1.5d	
CPME	2-4.6	13^h	19^h	5.7	1.5d	
CPME	4.6-15	13^h	15^h	0.7	1.5d	
CPME	15-25	13^h	14^h	0.17	1.5d	
CPME	25-48	13^h	13^h	0.025	1d	
CPME	48-96	12^h	12^h	0.006	1d	
CPME	96-145	12^h	12^h	-	1d	
CPME	145-440	12^h	12^h	0.001	1d	
SOHO						
LION	0,75-2	16^h	14^h	2.1	1.5d	
LION	2-6	16^h	15^h	0.47	1.5d	
EPHIN	4-8	11^h	14^h	2.1	1.5d	
EPHIN	8-25	11^h	14^h	0.47	1.5d	
EPHIN	25-41	11^h	14^h	0.04	1.5d	
EPHIN	41-53	- “ -	- “ -	- “ -	- “ -	

References

Slocum P.L., E.C. Stone, R.A. Leske et al., 2003.

Electromagnetic and other phenomena that are sources and/or accompanying for the event of 1999 May 27

1999 May 27 ⊡ AR8552 To event 359

CME	WL	1106	1691 km/s	-33.5 km/s	360º	341º

1999 May 26 ○ AR8552 To event 359

Hα		1917	1921	2026	N17 E46	2N	FU
1 -12.5	keV	1915	1932	1945		M1.2	1.3E-02
6.7	GHz	1911.0	1934.0	2106.0		1.43	
DS III	25-200	1955		1955	B	2	
DS CONT	25-75	1954		2038		1	
CME	WL	2026	0396 km/s	4.4km/s^2	017º	039º	

Event 1999.06.01 – (1999-152) **№ 360**

Particle event: To(Ep>10 MeV) – 01d20^h

Tmax$_1$(Ep>10 MeV) – 02d09^h, Jmax$_1$(Ep>10 MeV) – 23 /cm^2.s.sr

Tmax$_2$(Ep>10 MeV) – 02d21^h, Jmax$_2$(Ep>10 MeV) – 13 /cm^2.s.sr

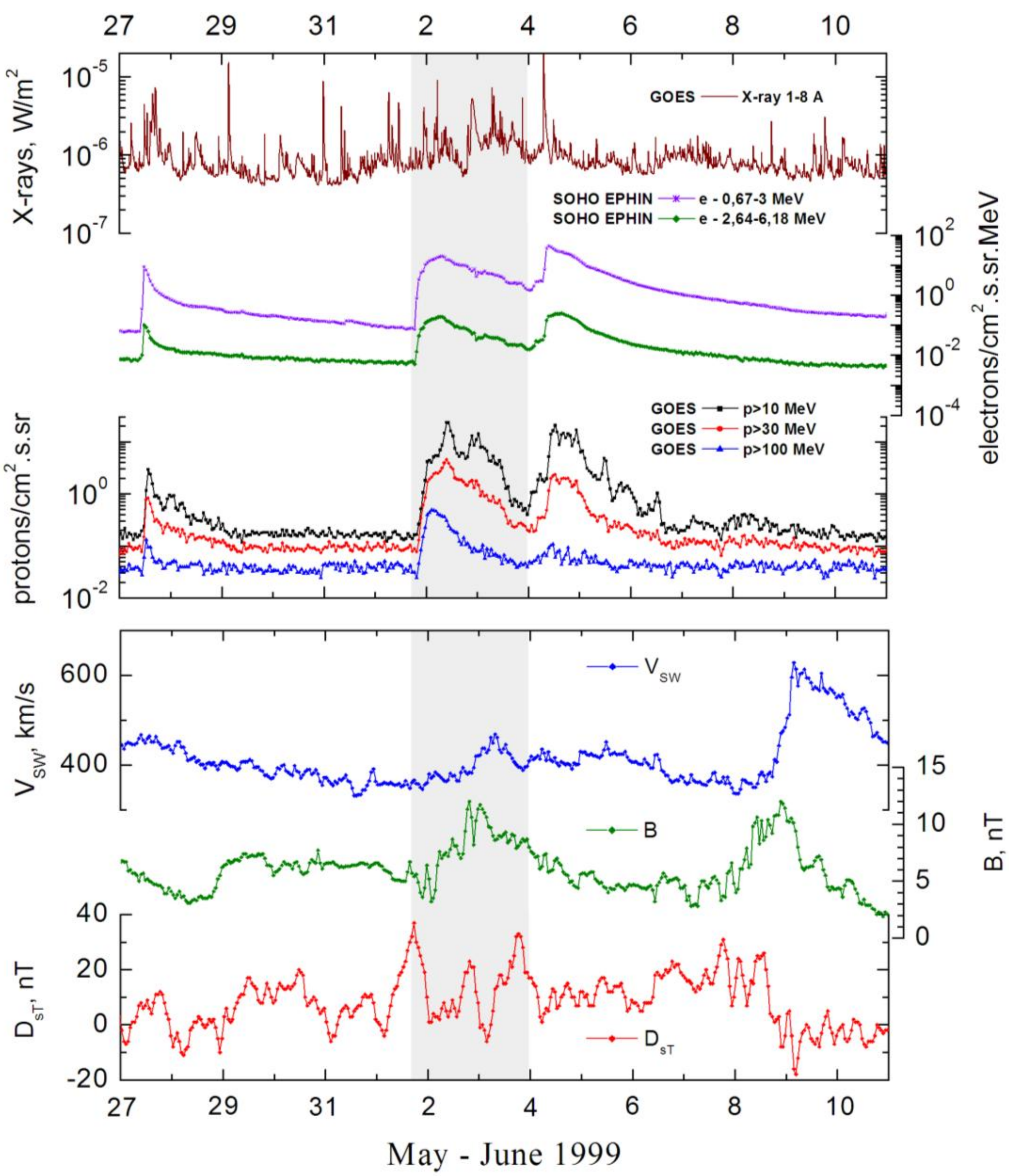
Duration of the event – 2 days

Quasimaximal energy of protons in the event – Eqm$_1$ = 350 MeV

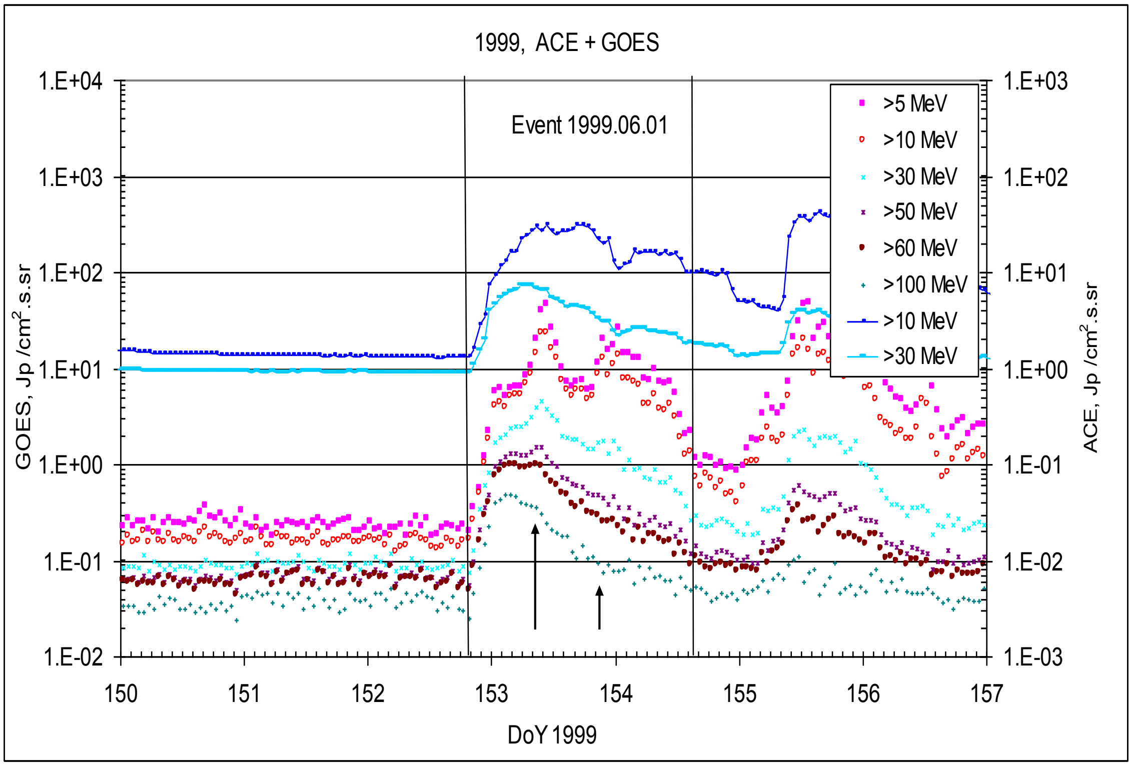
– Eqm$_2$ = 240 MeV

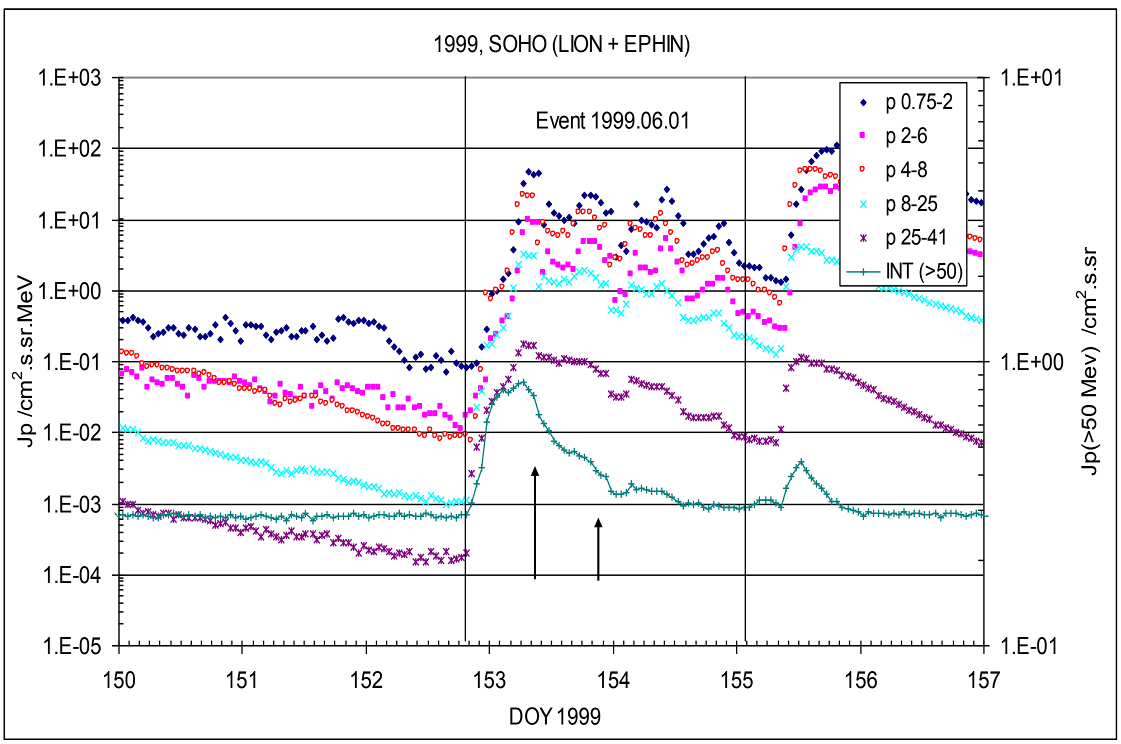
Sources: □ back side solar flare 01d18^{h}53^m, C1.2; n25w90, AR unknown
Main X-ray burst 1-8 Å: onset – 01d18^h 53^m, max – 01d19^{h}04^m, Φ = 0.0027 J/m^2
CME: 01d19^{h}37^m, V = 1772 km/s, Δφ = 360^o; dA=359^o
* − probable localization of the flare event

Particle fluxes and associated phenomena



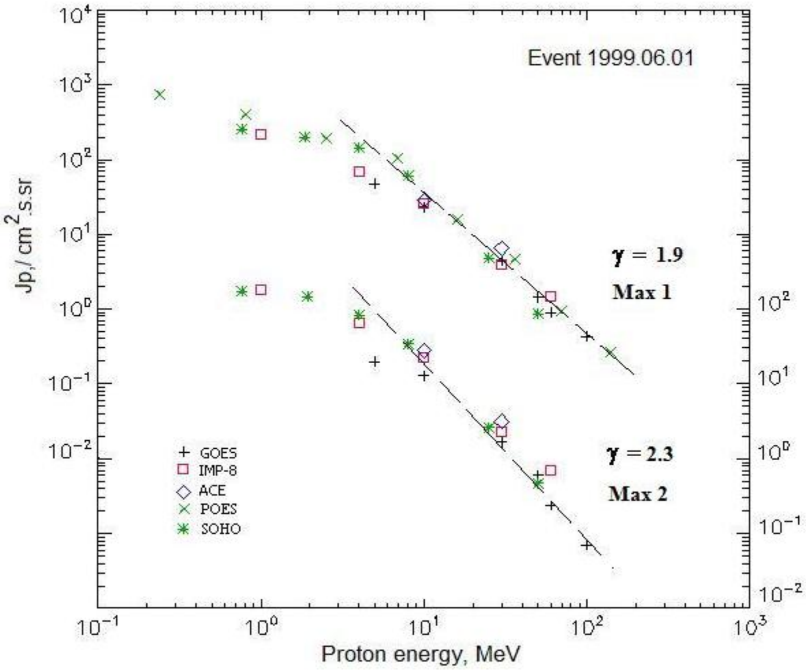
Time profiles of the proton fluxes for the event of 1999 June 01





Arrows on the profiles of the events indicate the time of the proton flux maxima, taken to build the proton spectra (see below)

Integral time-of-maximum proton spectrum



Integral fluxes of protons for the event of 1999 June 01

S/c, instruments	Ep, MeV	To	Tmax	Jmax, /cm^2.s.sr	Dura-tion	Comments
GOES-10						
EPS	>5	20^h	02d10^h/02d21^h	47/20.1	2d	
EPS	>10	20^h	02d09^h/02d21^h	23/13	2d	
EPS	>30	20^h	02d09^h/02d21^h	4.4/1.7	2d	
EPS	>50	20^h	02d09^h/02d21^h	1.42/0.6	2d	
EPS	>60	20^h	02d05^h/02d20^h	0.90/0.24	2d	
EPS	>100	20^h	02d03^h/02d20^h	0.43/0.07	2d	
POES-15						
MEPED	>0.24	-	02d08^h/ -	755/ -	2d	
MEPED	>0.8	-	02d08^h/ -	403/ -	2d	
MEPED	>2.5	-	02d08^h/ -	192/ -	2d	
MEPED	>6.9	-	02d08^h/ -	106/ -	2d	
MEPED	>16	-	02d08^h/ -	16/ -	2d	
MEPED	>36	-	02d08^h/ -	4.65/ -	2d	
MEPED	>70	-	02d08^h/ -	0.93/ -	2d	
MEPED	>140	-	02d08^h/ -	0.26/ -	2d	
IMP-8						
CPME	>1	21^h	02d09^h/02d19^h	215/188	2 d	
CPME	>4	21^h	02d09^h/02d19^h	68/65,4	2 d	
CPME	>10	21^h	02d09^h/02d19^h	26/23	2 d	
CPME	>30	21^h	02d08^h/02d19^h	3.9/2.3	2 d	
CPME	>60	21^h	02d07^h/02d19^h	1.5/0.7	2 d	
ACE						
SIS	>10	21^h	02d08^h/02d18^h	29/28.3	2 d	
SIS	>30	21^h	02d07^h/02d18^h	6.5/3.2	2 d	

SOHO						
EPHIN (INT)	>50	20^h	$02d07^h/02d19^h$	0.85/0.47	-	

Differential fluxes of protons for the event of 1999 June 01

S/c, instruments	ΔE, MeV	To	Tmax	Jmax /cm^2.s.sr.MeV	Duration	Comments
IMP-8						
CPME	1-2	$02d01^h$	$02d09^h/02d19^h$	80.2/66	2d	
CPME	2-4.6	22^h	$02d09^h/02d19^h$	30/25.6	2d	
CPME	4.6-15	21^h	$02d09^h/02d19^h$	4.0/4.1	2d	
CPME	15-25	21^h	$02d09^h/02d19^h$	1.2/1.05	2d	
CPME	25-48	21^h	$02d08^h/02d19^h$	0.14/0.095	2d	
CPME	48-96	20^h	$02d08^h/02d19^h$	0.020/0.01	2d	
CPME	96-145	- / -	- / -	- / -	-	
CPME	145-440	- / -	- / -	- / -	-	
SOHO						
LION	0,75-2	21^h	$02d07^h/02d19^h$	46.6/21.6	2d	
LION	2-6	21^h	$02d07^h/02d19^h$	9.6/4.9	2d	
EPHIN	4-8	21^h	$02d07^h/02d19^h$	20.7/12.1	2d	
EPHIN	8-25	21^h	$02d07^h/02d19^h$	3.3/1.9	2d	
EPHIN	25-41	20^h	$02d07^h/02d19^h$	0.17/0.1	2d	
EPHIN	41-53	- “ -	- “ -	- “ -	- “ -	

Electromagnetic and other phenomena that are sources and/or accompanying for the event of 1999 June 01

1999 June 01 □ AR To event 360

Hα	6563 Å	No Flare			n25w90*		
1 -12.5	keV	1853	1904	1932		C1.2	2.7E-3
5	GHz	1855.0	1855.0	1856.0		1.75	
2.8	GHz	1852.0	1855.0	1931.0		1.26	2.8
CME	WL	1938	1772 km/s	1.8 km/s^2	360º	359º	

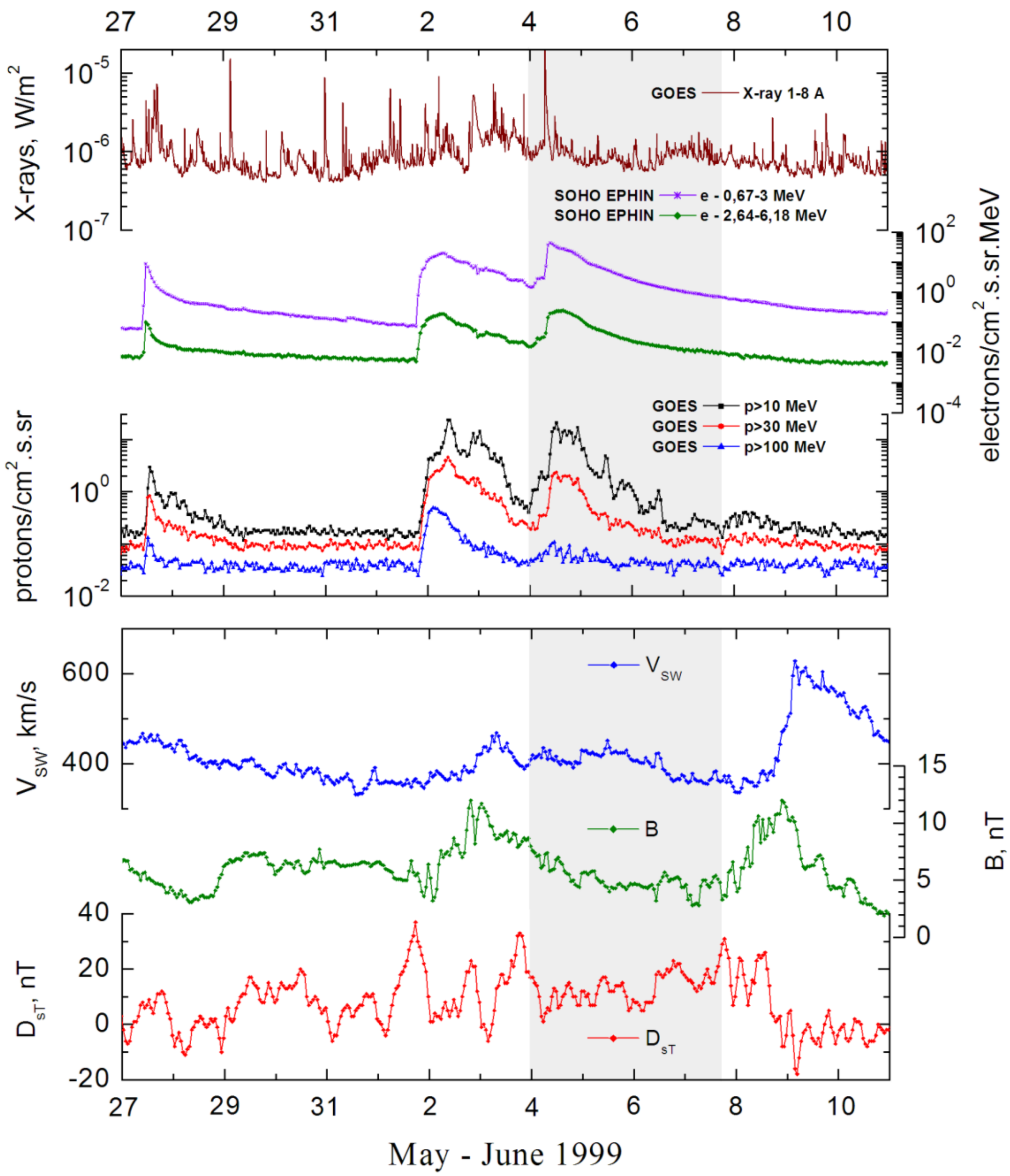
* − probable localization of the flare event

Event 1999.06.04 – (1999-155) **№ 361**

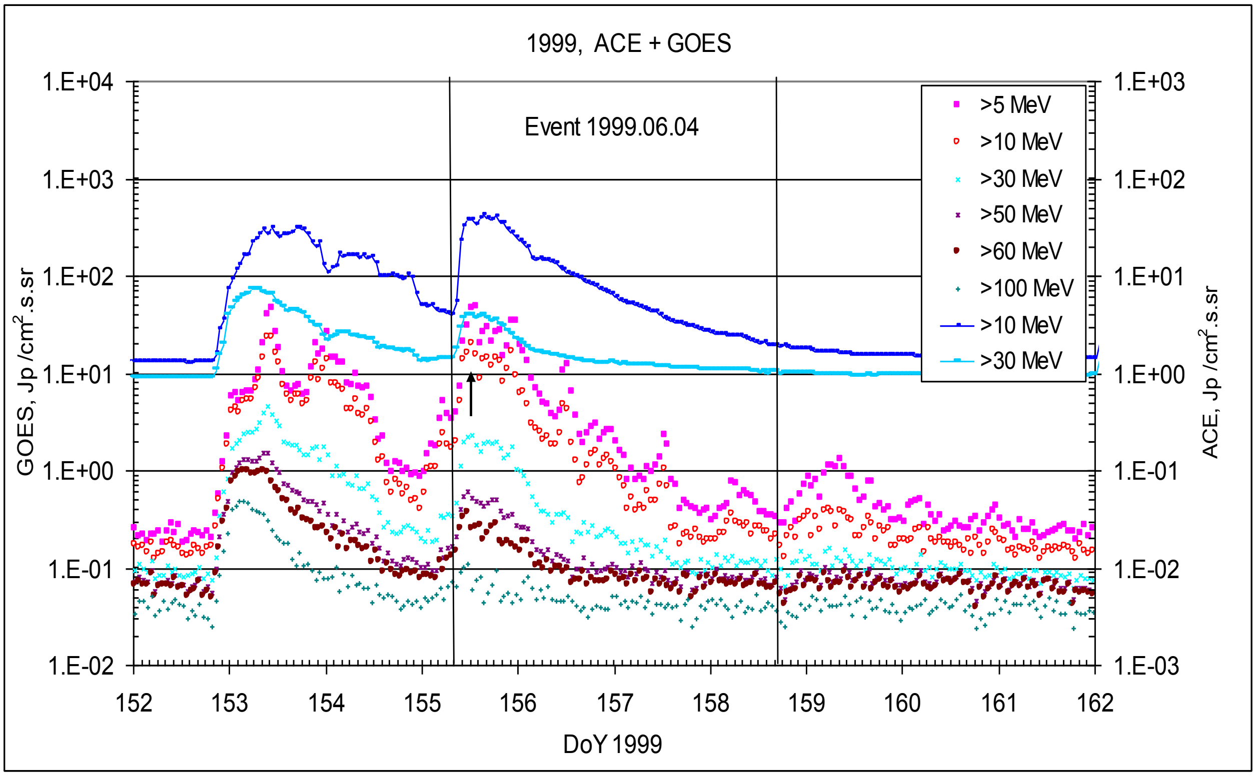
Particle event: To(Ep>10 MeV) – 04d08^h
Tmax(Ep>10 MeV) – 04d12^h, Jmax (Ep>10 MeV) – 20 /cm^2.s.sr
Duration of the event – 3 days
Quasimaximal energy of protons in the event – Eqm = 300 MeV

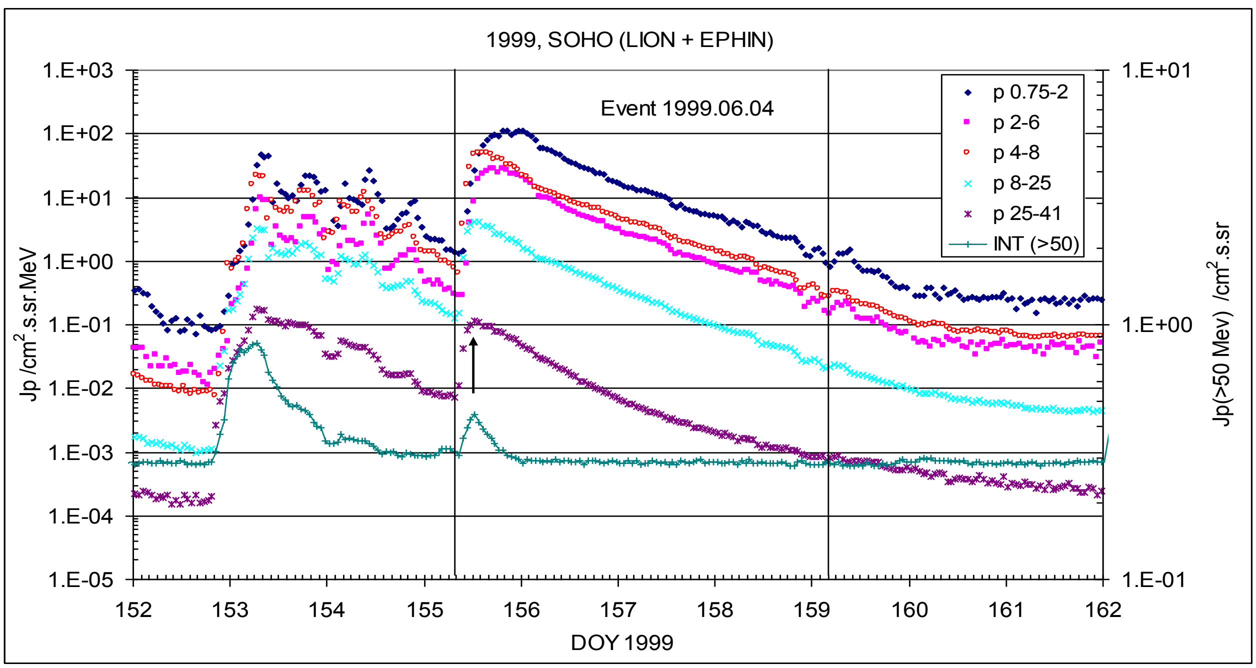
Sources: ● solar flare 04d06^{h}52^m, M3.9/2N, N18W72, AR8552
Main X-ray burst 1-8 Å: onset – 04d06^{h}52^m, max – 04d07^{h}03^m, Φ = 0.024 J/m^2
CME: 04d07^{h}27^m, V = 2230 km/s, Δφ = 150 º, dA= 287º

Particle fluxes and associated phenomena



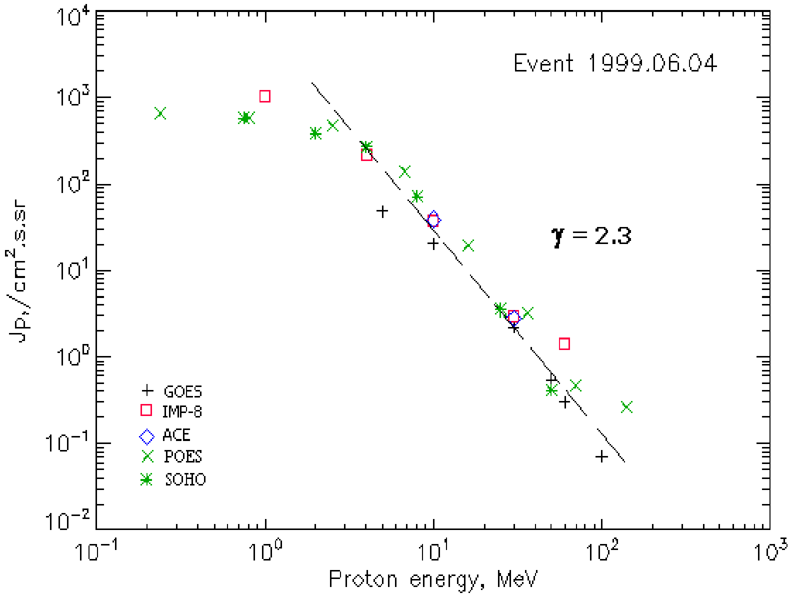
Time profiles of the proton fluxes for the event of 1999 June 04





Arrows on the profiles of the events indicate the time of the proton flux maxima, taken to build the proton spectra (see below)

Integral time-of-maximum proton spectrum



Integral fluxes of protons for the event of 1999 June 04

S/c, instruments	Ep, MeV	To	Tmax	Jmax, /cm^2.s.sr	Dura-tion	Comments
GOES-10						
EPS	>5	08^h	13 ^{h}	48	3d	
EPS	>10	08^h	12^h	20	3d	
EPS	>30	08^h	12^h	2.2	3d	
EPS	>50	08^h	11^h	0.55	3d	
EPS	>60	-	11^h	0.3	2d	
EPS	>100	-	11^h	0.07	2d	
POES-15						
MEPED	>0.24	-	12^h	615	3d	
MEPED	>0.8	-	12^h	540	3d	
MEPED	>2.5	-	12^h	430	3d	
MEPED	>6.9	-	12^h	170	3d	
MEPED	>16	-	12^h	19.72	3d	
MEPED	>36	-	12^h	3.27	3d	
MEPED	>70	-	12^h	0.46	2d	
MEPED	>140	-	12^h	0.26	2d	
IMP-8						
CPME	>1	09^h	20^h	1020	5 d	
CPME	>4	09^h	17^h	220	5 d	
CPME	>10	09^h	16^h	37	5 d	
CPME	>30	09^h	13^h	2.9	2 d	
CPME	>60	09^h	12^h	1.4	2 d	
ACE						
SIS	>10	09^h	16^h	39	4d	
SIS	>30	09^h	13^h	2.8	1d	
SOHO						
EPHIN (INT)	>50	09^h	12^h	0.41	<1d	

Differential fluxes of protons for the event of 1999 June 04

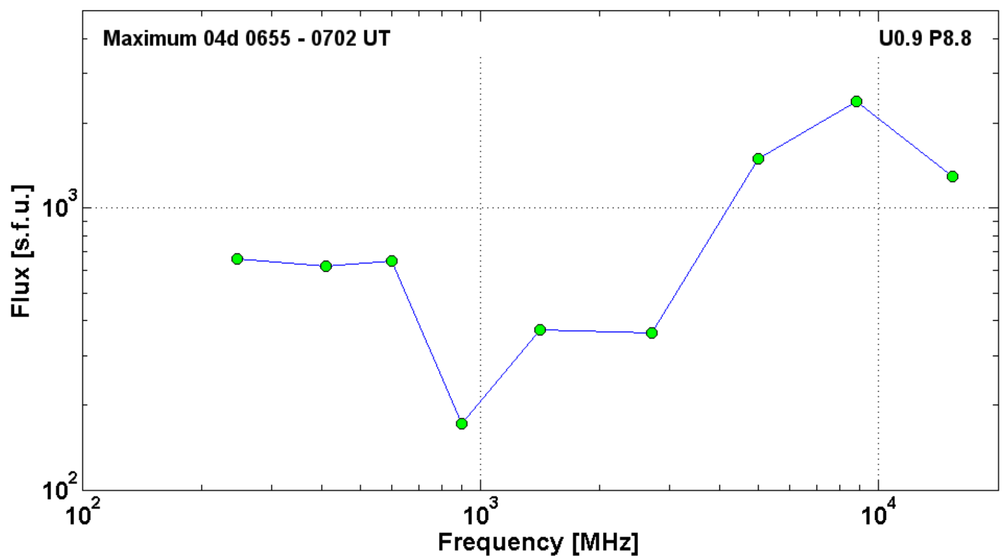
S/c, instruments	ΔE, MeV	To	Tmax	Jmax /cm^2.s.sr.MeV	Dura-tion	Comments
IMP-8						
CPME	1-2	10^h	23^h	560	5d	
CPME	2-4.6	09^h	19^h	188	5d	
CPME	4.6-15	09^h	16^h	17	5d	
CPME	15-25	07^h	14^h	1.2	5d	
CPME	25-48	09^h	13^h	0,1	4d	
CPME	48-96	08^h	12^h	0,01	2d	
CPME	96-145	08^h	-	-	1d	
CPME	145-440	06^h	10^h	0,002	1d	
SOHO						
LION	0,75-2	10^h	23^h	110	4d	
LION	2-6	10^h	17^h	28	4d	
EPHIN	4-8	09^h	15^h	49.7	5d	
EPHIN	8-25	09^h	14^h	40.5	5d	
EPHIN	25-41	09^h	13^h	0.1	5d	
EPHIN	41-53	- ‘ -	- ‘ -	- ‘ -	- ‘ -	

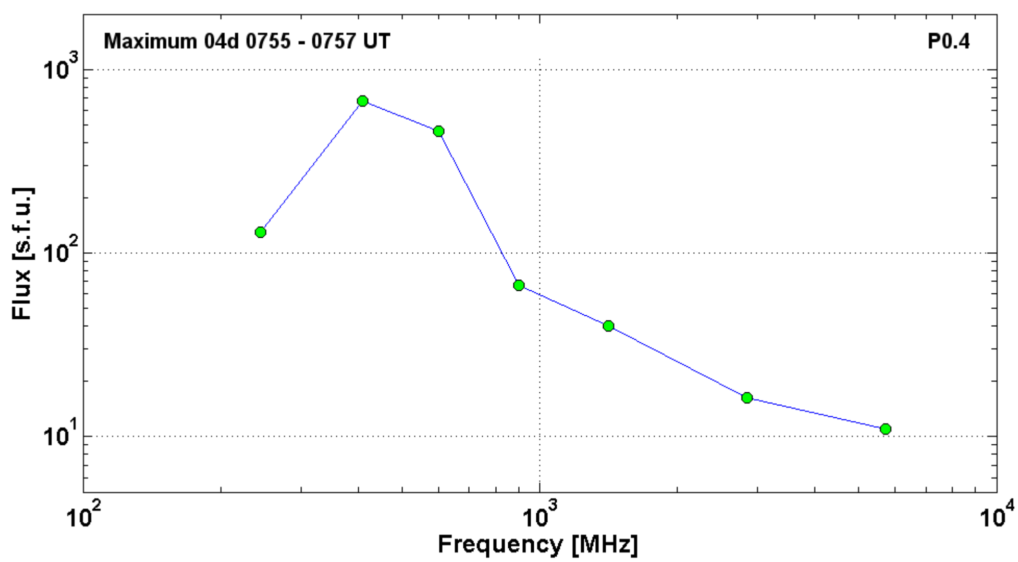
Electromagnetic and other phenomena that are sources and/or accompanying for the event of 1999 June 04

1999 June 04 ● AR8552 To event 361

Hα	6563 Å	0655	0700	0716	N18 W72	2N	F
1 -12.5	keV	0652	0703	0711		M3.9	2.4E-2
>300	keV	065329	065958	071125		4242.30	BATS C
15.4	GHz	0656.0	0700.0	0710.0		3.11	
8.8	GHz	0656.0	0700.0	0713.0	U0.9 P8.8	3.38	
5	GHz	0656.0	0700.0	0710.0		3.18	
2.7	GHz	0653.0	0701.0	0708.0		2.56	
1.4	GHz	0654.0	0659.0	0705.0		2.57	
900	MHz	0649.5	0659.1	0708.6		2.24	
600	MHz	0655.0	0700.7	0711.3		2.81	
410	MHz	0654.0	0702.0	0707.0		2.79	
245	MHz	0653.0	0655.0	0716.0		2.82	
DS II	30-90	0704		0710	FN	2	
DS II	50-150	0705		0716		3	
DS IV	35-85	0658		0728		3	
DS III	45-270	0652		~0721	N	2	
DS III	380-550	0654		0658	GG,RS	2	
DS DCIM	800-2000	0652		0709	GG,FS	2	
DS DCIM	270-550	0653		0700	P	2	
DS DCIM	2000-4365	0653		0710	GG	2	

5.7	GHz	0754.7	0756.9	0809.0		1.04	
2.8	GHz	0751.0	0755.0	0820.0		1.21	
1.4	GHz	0756.0	0757.0	0758.0		1.60	
900	MHz	0753.5	0756.1	0804.9		1.83	
600	MHz	0753.5	0756.2	0800.0		2.66	
410	MHz	0754.0	0756.0	0801.0	P0.4	2.83	
245	MHz	0754.0	0757.0	0758.0		2.11	
DS III	45-90	~0753		>1200	N	1	
DS DCIM	800-2000	0754		0801	GG,FS	2	
DS DCIM	290-550	0754		0759	P	1	
DS DCIM	2000-4355	0755		0800		1	
CME	WL	0727	2230 km/s	-158.8 km/s	150º	287º	





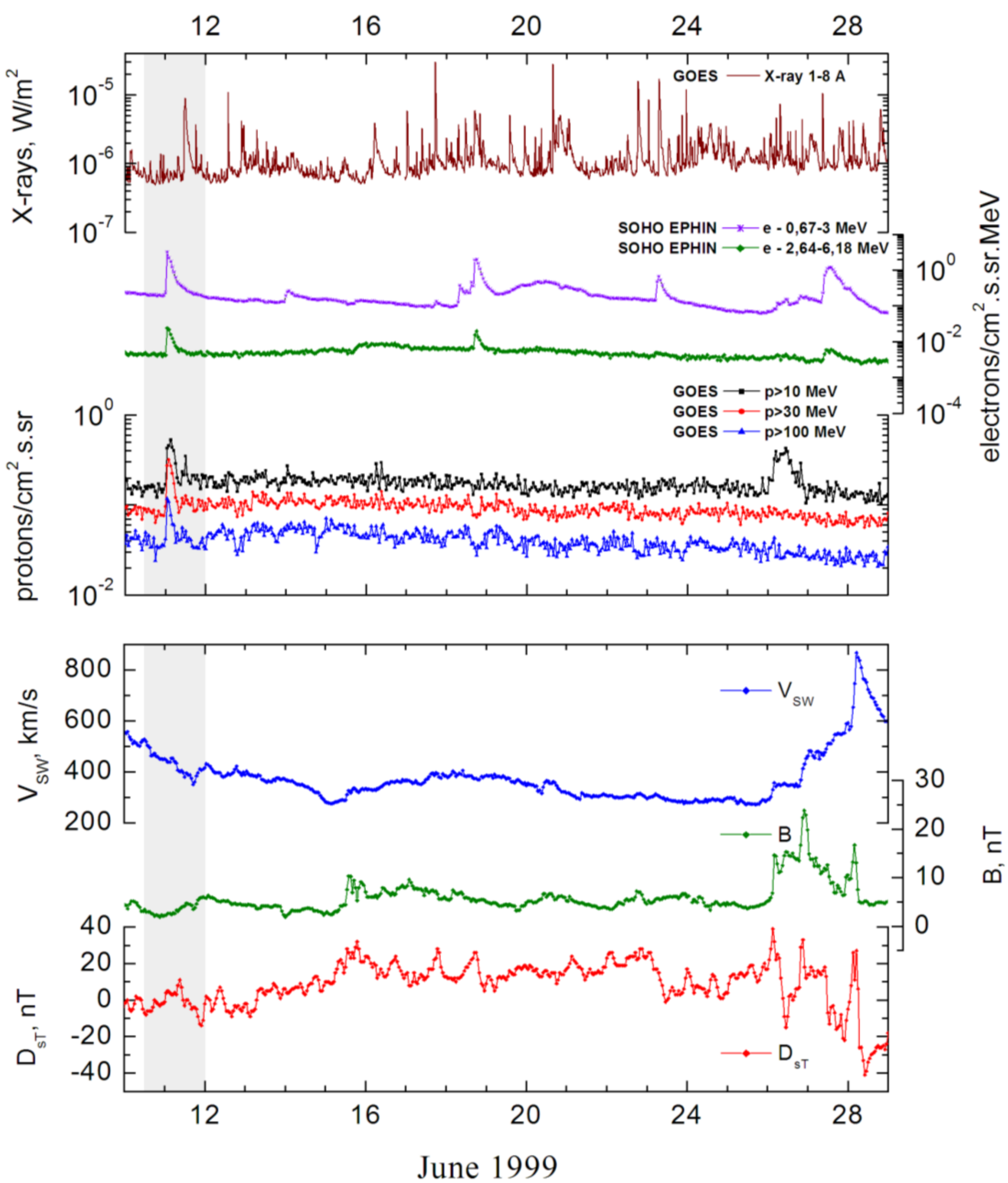
Список 1999 г.

Event 1999.06.11 – (1999-162) **№ 362**

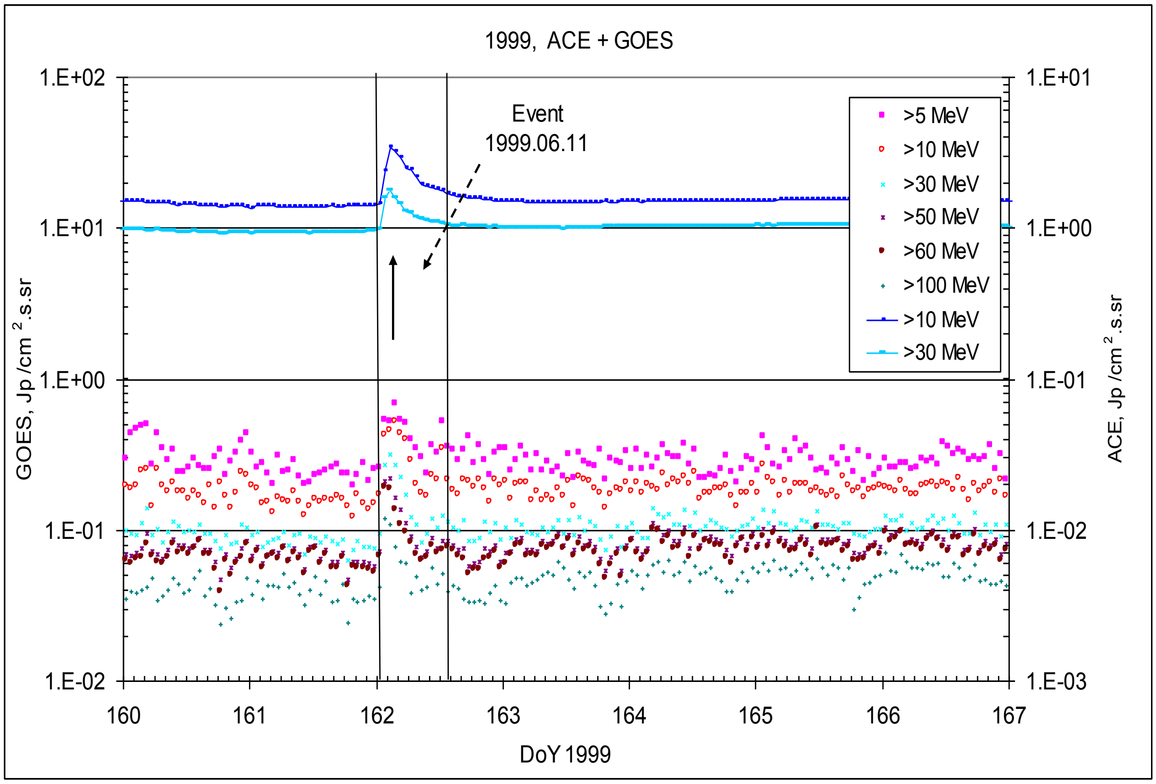
Particle event: To(Ep>10 MeV) – 11d01^h
Tmax(Ep>10 MeV) – 11d03^h, Jmax (Ep>10 MeV) – 2.2 /cm^2.s.sr *)
Duration of the event – 10 hours
Quasimaximal energy of protons in the event – Eqm = 240 MeV
*) From CPME s/c IMP-8

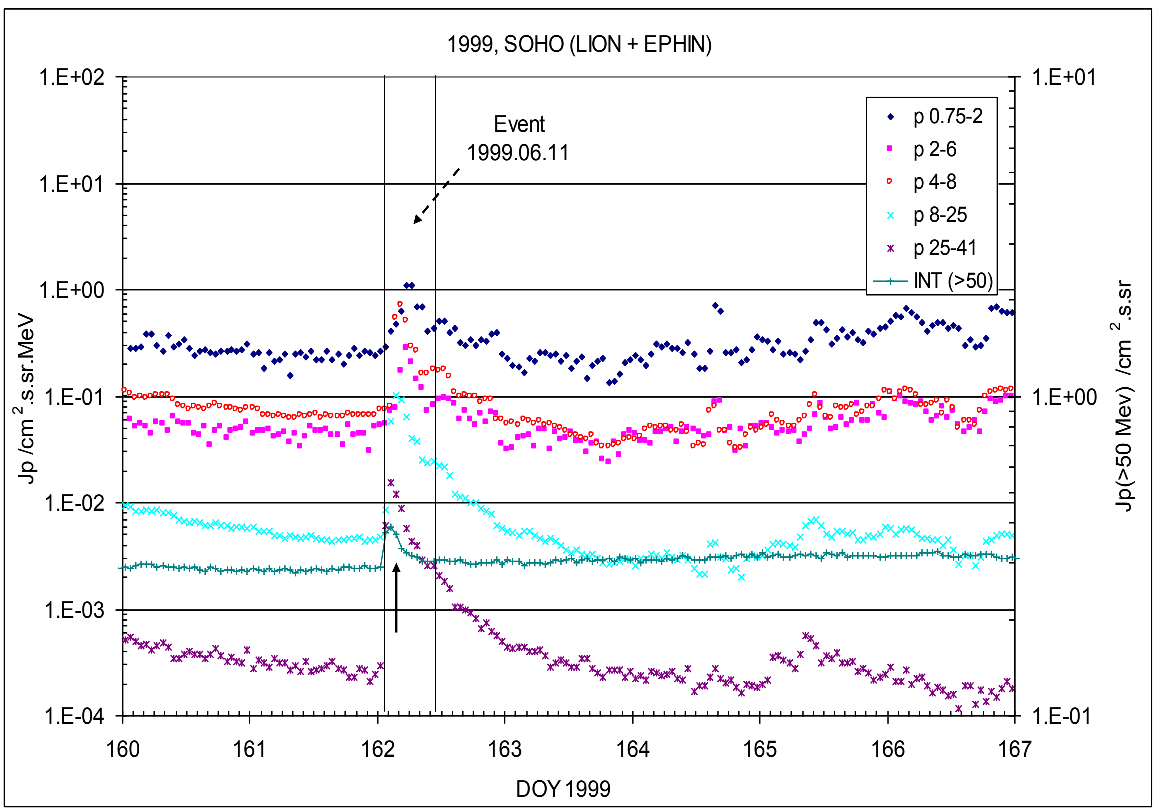
Sources: □ solar flare 11d01^{h}05^m, C1.0/…, AR behind the W- limb
Main X-ray burst 1-8 Å: onset: – 11d01^{h}05^m, max – 11d01^{h}10^m, Φ = 0.00061 J/m^2
CME: 11d01^{h}27^m, V = 0719 km/s, Δφ = 101^o, dA = 288^o

Particle fluxes and associated phenomena



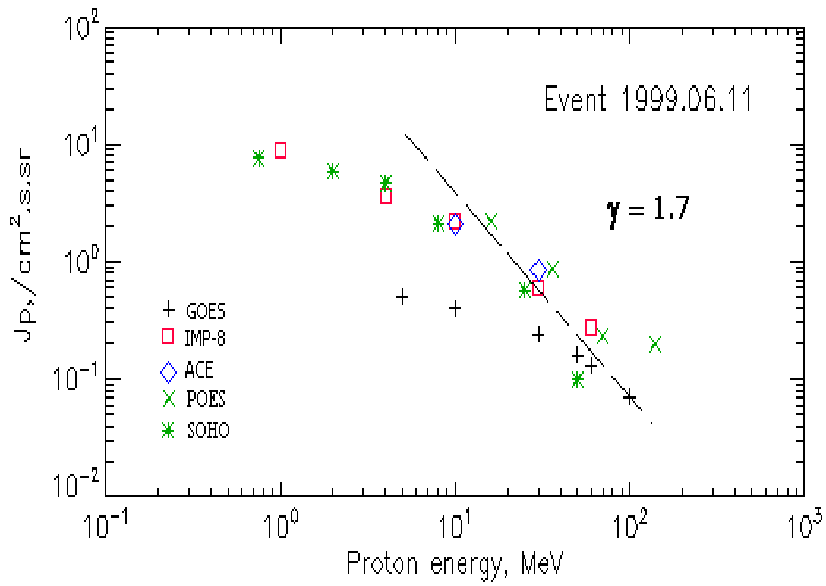
Time profiles of the proton fluxes for the event of 1999 June 11





Arrows on the profiles of the events indicate the time of the proton flux maxima, taken to build the proton spectra (see below)

Integral time-of-maximum proton spectrum



Integral fluxes of protons for the event of 1999 June 11

S/c, instruments	Ep, MeV	To	Tmax	Jmax, /cm^2.s.sr	Duration	Comments
GOES-10						
EPS	>5	01^h	03^h	0.5	10 h	
EPS	>10	00^h	03^h	0.4	10 h	
EPS	>30	00^h	02^h	0.24	10 h	
EPS	>50	00^h	02^h	0.16	10 h	
EPS	>60	00^h	02^h	0.13	8 h	
EPS	>100	00^h	01^h	0.07	6 h	
POES-15						
MEPED	>0.24	-	-	-	-	
MEPED	>0.8	-	-	-	-	
MEPED	>2.5	-	-	-	-	
MEPED	>6.9	-	-	-	-	
MEPED	>16	-	02^h	2.21	10 h	
MEPED	>36	-	02^h	0.88	10 h	
MEPED	>70	-	02^h	0.23	8 h	
MEPED	>140	-	02^h	0.2	6 h	
IMP-8						
CPME	>1	01^h	06^h	9	10 h	
CPME	>4	01^h	04^h	3.6	10 h	
CPME	>10	01^h	03^h	2.2	10 h	
CPME	>30	01^h	02^h	0.6	10 h	
CPME	>60	01^h	02^h	0.28	10 h	
ACE						
SIS	>10	01^h	02^h	2.1	10 h	
SIS	>30	01^h	02^h	0.85	8 h	
SOHO						
EPHIN (INT)	>50	01^h	02^h	0.1	10 h	

Differential fluxes of protons for the event of 1999 June 11

S/c, instruments	ΔE, MeV	To	Tmax	Jmax /cm^2.s.sr.MeV	Dura-tion	Comments
IMP-8						
CPME	1-2	04^h	06^h	4	15h	
CPME	2-4.6	04^h	05^h	1.5	15h	
CPME	4.6-15	04^h	03^h	0.22	15h	
CPME	15-25	03^h	02^h	0.11	12h	
CPME	25-48	-	02^h	0.018	10h	
CPME	48-96	-	01^h	0.007	10h	
CPME	96-145	-	02^h	0.004	8h	
CPME	145-440	-	01^h	0.0003	8h	
SOHO						
LION	0,75-2	01^h	06^h	1	~1d	
LION	2-6	01^h	05^h	0,3	~1d	
EPHIN	4-8	01^h	03^h	0.64	1,5d	
EPHIN	8-25	01^h	02^h	0.1	1d	
EPHIN	25-41	01^h	02^h	0.015	1d	
EPHIN	41-53	- “ -	- “ -	- “ -	- “ -	

Electromagnetic and other phenomena that are sources and/or accompanying for the event of 1999 June 11

1999 June 11 □ AR To event 362

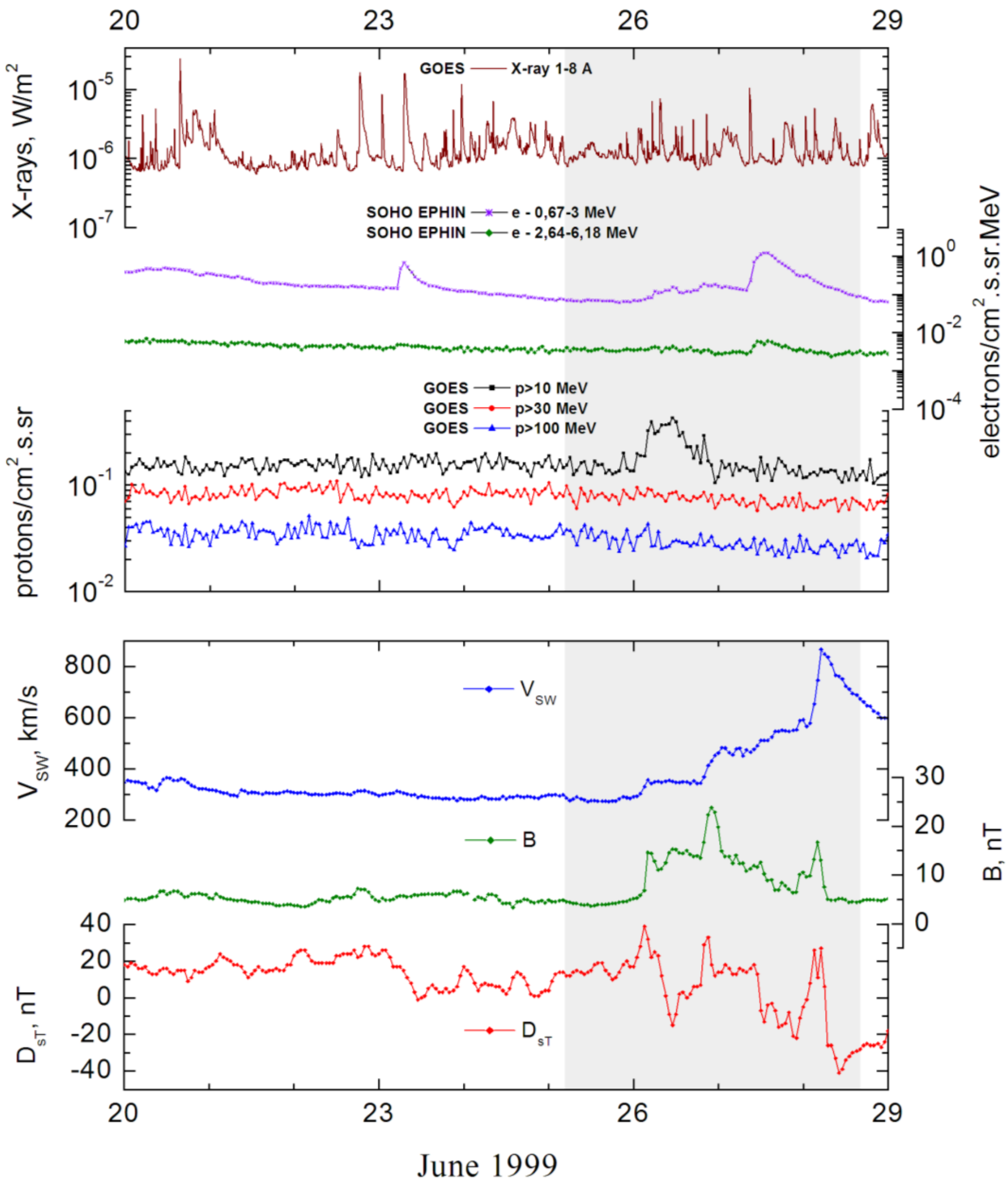
Hα	6563 Å	No Flare					
1 -12.5	keV	0105	0110	0116		C1.0	6.1E-04
1.4	GHz	0038.0	0038.0	0039.0		1.61	
245	MHz	0039.0	0039.0	~0039.0		1.74	
DS II	50-250	0039		0049	SH,H	3	
DS II	30-130	0039		0049	FN,H	3	
DS IV	25-75	0051		0116		1	
DS III	20-150	0041		0042	B	2	
410	MHz	0109.0	0109.0	0110.0		2.34	
245	MHz	0109.0	0109.0	0110.0		2.23	
DS III	30-55	0103		0104		1	
CME	WL	0127	0719 km/s	-38.2 km/s	101º	262º	

Event 1999.06.25 – (1999-176) **№ 363**

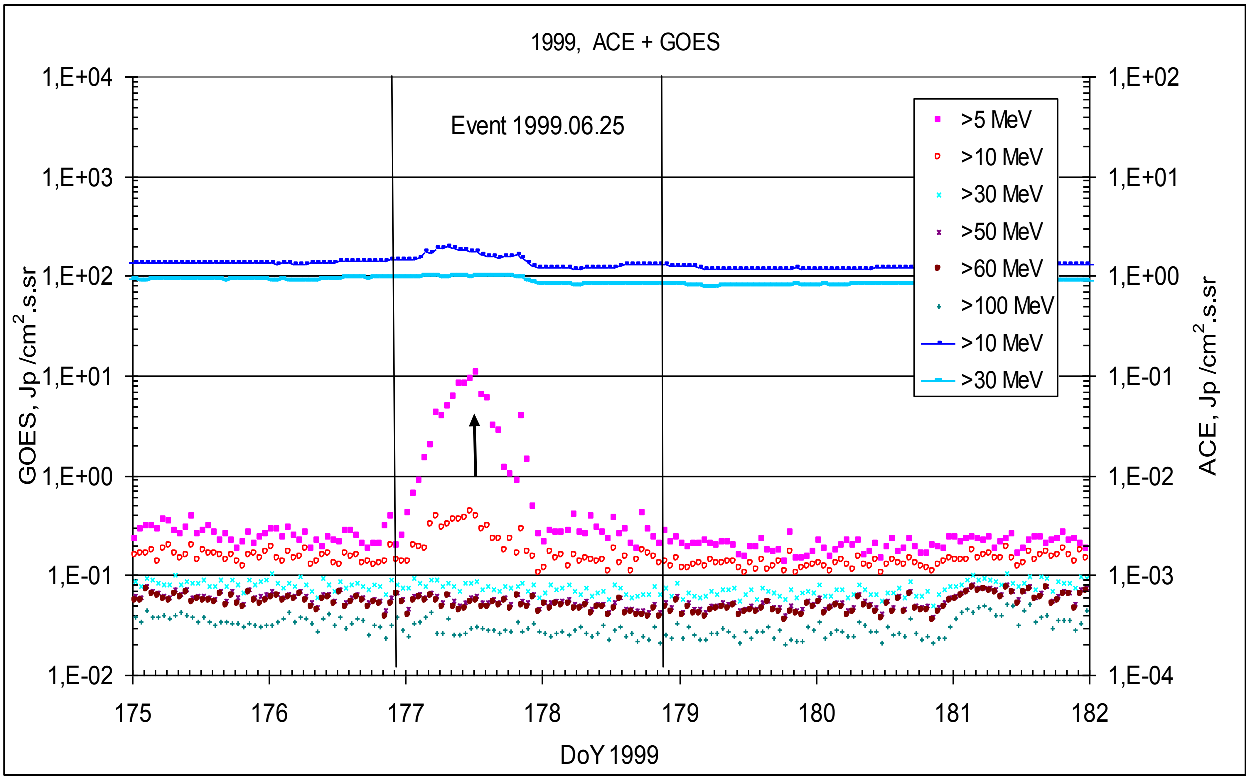
Particle event: To(Ep>10 MeV) – 25d10^h
Tmax(Ep>10 MeV) – 26d12^h, Jmax(Ep>10 MeV) – 1.7 /cm^2.s.sr *)
Duration of the event – 2 days
Quasimaximal energy of protons in the event – Eqm = 40 MeV
*) The data from IMP-8

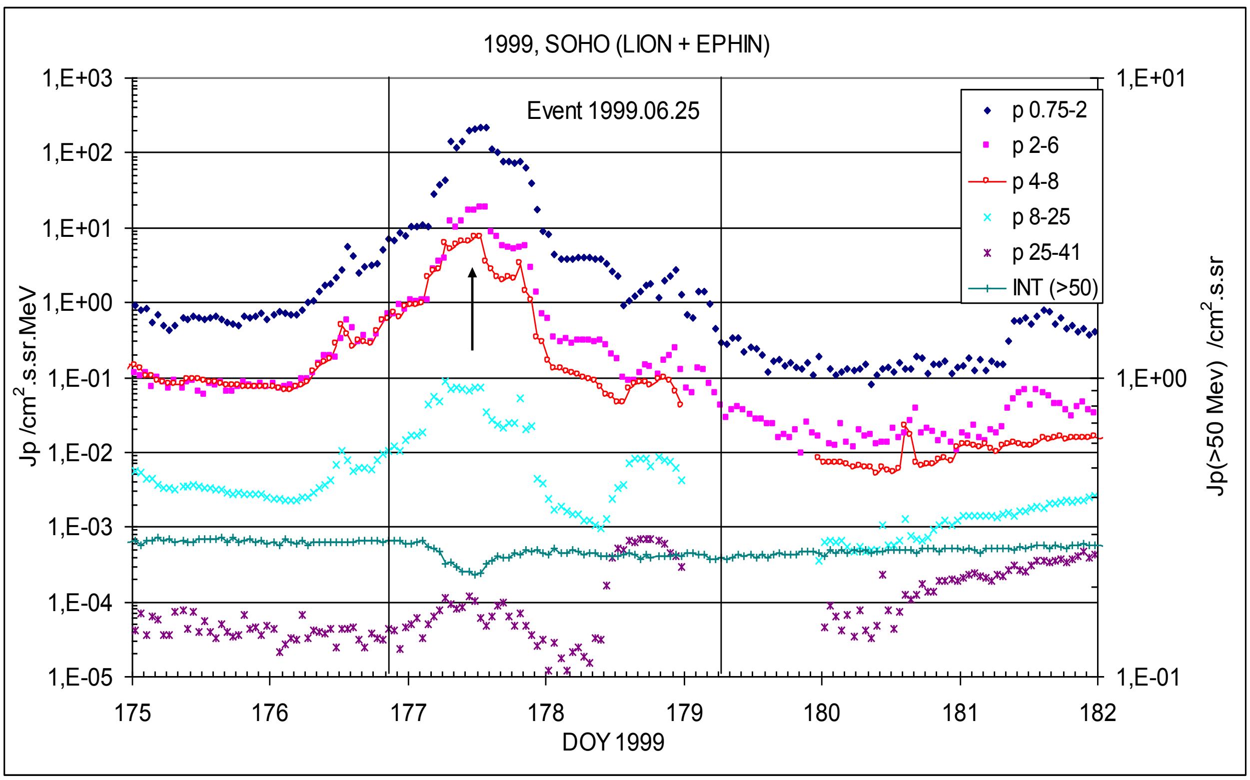
Sources: ○ solar flare 24d12^{h}04^m, C4.1/1F, N29W13, AR8595
Ø solar flare 26d05^{h}08^m, M2.3/2B, N24E02, AR8598
Main X-ray burst 1-8 Å: onset – 24d12^{h}04^m, max – 24d14^{h}12^m, Φ = 0.004 J/m^2
CME: 24d13^{h}31^m, V = 0975 km/s, Δφ = 360º, dA = 335º
▲SC 26d03^{h}25^m, 26d20^{h}16^m

Particle fluxes and associated phenomena



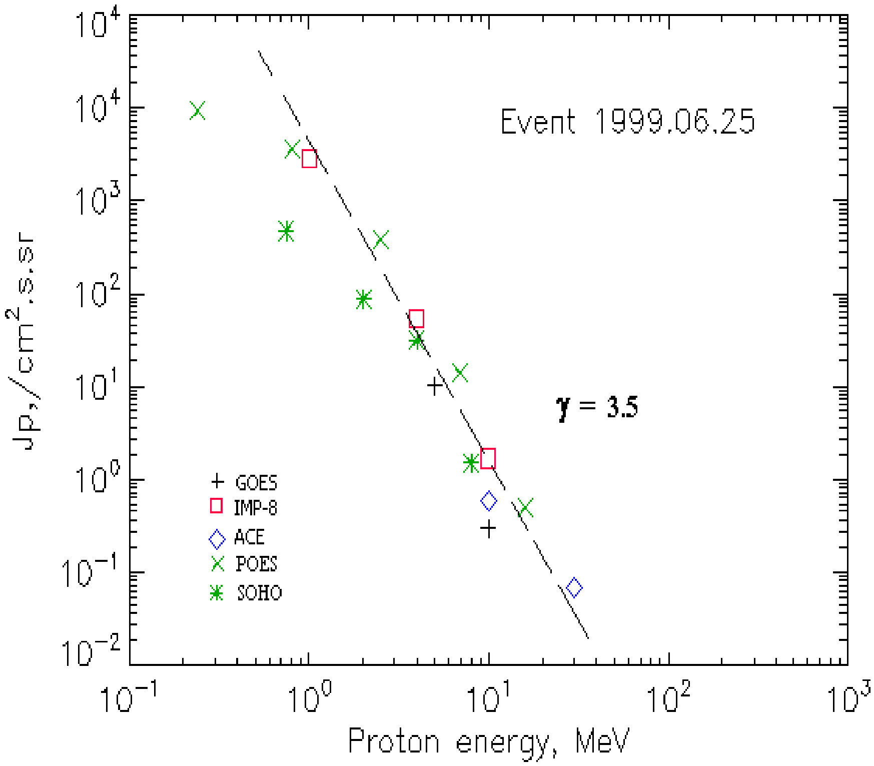
Time profiles of the proton fluxes for the event of 1999 June 25





Arrows on the profiles of the events indicate the time of the proton flux maxima, taken to build the proton spectra (see below)

Integral time-of-maximum proton spectrum



Integral fluxes of protons for the event of 1999 June 25

S/c, instruments	Ep, MeV	To	Tmax	Jmax, /cm^2.s.sr	Dura -tion	Comments
GOES-10						
EPS	>5	20 ^{h}	26d12 ^{h}	10.3	1d	
EPS	>10	21 ^{h}	26d11 ^{h}	0.3	1d	
EPS	>30	-	26d12 ^{h}	0.003	-	
EPS	>50	-	-	-	-	
EPS	>60	-	-	-	-	
EPS	>100	-	-	-	-	
POES-15						
MEPED	>0.24	-	26d10^h	9310	-	
MEPED	>0.8	-	26d10^h	3670	2d	
MEPED	>2.5	-	26d10^h	390	2d	
MEPED	>6.9	-	26d10^h	14	2d	
MEPED	>16	-	26d10^h	0.5	2d	
MEPED	>36	-	26d10^h	0.3	2d	
MEPED	>70	-	26d10^h	0.22	2d	
MEPED	>140	-	26d10^h	0.2	2d	
IMP-8						
CPME	>1	8^h	26d12^h	2790	2d	
CPME	>4	10^h	26d12^h	54	2d	
CPME	>10	10^h	26d12^h	1.7	2d	
CPME	>30	-	-	-	-	
CPME	>60	-	-	-	-	

ACE						
SIS	>10	8^h	$26d10^h$	0.6	2d	
SIS	>30	-	$26d12^h$	0.07	-	
SOHO						
EPHIN (INT)	>50	-	-	-	-	Forbush

Differential fluxes of protons for the event of 1999 June 25

S/c, instruments	ΔE, MeV	To	Tmax	Jmax /cm^2.s.sr.MeV	Dura-tion	Comments
IMP-8						
CPME	1-2	09^h	$26d12^h$	2340	3d	
CPME	2-4.6	08^h	$26d12^h$	226	3d	
CPME	4.6-15	08^h	$26d12^h$	3.2	3d	
CPME	15-25	-	-	-	-	
CPME	25-48	-	-	-	-	
CPME	48-96	-	-	-	-	
CPME	96-145	-	-	-	-	
CPME	145-440	-	-	-	-	
SOHO						
LION	0,75-2	06^h	$26d13^h$	222	2d	
LION	2-6	06^h	$26d13^h$	18.5	2d	
EPHIN	4-8	06^h	$26d12^h$	7.6	2d	
EPHIN	8-25	06^h	$26d12^h$	0.09	2d	
EPHIN	25-41	-	-	-	-	
EPHIN	41-53	- “ -	- “ -	- “ -	-	

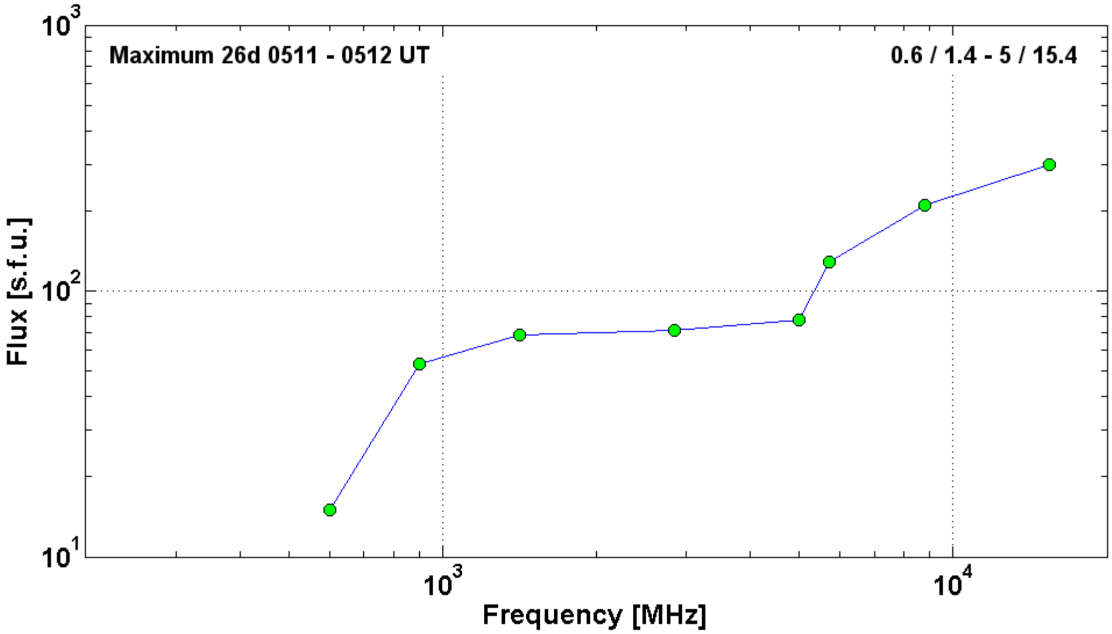
Electromagnetic and other phenomena that are sources and/or accompanying for the event of 1999 June 25

1999 June 24 O AR8595 To event 363

Hα	6563 Å	<1321	1342	1444	N29W13	1F	SU
1 -12.5	keV	1204	1412	1510		C4.1	4.0E-3
6.7	GHz	1330.0	1420.0	1523.0		1.05	
280	MHz	<1300.0					
235	MHz	<1300.0					
33	MHz	1421.0					
CME	WL	1331	0975 km/s	32.4 km/s	360º	335º	

1999 June 26 Ø AR8598 To event 363

Hα	6563 Å	0505	0512	0538	N24E02	2B	EF
1 -12.5	keV	0508	0512	0514		M2.3	3.9E-3
15.4	GHz	0511.0	0511.0	0512.0	0.6/1.4 - 5/15.4	2.48	
8.8	GHz	0511.0	0511.0	0512.0		2.32	
5.7	GHz	0510.4	0511.9	0521.0		2.11	
5	GHz	0511.0	0511.0	0512.0		1.89	
2.8	GHz	0503.0	0512.0	0514.0		1.85	
1.4	GHz	0511.0	0512.0	0512.0		1.83	
900	MHz	0511.5	0512.3	0512.7		1.72	
600	MHz	0511.3	0512.3	0512.9		1.18	
DS III	450-550	0511		0512		1	
DS DCIM	800-2000	0511		0512	GG	2	
CME	WL	0731	0558 km/s	-9.8 km/s^2	360º	021º	

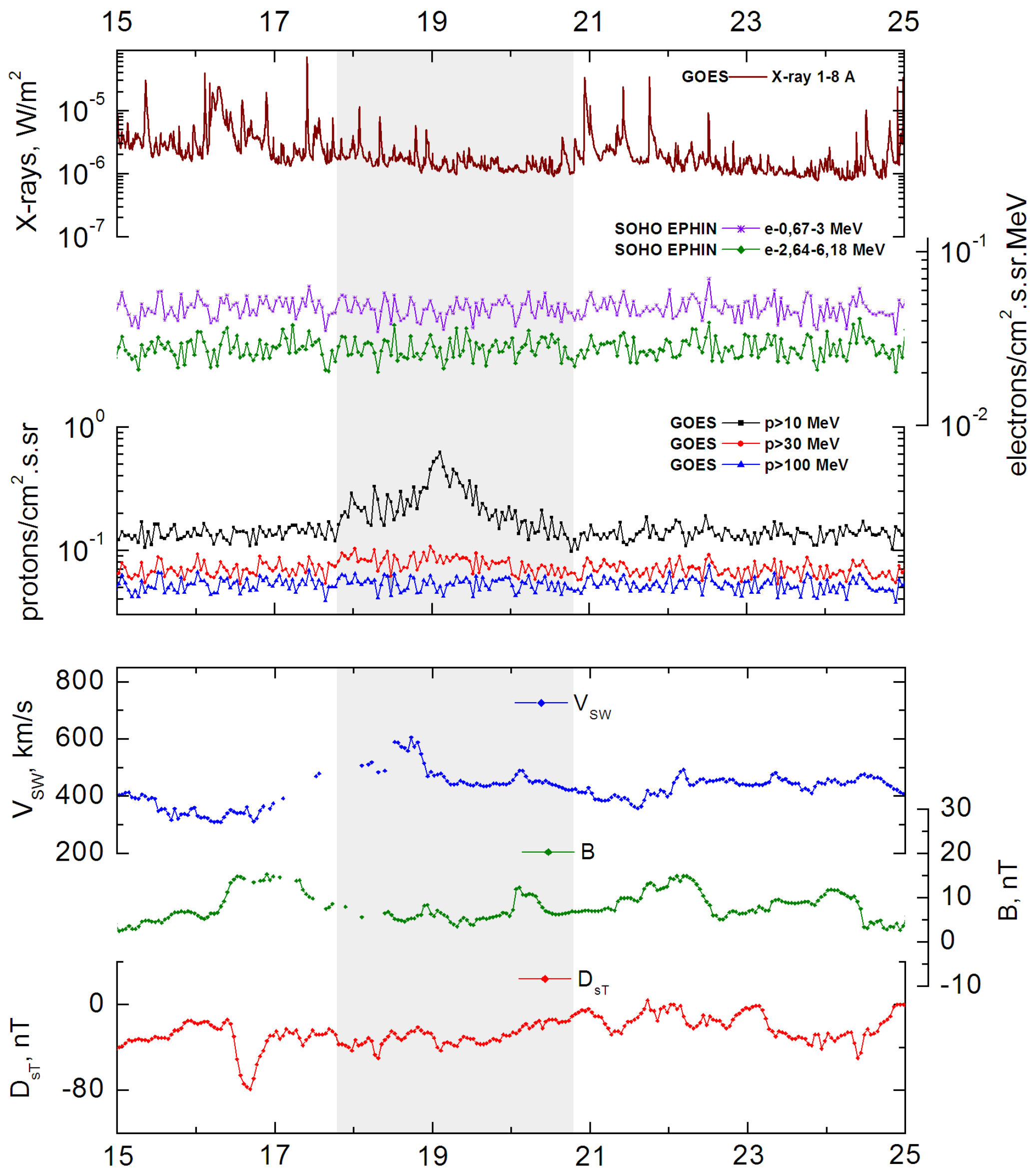


Event 1999.11.17 – (1999-321) **№ 364**

Particle event: To(Ep>10 MeV) – 17d19^h
Tmax$_1$(Ep>10 MeV) – 19d02^h, Jmax$_1$(Ep>10 MeV) – 1 /cm^2.s.sr *)
Tmax$_2$(Ep>10 MeV) – 19d23^h, Jmax$_2$(Ep>10 MeV) – 0.4 /cm^2.s.sr *)
Duration of the event – 2.5 days
Quasimaximal energy of protons in the event – Eqm$_1$ = 50 MeV
*) The data from IMP-8 – Eqm$_2$ = 25 MeV

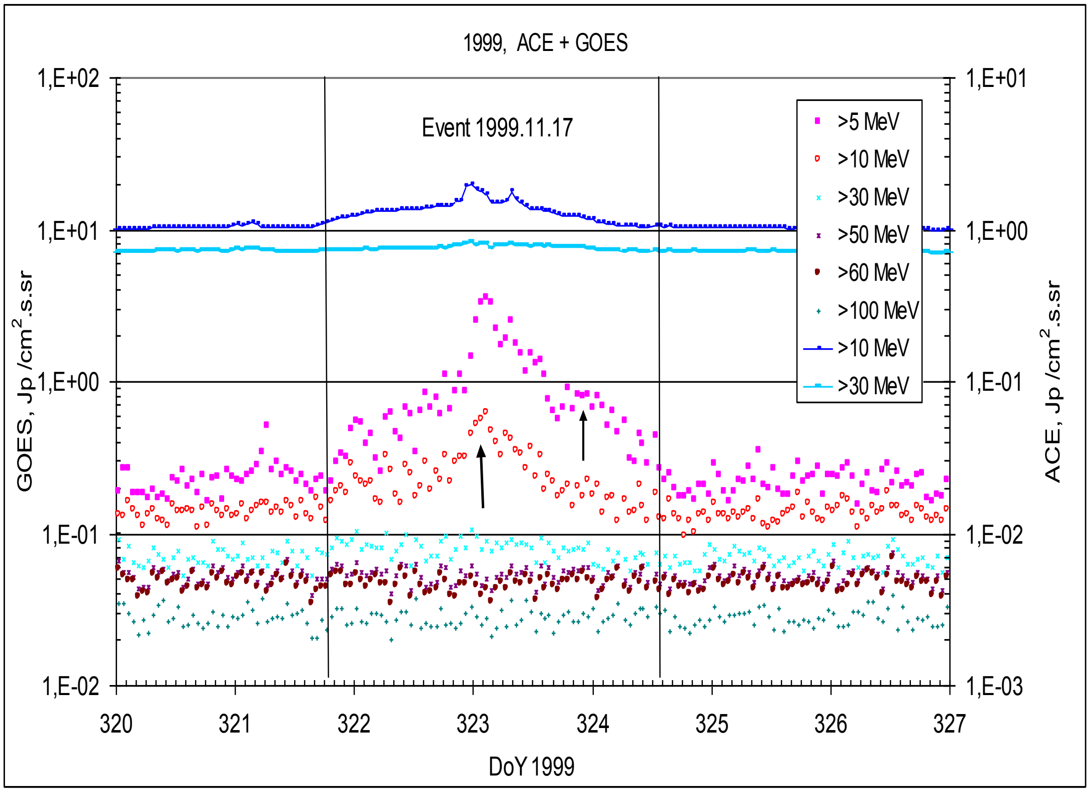
Sources: ● solar flare 17d09^{h}47^m, M7.4/2B, N17E21, AR8766
Main x-ray burst 1-8 Å: onset – 17d09^{h}47^m, max – 17d09^{h}57^m, Φ = 0.04 J/m^2
CME: gap

Particle fluxes and associated phenomena



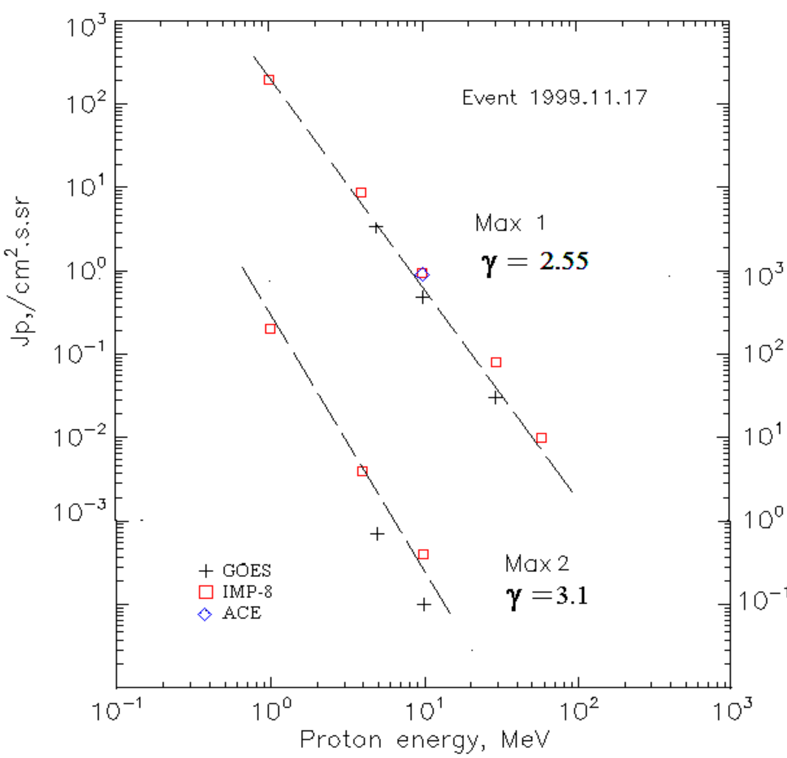
November 1999 г.

Time profiles of the proton fluxes for the event of 1999 November 17



Arrows on the profiles of the events indicate the time of the proton flux maxima, taken to build the proton spectra (see below)

Integral time-of-maximum proton spectrum



Integral fluxes of protons for the event of 1999 November 17

S/c, instruments	Ep, MeV	To	Tmax	Jmax, /cm^2.s.sr	Dura-tion	Comments
GOES-10						
EPS	>5	19^h	19d02^h/19d23^h	3.4/0.7	2.5d	
EPS	>10	19^h	19d02^h/19d23^h	0.48/0.1	2.5d	
EPS	>30	19^h	19d02^h/ -	0.03/ -	2.5d	
EPS	>50	-	-	-	-	
EPS	>60	-	-	-	-	
EPS	>100	-	-	-	-	
IMP-8						
CPME	>1	19^h	19d02^h/19d23^h	195/202	5 d	
CPME	>4	19^h	19d02^h/19d23^h	8.6/4	4 d	
CPME	>10	19^h	19d02^h/19d23^h	1/0.4	2.5 d	
CPME	>30	19^h	19d02^h/ -	0.08/ -	-	
CPME	>60	-	19d02^h/ -	0.01/ -	-	
ACE						
SIS	>10	19^h	19d02^h/ -	0.9/ -	1d	
SIS	>30	-	-	-	-	

Differential fluxes of protons for the event of 1999 November 17

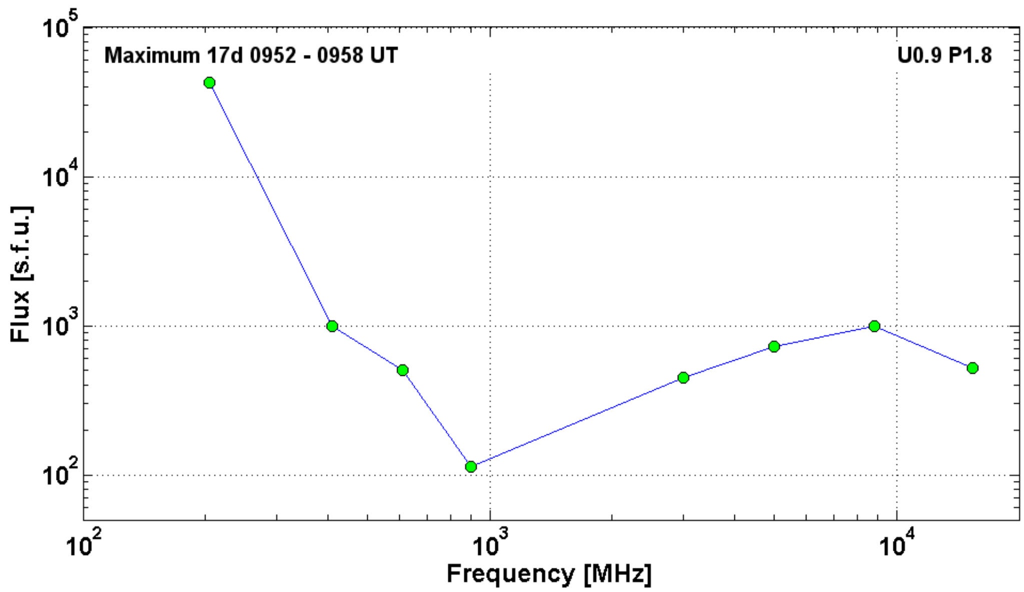
S/c, instruments	ΔE, MeV	To	Tmax	Jmax /cm^2.s.sr.MeV	Dura-tion	Comments
IMP-8						
CPME	1-2	23^h	19d02^h/19d20^h	160/160	7d	
CPME	2-4.6	20^h	19d02^h/19d20^h	15/11.3	7d	
CPME	4.6-15	18^h	19d01^h/19d20^h	0.6/0.2	4d	
CPME	15-25	18^h	19d00^h/19d20^h	0.018/ -	3d	
CPME	25-48	-	-	-	-	
CPME	48-96	-	-	-	-	
CPME	96-145	-	-	-	-	
CPME	145-440	-	-	-	-	
SOHO			No	Data		

Electromagnetic and other phenomena that are sources and/or accompanying for the event of 1999 November 17

1999 November 17 • AR8766 To event 364

Hα	6563 Å	0951	0955	>1024	N17E21	2B	E
1 -12.5	keV	0947	0957	1002		M7.4	4.0E-2

15.4	GHz	0952.0	0953.0	1002.0		2.72	
8.8	GHz	0951.0	0953.0	1007.0	U0.9 P1.8	3.00	
5	GHz	0950.0	0954.0	0959.0		2.86	
3	GHz	0951.1	0957.2	1006.6		2.65	
900	MHz	0951.2	0952.9	1006.9		2.05	
610	MHz	0951.0	0958.0	1002.0		2.70	
410	MHz	0951.0	0953.0	0959.0		3.00	
204	MHz	0951.9	0952.5	1006.8		4.63	
DS II	30-80	0959		1005		2	
DS IV	35-85	0951		1403		3	
DS III	30-80	0951		0958		3	
DS DCIM	800-2000	0951		1000	GG	2	
CME	WL						gap



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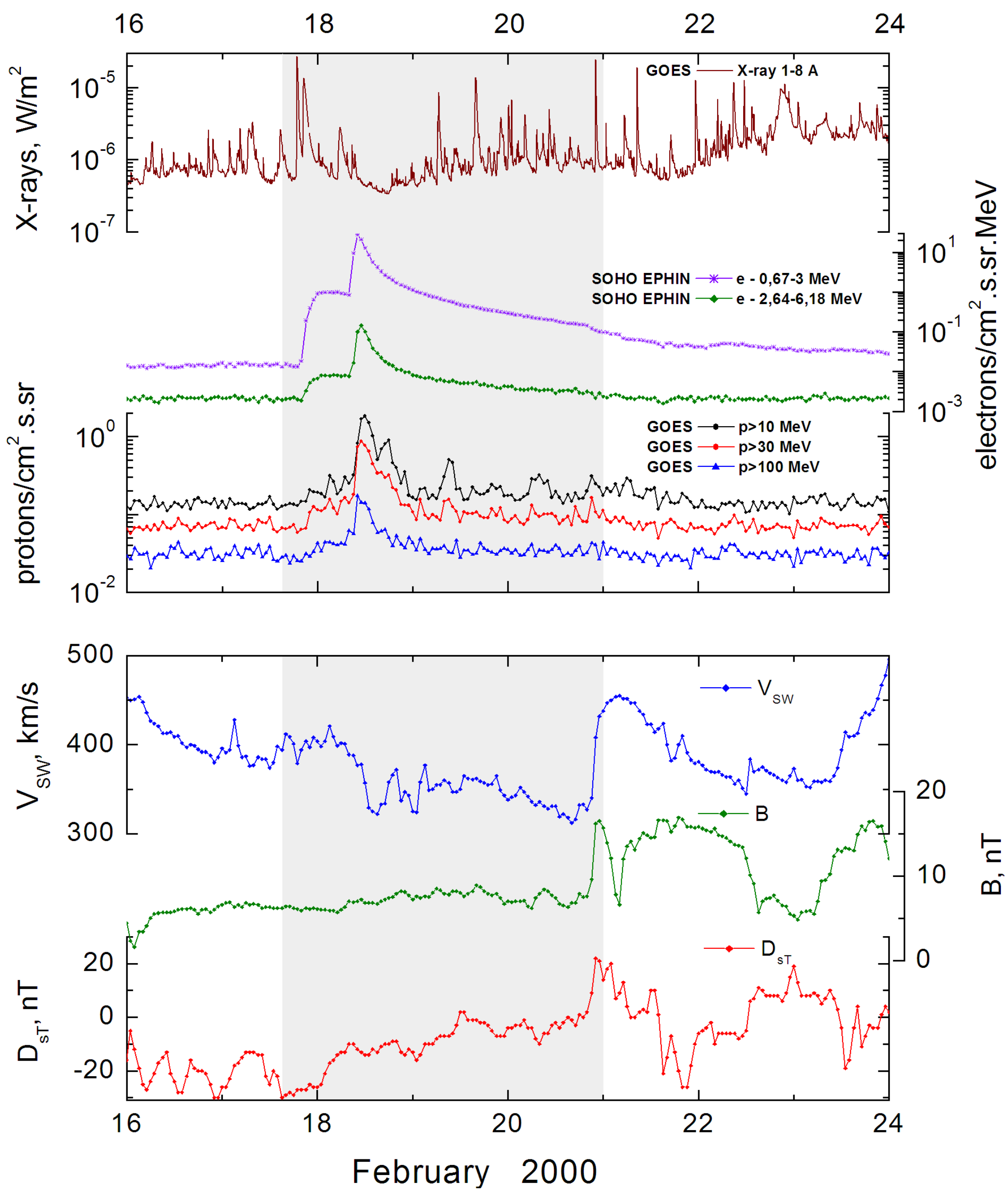
Event 2000.02.18 – (2000-049) **№ 365**

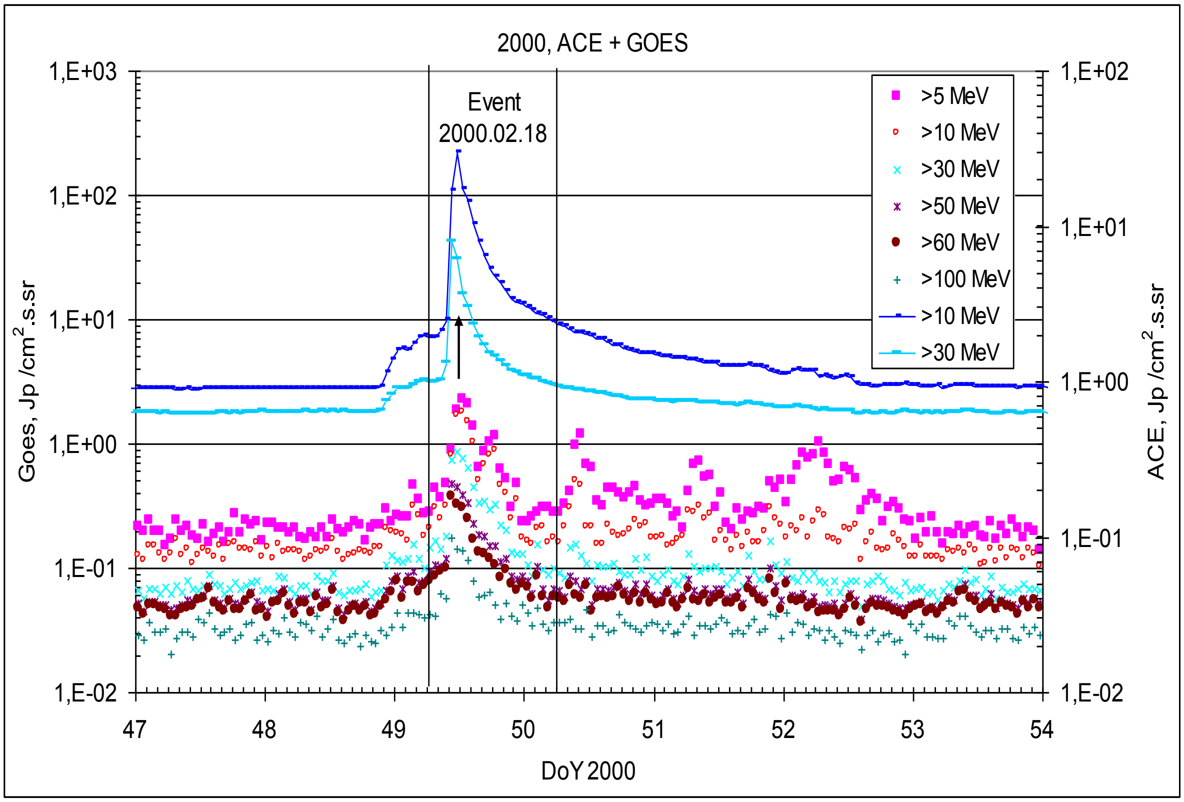
Particle event: To(Ep>10 MeV) – 18d06^h
Tmax(Ep>10 MeV) – 18d12^h, Jmax (Ep>10 MeV) –1.7 /cm^2.s.sr
Duration of the event – 1 day
Quasimaximal energy of protons in the event – Eqm = 290 MeV

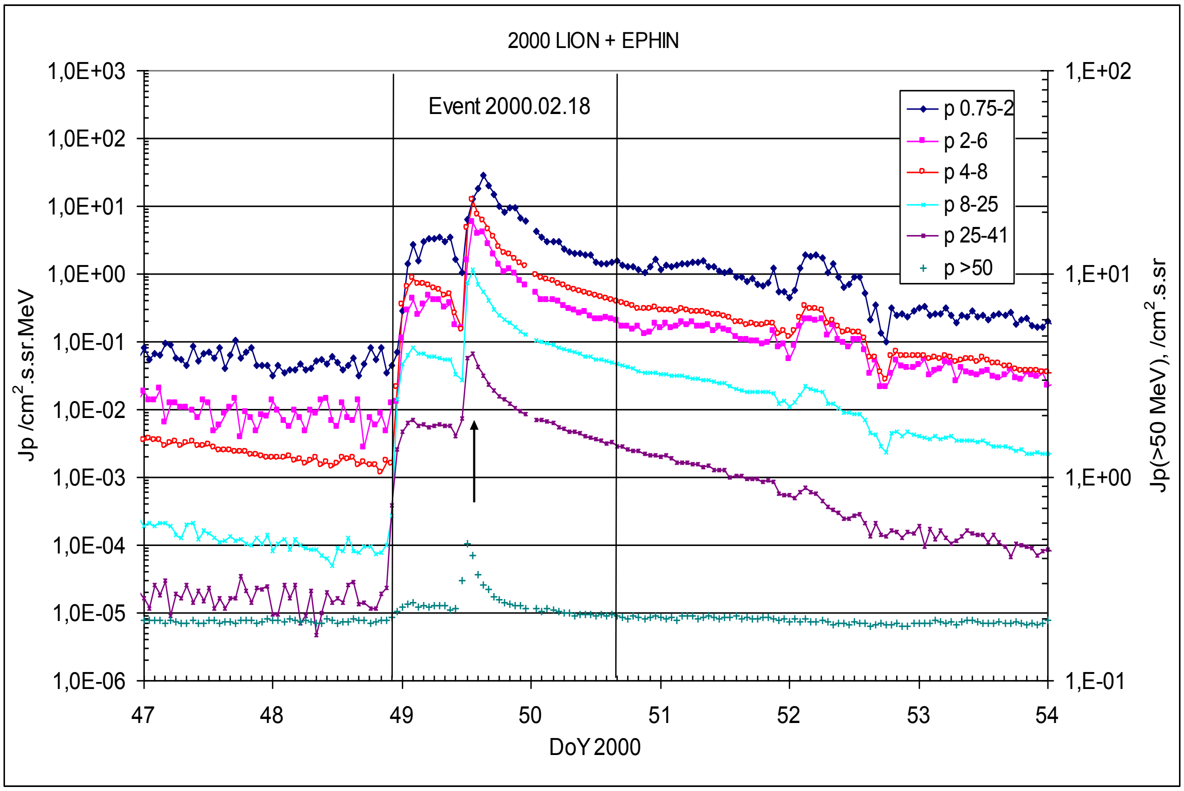
Sources: ⊙ solar flare 17d20^{h}17^m, M1.3/2N, S29E07, AR8872
Ø solar flare 17d18^{h}41^m, M2.5/1B, S25W16*, AR8869
Main X-ray burst 1-8 Å: onset – 17d20^{h}17^m, max – 17d20^{h}45^m, Φ = 0.027 J/m^2
CME: 17d21^{h}30^m, V = 728 km/s, Δφ = 360^o; dA=184^o;
* - the contribution to the beginning

Particle fluxes and associated phenomena



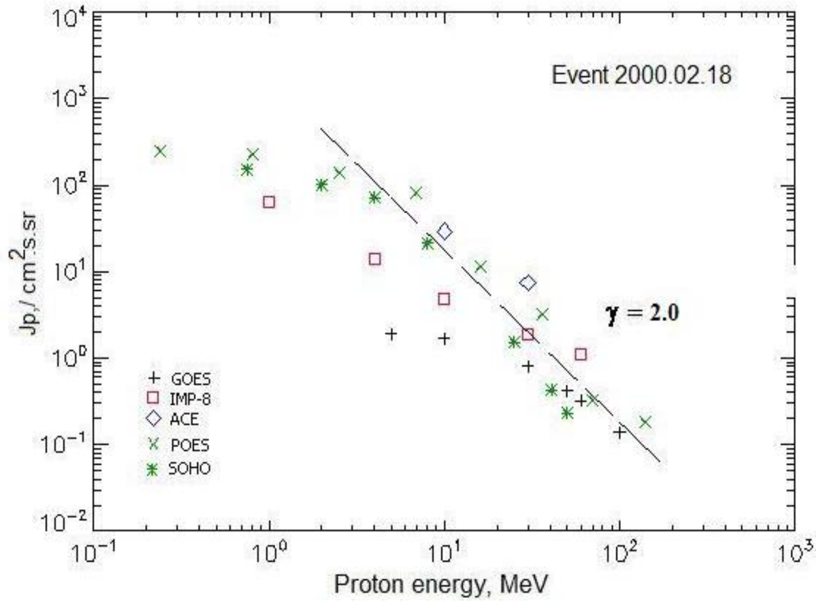
Time profiles of the proton fluxes for the event of 2000 February 18





Arrows on the profiles of the events indicate the time of the proton flux maxima, taken to build the proton spectra (see below)

Integral time-of-maximum proton spectrum



○

Integral fluxes of protons for the event of 2000 February 18

S/c, instruments	Ep, MeV	To	Tmax	Jmax, /cm2.s.sr	Dura-tion	Comments
GOES-10						
EPS	>5	07h	13h	1.9	1d	
EPS	>10	06h	12h	1.7	1d	
EPS	>30	06h	11h	0.8	1d	
EPS	>50	06h	11h	0.42	1d	
EPS	>60	06h	10h	0.32	1d	
EPS	>100	06h	10h	0.14	1d	
POES-15						
MEPED	>0.24	-	10h	250	1d	
MEPED	>0.8	-	10h	228	1d	
MEPED	>2.5	-	10h	136	1d	
MEPED	>6.9	-	10h	80	1d	
MEPED	>16	-	10h	11.5	1d	
MEPED	>36	-	10h	3.27	1d	
MEPED	>70	-	10h	0.33	1d	
MEPED	>140	-	10h	0.18	1d	
IMP-8						
CPME	>1	11h	12h	64	4d	
CPME	>4	11h	12h	14.2	4d	
CPME	>10	11h	12h	4.8	3d	
CPME	>30	11h	12h	1.9	1.5d	
CPME	>60	11h	12h	1.1	1d	
ACE						
SIS	>10	09h	12h	29	3d	
SIS	>30	09h	12h	7.4	2d	
SOHO						
EPHIN (INT)	>50	11h	12h	0.23	1d	

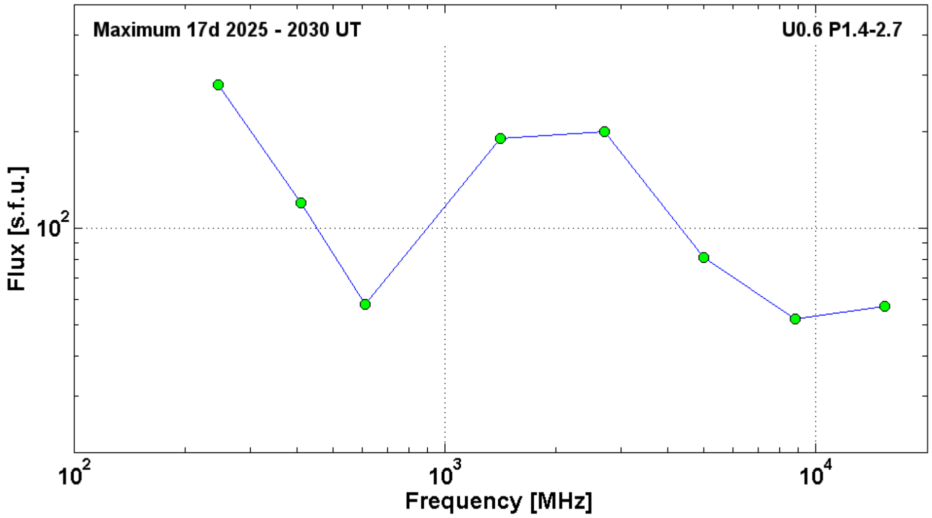
Differential fluxes of protons for the event of 2000 February 18

S/c, instruments	ΔE, MeV	To	Tmax	Jmax /cm^2.s.sr.MeV	Dura-tion	Comments
IMP-8						
CPME	1-2	11^h	15^h	32	4d	
CPME	2-4.6	10^h	14^h	9.6	4d	
CPME	4.6-15	10^h	14^h	0.9	3d	
CPME	15-25	10^h	13^h	0.17	3d	
CPME	25-48	09^h	10^h	0.043	2d	
CPME	48-96	09^h	10^h	0.012	1.5d	
CPME	96-145	09^h	10^h	0.006	1d	
CPME	145-440	09^h	10^h	0.002	1d	
SOHO						
LION	0,75-2	12^h	15^h	29	4d	
LION	2-6	12^h	14^h	7.3	4d	
EPHIN	4-8	11^h	13^h	12.5	4d	
EPHIN	8-25	11^h	13^h	1.2	4d	
EPHIN	25-41	11^h	13^h	0.07	4d	
EPHIN	41-53	- ‘ -	- ‘ -	- ‘ -	- ‘ -	

Electromagnetic and other phenomena that are sources and/or accompanying for the event of 2000 February 18

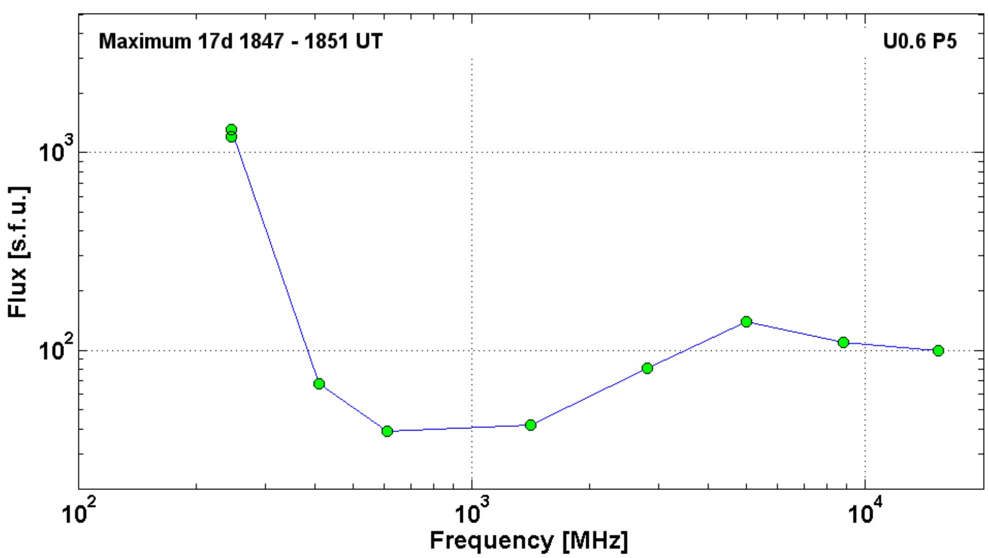
2000 February 17 ⊙· AR8872 To event 365

Hα	6563 Å	2031	2045	2218	S29E07	2N	FSU
1 -12.5	keV	2017	2035	2107		M1.3	2.7E-02
15.4	GHz	2024.0	2030.0	2034.0		1.76	
8.8	GHz	2024.0	2028.0	2039.0		1.72	
5	GHz	2024.0	2028.0	2039.0		1.91	
2.7	GHz	2023.0	2025.0	2039.0	U0.6 P1.4-2.7	2.30	
1.4	GHz	2023.0	2028.0	2039.0		2.28	
610	MHz	2024.0	2029.0	2039.0		1.76	
410	MHz	2024.0	2028.0	2039.0		2.08	
245	MHz	2024.0	2030.0	2039.0		2.45	
DS II	26-180	2025		2040	SH	3	
DS III	25-75	2024		2040		3	
CME		2130	0728 km/s	-22.9 km/s	360º	184	



2000 February 17 Ø AR8869 To event 365

Hα	6563 Å	1844	1847	1938	S25W16	1B	FU
1 -12.5	keV	1841	1852	1905		M2.5	2.3E-2
15.4	GHz	1844.0	1849.0	1859.0		2.00	
8.8	GHz	1847.0	1848.0	1855.0		2.04	
5	GHz	1846.0	1848.0	1855.0	U0.6 P5	2.15	
2.8	GHz	1836.0	1848.0	~1932.0		1.91	
1.4	GHz	1847.0	1847.0	1855.0		1.62	
610	MHz	1847.0	1848.0	1855.0		1.59	
410	MHz	1847.0	1847.0	1850.0		1.83	
245	MHz	1849.0	1851.0	1852.0		3.11	
245	MHz	1849.0	1851.0	1852.0		3.08	
DS II	25-75	1852		1905		2	
CME	WL	1931	0543 km/s	-82.5 km/s	064º	184º	

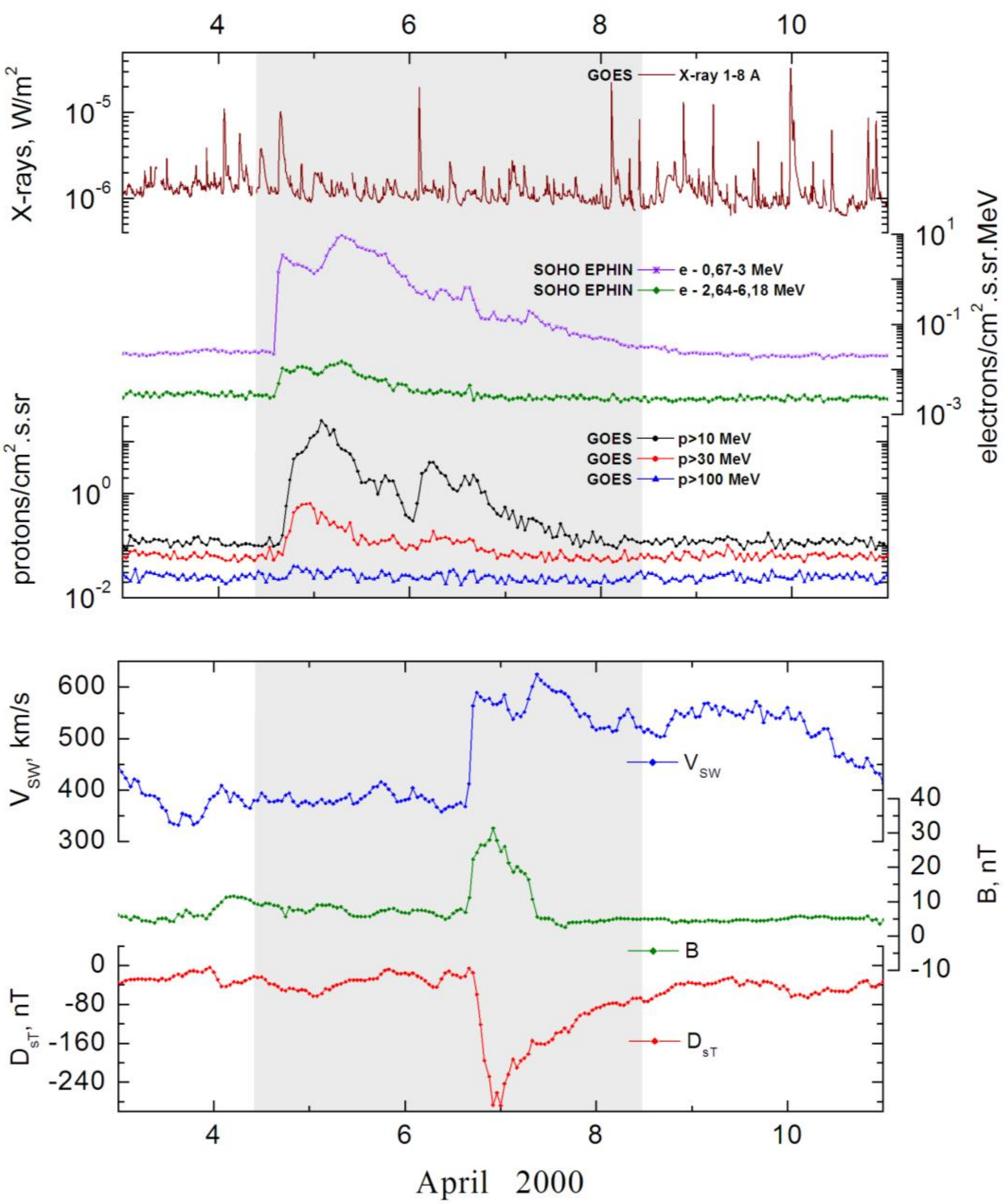


Event 2000.04.04 – (2000-095) **№ 366**

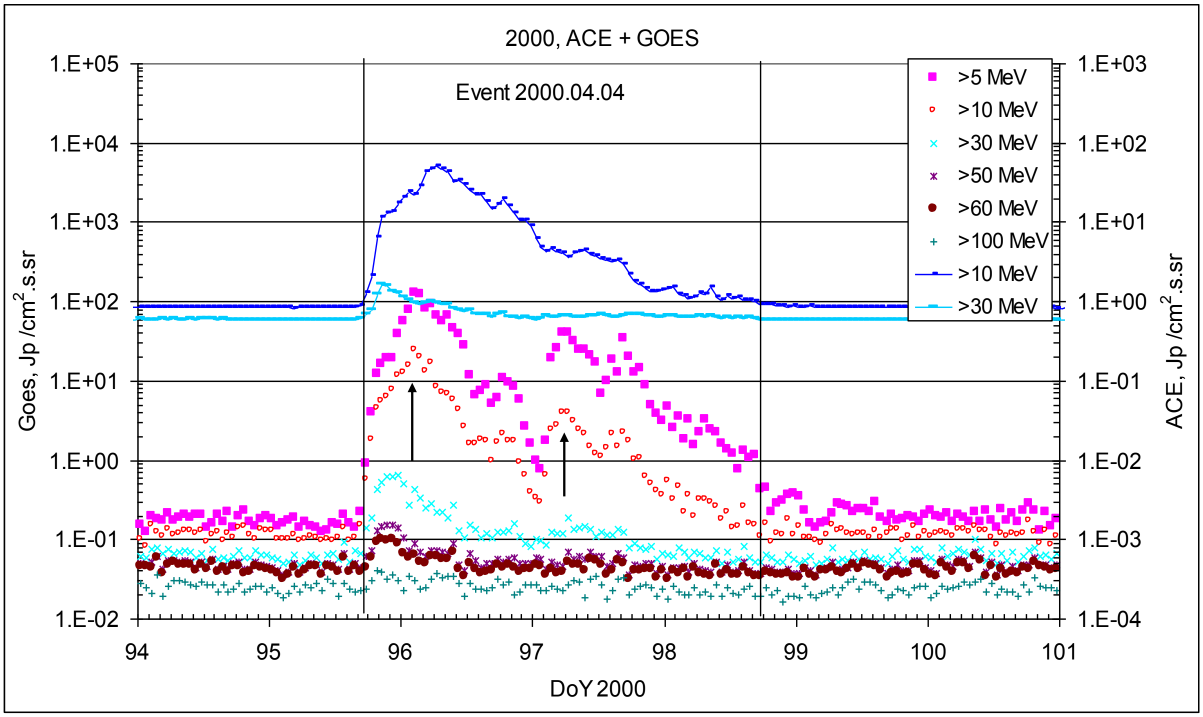
Particle event: To(Ep>10 MeV) – 04d17^h
Tmax$_1$(Ep>10 MeV) – 5d02^h, Jmax$_1$ (Ep>10 MeV) – 25 /cm^2.s.sr
Tmax$_2$(Ep>10 MeV) – 6d06^h, Jmax$_2$ (Ep>10 MeV) – 4 /cm^2.s.sr
Duration of the event – 3 days
Quasimaximal energy of protons in the event – Eqm$_1$ = 105 MeV
– Eqm$_2$ = 75 MeV

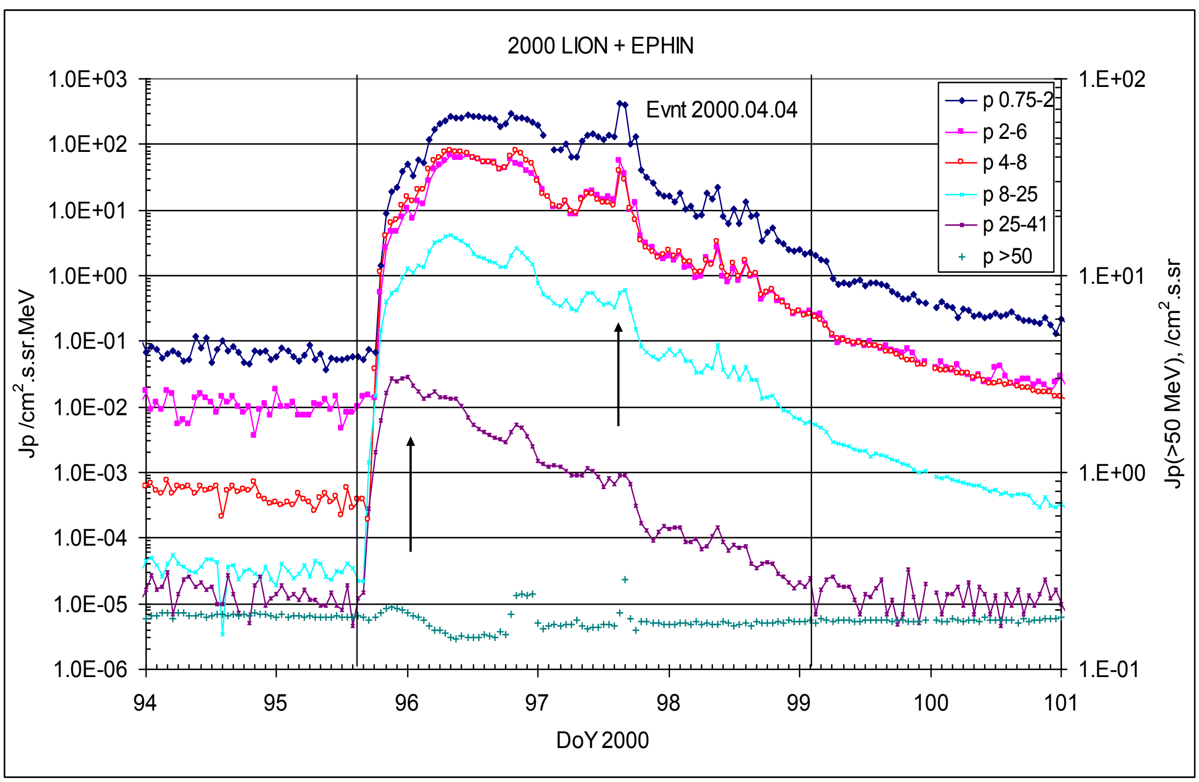
Sources: ● solar flare 04d15^{h}11^m, C9.7/2F, N16W66, AR8933
Main X-ray burst 1-8 Å: onset – 04d15^{h}12^m, max – 04d15^{h}41^m, Φ = 0.023 J/m^2
CME: 04d16^{h}33^m, V = 1188 km/s, Δφ = 360^o, dA = 265^o

Particle fluxes and associated phenomena



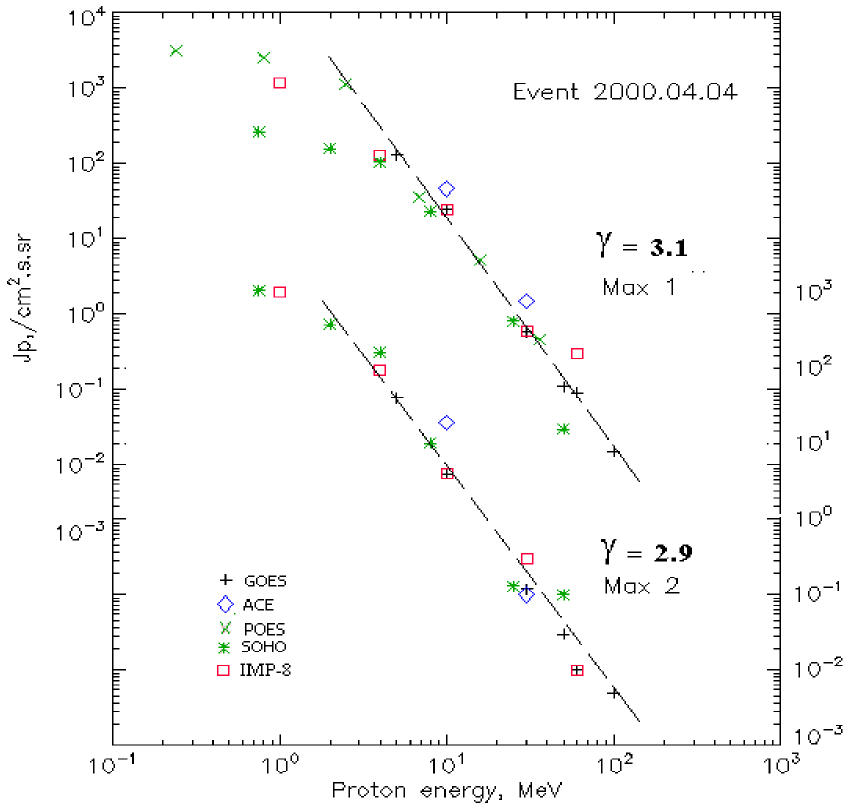
Time profiles of the proton fluxes for the event of 2000 April 04





Arrows on the profiles of the events indicate the time of the proton flux maxima, taken to build the proton spectra (see below)

Integral time-of-maximum proton spectrum



Integral fluxes of protons for the event of 2000 April 04

S/c, instruments	Ep, MeV	To	Tmax	Jmax, /cm^2.s.sr	Dura-tion	Comments
GOES-10						
EPS	>5	17^h	5d02^h/6d06^h	130.9/41.1	4d	
EPS	>10	17^h	5d02^h/6d06^h	25/4	3d	
EPS	>30	17^h	23^h/6d06^h	0.6/0.12	2d	
EPS	>50	17^h	22^h/6d06^h	0.11/0.03	1d	
EPS	>60	18^h	21^h/6d06^h	0.09/0.01	1d	
EPS	>100	18^h	20^h/6d06^h	0.015/0.005	1d	
POES-15						
MEPED	>0.24	18^h	5d10^h/ -	3200/ -	4d	
MEPED	>0.8	18^h	5d10^h/ -	2500/ -	4d	
MEPED	>2.5	18^h	5d10^h/ -	1120/ -	4d	
MEPED	>6.9	18^h	5d10^h/ -	36/ -	4d	
MEPED	>16	18^h	5d10^h/ -	5.2/ -	4d	
MEPED	>36	18^h	5d10^h/ -	0.46/ -	4d	
MEPED	>70	-	-	-	-	
MEPED	>140	-	-	-	-	
IMP-8						
CPME	>1	18^h	05d02^h/06d06^h	1200/1060	7 d	
CPME	>4	18^h	05d02^h/06d06^h	131/94	5 d	
CPME	>10	18^h	05d02^h/06d06^h	24/4	4 d	
CPME	>30	18^h	05d02^h/06d06^h	0.6/0.3	1 d	
CPME	>60	18^h	05d02^h/06d06^h	0.3/0.01	1 d	

ACE						
SIS	>10	18^h	$05d06^h/06d18^h$	46.5/19.1	2 d	
SIS	>30	18^h	$21^h/06d18^h$	1.5/ 0.1	1 d	
SOHO						
EPHIN (INT)	>50	18^h	$21^h/06d15^h$	0.03/0.1	2d	

Differential fluxes of protons for the event of 2000 April 04

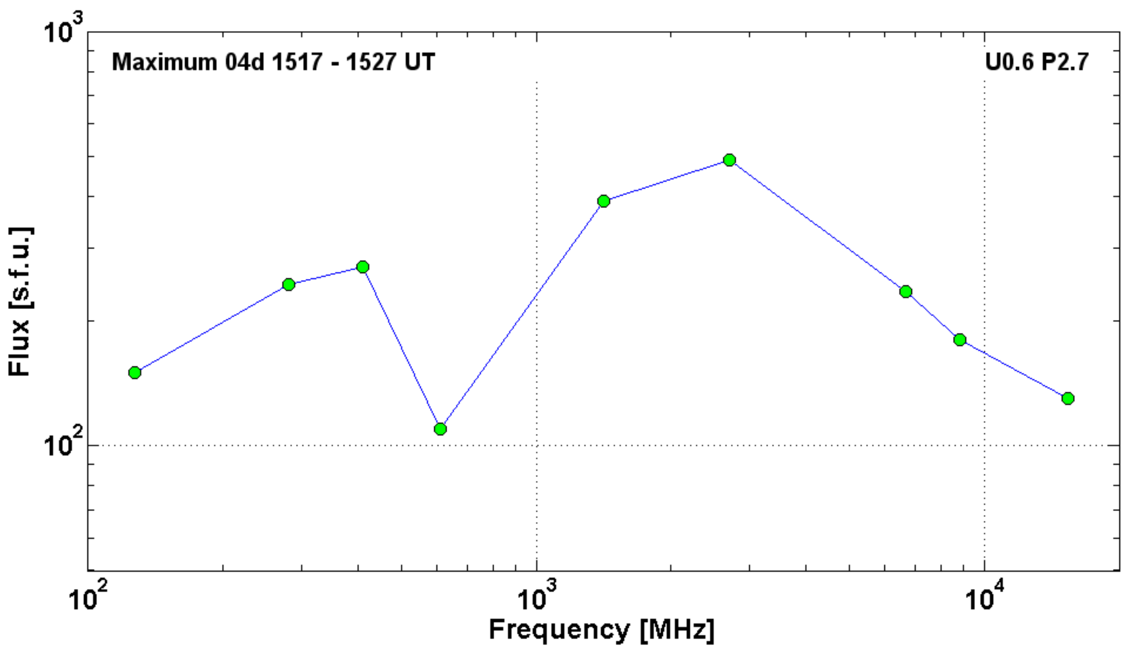
S/c, instruments	ΔE, MeV	To	Tmax	Jmax /cm^2.s.sr.MeV	Dura-tion	Comments
IMP-8						
CPME	1-2	19^h	- /10^h	- /950	8d	
CPME	2-4.6	19^h	- /10^h	- /143	8d	
CPME	4.6-15	19^h	- /10^h	- /6	5d	
CPME	15-25	19^h	- /10^h	- /0.07	3d	
CPME	25-48	19^h	- / -	- / -	2d	
CPME	48-96	19^h	- / -	- / -	1d	
CPME	96-145	19^h	- / -	- / -	1d	
CPME	145-440	19^h	- / -	- / -	1d	
SOHO						
LION	0,75-2	19^h	$05d02^h/06d15^h$	59/407	6d	
LION	2-6	19^h	$05d02^h/06d15^h$	13.4/55.5	6d	
EPHIN	4-8	19^h	$05d02^h/06d15^h$	20.3/38.7	8d	
EPHIN	8-25	18^h	$05d03^h/06d15^h$	1.3/0.6	5d	
EPHIN	25-41	17^h	$05d00^h/06d15^h$	0.028/0.001	4d	
EPHIN	41-53	- ‘ -	- ‘ -	- ‘ -	- ‘ -	

Electromagnetic and other phenomena that are sources and/or accompanying for the event of 2000 April 04

2000 April 04 ● AR8933 To event 366

Hα	6563 Å	1512	1533	1724	N16W66	2F	FS
1 -12.5	keV	1512	1541	1605		C9.7	2.3E-02
>300	keV	1523				8.7	O

15.4	GHz	1517.0	1526.0	1552.0		2.11	
8.8	GHz	1517.0	1527.0	1552.0		2.26	
6.7	GHz	1516.3	1526.2	1543.2		2.37	
2.7	GHz	1517.0	1519.0	1552.0	U0.6 P2.7	2.69	
1.4	GHz	1515.0	1524.0	1542.0		2.59	
610	MHz	1516.0	1518.0	1551.0		2.04	
410	MHz	1516.0	1518.0	1552.0		2.43	
280	MHz	1507.9	1522.0	1555.0		2.39	
127	MHz	1516.1	1517.8	1534.1		>2.18	
DS II	110-170	1524		1526	SH	3	
DS II	40-80	1530		1531	F,H	3	
DS IV	35-85	1515		1619		3	
DS IV	40-550	1517		1527	P	3	
DS III	30-80	1516		1539	N	3	
DS DCIM	800-2000	1514		1542	GG	2	
DS DCIM	2000-4500	1517		1543	GG	2	
CME	WL	1633	1188 km/s	12.8 km/s	360º	265º	

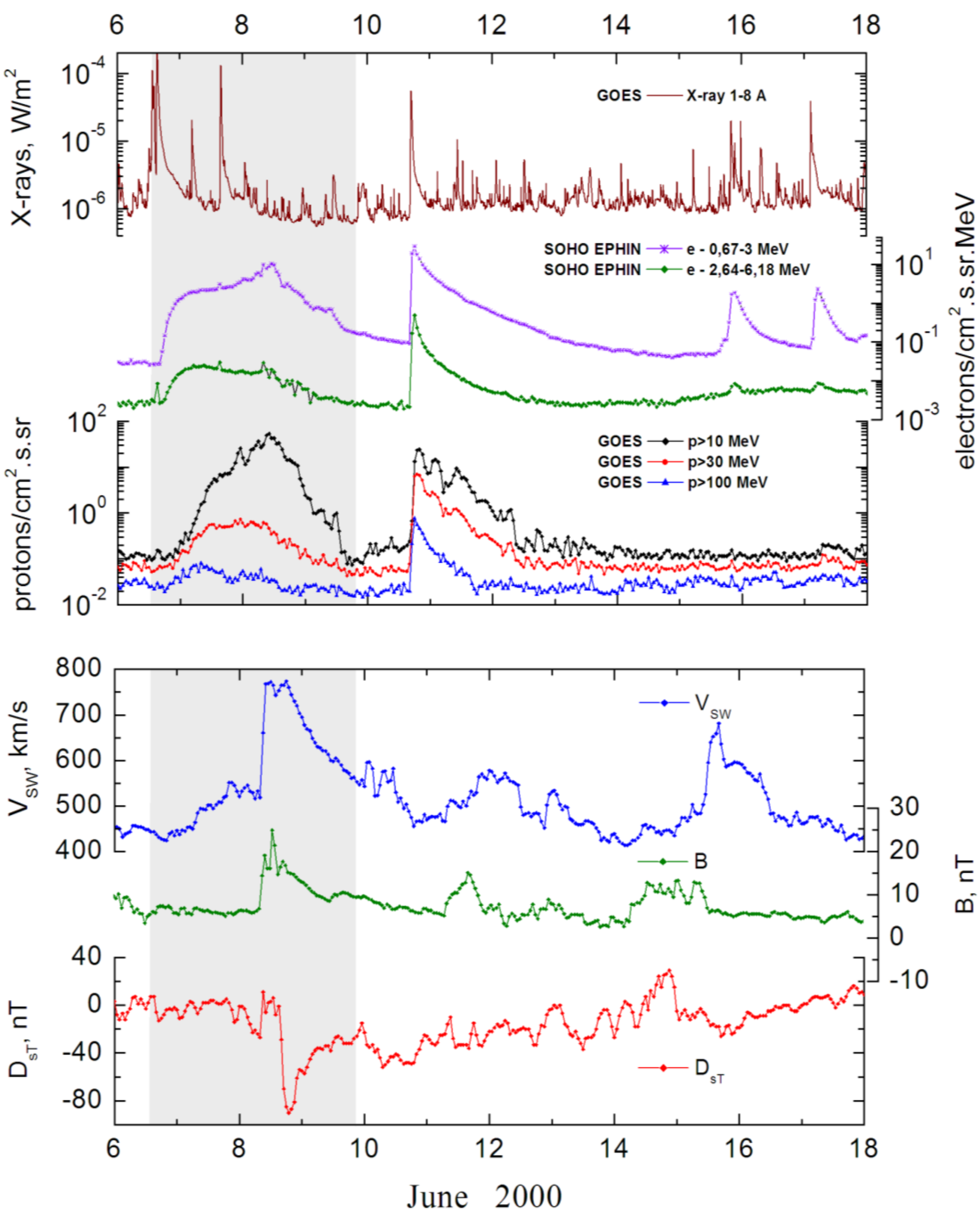


Event 2000.06.07 – (2000-159) **№ 367**

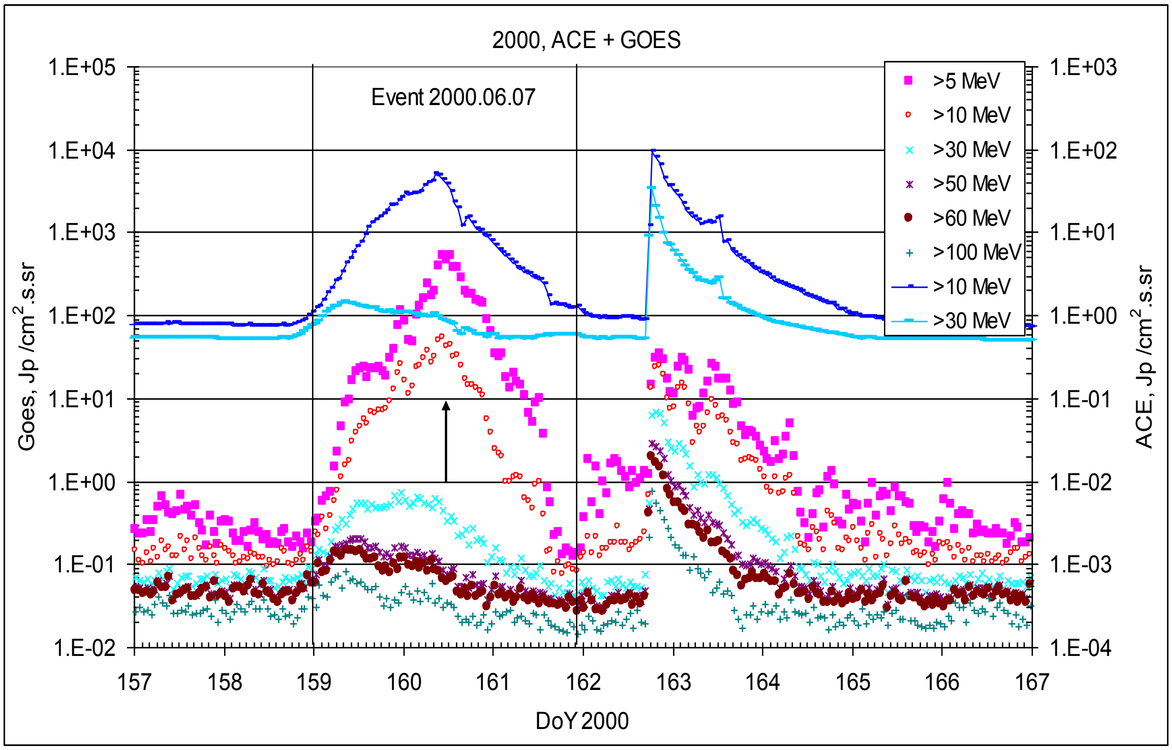
Particle event: To(Ep>10 MeV) – 07d00^h
Tmax(Ep>10 MeV) – 8d10^h, Jmax (Ep>10 MeV) – 54 /cm^2.s.sr
Duration of the event – 3 days
Quasimaximal energy of protons in the event – Eqm = 100 MeV

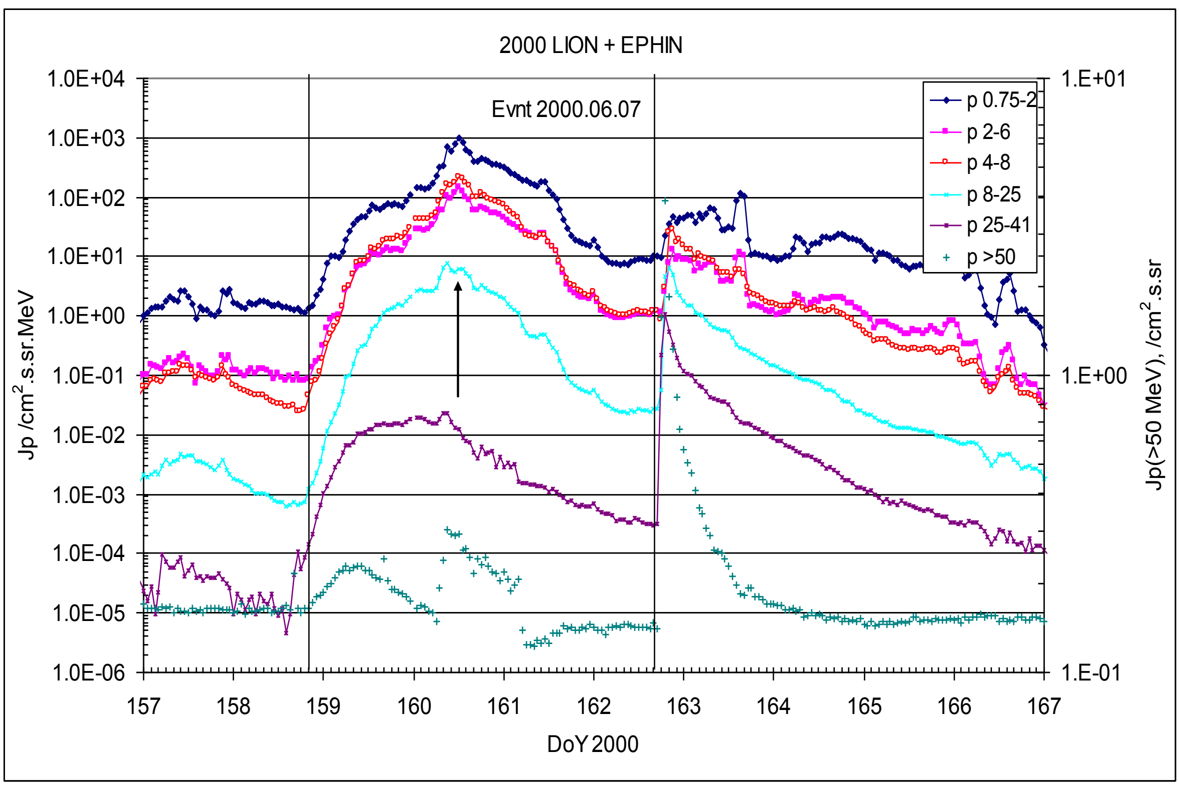
Sources: • solar flare 06d11^{h}25^m, X2.3/3B, N20E18, AR9026
Main X-ray burst 1-8 Å: onset – 06d14^{h}28^m, max – 06d15^{h}25^m, Φ = 0.36 J/m^2
CME: 06d15^{h}54^m, V = 1119 km/s, Δφ = 360^o, dA = 047^o

Particle fluxes and associated phenomena



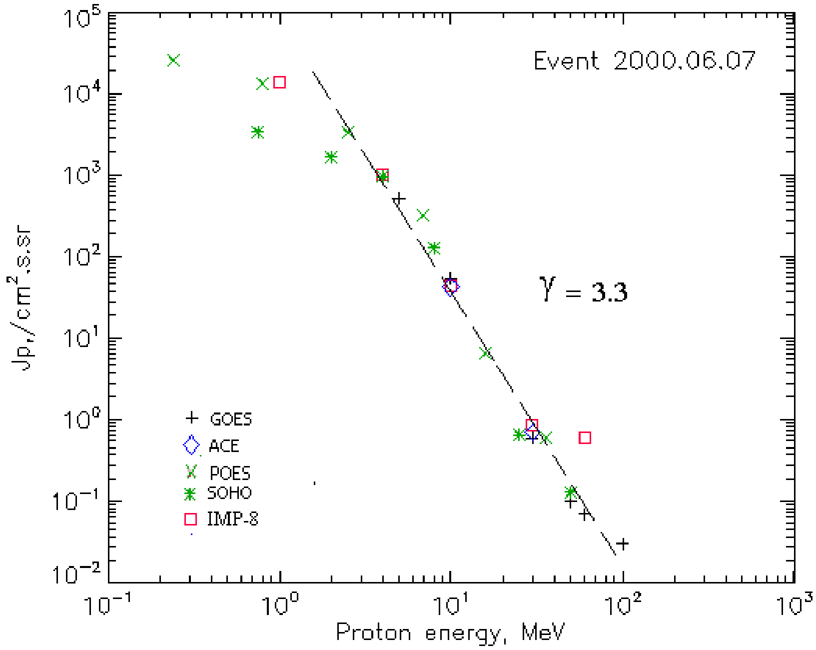
Time profiles of the proton fluxes for the event of 2000 June 07





Arrows on the profiles of the events indicate the time of the proton flux maxima, taken to build the proton spectra (see below)

Integral time-of-maximum proton spectrum



Integral fluxes of protons for the event of 2000 June 07

S/c, instruments	Ep, MeV	To	Tmax	Jmax, /cm^2.s.sr	Dura-tion	Comments
GOES-10						
EPS	>5	01^h	08d10^h	520	3d	
EPS	>10	01^h	08d10^h	54	3d	
EPS	>30	00^h	08d09^h	0.6	3d	
EPS	>50	-	08d08^h	0.1	2d	
EPS	>60	-	08d07^h	0.07	2d	
EPS	>100	-	08d07^h	0.03	2d	
POES-15						
MEPED	>0.24	-	08d10^h	25310	3d	
MEPED	>0.8	-	08d10^h	13250	3d	
MEPED	>2.5	-	08d10^h	3290	3d	
MEPED	>6.9	-	08d10^h	320	2d	
MEPED	>16	-	08d10^h	6.5	2d	
MEPED	>36	-	08d10^h	0.6	2d	
MEPED	>70	-	-	-	-	
MEPED	>140	-	-	-	-	
IMP-8						
CPME	>1	6d23^h	08d11^h	13700	3 d	
CPME	>4	6d22^h	08d11^h	994	3 d	
CPME	>10	02^h	08d10^h	44	3 d	
CPME	>30	02^h	08d09^h	0.85	2 d	
CPME	>60	02^h	08d09^h	0.6	2 d	
ACE						
SIS	>10	01^h	08d12^h	42	3d	
SIS	>30	06d23^h	07d11^h	0.7	2d	

SOHO						
EPHIN (INT)	>50	06d22^h	08d10^h	0.13	2d	

Differential fluxes of protons for the event of 2000 June 07

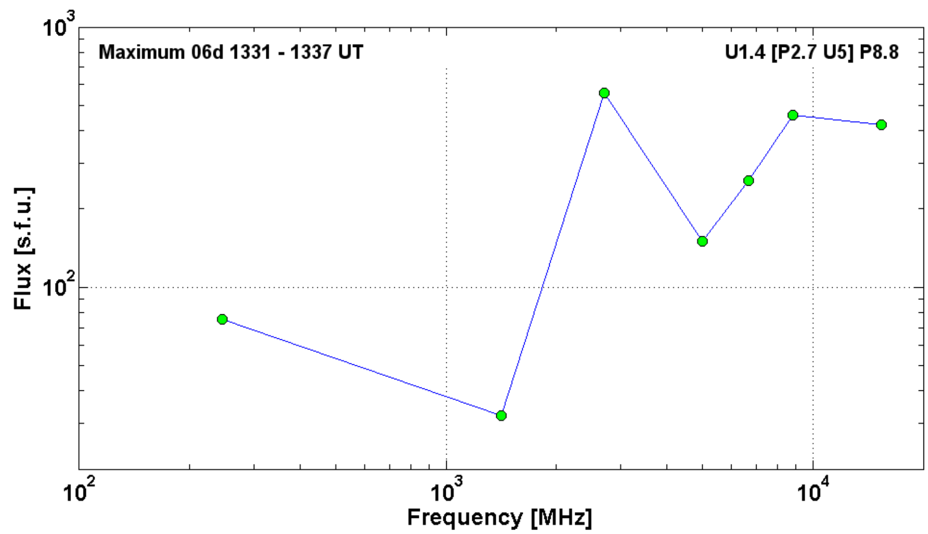
S/c, instruments	ΔE, MeV	To	Tmax	Jmax /cm^2.s.sr.MeV	Dura-tion	Comments
IMP-8						
CPME	1-2	06d23^h	08d10^h	980	4d	
CPME	2-4.6	06d23^h	08d10^h	178	4d	
CPME	4.6-15	06d23^h	08d10^h	67	4d	
CPME	15-25	06d23^h	08d10^h	0.9	3d	
CPME	25-48	06d23^h	08d10^h	0.017	3d	
CPME	48-96	06d23^h	08d09^h	0.002	2d	
CPME	96-145	-	-	-	-	
CPME	145-440	-	-	-	-	
SOHO						
LION	0,75-2	06d23^h	08d12^h	996	4d	
LION	2-6	07d00^h	08d11^h	176	4d	
EPHIN	4-8	06d22^h	08d12^h	205	4d	
EPHIN	8-25	06d21^h	08d09^h	7.5	3d	
EPHIN	25-41	06d19^h	08d09^h	0.023	3d	
EPHIN	41-53	- ‘ -	- ‘ -	- ‘ -	- ‘ -	

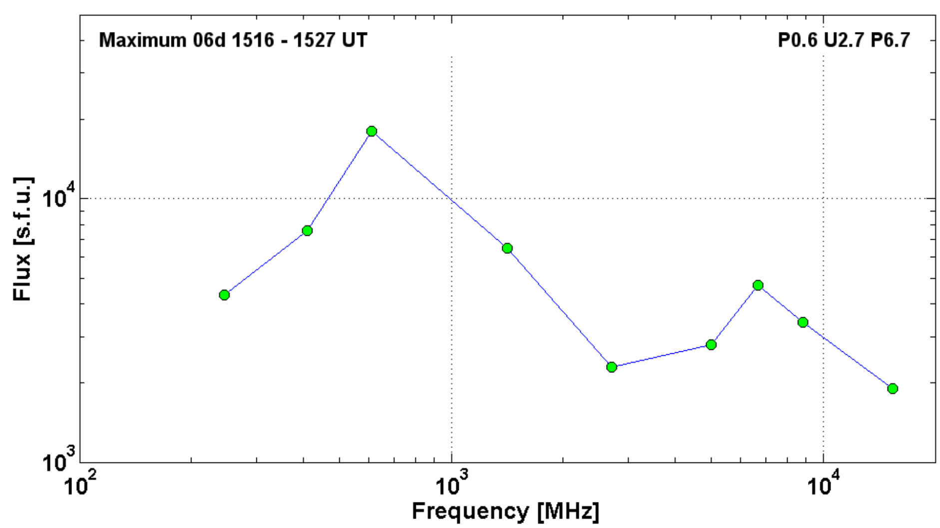
Electromagnetic and other phenomena that are sources and/or accompanying for the event of 2000 June 07

2000 June 06 ● AR9026 To event 367

Hα	6563 Å	1125	1317	1450	N20E13	2N	EFHKL
Hα	6563 Å	1206	1521	1841	N20E14	3B	UZ
1 -12.5	keV	1310	1319	1328		M2.7	1.9E-2
1 -12.5	keV	1330	1339	1346		X1.1	8.1E-2
1 -12.5	keV	1356	1401	1411		M7.1	5.0E-2
1 -12.5	keV	1458	1525	1540		X2.3	3.6E-1
53 - 93	keV	<1543	1548	>1556	199		HXT Y
15.4	GHz	1330.0	1332.0	1349.0		2.62	
8.8	GHz	1330.0	1332.0	1338.0	U1.4 [P2.7 U5] P8.8	2.66	
6.7	GHz	1330.8	1331.2	1333.8		2.41	
5	GHz	1330.0	1333.0	1338.0		2.18	
2.7	GHz	1332.0	1333.0	1338.0		2.75	
1.4	GHz	1333.0	1334.0	1336.0		1.51	
245	MHz	1336.0	1337.0	1338.0		1.88	
DS III	35-70	1322		1449	N	1	
DS DCIM	2000-4500	1331		1334	GG,SP	2	

15.4	GHz	1508.0	1519.0	0000.0		3.28	
8.8	GHz	1508.0	1519.0	0000.0		3.53	
6.7	GHz	1505.0	1516.5	1536.6	P0.6 U2.7 P6.7	3.67	
5	GHz	1506.0	1519.0	0000.0		3.45	
2.7	GHz	1506.0	1519.0	0000.0		3.36	
1.4	GHz	1506.0	1519.0	0000.0		3.81	
610	MHz	1507.0	1523.0	0000.0		4.26	
410	MHz	1507.0	1521.0	0000.0		3.88	
245	MHz	1507.0	1527.0	1607.0		3.63	
DS II	220-550	1516		~1530		3	
DS II	25-119	1528		1539		2	
DS IV	30-80	1457		2121		3	
DS III	220-550	1507		1509	GG,RS	3	
DS III	25-158	1507		1509		1	
DS DCIM	2000-4500	1503		1553	GG	3	
DS DCIM	400-4000	1520		1710	P,Z	3	
CME	WL	1506	0358 km/s	-3.9 km/s	051º	018º	
CME	WL	1530	0929 km/s	111.9 km/s^2	090º	004º	
CME	WL	1554	1119 km/s	1.5 km/s^2	360º	047º	



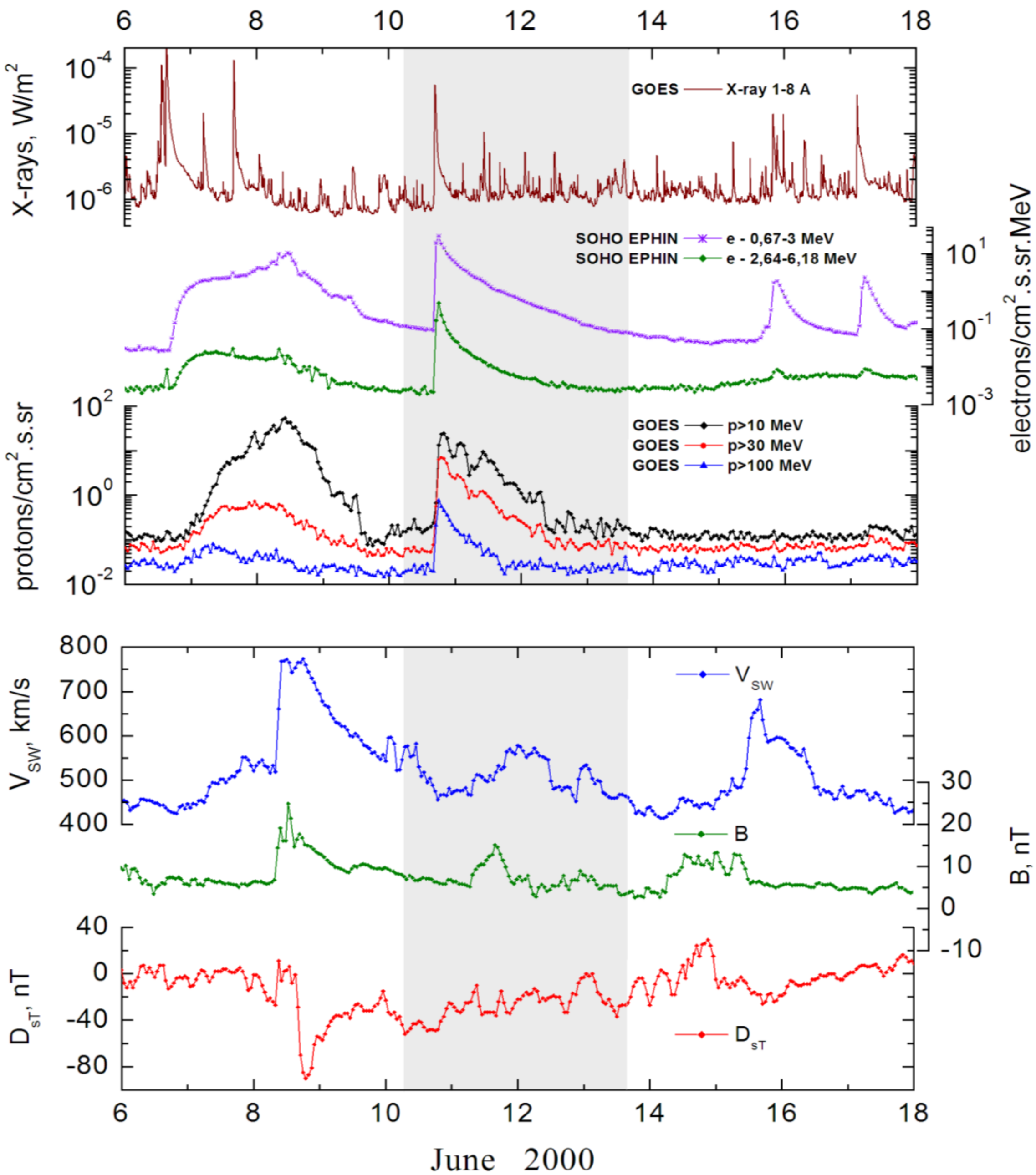


Event 2000.06.10 – (2000-162) **№ 368**

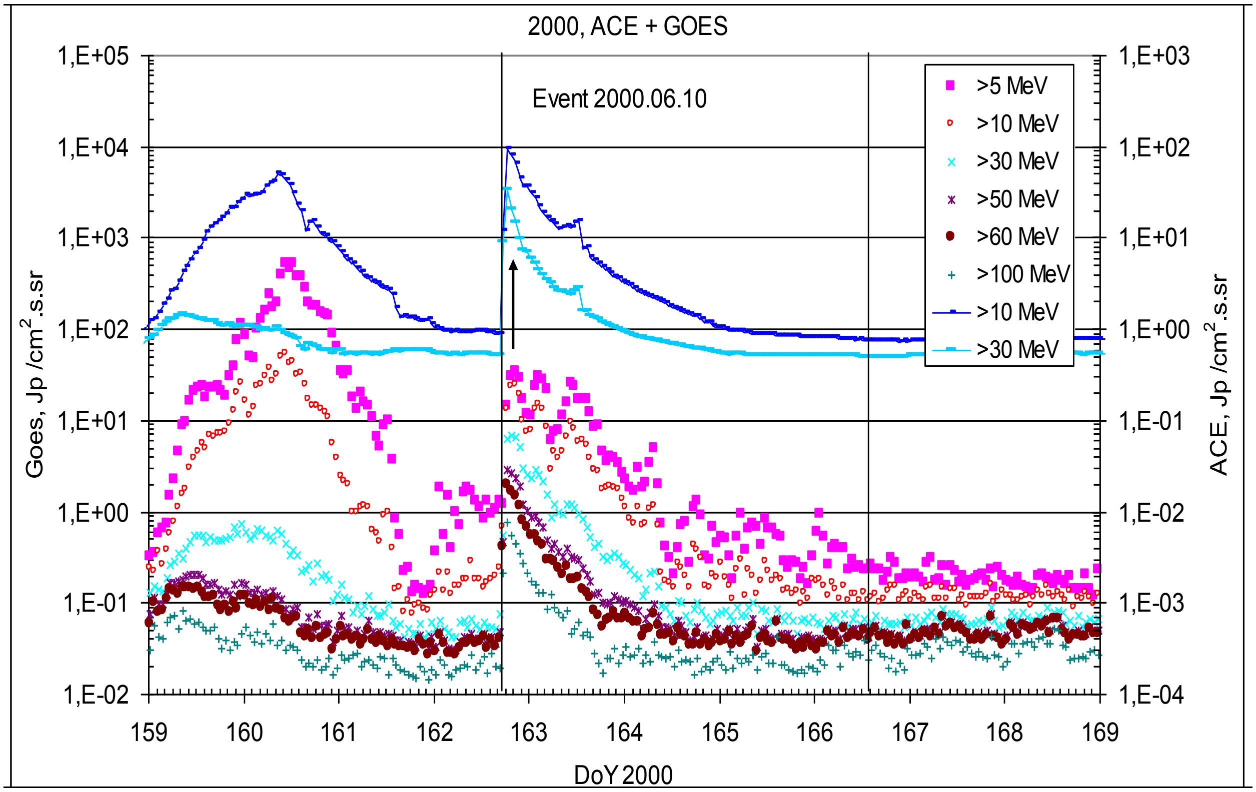
Particle event: To(Ep>10 MeV) – 10d17^h
Tmax(Ep>10 MeV) – 10d20^h, Jmax (Ep>10 MeV) – 24 /cm^2.s.sr
Duration of the event – 4 days
Quasimaximal energy of protons in the event – Eqm = 390 MeV

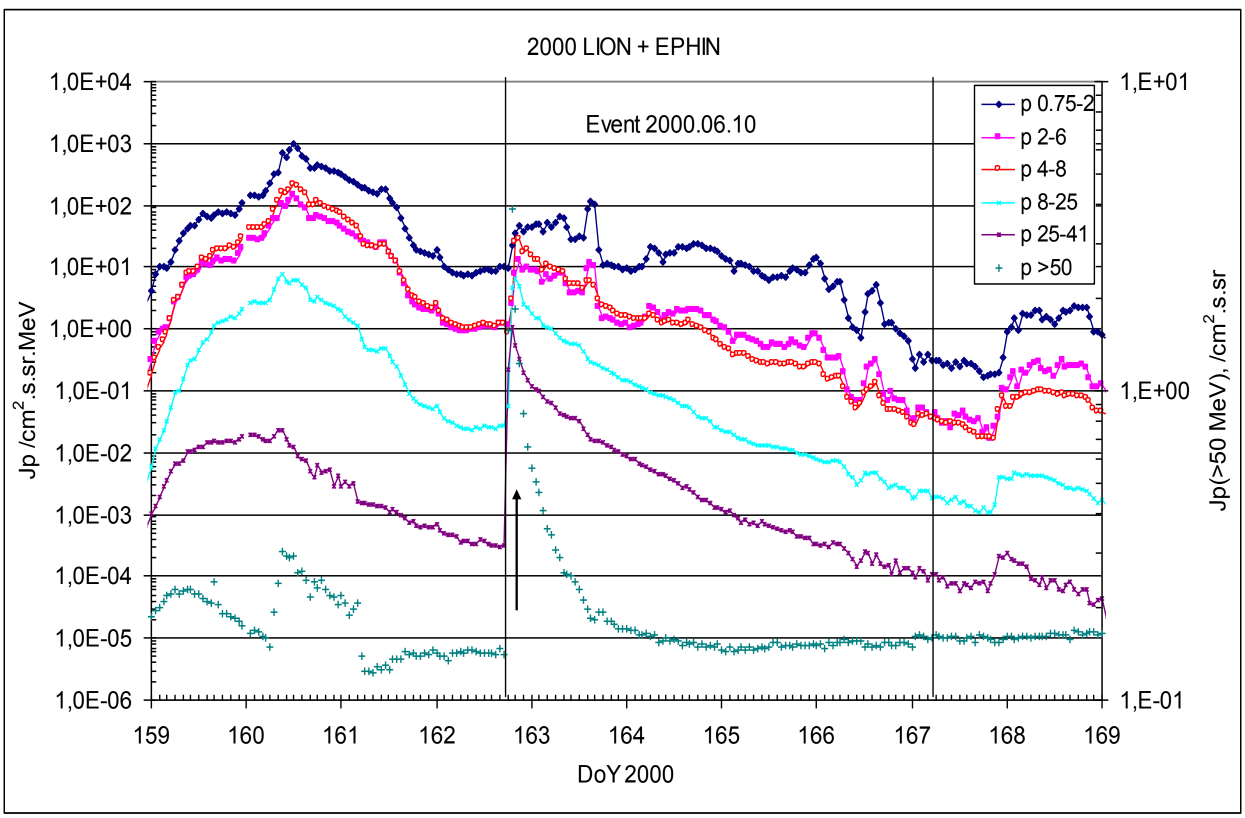
Sources: ● solar flare 10d16^{h}22^m, M5.2/3B, N22W39, AR9026
Main X-ray burst 1-8 Å: onset – 10d16^{h}40^m, max – 10d17^{h}02^m, Φ = 0.073 J/m^2
CME: 10d17^{h}08^m, V = 1108 km/s, Δφ = 360^o, dA = 307^o
Δ SC 11d08^{h}01^m, Δ SC 12d22^{h}08^m

Particle fluxes and associated phenomena



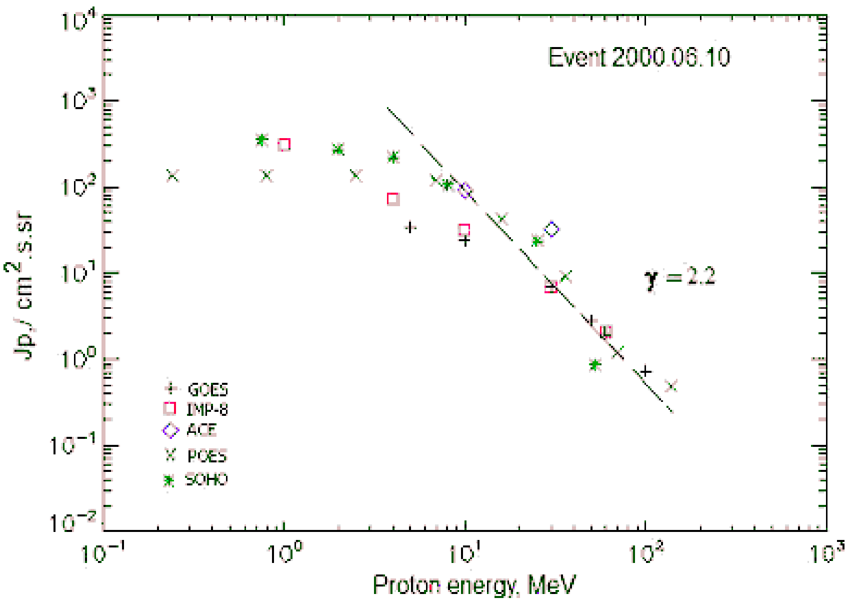
Time profiles of the proton fluxes for the event of 2000 June 10





Arrows on the profiles of the events indicate the time of the proton flux maxima, taken to build the proton spectra (see below)

Integral time-of-maximum proton spectrum



Integral fluxes of protons for the event of 2000 June 10

S/c, instruments	Ep, MeV	To	Tmax	Jmax, /cm^2.s.sr	Duration	Comments
GOES-10						
EPS	>5	17^h	20^h	34.4	>3d	
EPS	>10	17^h	20^h	24	>3d	
EPS	>30	17^h	19^h	6.9	>2d	
EPS	>50	17^h	18^h	2.8	>1d	
EPS	>60	17^h	18^h	1.96	>1d	
EPS	>100	17^h	18^h	0.73	1d	
POES-15						
MEPED	>0.24	17^h	19^h	137	3d	
MEPED	>0.8	17^h	19^h	137	3d	
MEPED	>2.5	17^h	19^h	137	3d	
MEPED	>6.9	17^h	19^h	119	3d	
MEPED	>16	17^h	19^h	41.5	3d	
MEPED	>36	17^h	19^h	9.2	3d	
MEPED	>70	17^h	19^h	1.2	3d	
MEPED	>140	17^h	19^h	0.48	3d	
IMP-8						
CPME	>1	14^h	23^h	303	5 d	
CPME	>4	14^h	21^h	73.2	4 d	
CPME	>10	15^h	19^h	31.1	4 d	
CPME	>30	15^h	19^h	6.8	1.5 d	
CPME	>60	16^h	19^h	2.1	1.5 d	
ACE						
SIS	>10	17^h	18^h	92	3d	
SIS	>30	17^h	18^h	32.5	2d	
SOHO						
EPHIN (INT)	>50	-	22^h	0.85	1.5d	

Differential fluxes of protons for the event of 2000 June 10

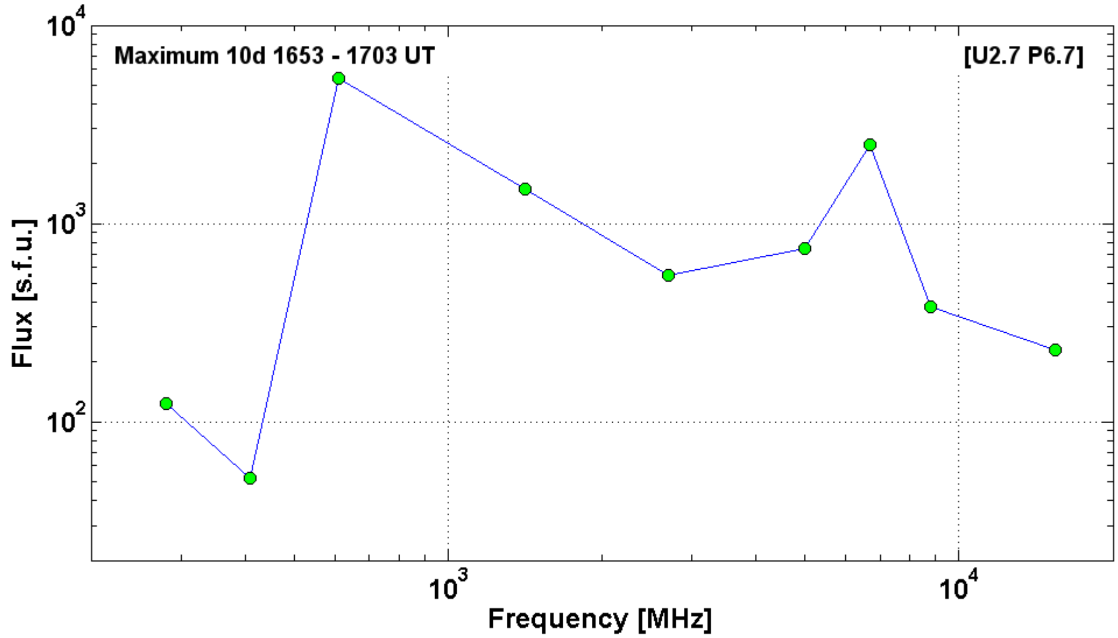
S/c, instruments	ΔE, MeV	To	Tmax	Jmax /cm^2.s.sr.MeV	Dura-tion	Comments
IMP-8						
CPME	1-2	21^h	$11d01^h$	197	4d	
CPME	2-4.6	19^h	23^h	56.4	4d	
CPME	4.6-15	19^h	21^h	4.9	4d	
CPME	15-25	18^h	18^h	1.8	3d	
CPME	25-48	18^h	19^h	0.25	3d	
CPME	48-96	16^h	19^h	0.052	2d	
CPME	96-145	-	-	-	-	
CPME	145-440	-	-	-	-	
SOHO						
LION	0,75-2	19^h	21^h	46	5d	
LION	2-6	19^h	21^h	12.7	5d	
EPHIN	4-8	19^h	21^h	28.4	5d	
EPHIN	8-25	19^h	20^h	4.9	5d	
EPHIN	25-41	19^h	19^h	1.1	5d	
EPHIN	41-53	- ‘ -	- ‘ -	- ‘ -	- ‘ -	

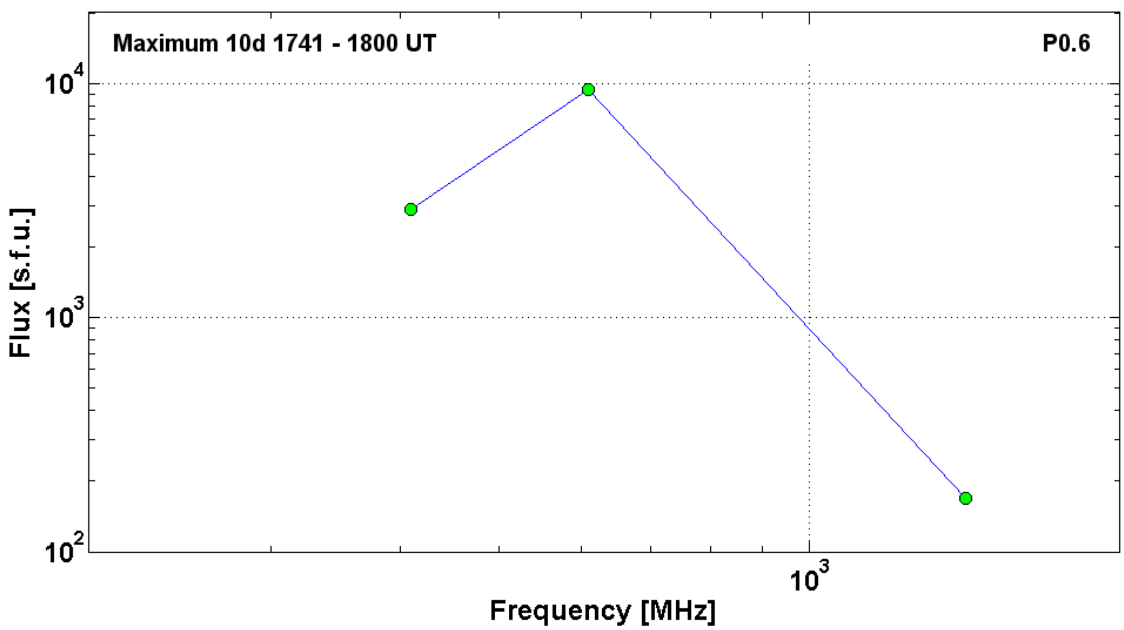
Electromagnetic and other phenomena that are sources and/or accompanying for the event of 2000 June 10

2000 June 10 ● AR9026 To event 368

Hα	6563 Å	1622	1653	1810	N22W39	3B	FUY
1 -12.5	keV	1640	1702	1719		M5.2	7.3E-2
53 – 93	keV	<1652	1653	1715		18	HXTY
15.4	GHz	1647.0	1653.0	0000.0		2.36	
8.8	GHz	1648.0	1653.0	0000.0		2.58	
6.7	GHz	1647.0	1653.1	1658.1	[U2.7 P6.7]	3.40	
5	GHz	1648.0	1653.0	0000.0		2.88	
2.7	GHz	1648.0	1653.0	0000.0		2.74	
2.7	GHz	1648.0	1653.0	0000.0		2.74	
1.4	GHz	1647.0	1653.0	1706.0		3.18	
610	MHz	1653.0	1700.0	1708.0		3.73	
410	MHz	1652.0	1700.0	1703.0		1.72	
280	MHz	1653.3	1703.0	1710.1		2.09	
DS II	25-180	1655		1714		2	
DS II	30-80	1655		1718		3	
DS III	25-180	1655		1659		1	
DS DCIM	1000-4000	1647		1716	P,C	3	

1.4	GHz	1756.0	1800.0	1819.0		2.23	
610	MHz	1737.0	1741.0	0000.0	P0.6	3.97	
410	MHz	1738.0	1741.0	0000.0		3.46	
DS DCIM	1000-1500	1757		1806	P,Z	3	
CME	WL	1708	1108 km/s	–21.2km/s^2	360º	307º	





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Event 2000.06.17 – (2000-169) **№ 369**

Particle event: To(Ep>10 MeV) – 17d07^h

Tmax(Ep>10 MeV) –18d06^h, Jmax (Ep>10 MeV) – 1.7 /cm^2.s.sr *)

Duration of the event – 2 days *)

Quasimaximal energy of protons in the event – Eqm = 110 MeV

*) According to data IMP-8 (CPME)

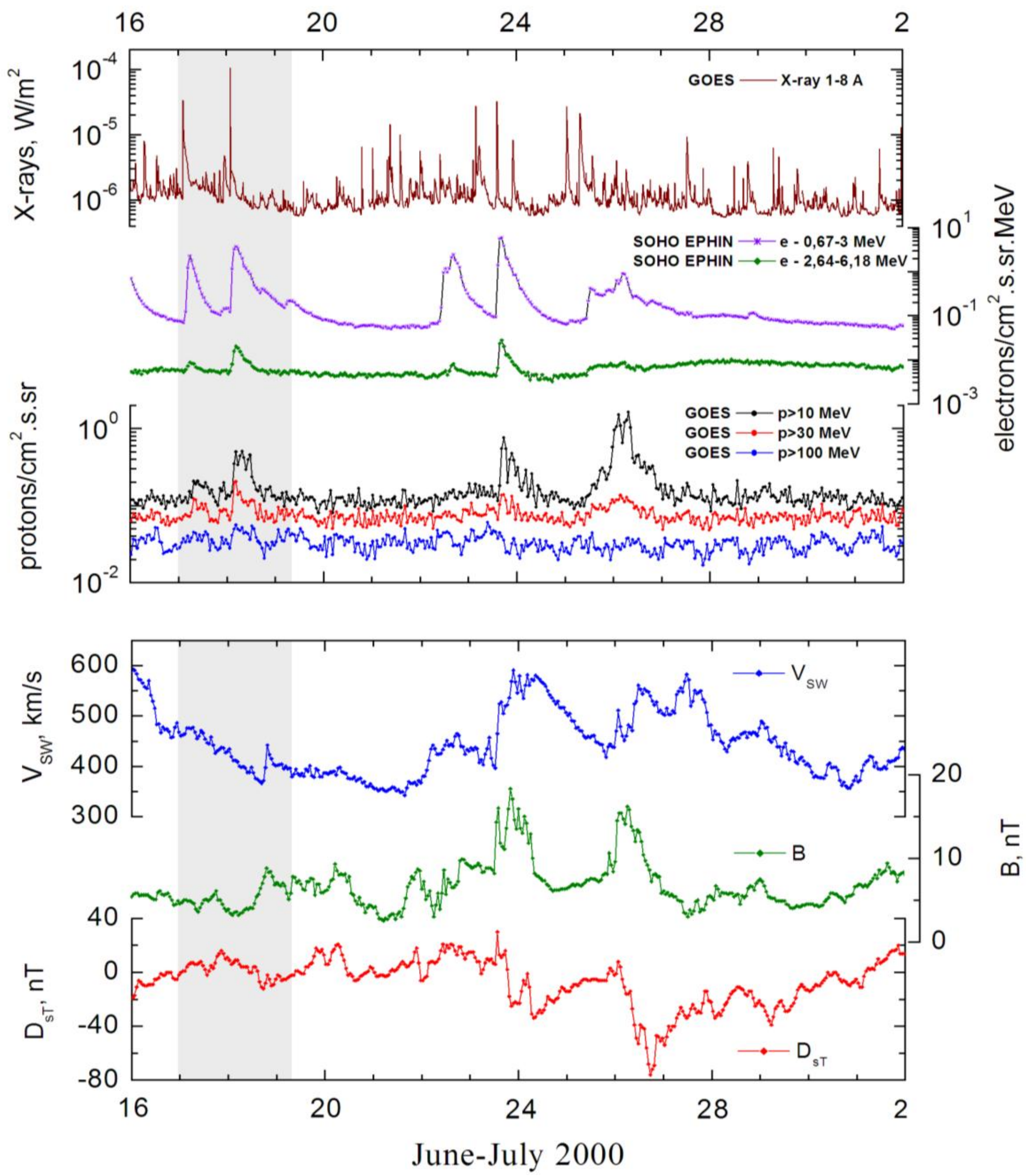
Sources: ● solar flare 17d02^{h}25^m, M3.5/2B, N22W72, AR9033

Ø solar flare 18d01^{h}52^m, X1.0/SF, N23W85, AR9033

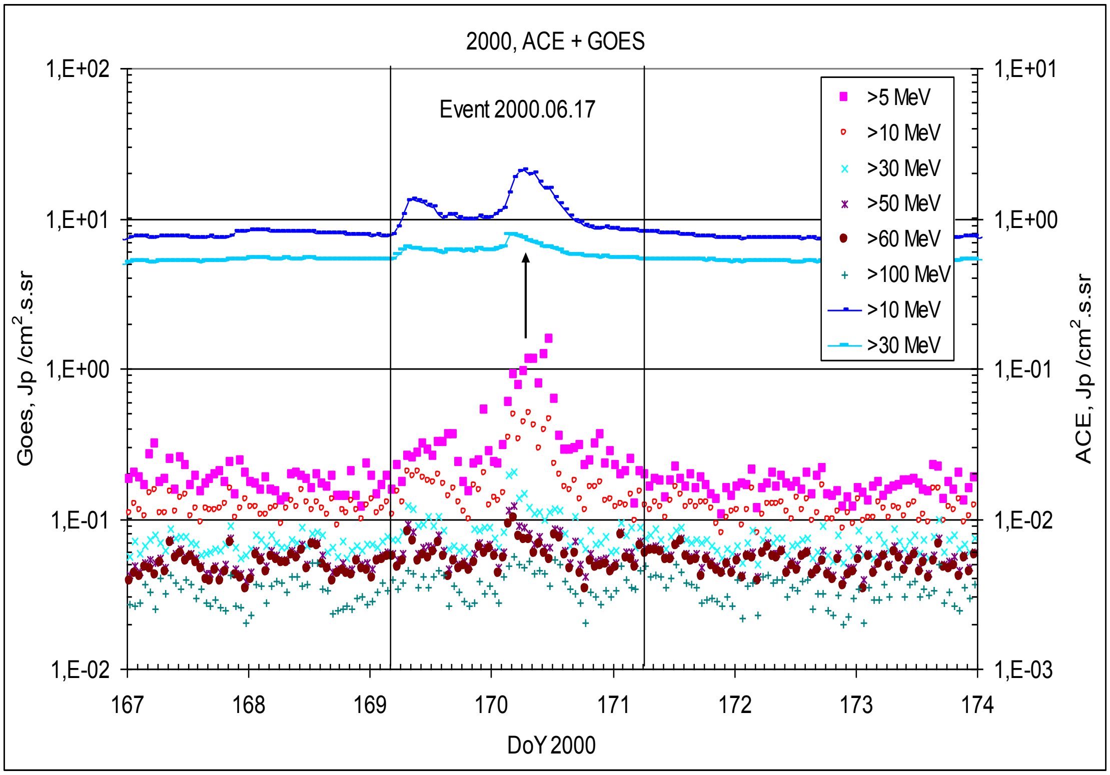
Main X-ray burst 1-8 Å: onset – 17d02^{h}25^m, max – 17d02^{h}37^m, Φ = 0.024 J/m^2

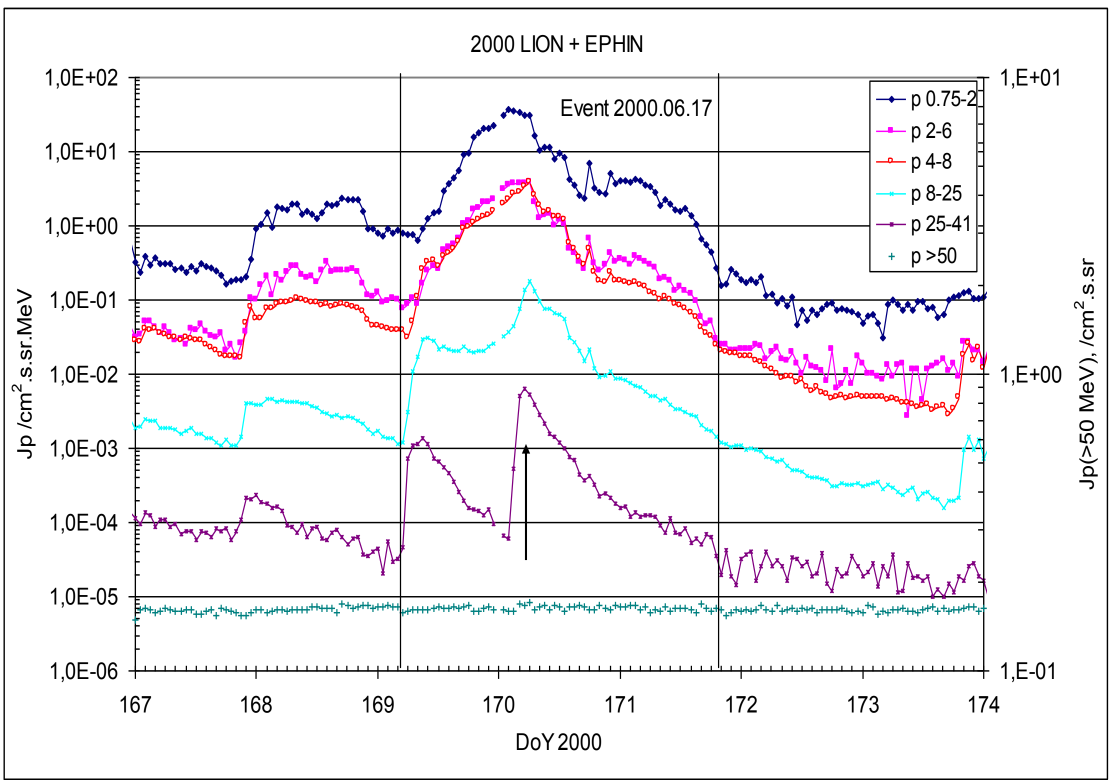
CME: 17d03^{h}28^m, V = 857 km/s, Δφ = 133^o, dA=301^o;

Particle fluxes and associated phenomena



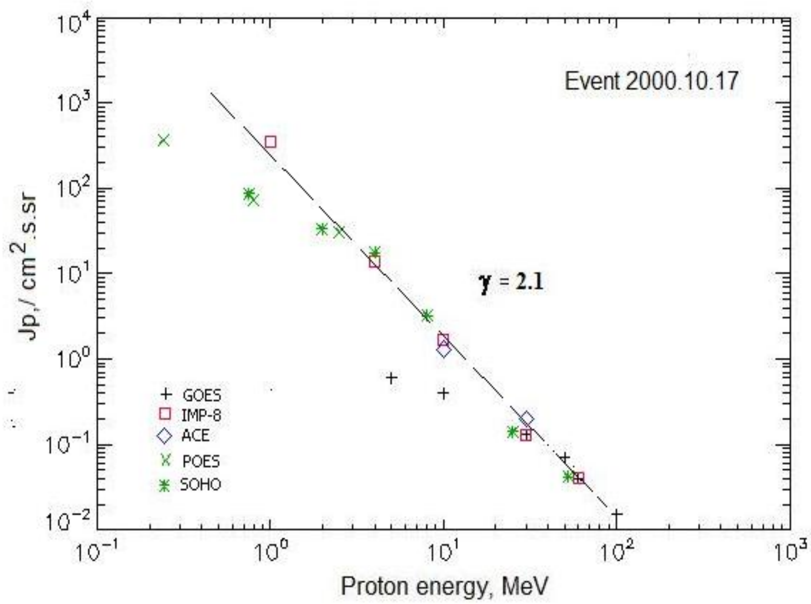
Time profiles of the proton fluxes for the event of 2000 June 17





Arrows on the profiles of the events indicate the time of the proton flux maxima, taken to build the proton spectra (see below)

Integral time-of-maximum proton spectrum



Integral fluxes of protons for the event of 2000 June 17

S/c, instruments	Ep, MeV	To	Tmax	Jmax, /cm^2.s.sr	Dura-tion	Comments
GOES-10						
EPS	>5	07^h	18d05^h	0.6	1d	
EPS	>10	07^h	18d04^h	0.4	1d	
EPS	>30	07^h	18d04^h	0.13	1d	
EPS	>50	07^h	18d04^h	0.07	1d	
EPS	>60	07^h	18d04^h	0.04	1d	
EPS	>100	07^h	18d04^h	0.015	1d	
POES-15						
MEPED	>0.24	14^h	18d04^h	371	3d	
MEPED	>0.8	14^h	18d04^h	73	3d	
MEPED	>2.5	14^h	18d04^h	31	3d	
MEPED	>6.9	-	-	-	-	
MEPED	>16	-	-	-	-	
MEPED	>36	-	-	-	-	
MEPED	>70	-	-	-	-	
MEPED	>140	-	-	-	-	
IMP-8						
CPME	>1	10^h	18d03^h	356	3 d	
CPME	>4	08^h	18d05^h	14	2 d	
CPME	>10	07^h	18d06^h	1.7	2 d	
CPME	>30	-	18d06^h	0.13	1.5 d	
CPME	>60	-	18d06^h	0.04	0.5 d	
ACE						
SIS	>10	07^h	18d06^h	1.3	1d	
SIS	>30	07^h	18d04^h	0.2	1d	
SOHO						
EPHIN (INT)	>50	-	18d05^h	0.008	-	

Differential fluxes of protons for the event of 2000 June 17

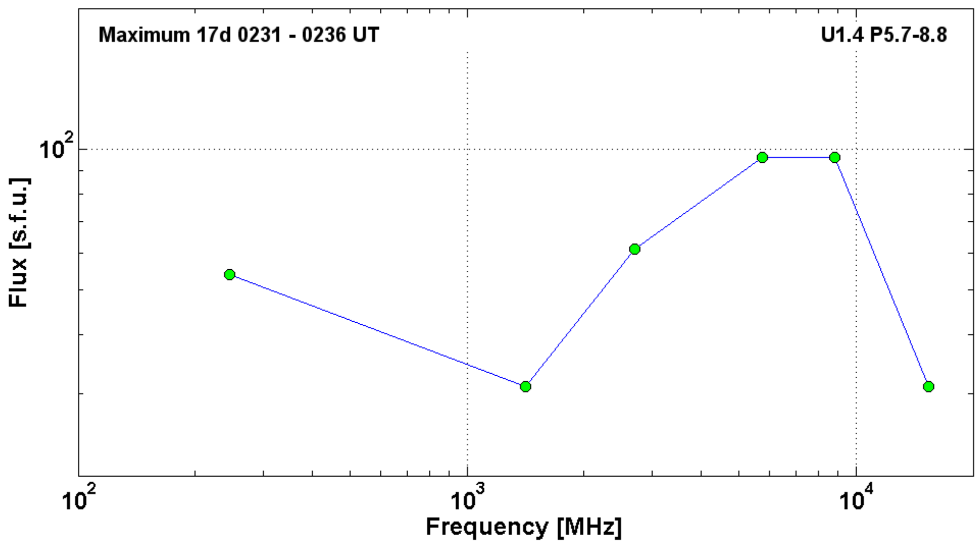
S/c, instruments	ΔE, MeV	To	Tmax	Jmax /cm^2.s.sr.MeV	Dura-tion	Comments
IMP-8						
CPME	1-2	09^h	$18d02^h$	274	3d	
CPME	2-4.6	08^h	$18d03^h$	34.6	3d	
CPME	4.6-15	06^h	$18d03^h$	0.77	2d	
CPME	15-25	05^h	$18d01^h$	0.045	1,5d	
CPME	25-48	05^h	$18d05^h$	0.008	0,5d	
CPME	48-96	-	$18d05^h$	0.0025	0,5d	
CPME	96-145	-	-	-	-	
CPME	145-440	-	-	-	-	
SOHO						
LION	0,75-2	06^h	$18d06^h$	30.3	3d	
LION	2-6	06^h	$18d06^h$	3.9	3d	
EPHIN	4-8	06^h	$18d05^h$	3.9	3d	
EPHIN	8-25	05^h	$18d05^h$	0.81	3d	
EPHIN	25-41	05^h	$18d04^h$	0.006	3d	
EPHIN	41-53	- “ -	- “ -	- “ -	- “ -	

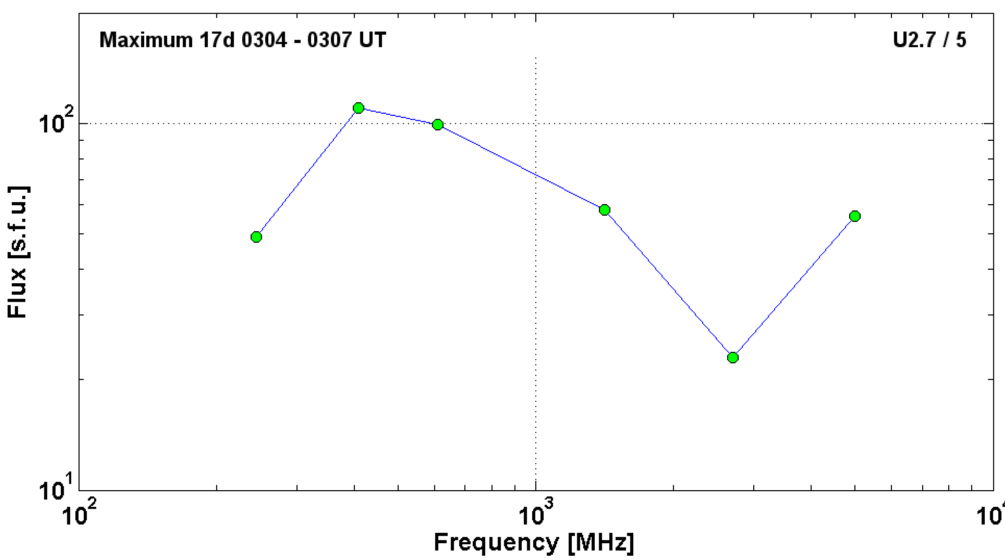
Electromagnetic and other phenomena that are sources and/or accompanying for the event of 2000 June 17

2000 June 17 ● AR9033 To event 369

Hα	6563 Å	0228	0238	0501	N22W72	2B	EF
1 -12.5	keV	0225	0237	0244		M3.5	2.4E-2
50 – 150	keV	0228	0235	0337		206	HXT Y
15.4	GHz	0231.0	0231.0	0232.0		1.49	
8.8	GHz	0230.0	0231.0	0235.0	U1.4 P5.7-8.8	1.98	
5.7	GHz	0230.3	0232.0	0405.0		1.98	
2.7	GHz	0231.0	0233.0	0235.0		1.79	
1.4	GHz	0231.0	0234.0	0235.0		1.49	
245	MHz	0236.0	0236.0	~0236.0		1.73	
DS III	25-150	0247		0332	N	2	
DS CONT	30-80	0250		0413		1	
5	GHz	0258.0	0305.0	0310.0	U2.7 / 5	1.75	
2.7	GHz	0307.0	0307.0	~0307.0		1.36	
1.4	GHz	0305.0	0307.0	0309.0		1.76	
610	MHz	0306.0	0307.0	0309.0		2.00	
410	MHz	0306.0	0307.0	0308.0		2.04	
245	MHz	0304.0	0304.0	~0304.0		1.69	
DS III	23-600	0301		0309	GG	3	

5	GHz	0353.0	0353.0	0354.0	[0.9 - 5]	1.77	
2.7	GHz	0351.0	0352.0	0356.0		1.94	
1.4	GHz	0346.0	0346.0	0347.0		1.91	
900	MHz	0345.0	0352.2			1.95	
610	MHz	0345.0	0352.0	0357.0		2.26	
410	MHz	0345.0	0347.0	0349.0		2.00	
245	MHz	0340.0	0342.0	0000.0		2.90	
DS III	160-260	0340		0346	G	2	
DS CONT	160-820	0341		0355		1	
CME	WL	0328	0857 km/s	16.4 km/s^2	133º	301º	





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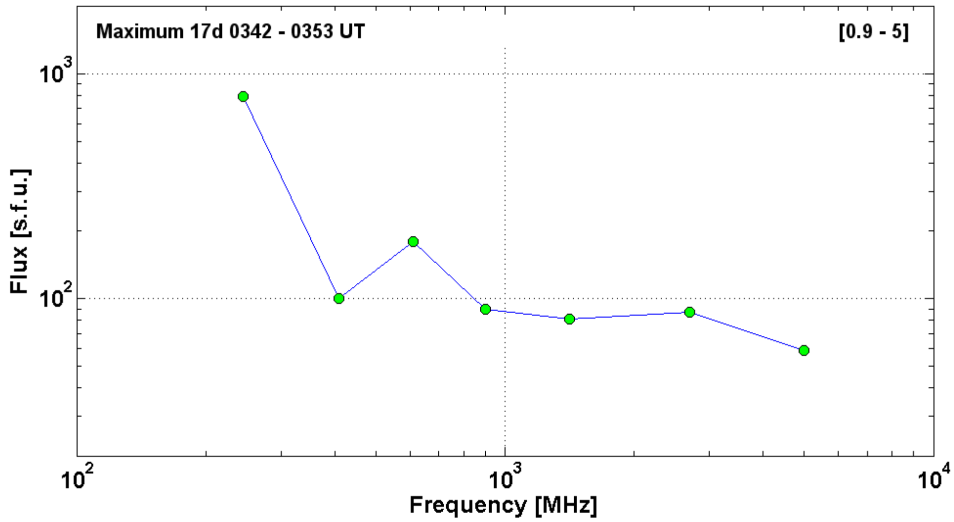
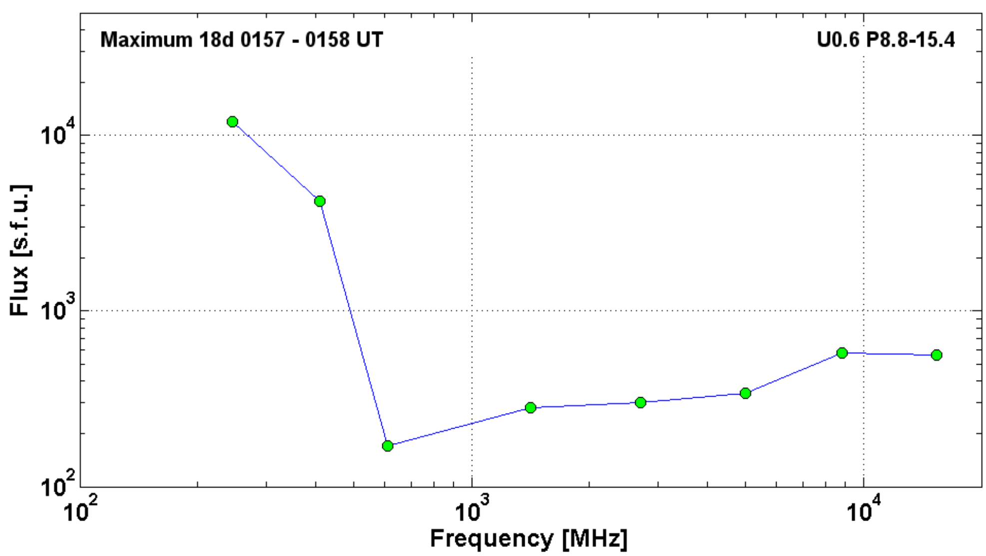


2000 June 18 Ø AR9033 To event 369

Hα	6563 Å	0156	0157	0213	N23W85	SF	EF
1 -12.5	keV	0152	0159	0213		X1.0	3.4E-2
53 – 93	keV	>020422	~020426	020912		188	HXT Y
15.4	GHz	0156.0	0157.0	0158.0	U0.6 P8.8-15.4	2.75	
8.8	GHz	0156.0	0157.0	0158.0		2.76	
5	GHz	0155.0	0157.0	0159.0		2.53	
2.7	GHz	0155.0	0157.0	0159.0		2.48	
1.4	GHz	0156.0	0157.0	0200.0		2.45	
610	MHz	0156.0	0157.0	0200.0		2.23	
410	MHz	0157.0	0158.0	0200.0		3.62	
245	MHz	0156.0	0158.0	0203.0		4.08	
DS II	30-650	0157		0211	FN	3	
DS III	18-180	0157		0204	GG	3	
BSL	6563 Å	0156		0233	N17W90		
CME	WL	0210	0629 km/s	-1.2 km/s^2	132º	318º	

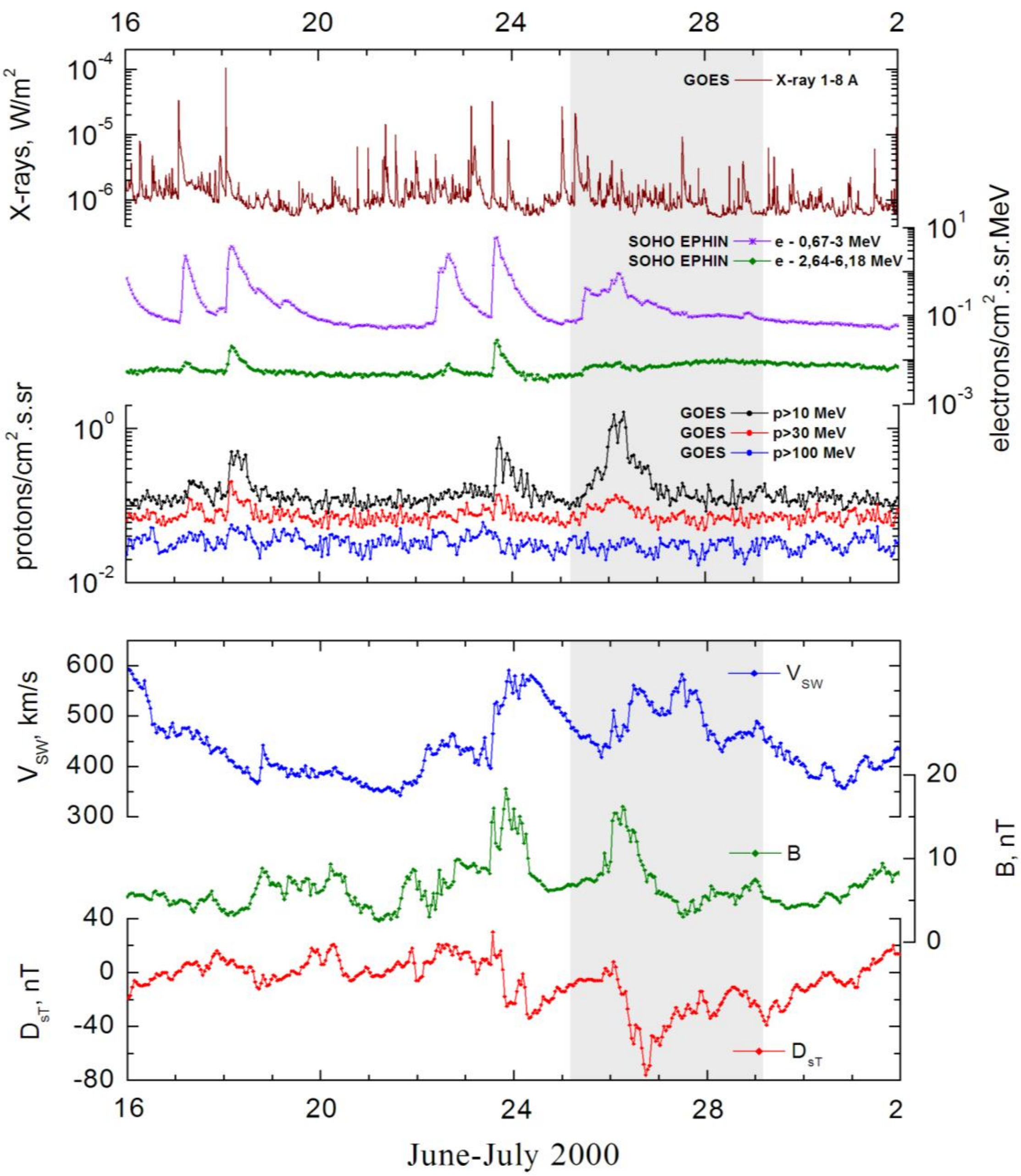


Event 2000.06.25 – (2000-177) **№ 370**

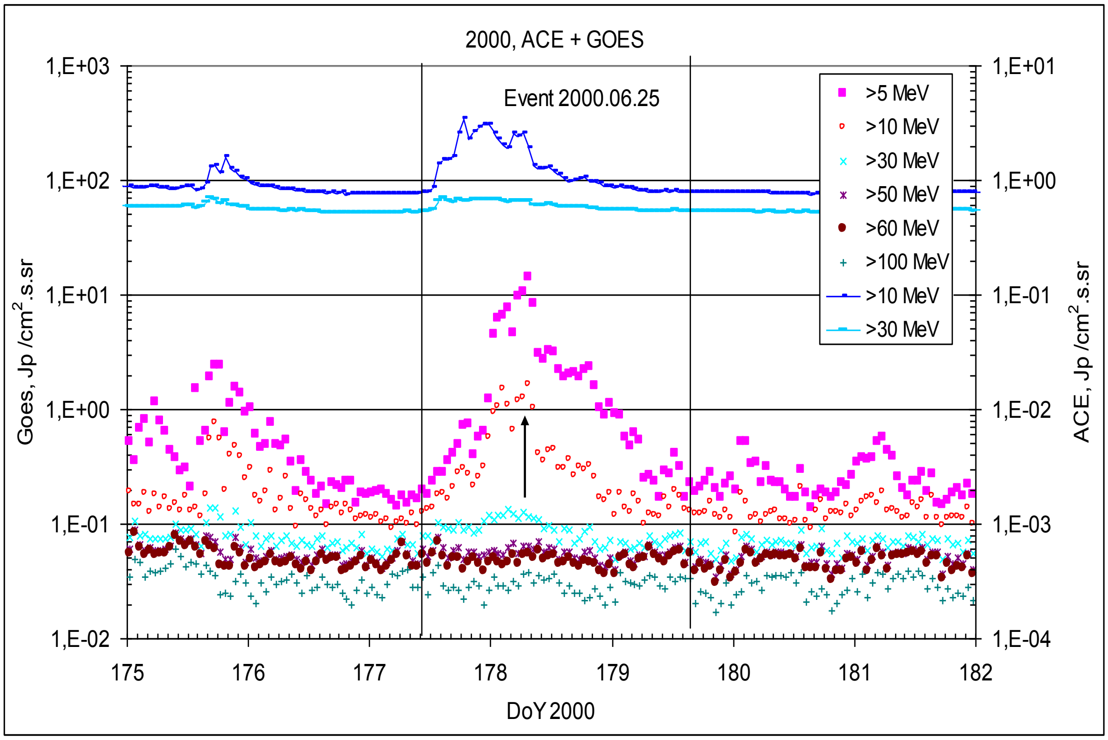
Particle event: To(Ep>10 MeV) – 25d10^h
Tmax(Ep>10 MeV) – 26d07^h, Jmax (Ep>10 MeV) – 1.5 /cm^2.s.sr
Duration of the event – 3 days
Quasimaximal energy of protons in the event – Eqm = 70 MeV

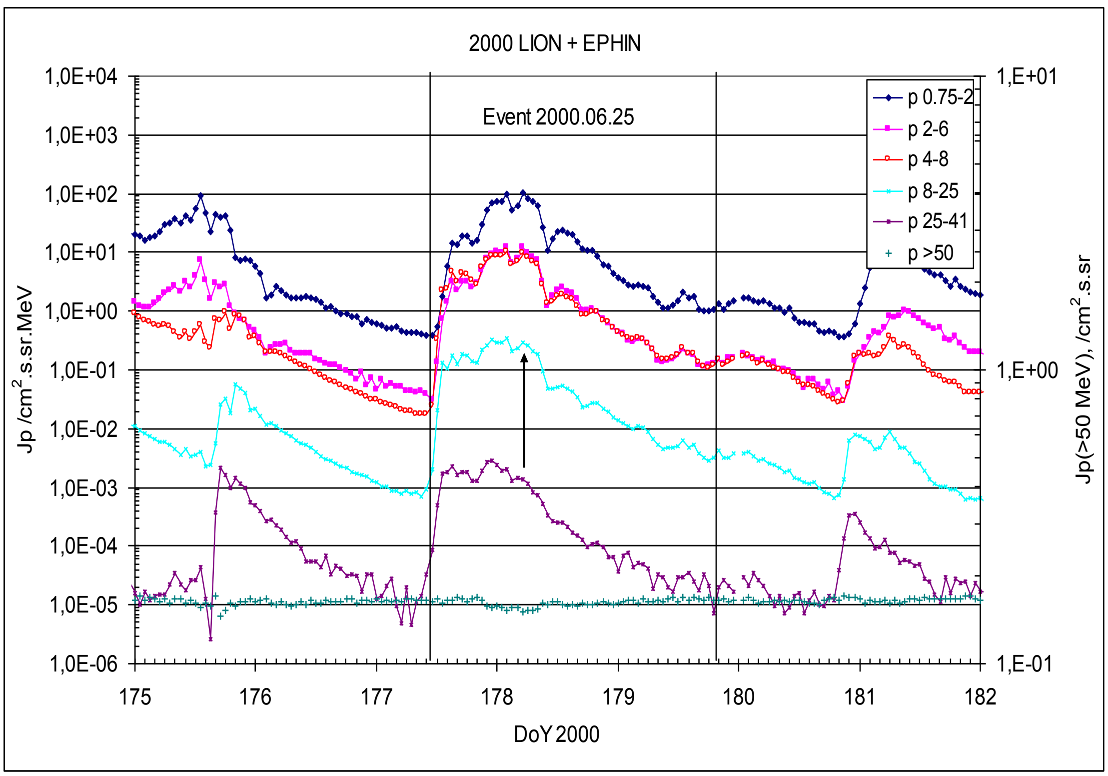
Sources: ⊙ solar flare 25d07^{h}17^m, M1.9/2N, N16W55, AR9046
Main X-ray burst 1-8 Å : onset – 25d07^h 17^m, max – 25d07^{h}52^m, Φ = 0.043 J/m^2
CME: 25d07^{h}54^m, V = 0546 km/s, Δφ = 165^o, dA = 274 ^{o}

Particle fluxes and associated phenomena



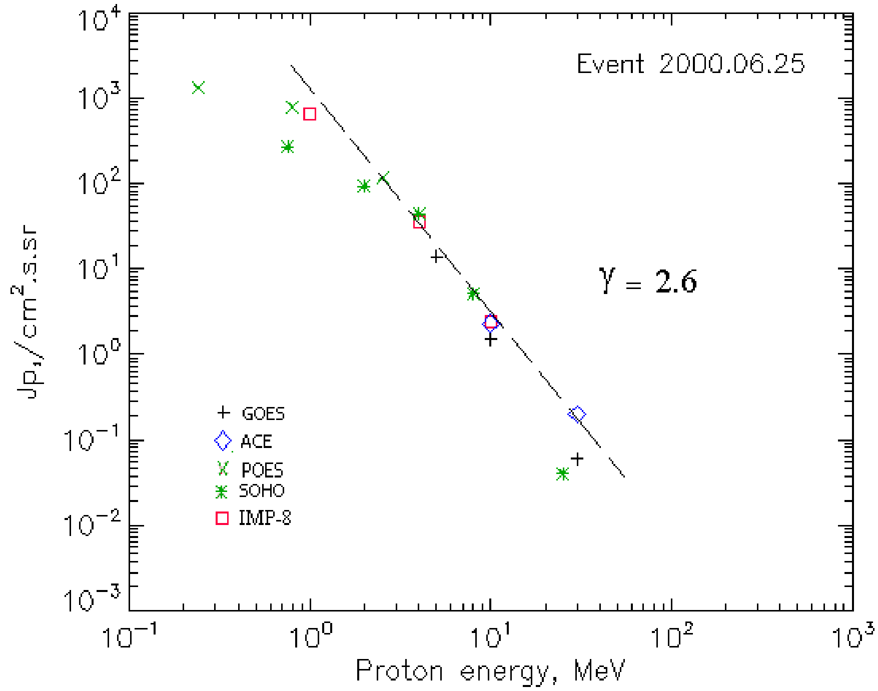
Time profiles of the proton fluxes for the event of 2000 June 25





Arrows on the profiles of the events indicate the time of the proton flux maxima, taken to build the proton spectra (see below)

Integral time-of-maximum proton spectrum



Integral fluxes of protons for the event of 2000 June 25

S/c, instruments	Ep, MeV	To	Tmax	Jmax, /cm^2.s.sr	Dura-tion	Comments
GOES-10						
EPS	>5	10^h	$26d07^h$	14	2d	
EPS	>10	10^h	$26d07^h$	1.5	1.5d	
EPS	>30	11^h	$26d07^h$	0.06	1d	
EPS	>50	-	-	-		
EPS	>60	-	-	-		
EPS	>100	-	-	-		
POES-15						
MEPED	>0.24	-	$26d04^h$	1320	3 d	
MEPED	>0.8	-	$26d04^h$	785	3 d	
MEPED	>2.5	-	$26d04^h$	118	3 d	
MEPED	>6.9	-	-	-	-	
MEPED	>16	-	-	-	-	
MEPED	>36	-	-	-	-	
MEPED	>70	-	-	-	-	
MEPED	>140	-	-	-	-	
IMP-8						
CPME	>1	12^h	$26d01^h$	655	3 d	
CPME	>4	12^h	$26d01^h$	36	3 d	
CPME	>10	12^h	$26d01^h$	2.4	2 d	
CPME	>30	-	-	-	-	
CPME	>60	-	-	-	-	
ACE						
SIS	>10	11^h	23^h	2.3	1.5d	
SIS	>30	12^h	22^h	0.2	1d	

SOHO						
EPHIN (INT)	>50	-	-	-	-	

Differential fluxes of protons for the event of 2000 June 25

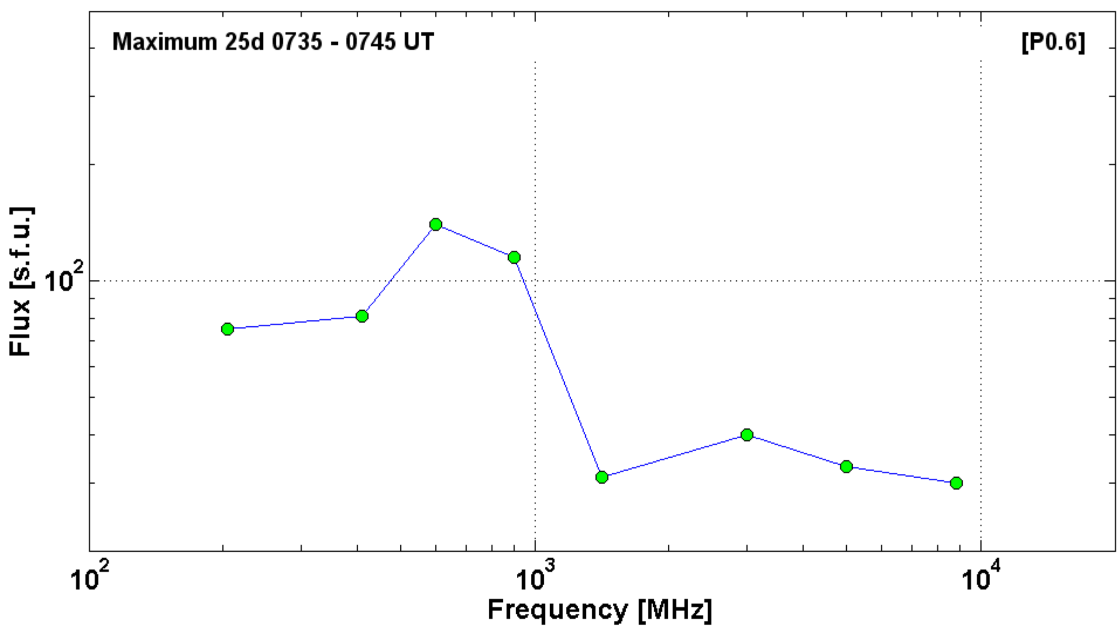
S/c, instruments	ΔE, MeV	To	Tmax	Jmax /cm^2.s.sr.MeV	Dura-tion	Comments
IMP-8						
CPME	1-2	12^h	$26d08^h$	313	~3d	
CPME	2-4.6	12^h	$26d08^h$	38	~3d	
CPME	4.6-15	11^h	$26d08^h$	1.2	~3d	
CPME	15-25	11^h	$26d08^h$	0.02	~1,5d	
CPME	25-48	-	-	-	-	
CPME	48-96	-	-		-	
CPME	96-145	-	-	-	-	
CPME	145-440	-	-	-	-	
SOHO						
LION	0,75-2	12^h	$26d05^h$	102	3.5d	
LION	2-6	12^h	$26d05^h$	12.1	3.5d	
EPHIN	4-8	12^h	$26d01^h$	9.6	3.5d	
EPHIN	8-25	11^h	$26d01^h$	0.3	3d	
EPHIN	25-41	10^h	$26d10^h$	0,0014	2.5d	
EPHIN	41-53	- “ -	- “ -	- “ -	- “ -	

Electromagnetic and other phenomena that are sources and/or accompanying for the event of 2000 June 25

2000 June 25 ⊙ AR9046 To event 370

Hα	6563 Å	0720	0741	0853	N16W55	2N	FH
1 -12.5	keV	0717	0752	0821		M1.9	4.3E-02
3	GHz	0716.2	0720.8	0726.8		1.49	
245	MHz	0719.0	0720.0	0721.0		1.82	
204	MHz	0720.2	0720.6	0721.5		2.16	
DS III	220-450	0720		0721	GG,S	3	
DS III	50-270	0720		0721	GG	2	
DS DCIM	2088-4500	0720		0721	G	1	

8.8	GHz	0741.0	0741.0	0000.0		1.48	
5	GHz	0740.0	0741.0	0744.0		1.52	
3	GHz	0733.9	0741.6	0801.4		1.60	
1.4	GHz	0741.0	0741.0	0742.0		1.49	
900	MHz	0715.0	0735.6			2.06	
600	MHz	0719.5	0738.6		[P0.6]	2.15	
410	MHz	0740.0	0741.0	0742.0		1.91	
204	MHz	0736.8	0745.8	0752.0		1.88	
DS II	40-90	0751		0759		2	
DS I	50-160	0738		~0804	N,C	2	
DS III	45-95	0742		~0808	N	2	
DS CONT	25-180	0739		0805		1	
DS DCIM	800-2000	0730		0746	GG,SP	2	
DS DCIM	220-550	0734		0747	C	2	
CME	WL	0754	1617 km/s	–17.5 km/s^2	165º	274º	

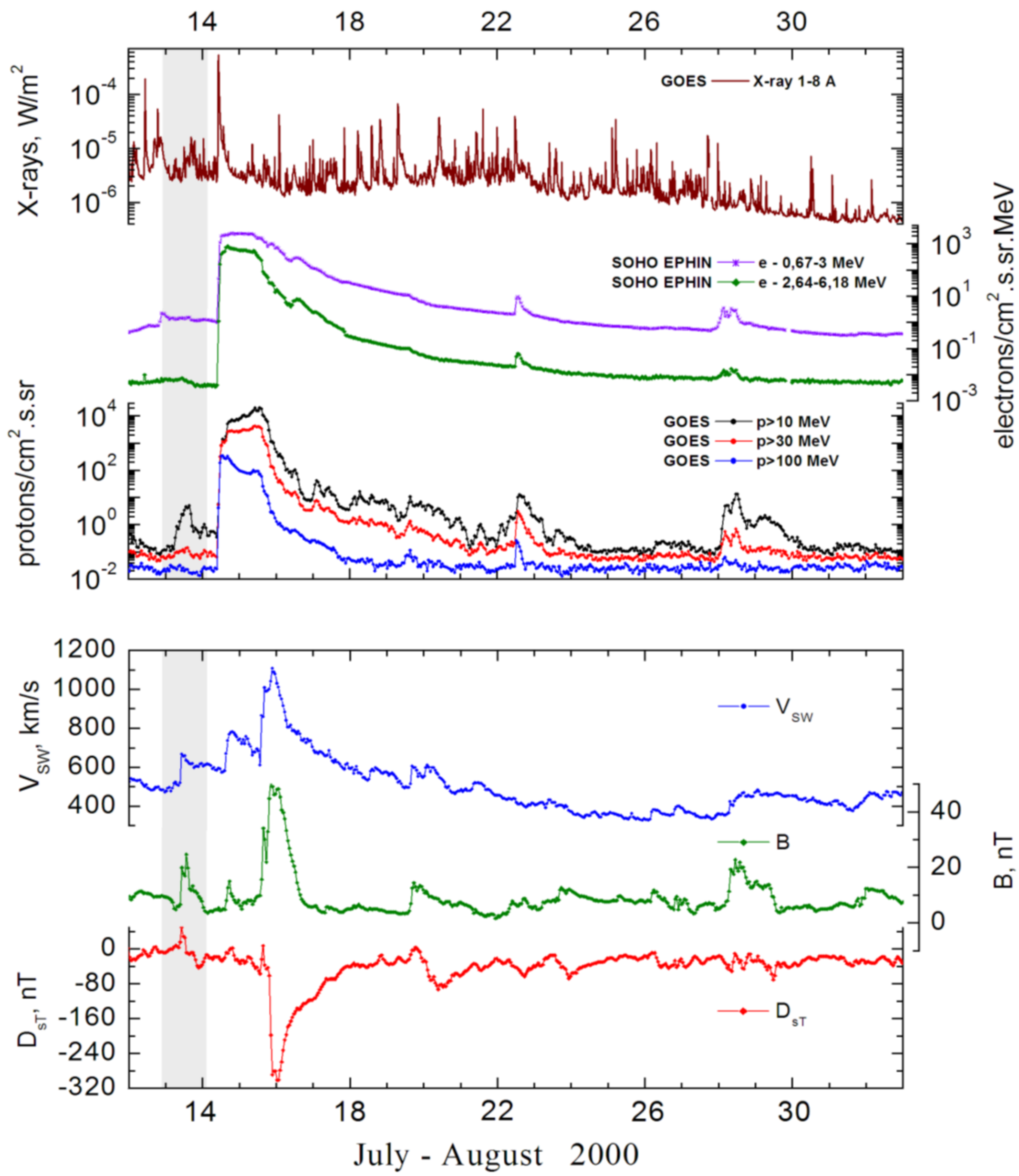


Event 2000.07.13 – (2000-195) **№ 371**

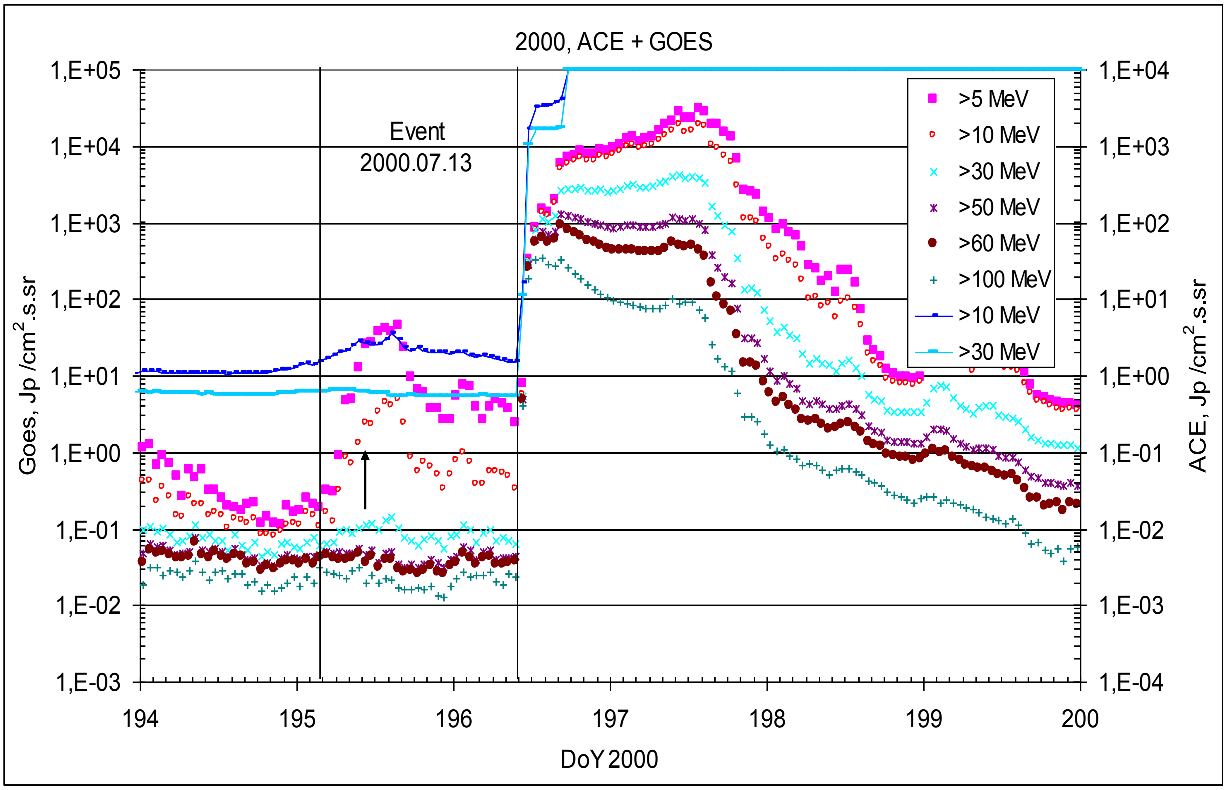
Particle event: To(Ep>10 MeV) – 13d06^h
Tmax(Ep>10 MeV) –13d10^h, Jmax (Ep>10 MeV) – 5 /cm^2.s.sr
Duration of the event – 1.5 days
Quasimaximal energy of protons in the event – Eqm = 40 MeV

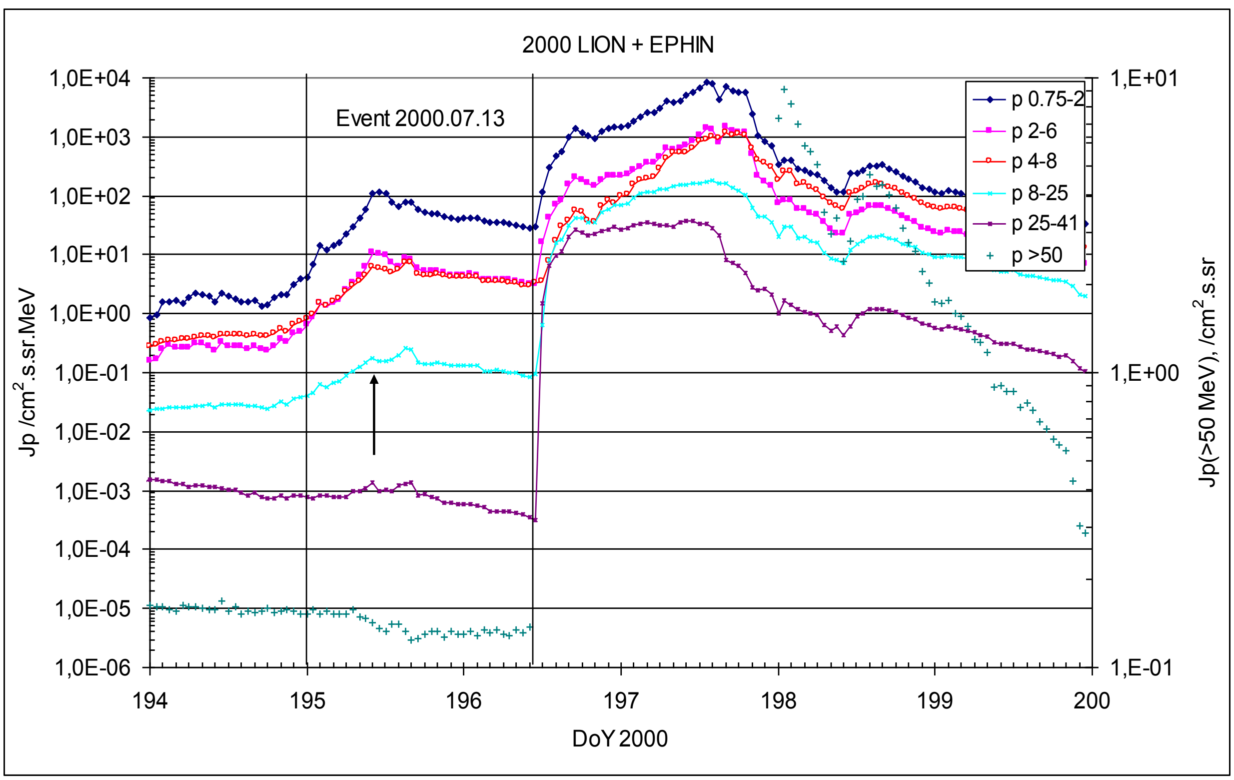
Sources: ⊙ solar flare 12d18^{h}41^m, M5.7/2F, N16W64, AR9070
Main X-ray burst 1-8 Å : onset – 12d18^{h}41^m, max – 12d18^{h}47^m, Φ = 0.063 J/m^2
CME: 12d20^{h}30^m, V = 820 km/s, Δφ = 101^o, dA = 281^o
▲SC 13d09^{h}42^m

Particle fluxes and associated phenomena



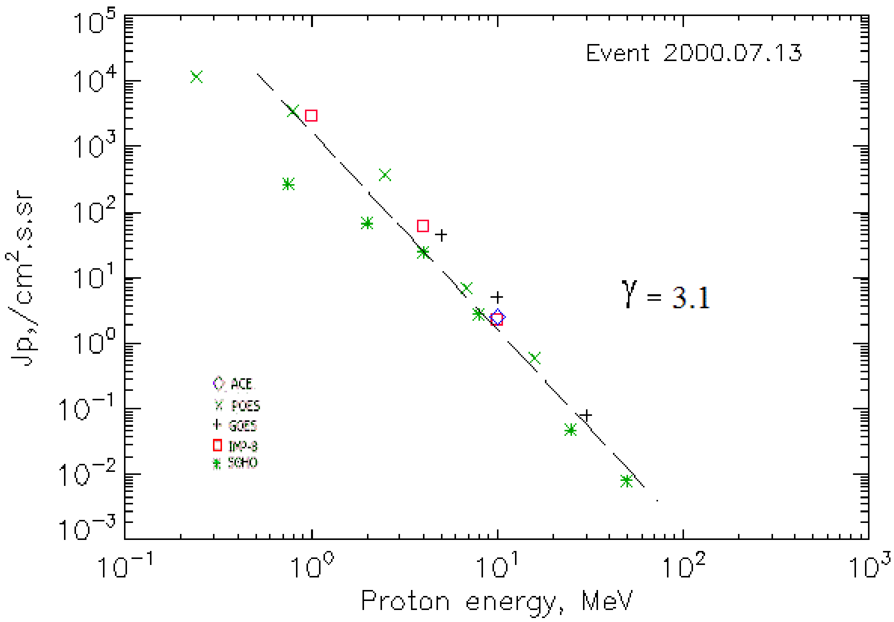
Time profiles of the proton fluxes for the event of 2000 July 13





Arrows on the profiles of the events indicate the time of the proton flux maxima, taken to build the proton spectra (see below)

Integral time-of-maximum proton spectrum



Integral fluxes of protons for the event of 2000 July 13

S/c, instruments	Ep, MeV	To	Tmax	Jmax, /cm^2.s.sr	Dura-tion	Comments
GOES 10						
EPS	>5	06^h	15^h	45	1.5d	
EPS	>10	06^h	15^h	5	1.5d	
EPS	>30	06^h	14^h	0.08	1d	
EPS	>50	-	-	-	-	
EPS	>60	-	-	-	-	
EPS	>100	-	-	-	-	
POES-15						
MEPED	>0.24	-	09^h	11490	1.5 d	
MEPED	>0.8	-	09^h	3480	1.5 d	
MEPED	>2.5	-	09^h	362	1.5 d	
MEPED	>6.9	-	09^h	7	1.5 d	
MEPED	>16	-	09^h	0.6	1.5 d	
MEPED	>36	-	-	-	-	
MEPED	>70	-	-	-	-	
MEPED	>140	-	-	-	-	
IMP-8						
CPME	>1	02^h	10^h	2920	1.5 d	
CPME	>4	02^h	10^h	62	1.5 d	
CPME	>10	02^h	10^h	2.3	1.5 d	
CPME	>30	-	-	-	-	
CPME	>60	-	-	-	-	
ACE						
SIS	>10	12d20^h	14^h	2.5	1.5 d	
SIS	>30	-	-	-	1.5 d	
SOHO						
EPHIN (INT)	>50	-	14^h	0.008	-	

Differential fluxes of protons for the event of 2000 July 13

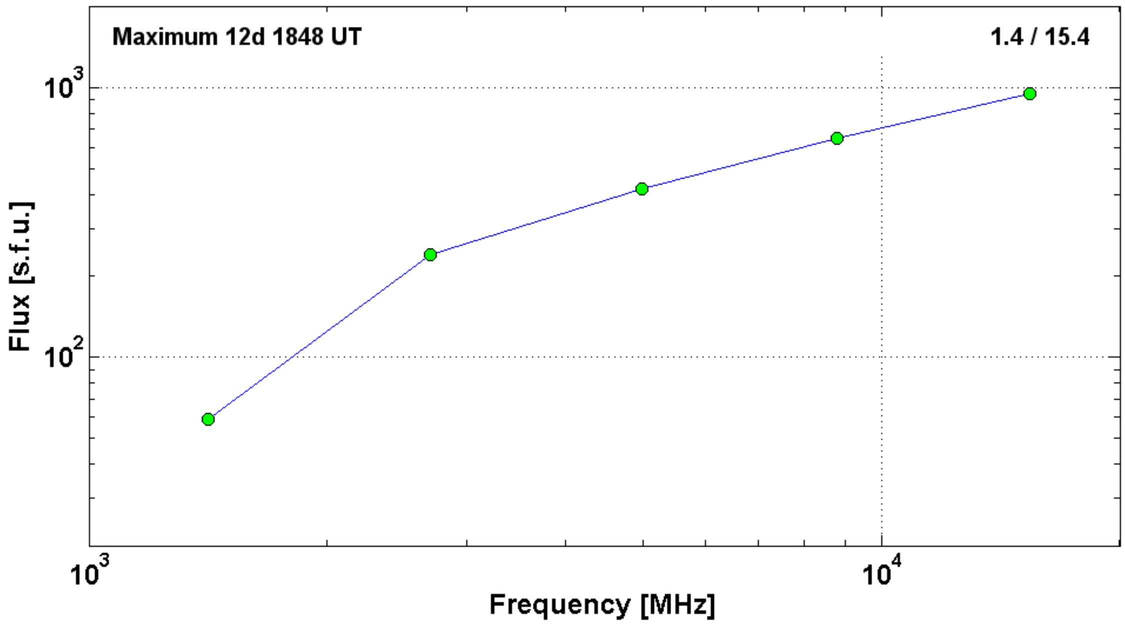
S/c, instruments	ΔE, MeV	To	Tmax	Jmax /cm^2.s.sr.MeV	Dura-tion	Comments
IMP-8						
CPME	1-2	12d17^h	10^h	2630	2d	
CPME	2-4.6	12d17^h	10^h	200	2d	
CPME	4.6-15	12d17^h	10^h	3.85	2d	
CPME	15-25	-	-	-	-	
CPME	25-48	-	-	-	-	
CPME	48-96	-	-	-	-	
CPME	96-145	-	-	-	-	
CPME	145-440	-	-	-	-	
SOHO						
LION	0,75-2	12d19^h	12^h	111	1.5d	
LION	2-6	12d19^h	12^h	10.8	1.5d	
EPHIN	4-8	12d20^h	12^h	5.5	1.5d	
EPHIN	8-25	12d20^h	11^h	0.16	1.5d	
EPHIN	25-41	12d20^h	10^h	0.0014	1d	
EPHIN	41-53	- “ -	- “ -	- “ -	- “ -	

Electromagnetic and other phenomena that are sources and/or accompanying for the event of 2000 July 13

2000 July 12 ⊙ AR9070 To event 371

Hα	6563 Å	<1849	1848	>1957	N16W64	2F	
1 -12.5	keV	1841	1849	1907		M5.7	6.3E-2

15.4	GHz	1841.0	1848.0	1858.0	1.4 / 15.4	2.98	
8.8	GHz	1843.0	1848.0	1853.0		2.81	
5	GHz	1843.0	1848.0	1855.0		2.62	
2.7	GHz	1843.0	1848.0	1853.0		2.38	
1.4	GHz	1844.0	1848.0	1852.0		1.77	
DS III	25-86	1848		1849		1	
CME	WL	2030	0820 km/s	-3.2 km/s^2	101º	281º	

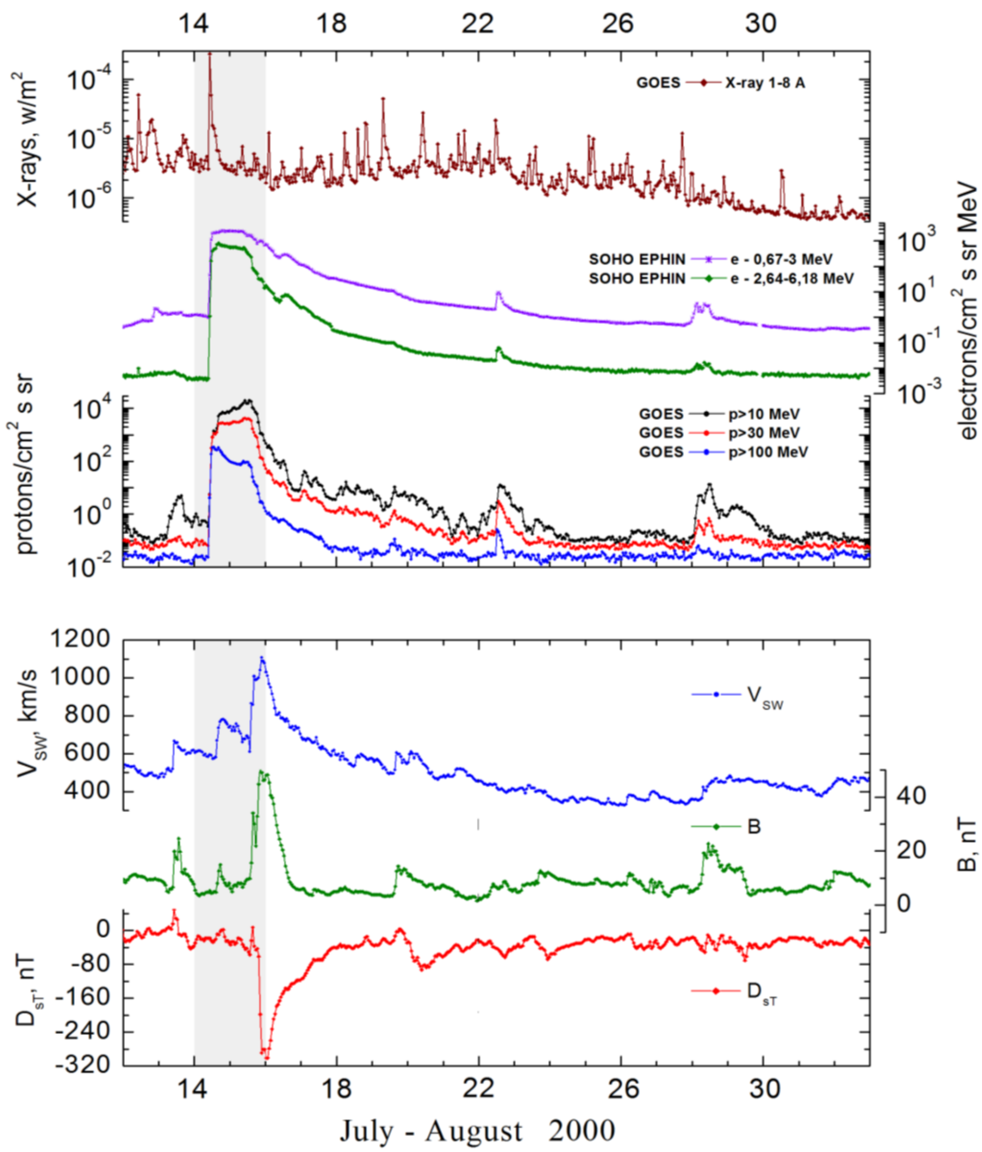


Event 2000.07.14 – (2000-196) – GLE-59 **№ 372**

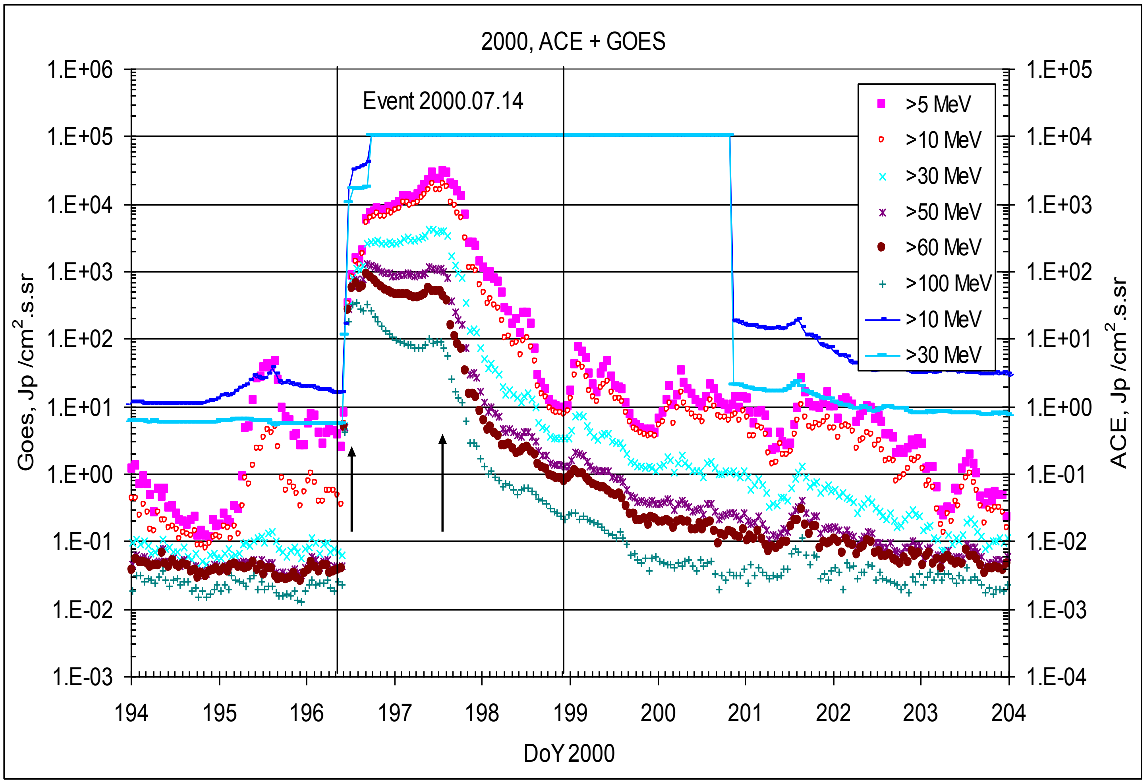
Particle event: To(Ep>10 MeV) – 14d10^h
Tmax$_1$(Ep>10 MeV) – 14d18^h, Jmax$_1$(Ep>10 MeV) – $7.2\cdot10^3$ cm^2.s.sr
Tmax$_2$(Ep>10 MeV) – 15d13^h, Jmax$_2$(Ep>10 MeV) – $1.8\cdot10^4$ cm^2.s.sr
Duration of the event – 2 days
Quasimaximal energy of protons in the event – Eqm$_1$ = 2160 MeV
– Eqm$_2$ = 630 MeV

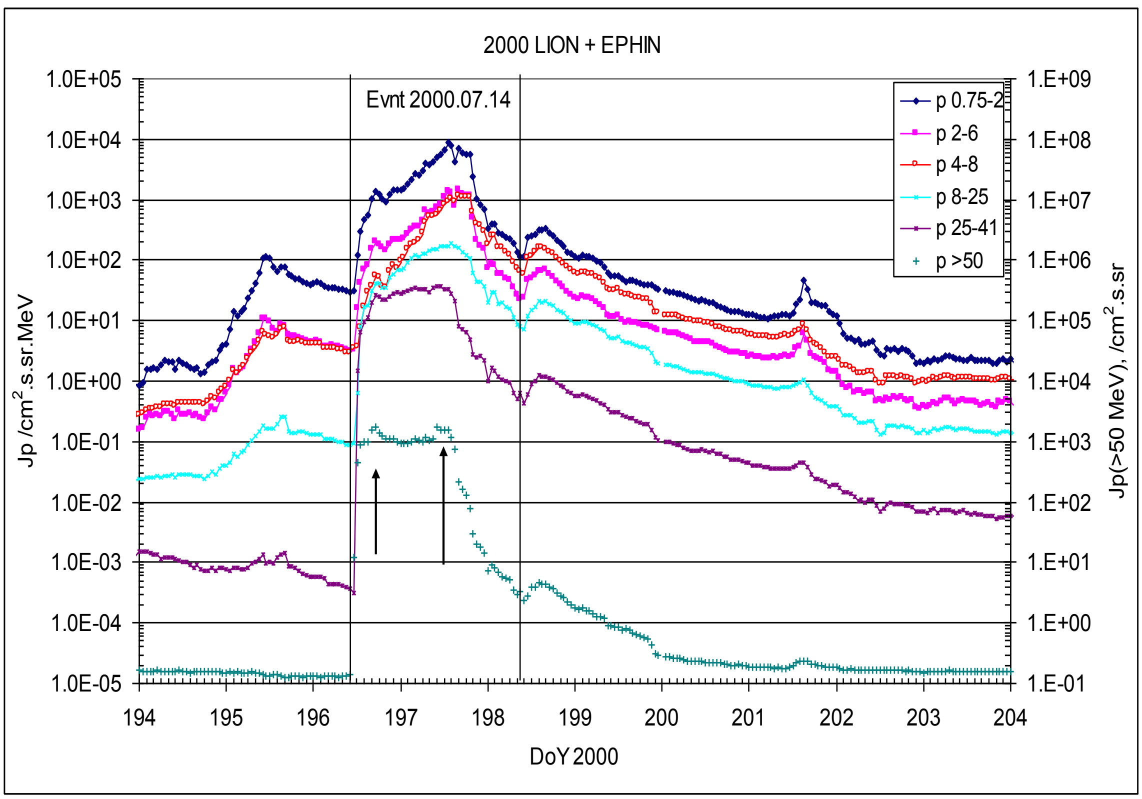
Sources: ● solar flare 14d10^{h}03^m, X5.7/3B, N22W07, AR9077
⦸ solar flare 15d08^{h}20^m, M1.3/SF, N16W12, AR9077
Main X-ray burst 1-8 Å: onset – 14d10^{h}03^m, max – 14d10^{h}24^m, Φ = 0.75 J/m^2
CME: 14d10^{h}54^m, V =1674 km/s, Δφ = 360^o, dA = 273^o
▲SC14d15^{h}32^m, ▲SC 15d14^{h}37^m

Particle fluxes and associated phenomena



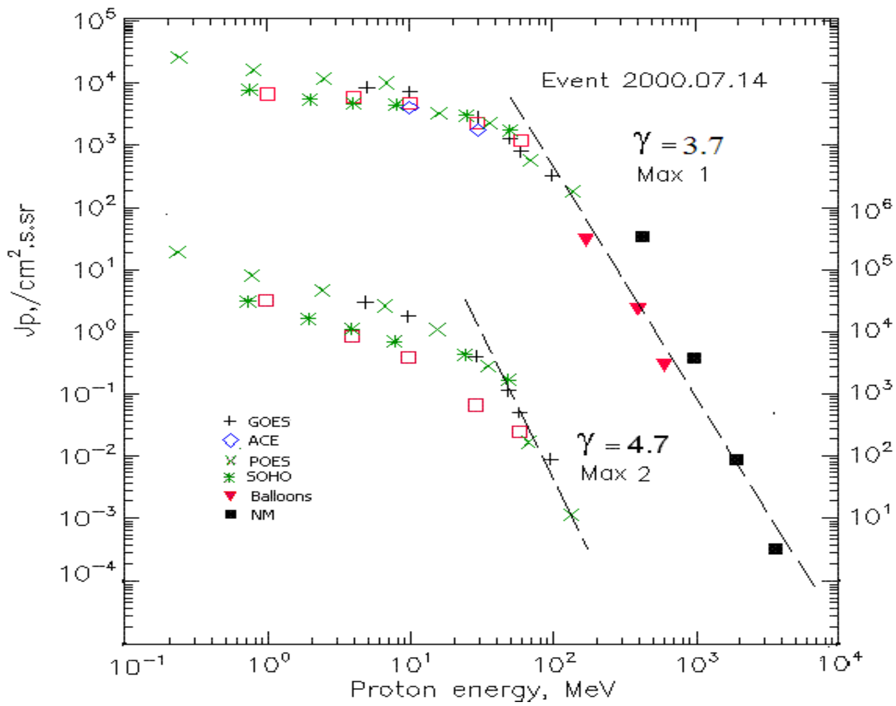
Time profiles of the proton fluxes for the event of 2000 July 14





Arrows on the profiles of the events indicate the time of the proton flux maxima, taken to build the proton spectra (see below)

Integral time-of-maximum proton spectrum



Integral fluxes of protons for the event of 2000 July 14

S/c, instruments	Ep, MeV	To	Tmax	Jmax, /cm^2.s.sr	Dura-tion	Comments
GOES-10						
EPS	>5	10^h	$18^h/15d13^h$	8600/30475	2d	
EPS	>10	10^h	$18^h/15d13^h$	7200/18000	2d	
EPS	>30	10^h	$18^h/15d12^h$	2860/4070	2d	
EPS	>50	10^h	$17^h/15d12^h$	1300/1160	2d	
EPS	>60	10^h	$17^h/15d12^h$	805/514	2d	
EPS	>100	10^h	$16^h/15d12^h$	330/91.3	2d	
POES-16						
MEPED	>0.24	-	$13^h/15d15^h$	26430/192050	2d	
MEPED	>0.8	-	$13^h/15d15^h$	16250/83230	2d	
MEPED	>2.5	-	$13^h/15d15^h$	11690/47710	2d	
MEPED	>6.9	-	$13^h/15d15^h$	10120/26470	2d	
MEPED	>16	-	$13^h/15d15^h$	3250/11080	2d	
MEPED	>36	-	$13^h/15d15^h$	2280/2900	2d	
MEPED	>70	-	$13^h/15d15^h$	570/170	2d	
MEPED	>140	-	$13^h/15d15^h$	180/12	2d	
IMP-8						
CPME	>1	11^h	$16^h/15d17^h$	6700/32400	2d	
CPME	>4	10^h	$16^h/15d17^h$	6000/8440	2d	
CPME	>10	10^h	$16^h/15d17^h$	4960/3960	2d	
CPME	>30	10^h	$17^h/15d16^h$	2270/675	2d	
CPME	>60	10^h	$16^h/15d16^h$	1200/250	2d	
ACE						
SIS	>10	10^h	16^h/ -	4040/ -	2d	
SIS	>30	10^h	16^h/ -	1770/ -	2d	

SOHO						
EPHIN (INT)	>50	10^h	$17^h/15d13^h$	1760/1510	2d	
BALLOONS						
Mu-1	>173	-	14^h-16^h/ -	29/ -	-	
Mu-1	>402	-	14^h-16^h/ -	2.3/ -	-	
Mu-1	>609	-	14^h-16^h/ -	0.28/ -	-	
NM						
Network	>433	-	11^h10^m / -	34	-	
Network	>1000	-	11^h10^m / -	0.37	-	
Network	>2000	-	11^h10^m / -	0.0088	-	
Network	>3700	-	11^h10^m / -	0.00032	-	

Differential fluxes of protons for the event of 2000 July 14

S/c, instruments	ΔE, MeV	To	Tmax	Jmax /cm^2.s.sr.MeV	Dura-tion	Comments
IMP-8						
CPME	1-2	10^h	$19^h/15d13^h$	167/15900	2d	
CPME	2-4.6	10^h	$19^h/15d13^h$	255/3850	2d	
CPME	4.6-15	10^h	$19^h/15d13^h$	183/435	2d	
CPME	15-25	09^h	$18^h/15d13^h$	234/208	2d	
CPME	25-48	09^h	$18^h/15d13^h$	61/23.6	2d	
CPME	48-96	09^h	$17^h/15d13^h$	24.5/4.6	2d	
CPME	96-145	09^h	$17^h/15d13^h$	8.3/6.5	2d	
CPME	145-440	09^h	$17^h/15d13^h$	1/0.17	2d	
SOHO						
LION	0,75-2	10^h	$17^h/15d13^h$	1315/8600	2d	
LION	2-6	10^h	$17^h/15d13^h$	201/1330	2d	
EPHIN	4-8	10^h	$18^h/15d14^h$	52/1001	2d	
EPHIN	8-25	10^h	$18^h/15d15^h$	41/766	2d	
EPHIN	25-41	10^h	$18^h/15d11^h$	24.5/36.7	2d	
EPHIN	41-53	- “ -	- “ -	- “ -	- “ -	

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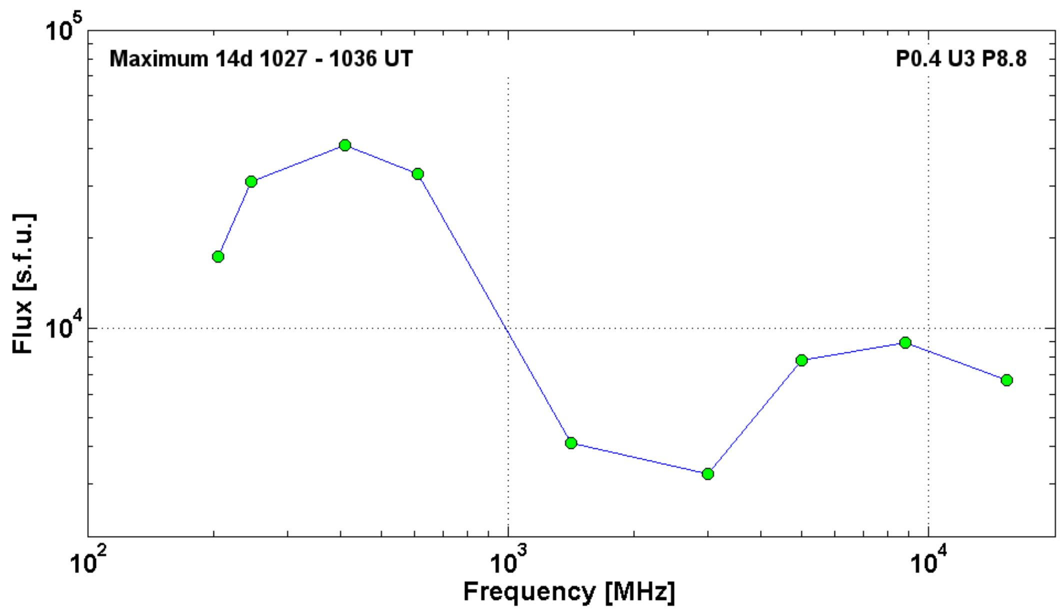
Electromagnetic and other phenomena that are sources and/or accompanying for the event of 2000 July 14

2000 July 14 ● AR9077 To event 372

Hα	6563 Å	<1012	~1021	1330	N22W07	3B	U
1 -12.5	keV	1003	1024	1043		X5.7	7.5E-1
50 – 150	keV	101113	102011	120115		8244	HXT Y

Список 2000 г.

15.4	GHz	1012.0	1027.0	1132.0		3.83	
8.8	GHz	1007.0	1027.0	1157.0	P0.4 U3 P8.8	3.95	
5	GHz	1005.0	1027.0	1159.0		3.89	
3	GHz	1001.3	1028.6	1240.7		3.51	
1.4	GHz	1006.0	1030.0	0000.0		3.61	
610	MHz	1009.0	1032.0	1132.0		4.52	
410	MHz	1010.0	1031.0	1132.0		4.61	
245	MHz	1011.0	1036.0	1132.0		4.49	
204	MHz	1013.9	1028.2	1043.8		4.24	
DS II	220-440	1017		1027	H	2	
DS II	35-85	1020		1026		3	
DS IV	30-80	1026		1330		3	
DS III	25-270	1015		~1039	S,C	2	
DS CONT	25-270	1026		~1041		3	
DS DCIM	800-2000	1003		1151	GG,FS	3	
DS DCIM	2000-4500	1007		1135	GG	3	
CME	WL	1054	1674 km/s	-96.1 km/s^2	360º	273º	



2000 July 15 ⦸ AR9087 To event 372

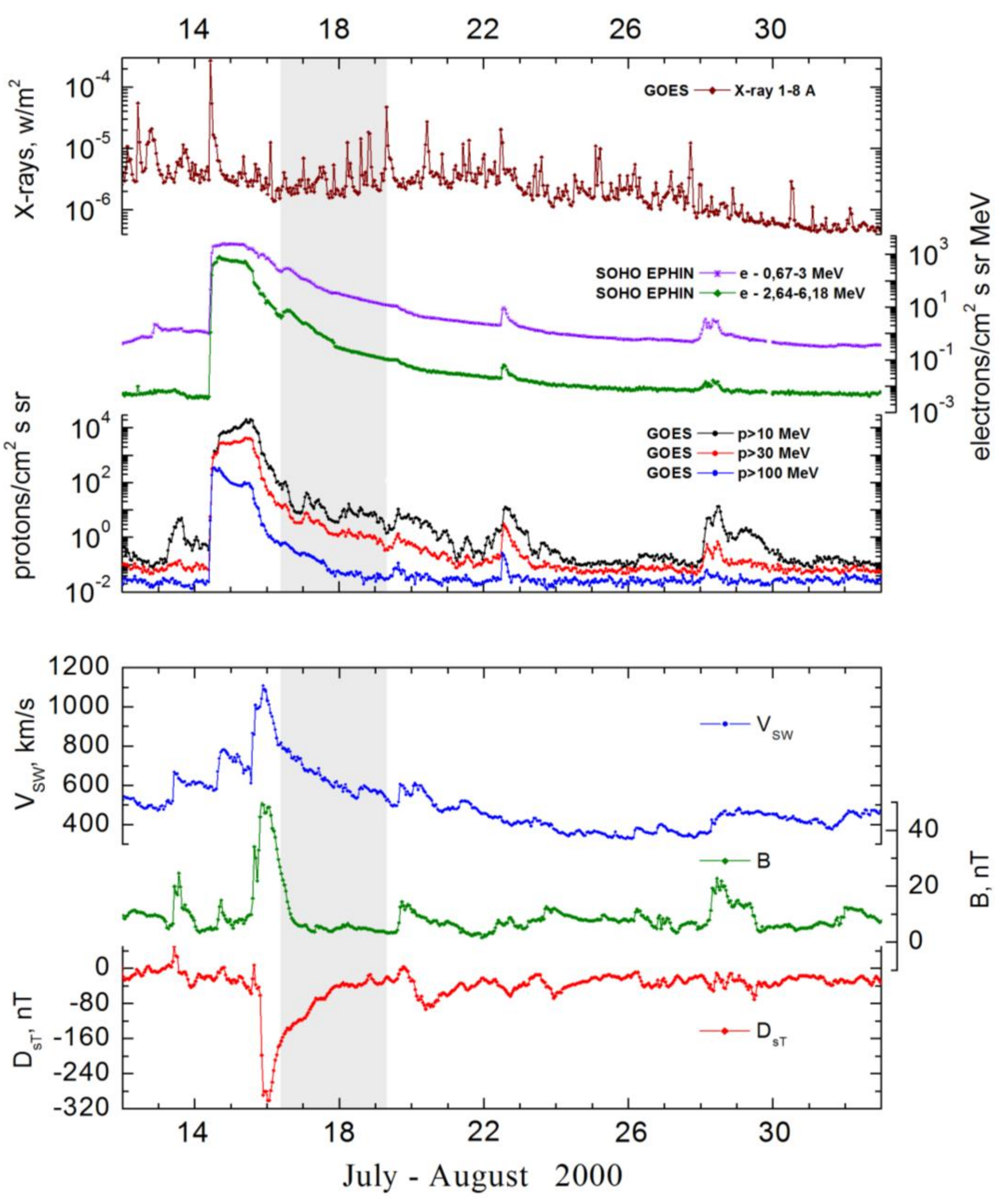
Hα	6563 Å	0822	0826	1146	N16W12	SF	U
1 -12.5	keV	0820	0833	0848		M1.3	1.8E-02
3	GHz	0831.6	0832.2	0836.7		1.18	
DS III	25-160	0832		0833	G	2	
DS III	30-210	0839		0839	G	2	
DS III	25-160	0843		0845	GG FS	2	
DS III	200-270	0903		0904	GG	1	

Event 2000.07.16 – (2000-198) **№ 373**

Particle event: To(Ep>10 MeV) – 16d11^h
Tmax$_1$(Ep>10 MeV) – 16d12^h, Jmax$_1$(Ep>10 MeV) – 100 /cm^2.s.sr
Tmax$_2$(Ep>10 MeV) – 17d02^h, Jmax$_2$(Ep>10 MeV) – 37 /cm^2.s.sr
Duration of the event – 3 days
Quasimaximal energy of protons in the event – Eqm$_1$ = 370 MeV
– Eqm$_2$ = 320 MeV

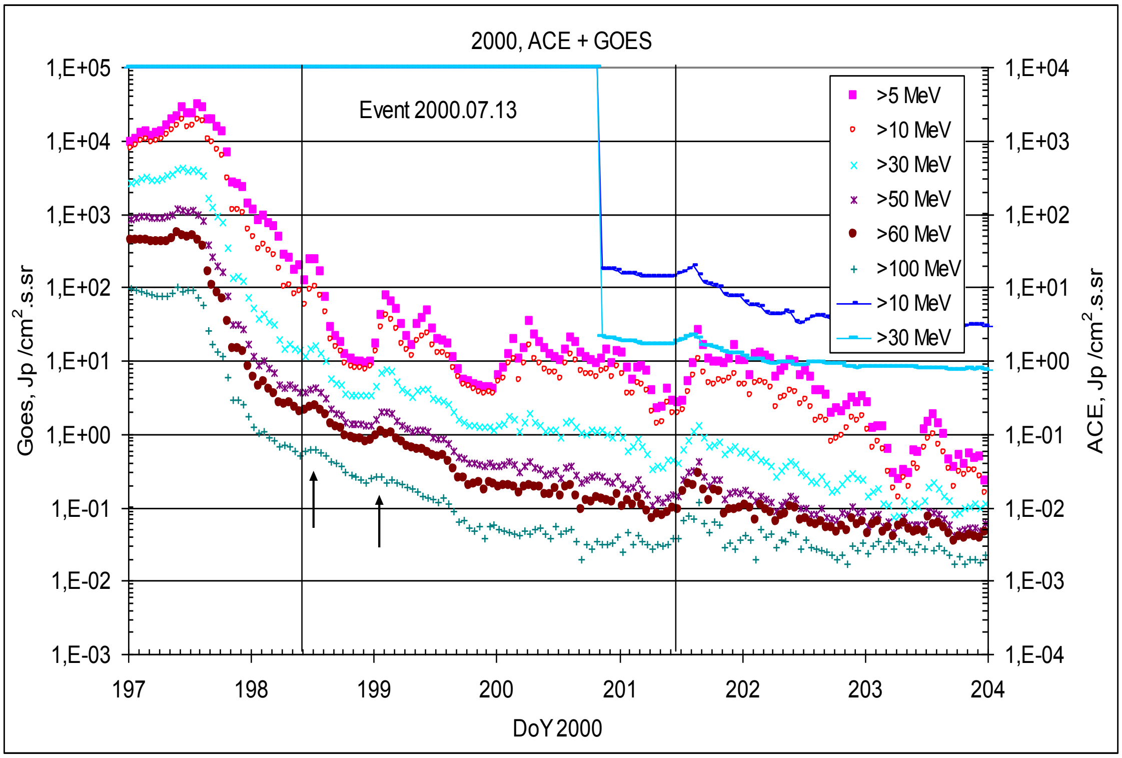
Sources: ⊙ solar flare 15d08^{h}20^m, M1.3/SF, N16W12 AR9077
Ø solar flare 16d23^{h}37^m, M1.4/2F, N17W40 AR9077
Main X-ray burst 1-8 Å: onset – 15d08^{h}20^m, max – 15d08^{h}33^m, Φ = 0.018 J/m^2
▲SC 15d14^{h}37^m, ▲SC 19d15^{h}27^m

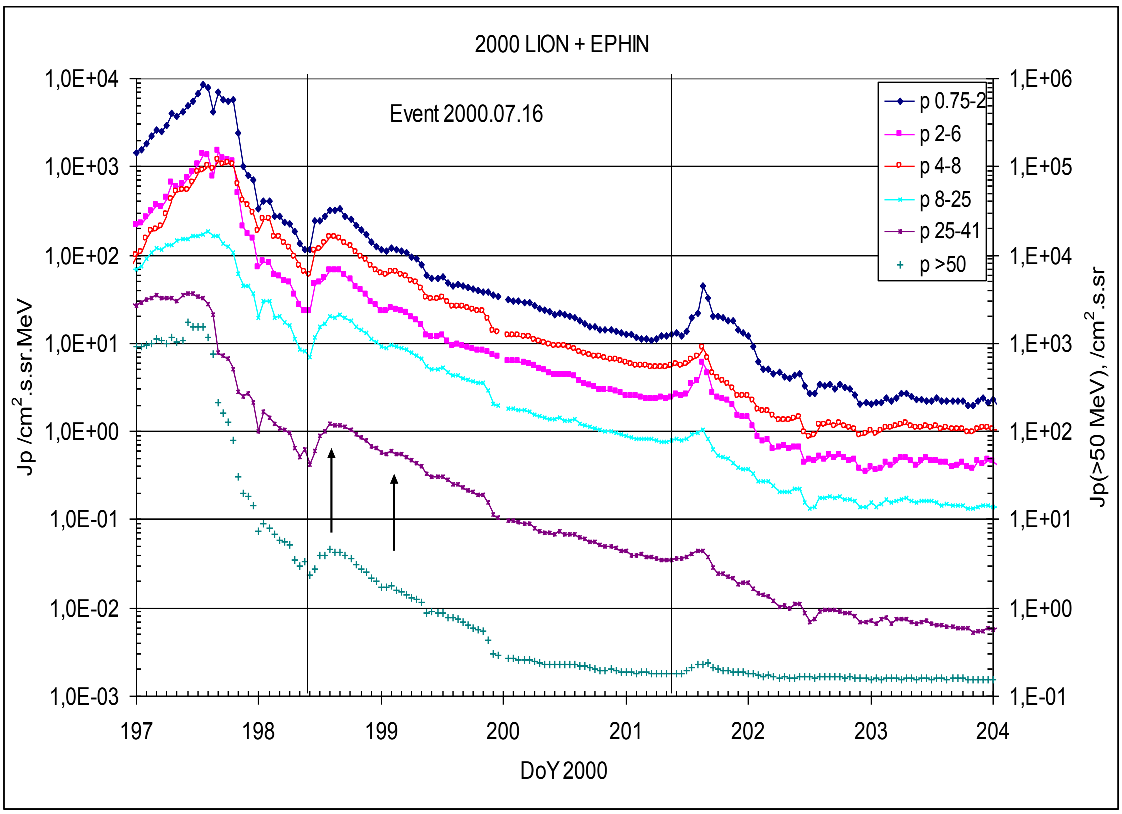
Particle fluxes and associated phenomena



Список 2000 г.

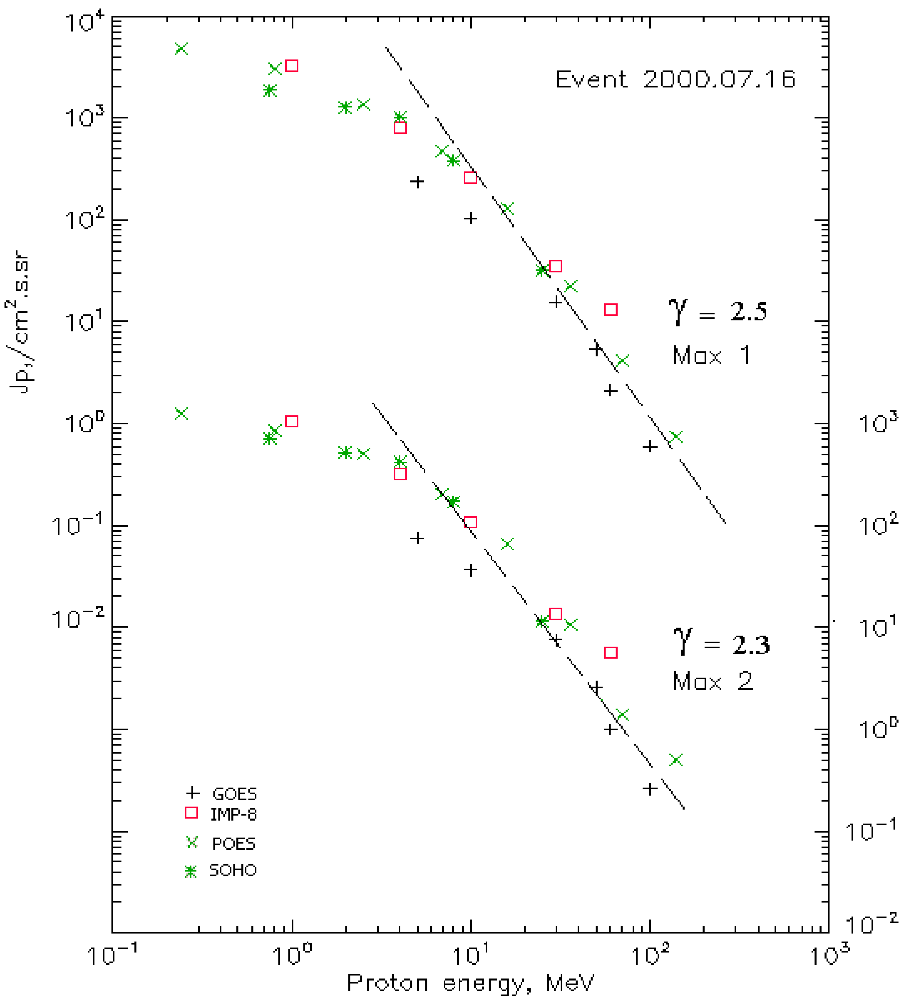
Time profiles of the proton fluxes for the event of 2000 July 16





Arrows on the profiles of the events indicate the time of the proton flux maxima, taken to build the proton spectra (see below)

Integral time-of-maximum proton spectrum



Integral fluxes of protons for the event of 2000 July 16

S/c, instruments	Ep, MeV	To	Tmax	Jmax, /cm^2.s.sr	Dura-tion	Comments
GOES-10						
EPS	>5	11^h	12^h/17d03^h	236/75.8	3d	
EPS	>10	11^h	12^h/17d02^h	100/37	3d	
EPS	>30	11^h	12^h/17d02^h	15.7/7.6	3d	
EPS	>50	11^h	12^h/17d02^h	5.4/2.6	3d	
EPS	>60	11^h	12^h/17d02^h	2.1/1.0	3d	
EPS	>100	11^h	12^h/17d01^h	0.6/0.26	3d	
POES-15						
MEPED	>0.24	11^h	12^h/17d02^h	4660/1825	3d	
MEPED	>0.8	11^h	12^h/17d02^h	3254/1290	3d	
MEPED	>2.5	11^h	12^h/17d02^h	1690/712	3d	
MEPED	>6.9	11^h	12^h/17d02^h	620/294	3d	
MEPED	>16	11^h	12^h/17d02^h	184/84	3d	
MEPED	>36	11^h	12^h/17d02^h	32/14	3d	
MEPED	>70	11^h	12^h/17d02^h	5.2/2.1	3d	
MEPED	>140	11^h	12^h/17d02^h	1./0.9	3d	

IMP-8						
CPME	>1	11^h	13^h/17d03^h	3210/1060	3d	
CPME	>4	11^h	12^h/17d02^h	810/323	3d	
CPME	>10	10^h	12^h/17d02^h	258/110	3d	
CPME	>30	10^h	11^h/17d02^h	35.2/13.6	3d	
CPME	>60	10^h	11^h/17d01^h	13.4/5.6	3d	
ACE						
SIS	>10	10^h	-	-	-	
SIS	>30	10^h	-	-	-	
SOHO						
EPHIN (INT)	>50	11^h	15^h/17d03^h	4.3/1.7	3d	

Differential fluxes of protons for the event of 2000 July 16

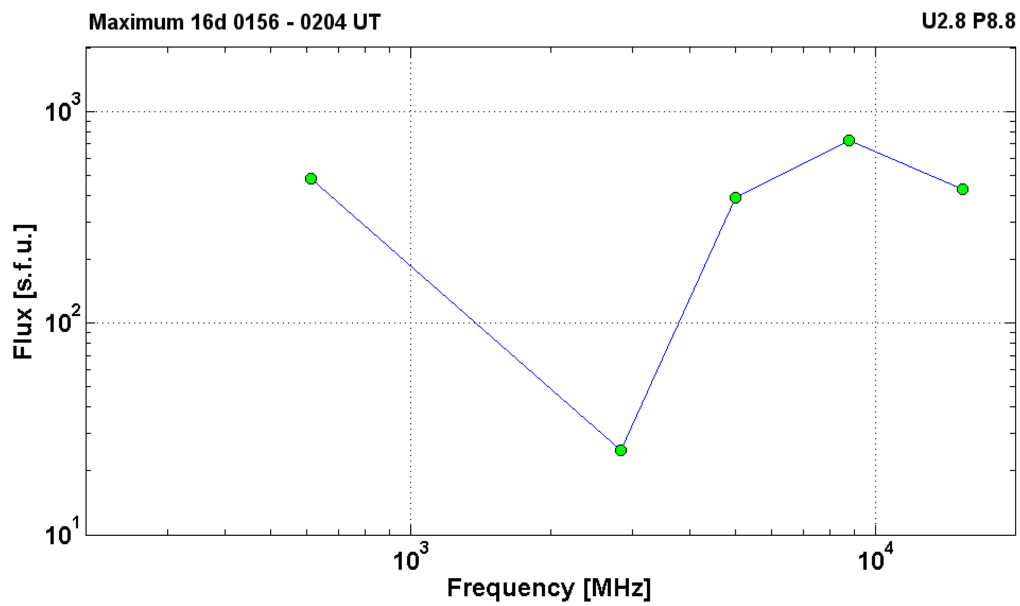
S/c, instruments	ΔE, MeV	To	Tmax	Jmax /cm^2.s.sr.MeV	Dura-tion	Comments
IMP-8						
CPME	1-2	10^h	12^h/17d02^h	1610/508	3d	
CPME	2-4.6	10^h	12^h/17d03^h	466/145	3d	
CPME	4.6-15	10^h	12^h/17d02^h	50.6/19.8	3d	
CPME	15-25	10^h	12^h/17d03^h	12.3/6.1	3d	
CPME	25-48	10^h	11^h/17d02^h	1.35/0.5	3d	
CPME	48-96	10^h	11^h/17d02^h	0.15/0.05	3d	
CPME	96-145	-	-	-	-	
CPME	145-440	-	-	-	-	
SOHO						
LION	0,75-2	11^h	16^h/17d03^h	332/115	3d	
LION	2-6	11^h	16^h/17d03^h	67.4/23.5	3d	
EPHIN	4-8	11^h	15^h/17d03^h	158/63.2	3d	
EPHIN	8-25	11^h	16^h/17d03^h	20.8/9.4	3d	
EPHIN	25-41	11^h	15^h /17d03^h	1.2/0.56	3d	
EPHIN	41-53	- " -	- " -	- " -	- " -	

Electromagnetic and other phenomena that are sources and/or accompanying for the event of 2000 July 16

2000 July 15 ⊙ AR9090 To event 373

Hα		0159	0203	0214	N09E81	1N	U
1 -12.5	keV	0159	0203	0214		M5.5	1.6E-02

15.4	GHz	0202.0	0202.0	0204.0		2.63	
8.8	GHz	0202.0	0202.0	0204.0	U2.8 P8.8	2.86	
5	GHz	0202.0	0202.0	0205.0		2.59	
2.8	GHz	0200.0	0204.0	0210.0		1.40	
610	MHz	0147.0	0156.0	0000.0		2.68	
DS III	35-90	0203		0203	B	1	
DS III	30-75	0225		0227	G	1	



2000 July 16 Ø AR9077 To event 373

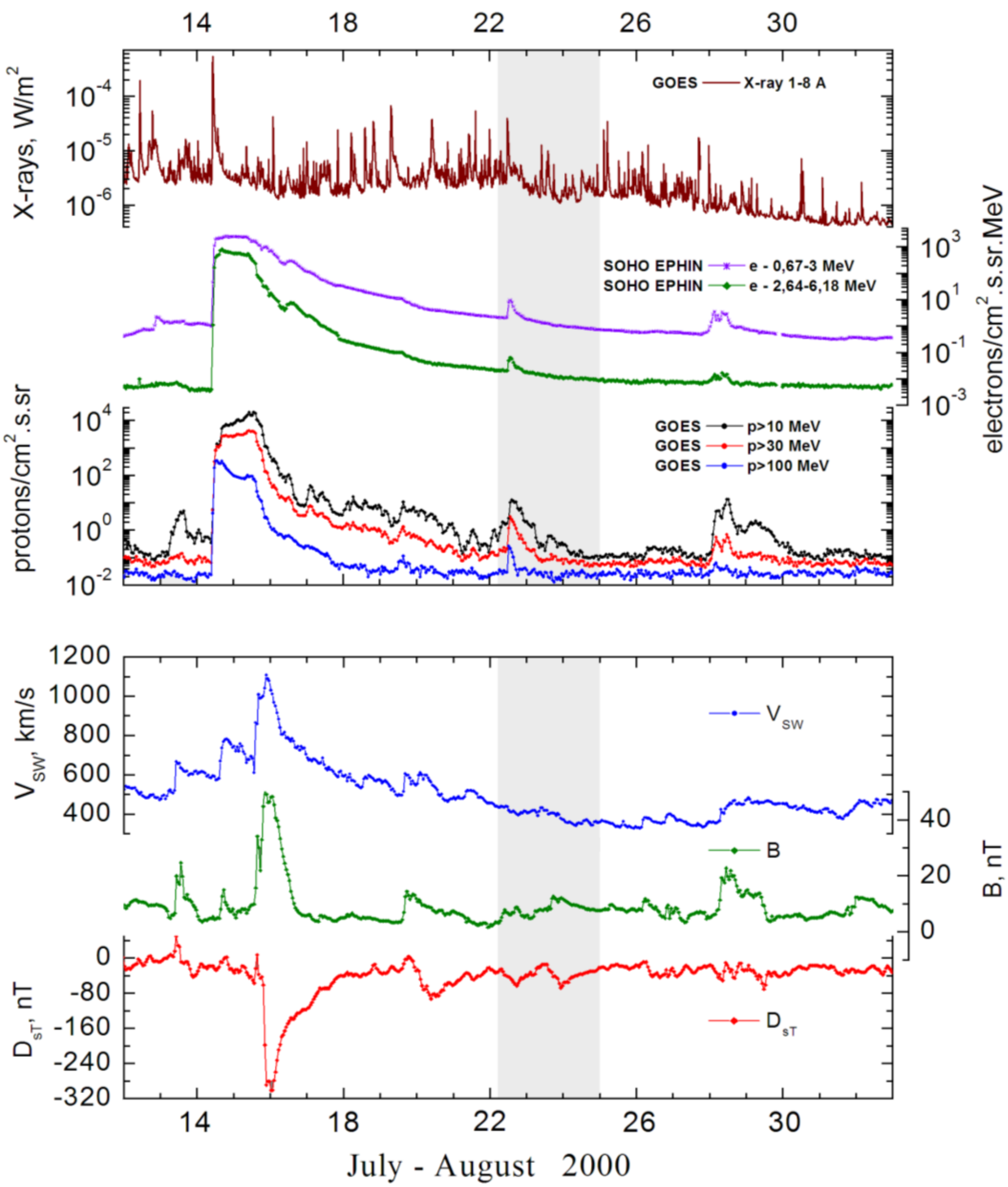
Hα		2341	2352	0051	N17W40	2F	EFU
1 -12.5	keV	2337	0004	0015		M1.4	1.7E-02
2.8	GHz	2333.0	2342.0	0143.0		1.40	
610	MHz	2354.0	2355.0	2356.0		1.91	
DS III	28-180	2310		2339	N	1	
DS III	57-180	2317		2324	N	1	

Event 2000.07.22 – (2000-204) **№ 374**

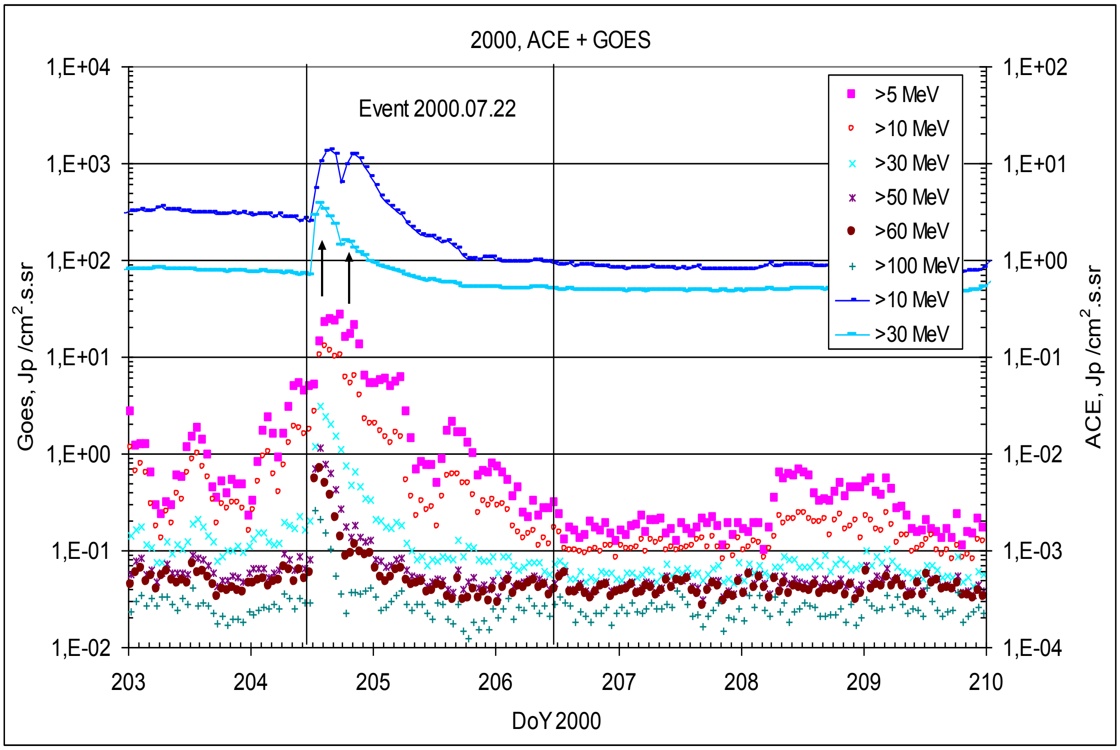
Particle event: To(Ep>10 MeV) – 22d12^h
Tmax$_1$(Ep>10 MeV) – 22d14^h, Jmax$_1$ (Ep>10 MeV) – 13 /cm^2.s.sr
Tmax$_2$(Ep>10 MeV) – 22d20^h, Jmax$_2$ (Ep>10 MeV) – 6 /cm^2.s.sr
Duration of the event – 2 days
Quasimaximal energy of protons in the event – Eqm$_1$ = 340 MeV
– Eqm$_2$ = 80 MeV

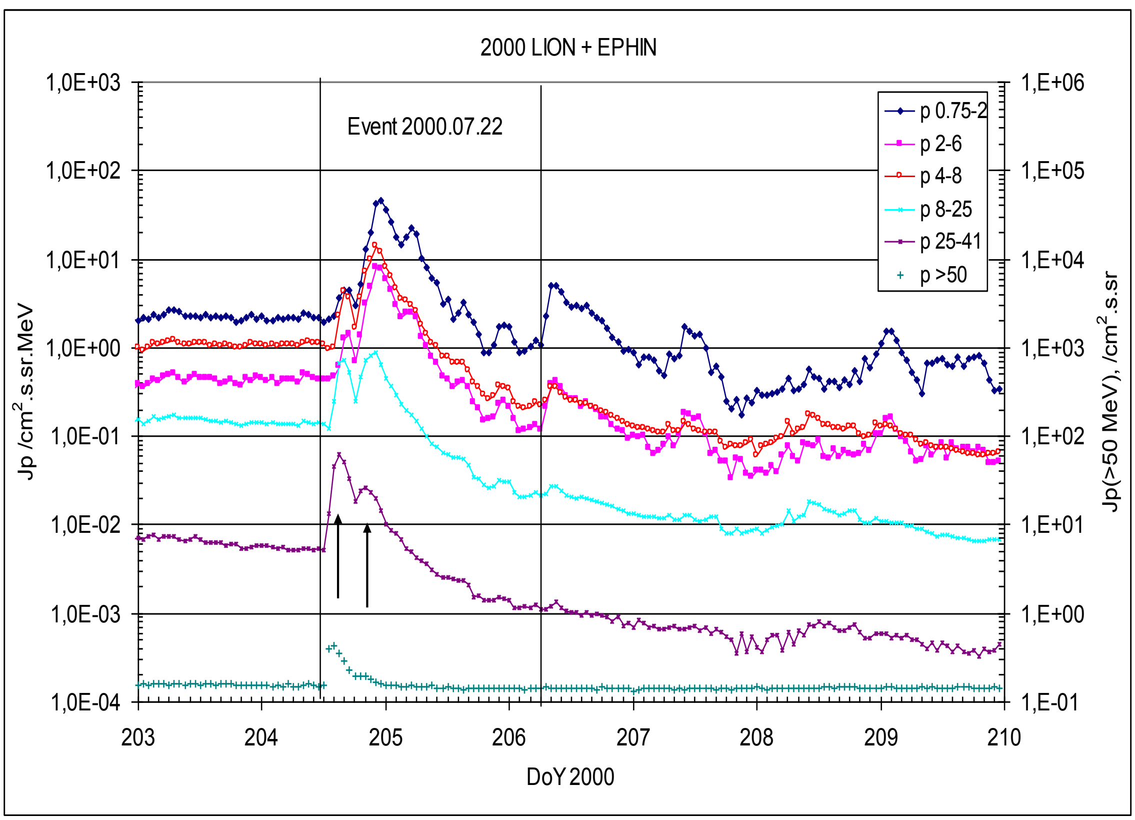
Sources: ● solar flare 22d11^{h}17^m, M3.7/2N, N14W56, AR9085
Main X-ray burst 1-8 Å : onset – 22d11^{h}17^m, max – 22d11^{h}34^m, Φ = 0.07 J/m^2
CME: 22d11^{h}54^m, V = 1230 km/s , Δφ = 229^o, dA = 275^o;
▲ SC 23d10^{h}41^m

Particle fluxes and associated phenomena



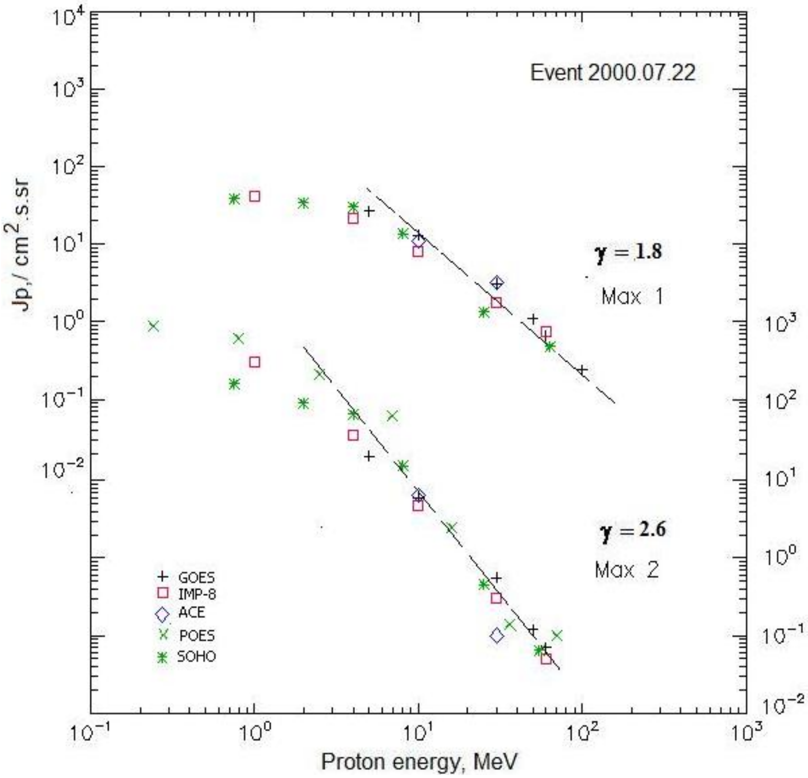
Time profiles of the proton fluxes for the event of 2000 July 22





Arrows on the profiles of the events indicate the time of the proton flux maxima, taken to build the proton spectra (see below)

Integral time-of-maximum proton spectrum



Integral fluxes of protons for the event of 2000 July 22

S/c, instruments	Ep, MeV	To	Tmax	Jmax, /cm^2.s.sr	Dura-tion	Comments
GOES-10						
EPS	>5	12^h	$17^h/20^h$	27/20.4	2d	
EPS	>10	12^h	$14^h/20^h$	13/6	2d	
EPS	>30	12^h	$13^h/20^h$	3.1/0.55	1d	
EPS	>50	12^h	$13^h/20^h$	1.1/0.12	1d	
EPS	>60	12^h	$13^h/20^h$	0.65/0.07	1d	
EPS	>100	12^h	12^h/ -	0.24/ -	1d	
POES-15						
MEPED	>0.24	-	- /24^h	- /940	2d	
MEPED	>0.8	-	- /24^h	- /650	2d	
MEPED	>2.5	-	- /24^h	- /200	2d	
MEPED	>6.9	-	- /24^h	- /30	2d	
MEPED	>16	-	- /24^h	- /2.5	1d	
MEPED	>36	-	- /24^h	- /0.14	1d	
MEPED	>70	-	- /24^h	- /0.1	1d	
MEPED	>140	-	-	-	-	
IMP-8						
CPME	>1	13^h	$16^h/22^h$	42/344	1.5 d	
CPME	>4	12^h	$16^h/22^h$	22/38	1.5 d	
CPME	>10	12^h	$15^h/20^h$	8/4.7	1.5d	
CPME	>30	12^h	$13^h/18^h$	1.8/0.3	1 d	
CPME	>60	12^h	$13^h/18^h$	0.75/0.05	1 d	

ACE						
SIS	>10	12^h	$15^h/19^h$	11/6.5	1.5d	
SIS	>30	12^h	$13^h/18^h$	3.2/0.1	1d	
SOHO						
EPHIN (INT)	>50	12^h	$14^h/20^h$	0.28/0.04	1d	

Differential fluxes of protons for the event of 2000 July 22

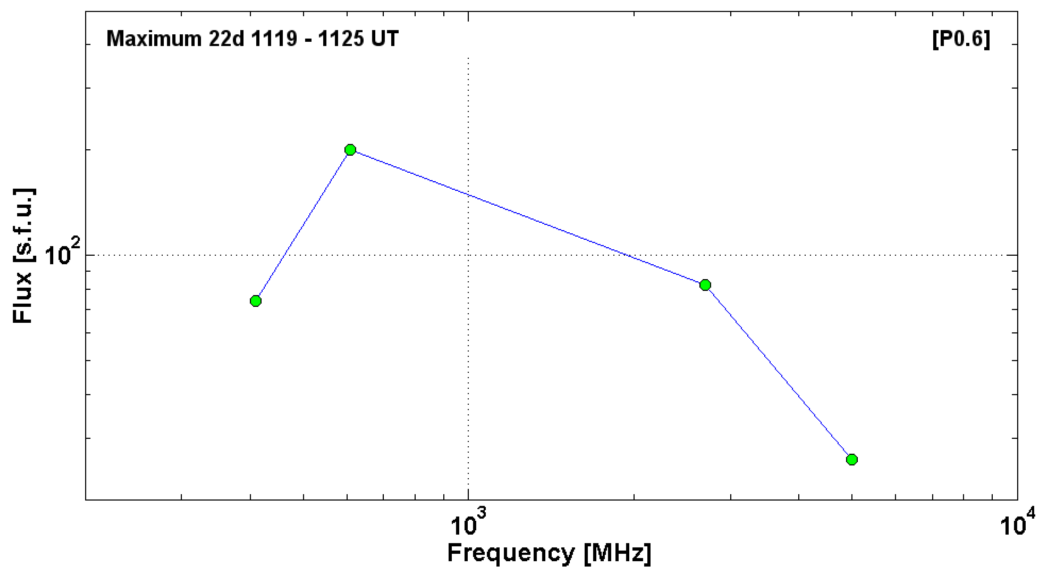
S/c, instruments	ΔE, MeV	To	Tmax	Jmax /cm^2.s.sr.MeV	Dura-tion	Comments
IMP-8						
CPME	1-2	15^h	-	- /189	2d	
CPME	2-4.6	14^h	$16^h/14^h$	8.7/61	2d	
CPME	4.6-15	11^h	15^h	1.5/3.7	2d	
CPME	15-25	11^h	13^h	0.37/0.22	1.5d	
CPME	25-48	11^h	13^h	0.06/0.018	1.5d	
CPME	48-96	11^h	13^h	0.013/0.0015	1d	
CPME	96-145	-	-	-	-	
CPME	145-440	-	-	-	-	
SOHO						
LION	0,75-2	14^h	$16^h/23^h$	2.5/43	2d	
LION	2-6	14^h	$17^h/23^h$	1/7.3	2d	
EPHIN	4-8	14^h	$16^h/22^h$	3.1/12.8	2d	
EPHIN	8-25	14^h	$16^h/22^h$	0.6/0.75	2d	
EPHIN	25-41	13^h	$15^h/21^h$	0.06/0.022	2d	
EPHIN	41-53	- “ -	- “ -	- “ -	- “ -	

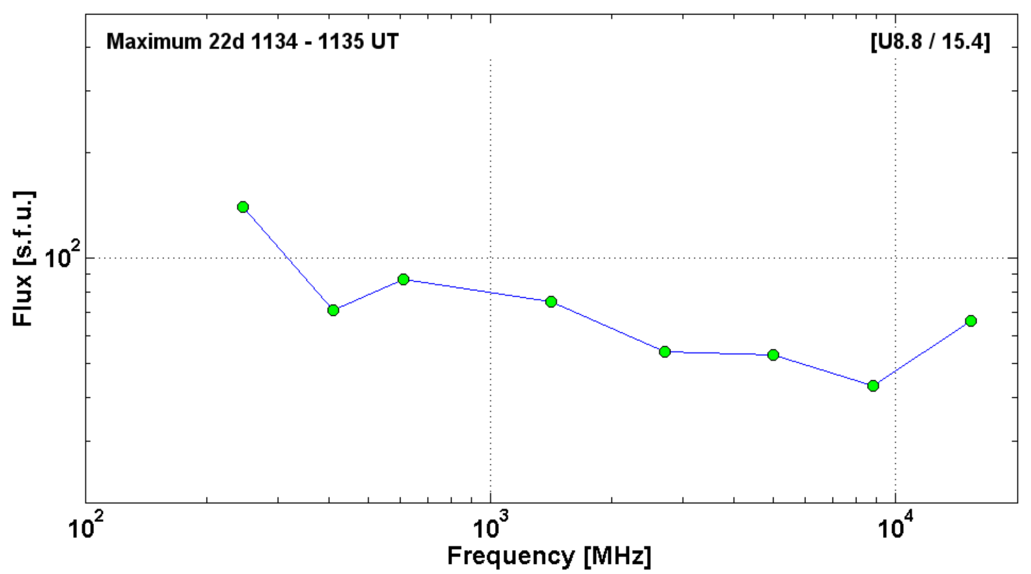
Electromagnetic and other phenomena that are sources and/or accompanying for the event of 2000 July 22

2000 July 22 • AR9085 To event 374

Hα	6563 Å	1117	1125	1246	N14W56	2N	FU
1 -12.5	keV	1117	1134	1202		M3.7	7.0E-2
53-93		<112059	~112335	>112339		253	HXT Y
5	GHz	1125.0	1125.0	~1125.0		1.41	
2.7	GHz	1119.0	1124.0	1133.0		1.91	
610	MHz	1118.0	1119.0	1142.0	[P0.6]	2.30	
410	MHz	1119.0	1120.0	1122.0		1.87	
8.8	GHz	1124.0	1134.0	1142.0		1.63	
5	GHz	1122.0	1134.0	1142.0		1.72	
1.4	GHz	1119.0	1134.0	1141.0		1.88	
DS II	25-160	1125		1144	FS	2	
DS DCIM	800-2000	1117		1204	GG	2	
DS DCIM	2000-4500	1118		1153	GG	1	

15.4	GHz	1133.0	1135.0	1158.0	[U8.8 / 15.4]	1.82	
8.8	GHz	1133.0	1146.0	1158.0		1.91	
5	GHz	1133.0	1146.0	1158.0		1.81	
2.7	GHz	1133.0	1134.0	1158.0		1.73	
610	MHz	1133.0	1134.0	1158.0		1.94	
410	MHz	1133.0	1134.0	1158.0		1.85	
245	MHz	1133.0	1134.0	1158.0		2.15	
DS IV	35-85	1137		1751		1	
DS III	200-260	1136		1136	G	2	
DS CONT	135-270	~1133		~1138		2	
CME	WL	1154	1230 km/s	-12.4 km/s^2	229º	275º	



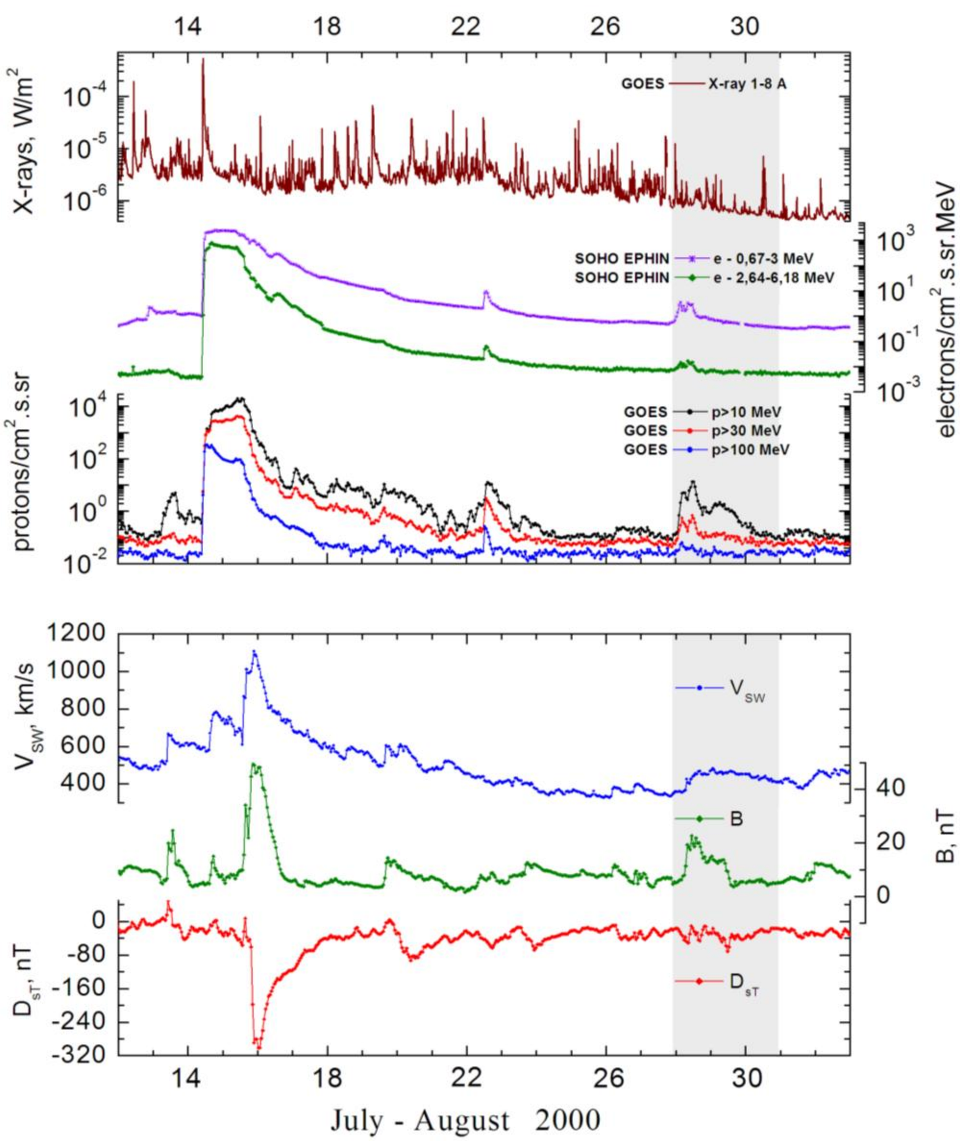


Event 2000.07.28 – (2000-210) **№ 375**

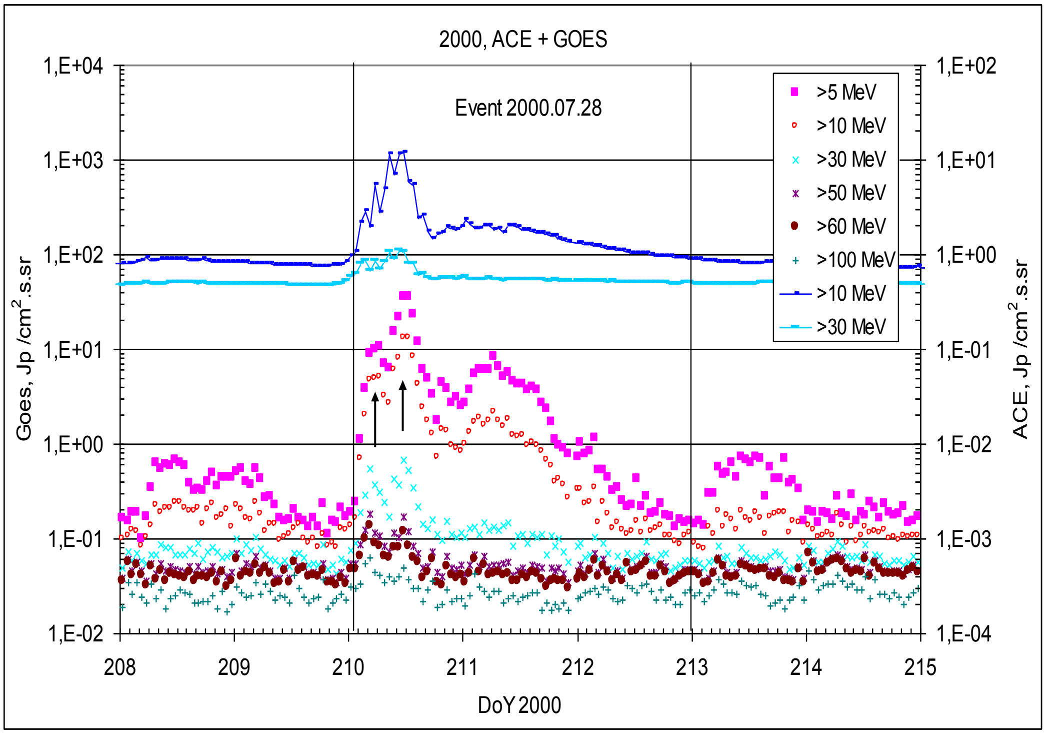
Particle event: To(Ep>10 MeV) – 28d02^h
Tmax$_1$(Ep>10 MeV) – 28d06^h, Jmax$_1$(Ep>10 MeV) – 5 /cm^2.s.sr
Tmax$_2$(Ep>10 MeV) – 28d12^h, Jmax$_2$(Ep>10 MeV) – 13 /cm^2.s.sr
Duration of the event – 3 days
Quasimaximal energy of protons in the event – Eqm$_1$ = 140 MeV
– Eqm$_2$ = 105 MeV

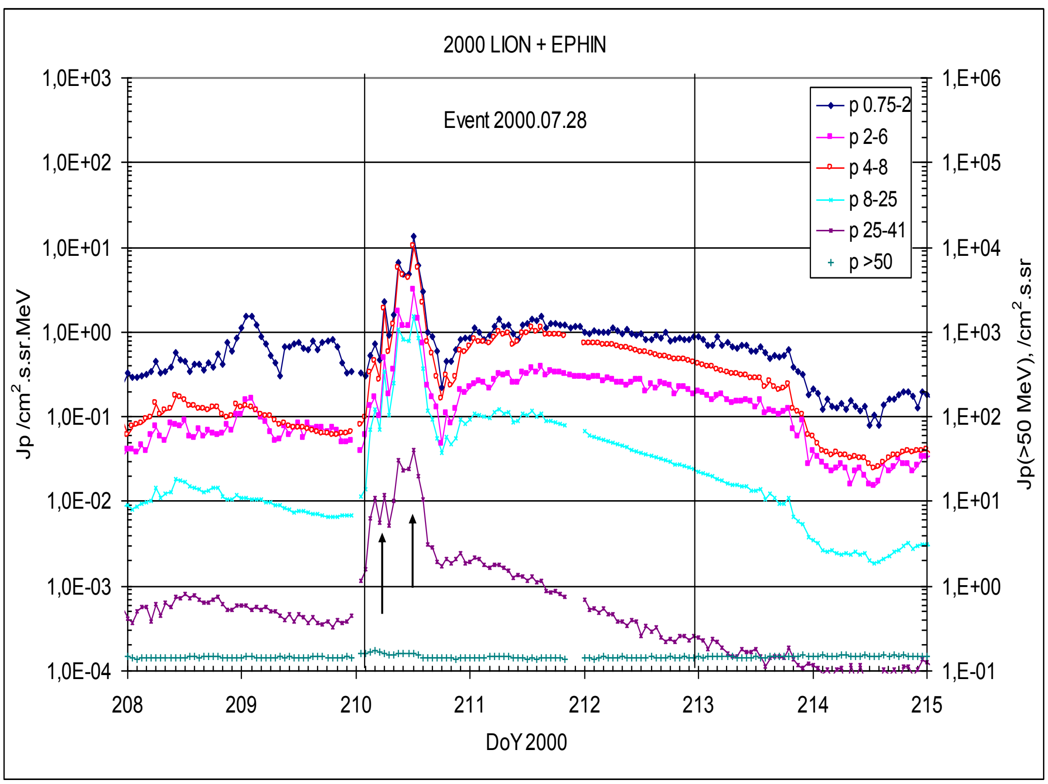
Sources: ⊙ solar flare 27d23^{h}37^m, M1.2/SF, N11W78, AR9090
Main X-ray burst 1-8 Å: onset – 27d23^{h}37^m,max – 27d23^{h}42^m, Φ = 0.0044 J/m^2
CME: 28d00^{h}54^m, V = 0447 km/s, Δφ = 057^o; dA = 296^o
▲ SC 28d06^{h}34^m

Particle fluxes and associated phenomena



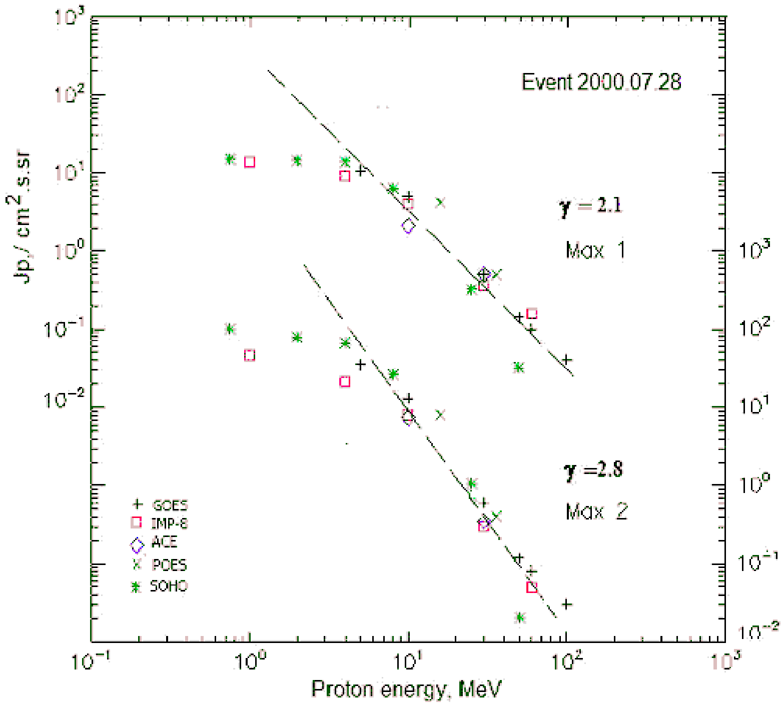
Time profiles of the proton fluxes for the event of 2000 July 28





Arrows on the profiles of the events indicate the time of the proton flux maxima, taken to build the proton spectra (see below)

Integral time-of-maximum proton spectrum



Integral fluxes of protons for the event of 2000 July 28

S/c, instruments	Ep, MeV	To	Tmax	Jmax, /cm^2.s.sr	Duration	Comments
GOES-10						
EPS	>5	02^h	06^h/12^h	10.7/36	3d	
EPS	>10	02^h	06^h/12^h	5/13	3d	
EPS	>30	02^h	04^h/11^h	0.5/0.6	2d	
EPS	>50	02^h	04^h/11^h	0.14/0.12	1d	
EPS	>60	02^h	04^h/11^h -	0.1/0.08	1d	
EPS	>100	02^h	04^h/11^h -	0.04/0.03	1d	
POES-16						
MEPED	>0.24	-	-	-	-	
MEPED	>0.8	-	-	-	-	
MEPED	>2.5	-	-	-	-	
MEPED	>6.9	-	-	-	-	
MEPED	>16	-	04^h/12^h	4.2 / 8.2	2d	
MEPED	>36	-	04^h/12^h	0.5 / 0.4	1d	
MEPED	>70	-	-	-	-	
MEPED	>140	-	-	-	-	
IMP-8						
CPME	>1	<3^h	04^h/11^h	14/48	2d	
CPME	>4	<3^h	04^h/11^h	9/21.7	2d	
CPME	>10	<3^h	04^h/11^h	4/8.2	2d	
CPME	>30	<3^h	04^h/11^h	0.35/0.3	1d	
CPME	>60	<3^h	04^h/11^h	0.16/0.05	1d	
ACE						
SIS	>10	2^h	03^h/11^h	2.1/7.5	1d	
SIS	>30	2^h	03^h/10^h	0.55/0.35	1d	

SOHO						
EPHIN (INT)	>50	00^h	$04^h/12^h$	0.03/0.02	1d	

Differential fluxes of protons for the event of 2000 July 28

S/c, instruments	ΔE, MeV	To	Tmax	Jmax /cm^2.s.sr.MeV	Dura-tion	Comments
IMP-8						
CPME	1-2	01^h	$06^h/12^h$	3.8/15	1d	
CPME	2-4.6	01^h	$04^h/12^h$	1.96/8.5	1d	
CPME	4.6-15	01^h	$04^h/11^h$	0.54/1.56	1d	
CPME	15-25	01^h	$04^h/11^h$	0.2/0.39	1d	
CPME	25-48	01^h	$04^h/11^h$	0.016/0.02	1d	
CPME	48-96	00^h	$04^h/11^h$	0.002/0.0016	1d	
CPME	96-145	00^h	-	-	-	
CPME	145-440	-	-	-	-	
SOHO						
LION	0,75-2	01^h	$04^h/12^h$	0.38/13.2	4d	
LION	2-6	01^h	$04^h/12^h$	0.16/3.1	4d	
EPHIN	4-8	01^h	$04^h/12^h$	0.4/10	4d	
EPHIN	8-25	01^h	$04^h/12^h$	0.11/1.5	4d	
EPHIN	25-41	01^h	$04^h/12^h$	0.011/0.04	4d	

Electromagnetic and other phenomena that are sources and/or accompanying for the event of 2000 July 28

2000 July 27 ⊙ AR9090 To event 375

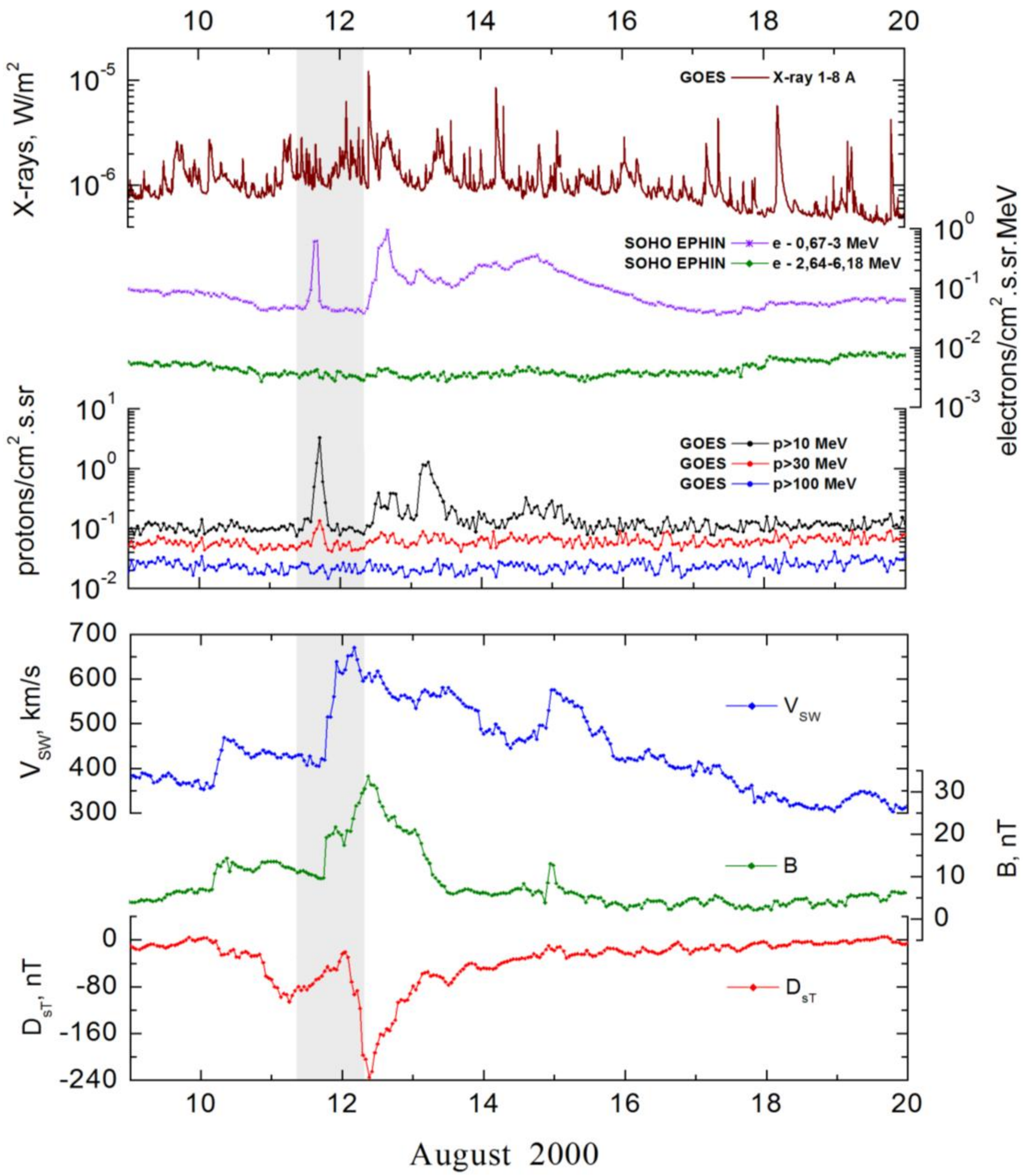
Hα	6563 Å	<2340	~2341	>0046	N11W78	SF	FU
1 -12.5	keV	2337	2342	2347		M1.2	4.4E-3
53-93	keV	<233922	234114	234406		237	HXT Y
5.7	GHz	2340.8	2342.3	2344.4		1.18	
2.8	GHz	2335.0	2341.0	2347.0		0.85	
CME	WL	0054	0447 km/s	-1.8 km/s^2	057º	296º	

Event 2000.08.11 – (2000-224) **№ 376**

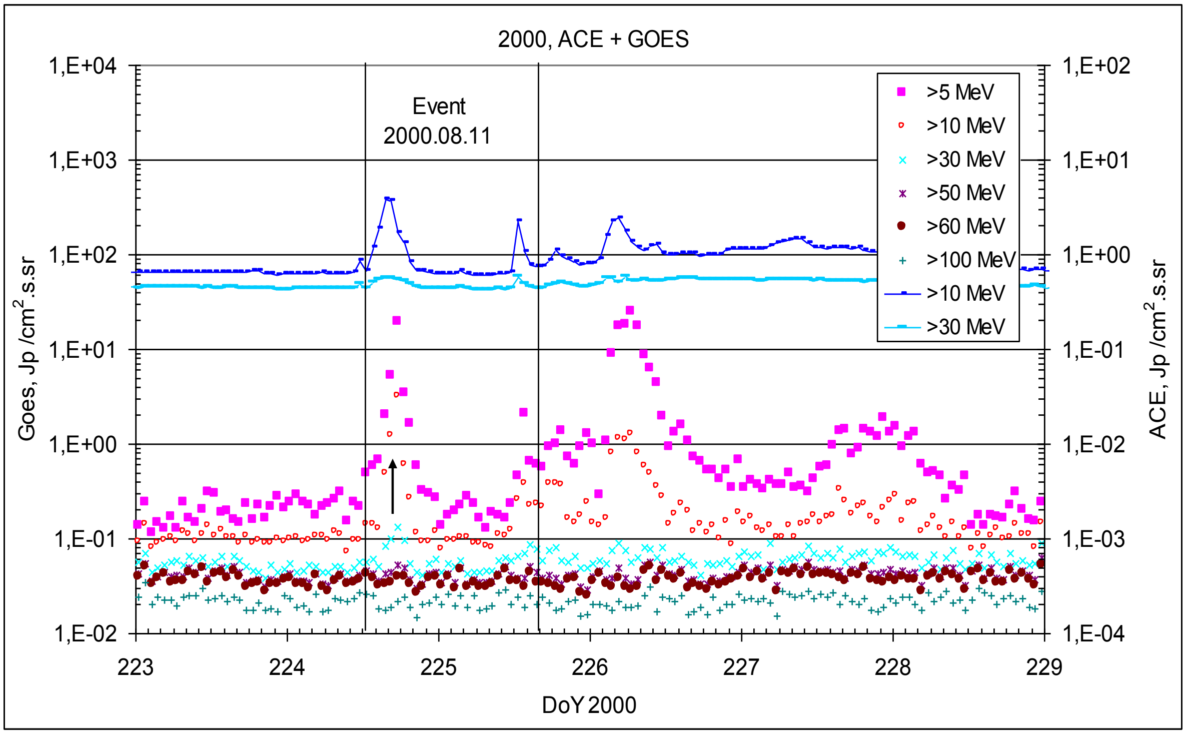
Particle event: To(Ep>10 MeV) – 11d15^{h}
Tmax(Ep>10 MeV) – 11d17^{h}, Jmax (Ep>10 MeV) – 3.2 /cm^{2}.s.sr
Duration of the event – 1 day
Quasimaximal energy of protons in the event – Eqm = 75 MeV

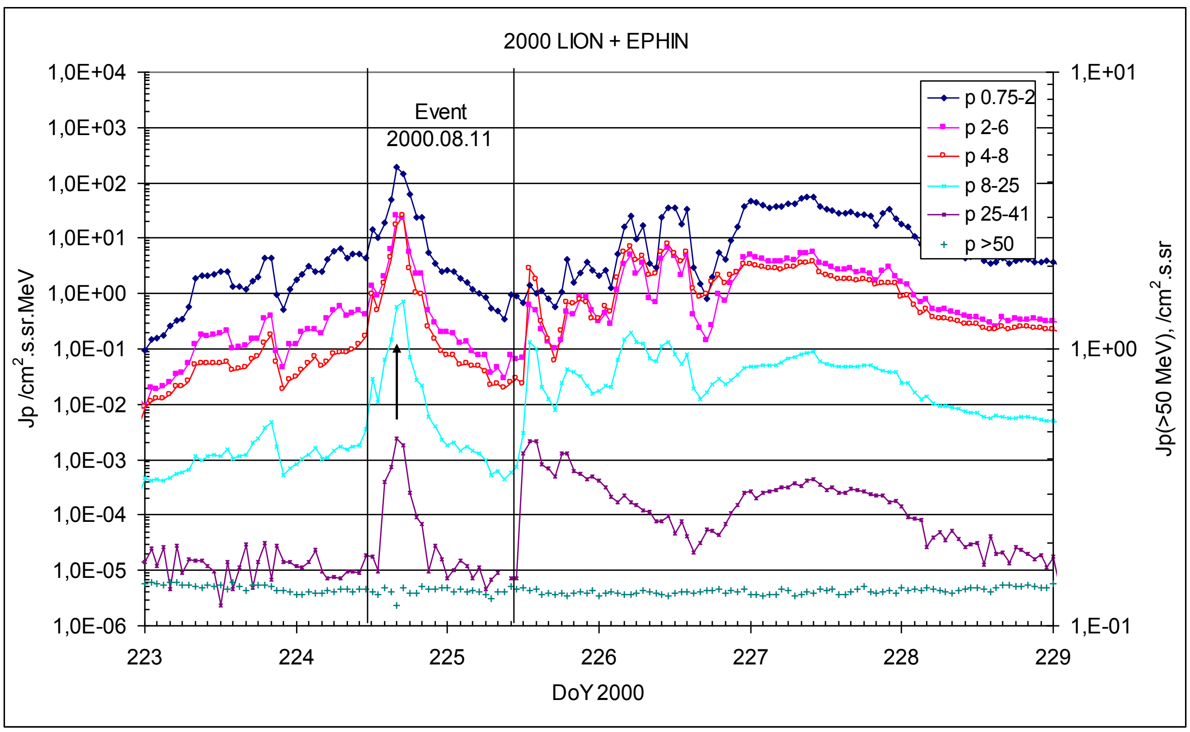
Sources: ⊡ back side solar flare event < 11d16^{h}54^{m}, AR unknown, behaind E_L;
CME: 11d16^{h}54^{m},V = 0300 km/s, Δφ = 271^{o},dA = 035^{o}
▲ SC 11d18^{h}46^{m}

Particle fluxes and associated phenomena



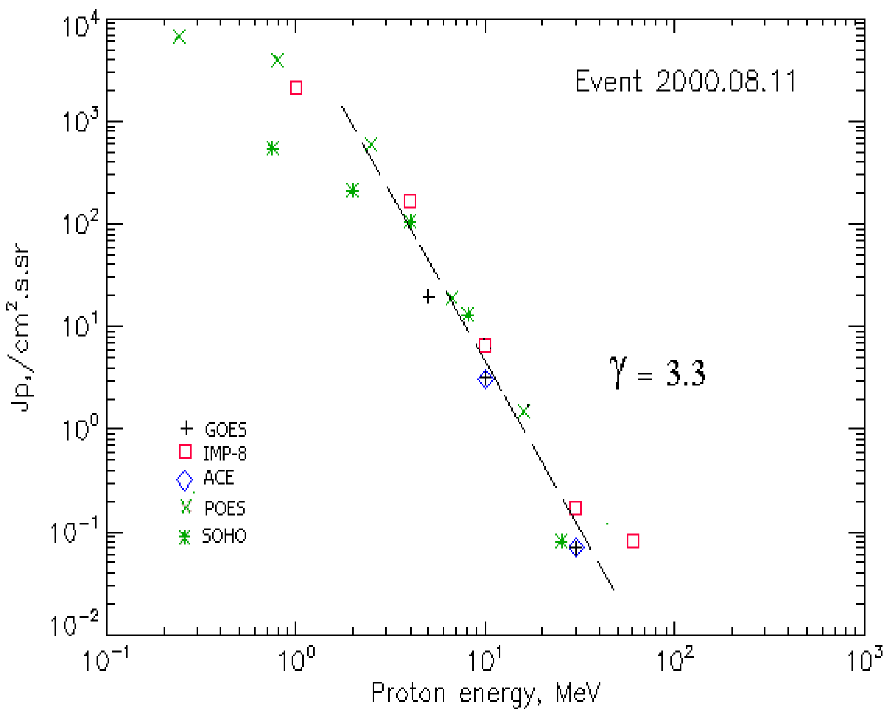
Time profiles of the proton fluxes for the event of 2000 August 11





Arrows on the profiles of the events indicate the time of the proton flux maxima, taken to build the proton spectra (see below)

Integral time-of-maximum proton spectrum



Integral fluxes of protons for the event of 2000 August 11

S/c, instruments	Ep, MeV	To	Tmax	Jmax, /cm^2.s.sr	Dura-tion	Comments
GOES-10						
EPS	>5	15^h	17^h	19.6	1d	
EPS	>10	15^h	17^h	3.2	1d	
EPS	>30	15^h	17^h	0.07	1d	
EPS	>50	-	-	-	-	
EPS	>60	-	-	-	-	
EPS	>100	-	-	-	-	
POES-16						
MEPED	>0.24	15^h	16^h	7340	1d	
MEPED	>0.8	15^h	16^h	5740	1d	
MEPED	>2.5	15^h	16^h	820	1d	
MEPED	>6.9	15^h	16^h	20	1d	
MEPED	>16	15^h	16^h	1.5	1d	
MEPED	>36	-	-	-	-	
MEPED	>70	-	-	-	-	
MEPED	>140	-	-	-	-	
IMP-8						
CPME	>1	15^h	17^h	2100	1 d	
CPME	>4	15^h	17^h	170	1 d	
CPME	>10	15^h	17^h	6.6	1 d	
CPME	>30	15^h	16^h	0.17	1 d	
CPME	>60	15^h	16^h	0.08	1 d	

ACE						
SIS	>10	14^h	16^h	3.1	1 d	
SIS	>30	14^h	17^h	0.07	1 d	
SOHO						
EPHIN (INT)	>50	-	-	-	-	

Differential fluxes of protons for the event of 2000 August 11

S/c, instruments	ΔE, MeV	To	Tmax	Jmax /cm^2.s.sr.MeV	Dura-tion	Comments
IMP-8						
CPME	1-2	10^h	17^h	1390	1d	
CPME	2-4.6	10^h	17^h	240	1d	
CPME	4.6-15	10^h	17^h	11.8	1d	
CPME	15-25	10^h	16^h	0.12	1d	
CPME	25-48	10^h	16^h	0.0015	0,5d	
CPME	48-96	-	-	-	-	
CPME	96-145	-	-	-	-	
CPME	145-440	-	-	-	-	
SOHO						
LION	0,75-2	10d23^h	16^h	193	1d	
LION	2-6	10d23^h	16^h	24.8	1d	
EPHIN	4-8	10d22^h	16^h	24,7	~1,5d	
EPHIN	8-25	10d22^h	16^h	0,75	~1,5d	
EPHIN	25-41	10^h	15^h	0,0025	~1,5d	
EPHIN	41-53	- " -	- " -	- " -	- " -	

References:

Wang R., 2009

Electromagnetic and other phenomena that are sources and/or accompanying for the event of 2000 August 11

2000 August 11 □ AR To event 376

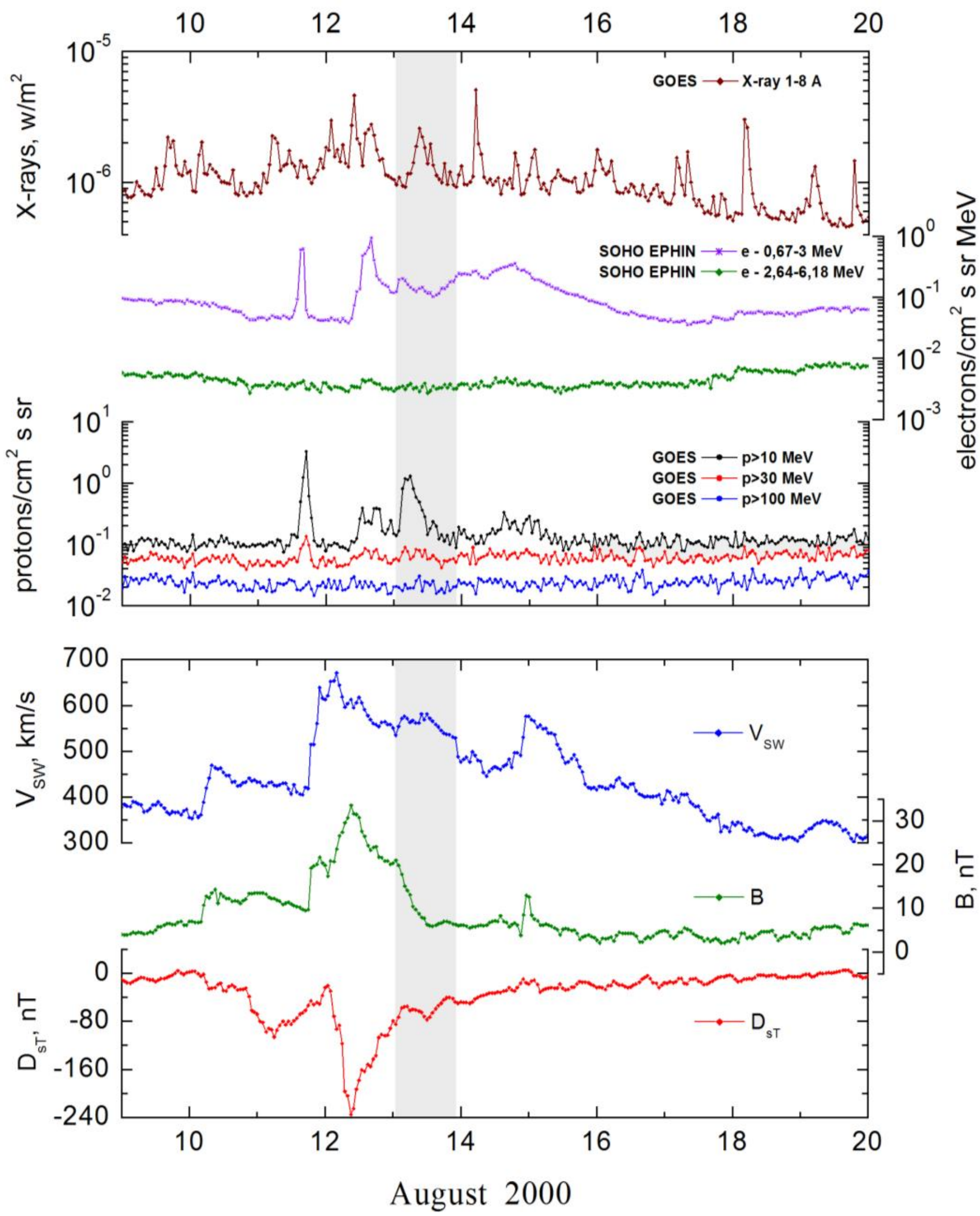
CME	WL	1654	0300 km/s	6.6 km/s^2	035º	273º	

Event 2000.08.13 – (2000-226) **№ 377**

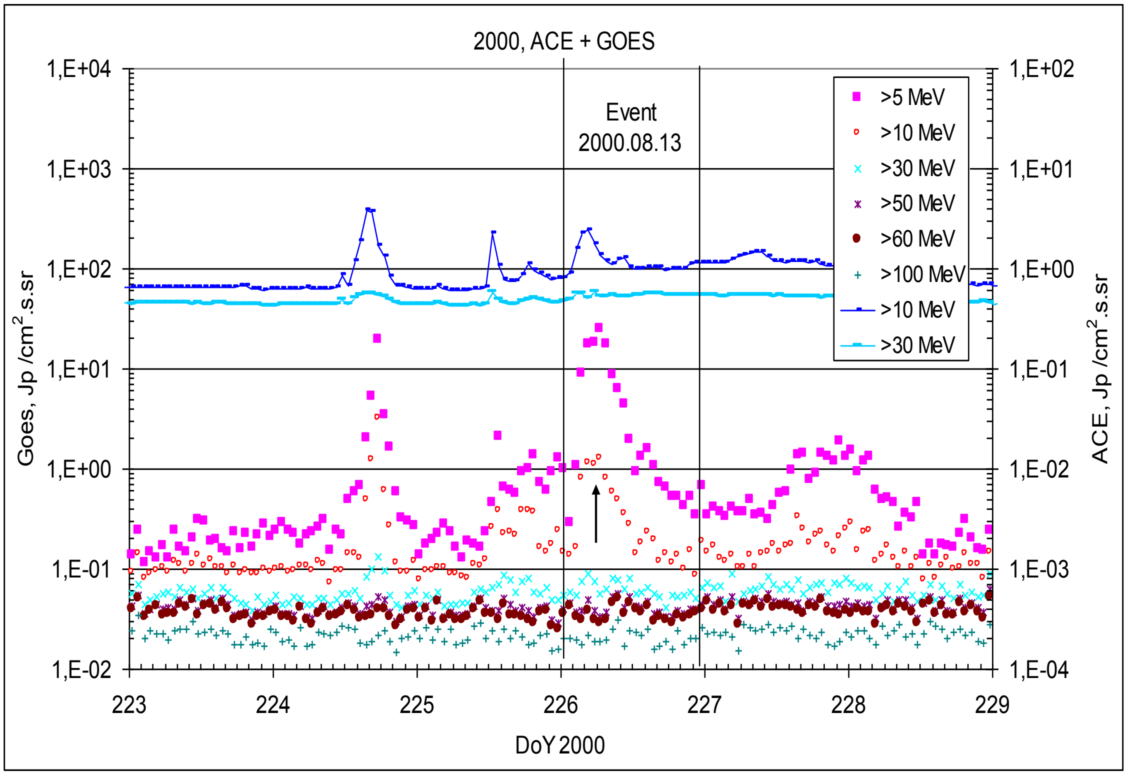
Particle event: To(Ep>10 MeV) – 13d01^h
Tmax(Ep>10 MeV) – 13d06^h, Jmax (Ep>10 MeV) – 1.2 /cm^2.s.sr
Duration of the event – 1 day
Quasimaximal energy of protons in the event – Eqm = 70 MeV

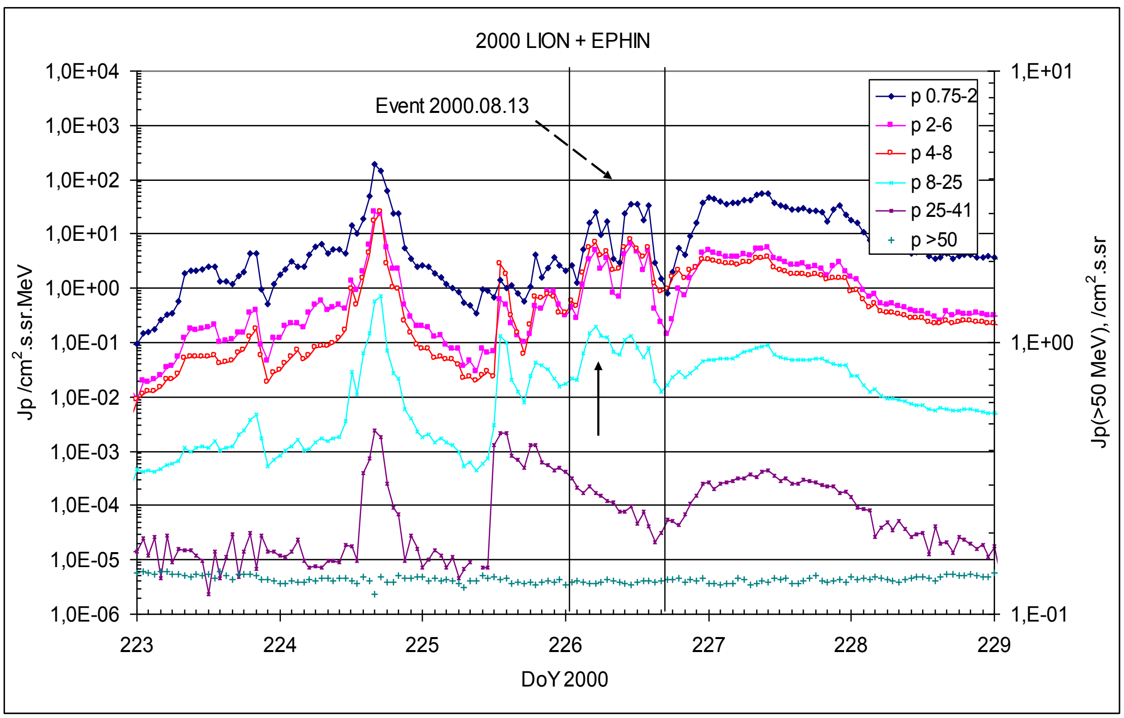
Sources: ● solar flare 12d09^{h}56^m, M1.1/SN, S16W79, AR9119
Main X-ray burst 1-8 Å : onset – 12d09^{h}45^m, max – 12d09^{h}56^m, Φ = 0.011 J/m^2
CME: 12d10^{h}35^m, V = 0662 km/s, Δφ = 168^o; dA = 262^o

Particle fluxes and associated phenomena



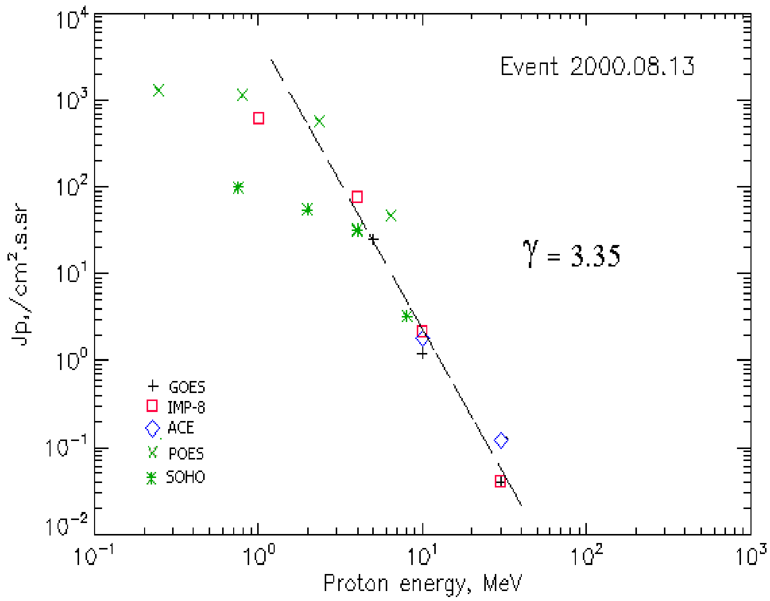
Time profiles of the proton fluxes for the event of 2000 August 13





Arrows on the profiles of the events indicate the time of the proton flux maxima, taken to build the proton spectra (see below)

Integral time-of-maximum proton spectrum



Integral fluxes of protons for the event of 2000 August 13

S/c, instruments	Ep, MeV	To	Tmax	Jmax, $/cm^2.s.sr$	Duration	Comments
GOES-10						
EPS	>5	02^h	06^h	25	1d	
EPS	>10	01^h	06^h	1.2	1d	
EPS	>30	-	04^h	0.04	-	
EPS	>50	-	-	-	-	
EPS	>60	-	-	-	-	
EPS	>100				-	
POES-16						
MEPED	>0.24	01^h	06^h	1514	1d	
MEPED	>0.8	01^h	06^h	1154	1d	
MEPED	>2.5	01^h	06^h	512	1d	
MEPED	>6.9	01^h	06^h	44	1d	
MEPED	>16	-	-	-	-	
MEPED	>36	-	-	-	-	
MEPED	>70	-	-	-	-	
MEPED	>140	-	-	-	-	
IMP-8						
CPME	>1	01^h	06^h	634	1d	
CPME	>4	01^h	06^h	78	1d	
CPME	>10	01^h	06^h	2.2	1d	
CPME	>30	01^h	05^h	0.04	1d	
CPME	>60	-	-	-	-	
ACE						
SIS	>10	01^h	04^h	1.8	<1d	
SIS	>30	-	05^h	0.12	-	
SOHO						
EPHIN (INT)	>50	-	-	-	-	

Differential fluxes of protons for the event of 2000 August 13

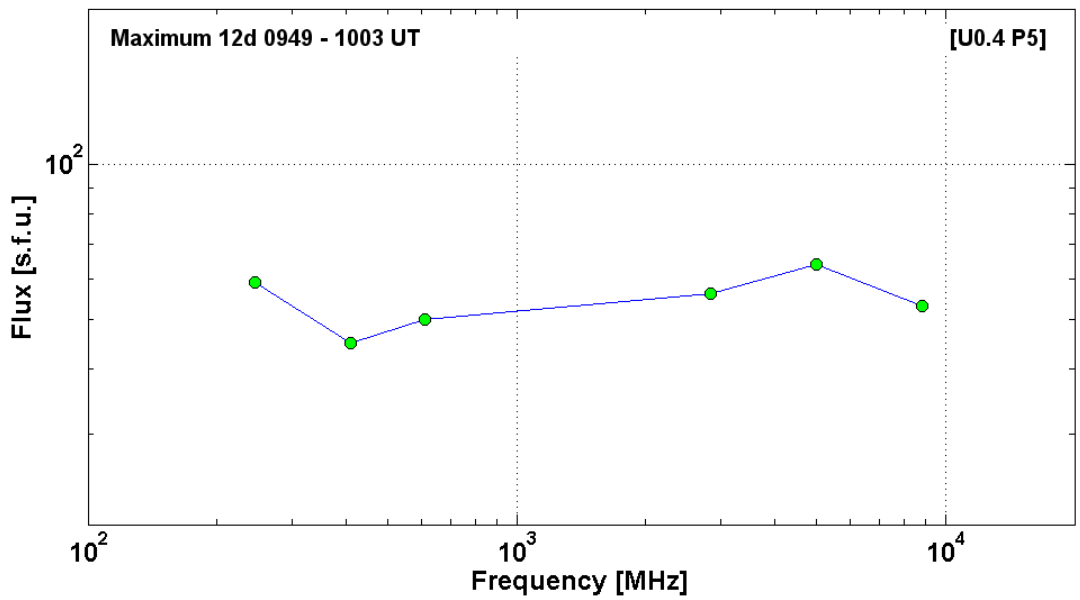
S/c, instruments	ΔE, MeV	To	Tmax	Jmax /cm^2.s.sr.MeV	Dura-tion	Comments
IMP-8						
CPME	1-2	01^h	06^h	327	7d	
CPME	2-4.6	01^h	06^h	96.4	6d	
CPME	4.6-15	01^h	06^h	5.5	5d	
CPME	15-25	01^h	06^h	0.012	1d	
CPME	25-48	-	-	-	-	
CPME	48-96	-	-	-	-	
CPME	96-145	-	-	-	-	
CPME	145-440	-	-	-	-	
SOHO						
LION	0,75-2	01^h	05^h	25.9	6d	
LION	2-6	01^h	05^h	5.8	5d	
EPHIN	4-8	01^h	05^h	7	5d	
EPHIN	8-25	01^h	05^h	0.2	4d	
EPHIN	25-41	-	-	-	-	
EPHIN	41-53	-	-	-	-	

Electromagnetic and other phenomena that are sources and/or accompanying for the event of 2000 August 13

2000 August 12 ● AR9119 To event 377

Hα	6563 Å	0951	0954	1015	S16W79	SN	AL
1 -12.5	keV	0945	0956	1009		M1.1	1.1E-2
50 -150	keV	0948	0949	0957		351	HXT Y
8.8	GHz	0948.0	0951.0	0955.0		1.72	
5	GHz	0947.0	0949.0	0955.0	[U0.4 P5]	1.81	
2.8	GHz	0947.0	1002.7	1016.0		1.75	
610	MHz	0947.0	0951.0	0955.0		1.70	
410	MHz	0955.0	0956.0	0956.0		1.65	
245	MHz	0954.0	1003.0	1004.0		1.77	

DS III	220-500	0956		0956	GG	2	
DS DCIM	2000-4500	0948		0955	GW	1	
DS DCIM	800-1672	0949		0953		2	
DS DCIM	2000-4500	1001		1006	G	1	
DS DCIM	800-2000	1001		1006		1	
CME	WL	1035	0662 km/s	-6.7 km/s^2	168º	262º	



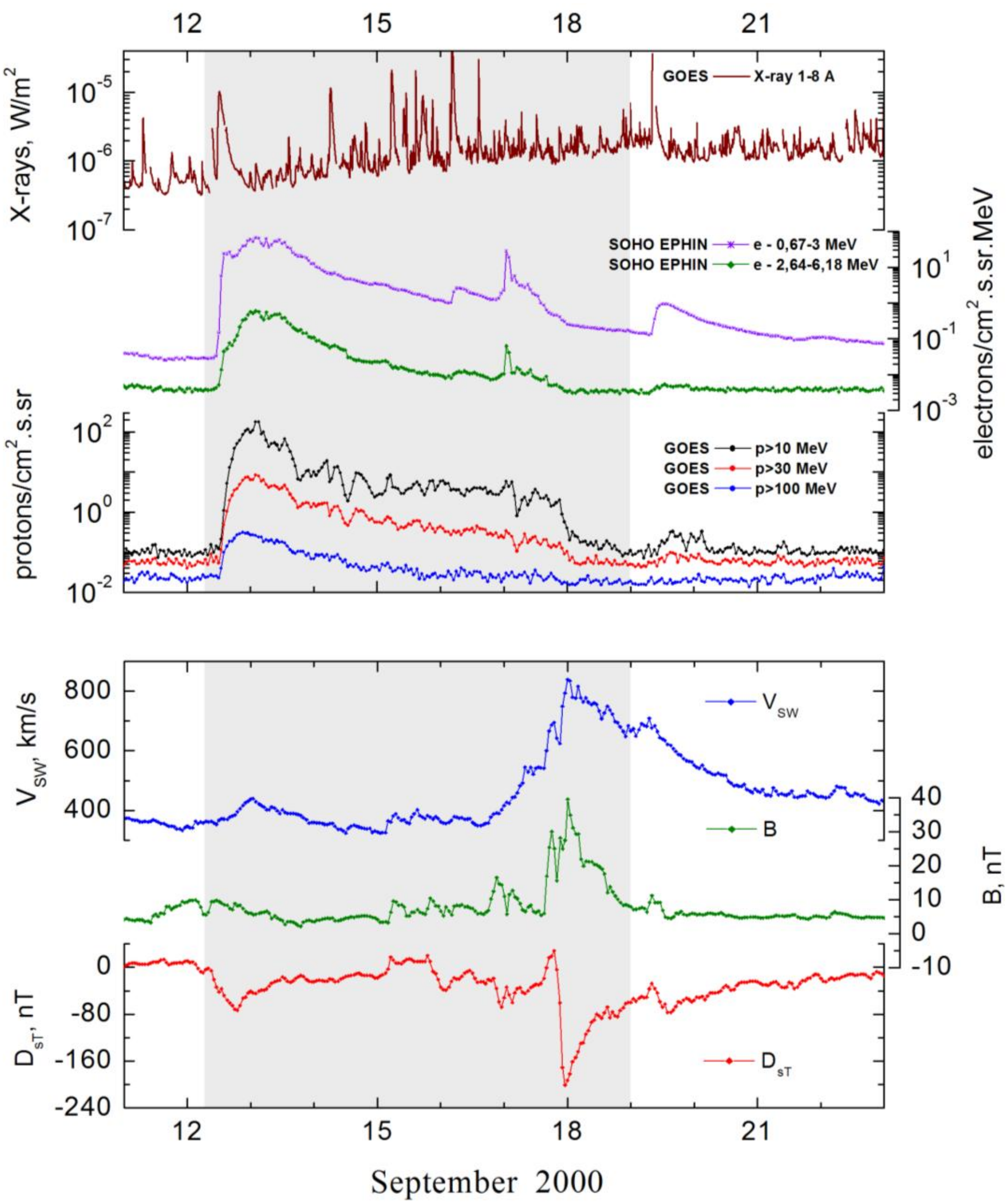
Список 2000 г.

Event 2000.09.12 – (2000-256) **№ 378**

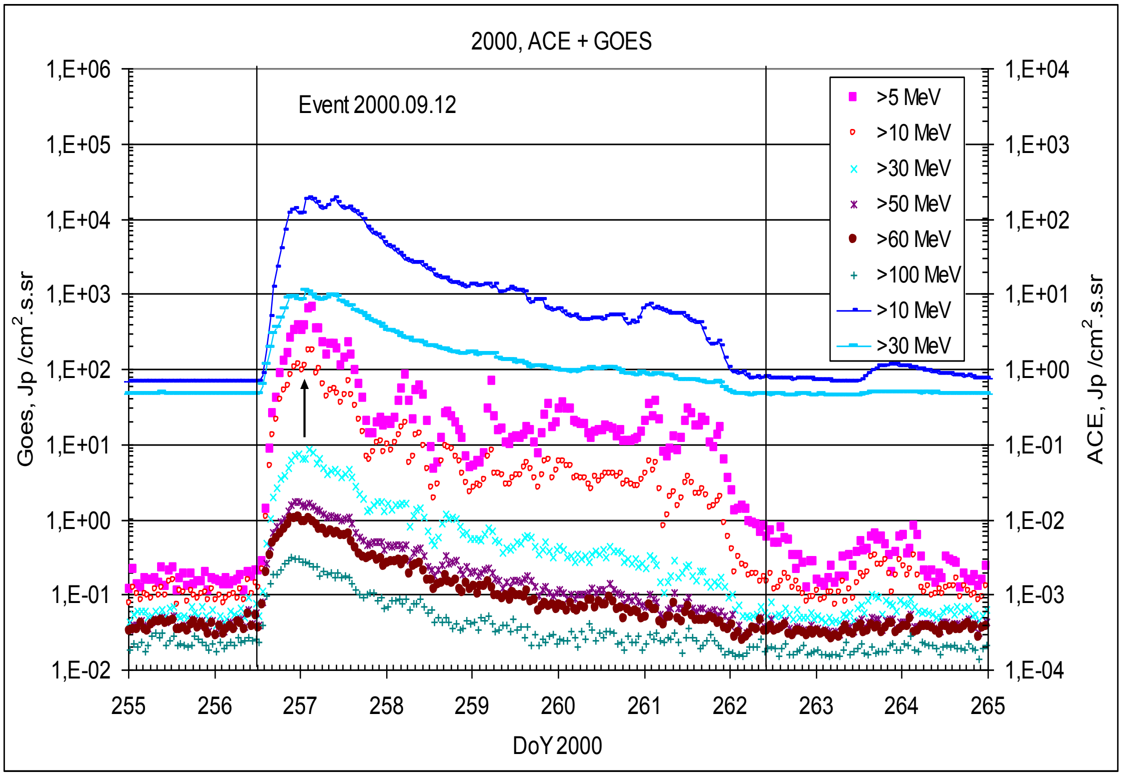
Particle event: To(Ep>10 MeV) – 12d14^h
Tmax(Ep>10 MeV) – 13d02^h, Jmax (Ep>10 MeV) – 180 /cm^2.s.sr
Duration of the event – 6 days
Quasimaximal energy of protons in the event – Eqm = 350 MeV

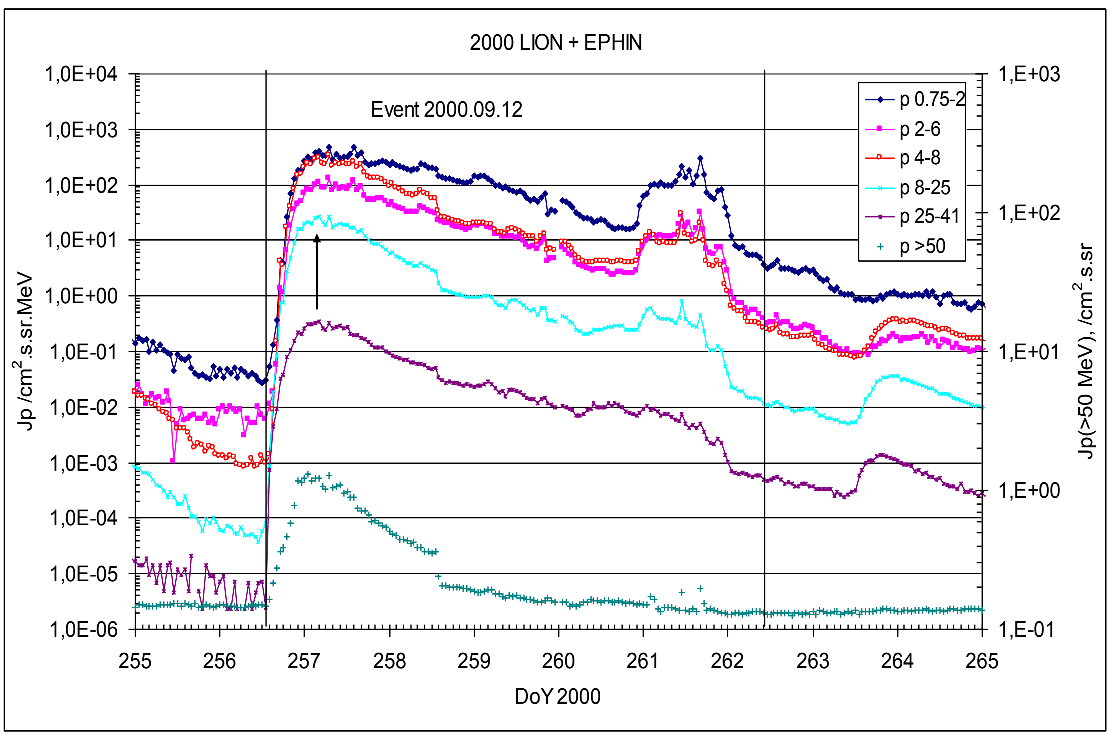
Sources: ● solar flare 12d11^{h}22^m, 2F/M1.0, S19W08, AR9163
Main X-ray burst 1-8 Å: onset – 12d11^{h}31^m, max – 12d12^{h}00^m, Φ = 0.045 J/m^2
CME: 12d11^{h}54^m, V = 1550 km/s, Δφ = 360^o, dA =220^o
▲SC15d04^{h}50^m, ▲SC15d19^{h}12^m, ▲SC18d14^{h}44^m

Particle fluxes and associated phenomena



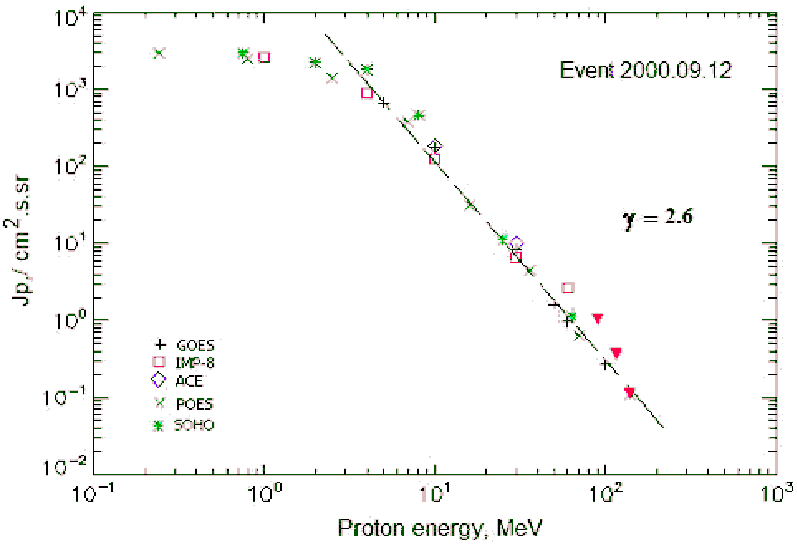
Time profiles of the proton fluxes for the event of 2000 September 12





Arrows on the profiles of the events indicate the time of the proton flux maxima, taken to build the proton spectra (see below)

Integral time-of-maximum proton spectrum



Integral fluxes of protons for the event of 2000 September 12

S/c, instruments	Ep, MeV	To	Tmax	Jmax, /cm^2.s.sr	Dura-tion	Comments
GOES-10						
EPS	>5	14^h	13d03^h	670	6d	
EPS	>10	14^h	13d02^h	180	6d	
EPS	>30	14^h	13d02^h	8.4	5d	
EPS	>50	14^h	13d02^h	1.6	5d	
EPS	>60	14^h	13d00^h	0.97	5d	
EPS	>100	14^h	21^h	0.27	3d	
POES-16						
MEPED	>0.24	-	13d00^h	2961	6d	
MEPED	>0.8	-	13d00^h	2501	6d	
MEPED	>2.5	-	13d00^h	1424	6d	
MEPED	>6.9	-	13d00^h	381	6d	
MEPED	>16	-	13d00^h	31.5	5d	
MEPED	>36	-	13d00^h	4.54	5d	
MEPED	>70	-	13d00^h	0.63	5d	
MEPED	>140	-	13d00^h	0.11	3d	
IMP-8						
CPME	>1	14^h	13d03^h	2610	7d	
CPME	>4	14^h	13d03^h	920	7d	
CPME	>10	14^h	13d03^h	128	6d	
CPME	>30	14^h	13d03^h	6.6	6d	
CPME	>60	14^h	13d03^h	2.7	5d	
ACE						
SIS	>10	14^h	13d03^h	188	3d	
SIS	>30	14^h	13d03^h	10	2d	
SOHO						
EPHIN (INT)	>50	14^h	13d01^h	1.2	3d	

BALLOONS						
Mu	> 94		13d(08^h-08^h)	1.01		
Mu	>116		13d(08^h-08^h)	0.36		
Mu	>140		13d(08^h-08^h)	0.11		

Differential fluxes of protons for the event of 2000 September 12

S/c, instruments	ΔE, MeV	To	Tmax	Jmax /cm^2.s.sr.MeV	Dura-tion	Comments
IMP-8						
CPME	1-2	15^h	13d04^h	810	7d	
CPME	2-4.6	15^h	13d03^h	445	7d	
CPME	4.6-15	14^h	13d03^h	57	6d	
CPME	15-25	14^h	13d03^h	4.4	6d	
CPME	25-48	14^h	13d02^h	0.22	5d	
CPME	48-96	13^h	13d02^h	0.028	5d	
CPME	96-145	-	-	-	-	
CPME	145-440	-	-	-	-	
SOHO						
LION	0,75-2	15^h	13d04^h	412	7d	
LION	2-6	15^h	13d04^h	109	7d	
EPHIN	4-8	14^h	13d04^h	296	7d	
EPHIN	8-25	14^h	13d04^h	26.8	6d	
EPHIN	25-41	14^h	13d04^h	0.35	6d	

References:

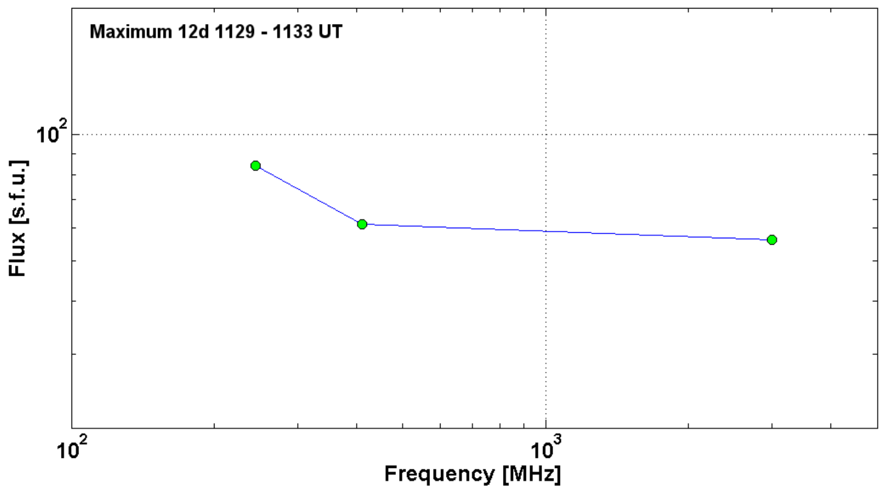
Nitta N.V., E.W. Cliver, A.J. Tylka et al., 2003.

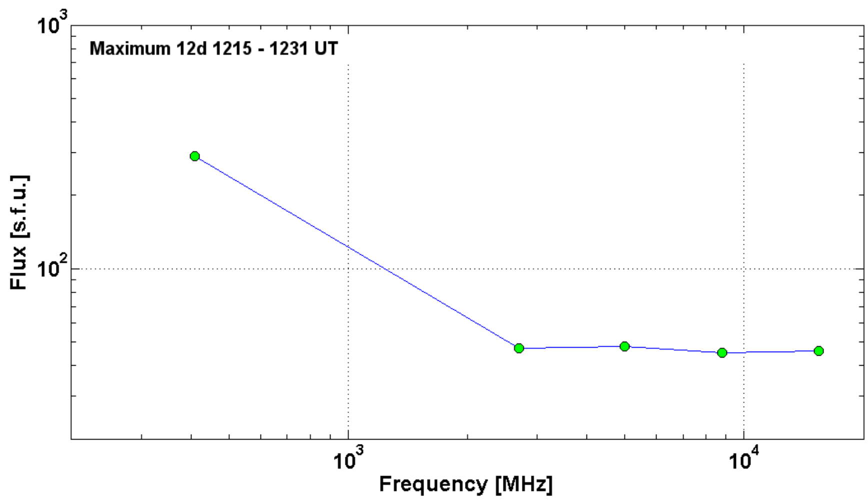
Electromagnetic and other phenomena that are sources and/or accompanying for the event of 2000 September 12

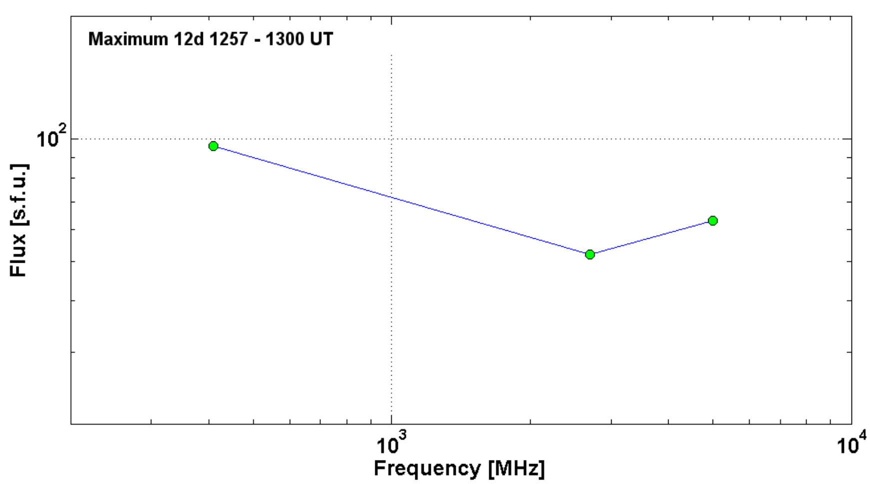
2000 September 12 ● AR9163 To event 378

Hα	6563 Å	1122	1200	1458	S19W08	2F	U
DSF	6563 Å	~1050		1230	S12W18	23º	
1 -12.5	keV	1131	1213	1313		M1.0	4.5E-2
3	GHz	1122.8	1129.2	>1255.8		1.75	
410	MHz	1130.0	1133.0	1137.0		1.79	
245	MHz	1128.0	1129.0	1129.0		1.92	
DS II	25-180	1133		1149	HARM,FS	2	
DS I	80-270	1151		~1231	N	1	
DS III	160-270	~1137		1144	S	1	
DS III	25-250	1152		1211	GG,DS	2	
15.4	GHz	1152.0	1215.0	1309.0		1.66	
8.8	GHz	1154.0	1222.0	1327.0		1.65	
5	GHz	1154.0	1222.0	1341.0		1.68	
2.7	GHz	1210.0	1231.0	0000.0		1.67	
410	MHz	1215.0	1215.0	1220.0		2.46	
DS III		1216		1224	25-40	1	

5	GHz	1210.0	1257.0	1345.0		1.80	
2.7	GHz	1210.0	1257.0	0000.0		1.72	
410	MHz	1300.0	1300.0	1302.0		1.98	
CME		1154	1550 km/s	58.2 km/s^2	360º	220º	







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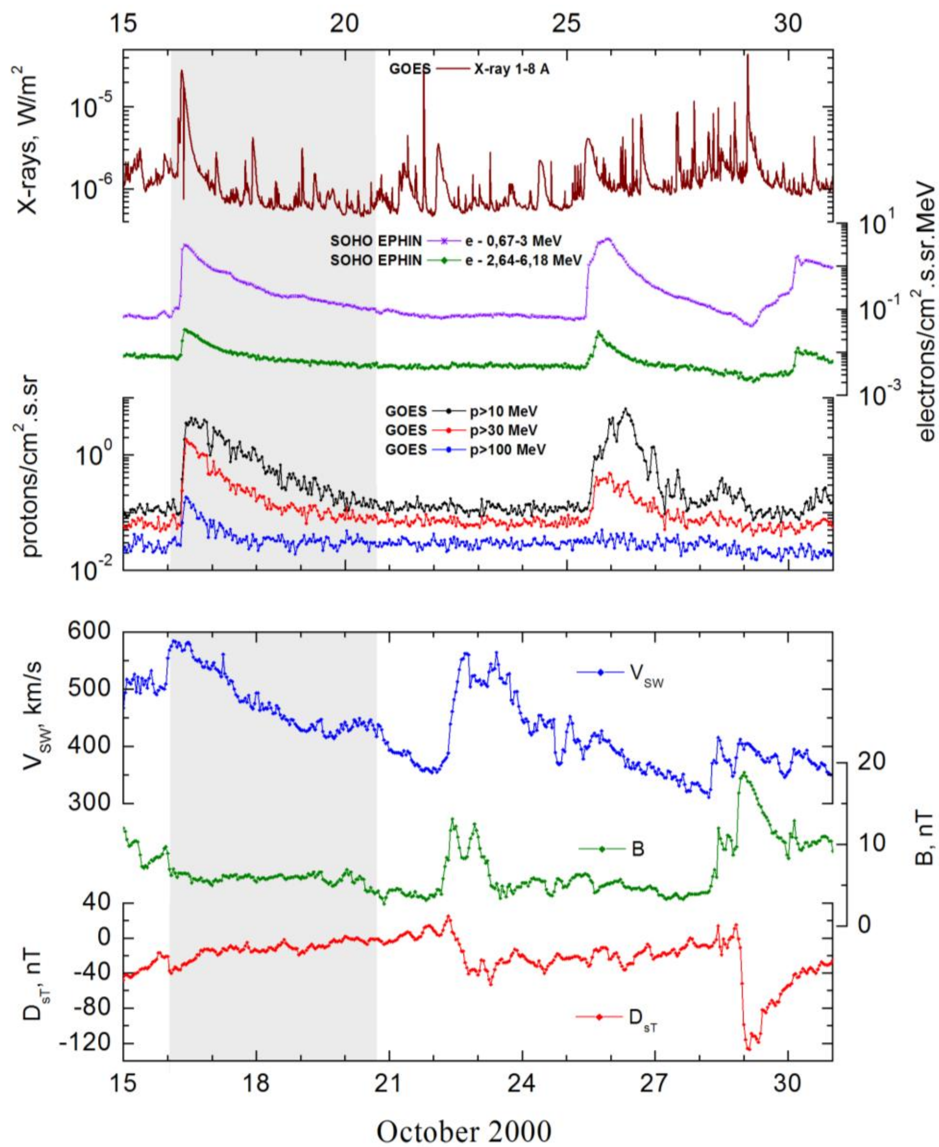
Event 2000.10.16 – (2000-290) **№ 379**

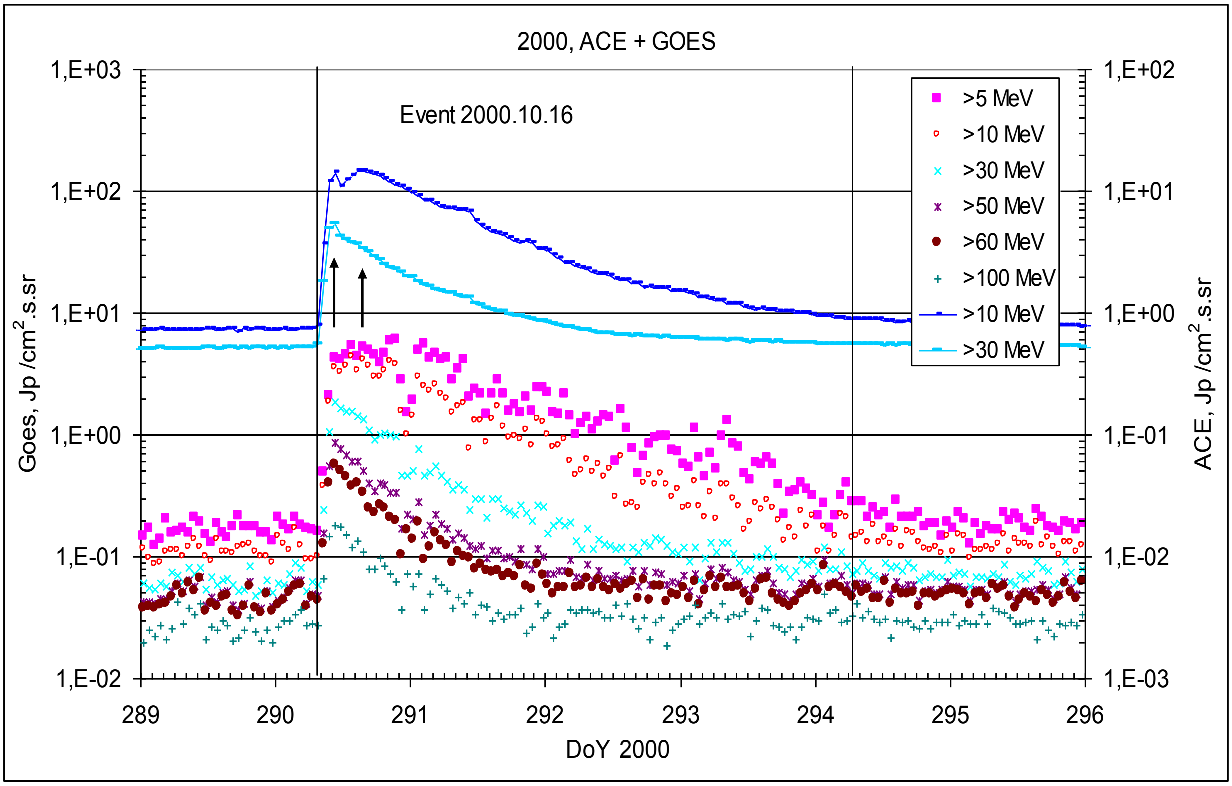
Particle event: To(Ep>10 MeV) – 16d08^h
Tmax$_1$(Ep>10 MeV) – 16d11^h, Jmax$_1$(Ep>10 MeV) – 3.5 /cm^2.s.sr
Tmax$_2$(Ep>10 MeV) – 16d17^h, Jmax$_2$(Ep>10 MeV) – 9.8 /cm^2.s.sr *)
Duration of the event – 4 days
Quasimaximal energy of protons in the event – Eqm$_1$ = 310 MeV
– Eqm$_2$ = 140 MeV
*) The data from IMP-8

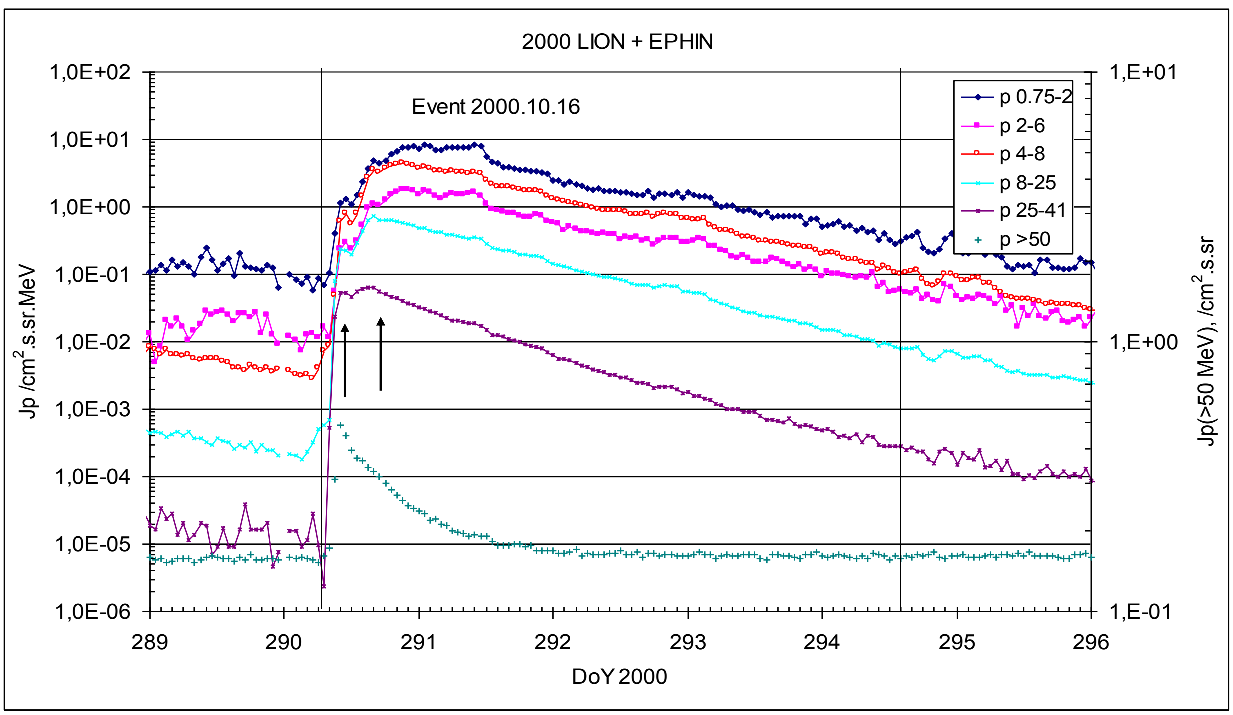
Sources: □ solar flare 16d06^{h}40^m, M2.5/ -, n05w90*, AR9182
Main X-ray burst 1-8 Å onset – 16d06^{h}40^m, max – 16d07^{h}28^m, Φ = 0.16 J/m^2
CME: 16d07^{h}27^m, V = 1336 km/s, Δφ = 360^o, dA = 270^o
* − probable localization of the flare event

Particle fluxes and associated phenomena



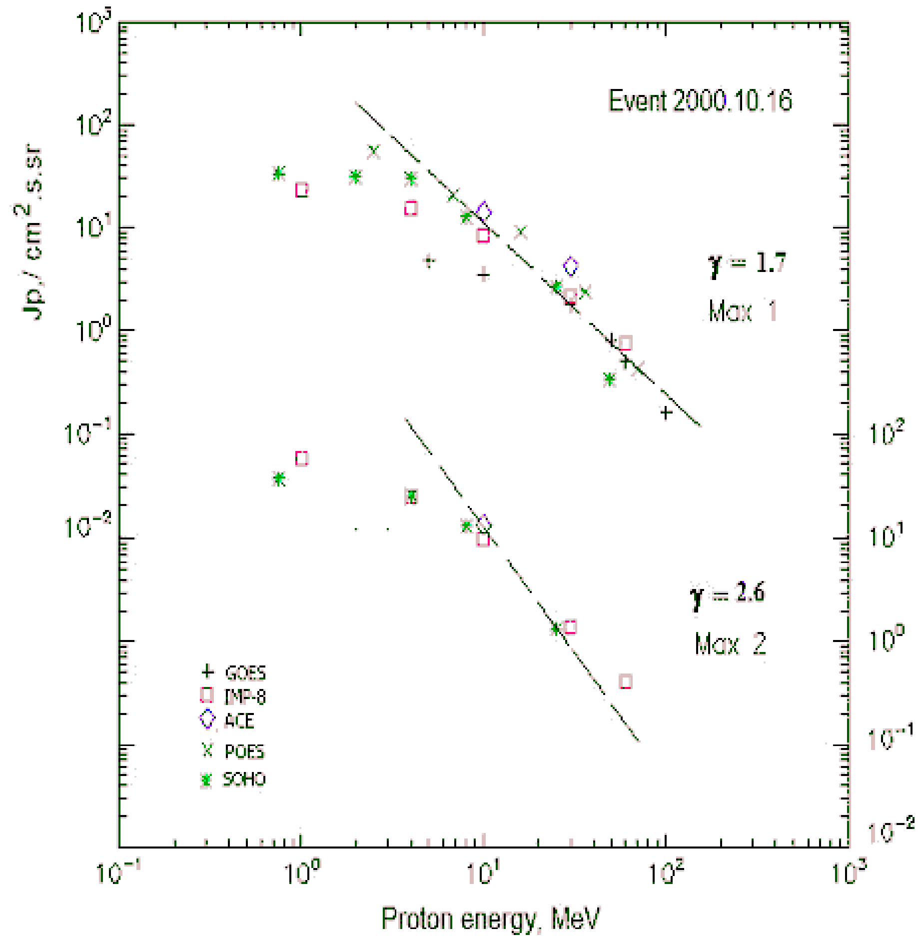
Time profiles of the proton fluxes for the event of 2000 October 16





Arrows on the profiles of the events indicate the time of the proton flux maxima, taken to build the proton spectra (see below)

Integral time-of-maximum proton spectrum



Integral fluxes of protons for the event of 2000 October 16

S/c, instruments	Ep, MeV	To	Tmax	Jmax, /cm^2.s.sr	Dura-tion	Comments
GOES-10						
EPS	>5	08^h	11^h/ -	4.8/ -	4d	
EPS	>10	08^h	11^h/ -	3.5/ -	4d	
EPS	>30	08^h	11^h/ -	1.8/ -	3d	
EPS	>50	08^h	11^h/ -	0.8/ -	3d	
EPS	>60	08^h	11^h/ -	0.5/ -	2d	
EPS	>100	08^h	11^h/ -	0.16/ -	1.5d	
POES-16						
MEPED	>0.24	-	-	-	-	
MEPED	>0.8	-	-	-	-	
MEPED	>2.5	-	12^h/ -	56/ -	4d	
MEPED	>6.9	-	12^h/ -	25/ -	4d	
MEPED	>16	-	12^h/ -	9.1/ -	3d	
MEPED	>36	-	12^h/ -	2.5/ -	3d	
MEPED	>70	-	12^h/ -	0.42/ -	2d	
MEPED	>140	-	-	-	-	

IMP-8						
CPME	>1	08^h	$11^h/17^h$	23.2/61	6 d	
CPME	>4	08^h	$11^h/18^h$	15.2/25	5 d	
CPME	>10	08^h	$11^h/17^h$	8.5/9.8	4 d	
CPME	>30	08^h	$12^h/17^h$	2.2/1.4	2 d	
CPME	>60	08^h	$12^h/17^h$	0.75/0.4	1 d	
ACE						
SIS	>10	08^h	$10^h/16^h$	13.7/14.1	3 d	
SIS	>30	08^h	10^h/ -	4.9/ -	2 d	
SOHO						
EPHIN (INT)	>50	08^h	10^h/ -	0.34/ -	1d	

Differential fluxes of protons for the event of 2000 October 16

S/c, instruments	ΔE, MeV	To	Tmax	Jmax /cm^2.s.sr.MeV	Dura-tion	Comments
IMP-8						
CPME	1-2	08^h	$13^h/16^h$	3.3/16.2	6d	
CPME	2-4.6	08^h	$11^h/16^h$	2.6/9.4	6d	
CPME	4.6-15	08^h	$11^h/16^h$	0.66/1.6	6d	
CPME	15-25	08^h	$11^h/16^h$	0.4/0.43	4d	
CPME	25-48	08^h	$11^h/16^h$	0.08/0.06	3d	
CPME	48-96	08^h	$11^h/16^h$	0.014/0.01	2d	
CPME	96-145	08^h	-	-	-	
CPME	145-440	08^h	-	-	-	
SOHO						
LION	0,75-2	08^h	$11^h/16^h$	1.3/4.8	7d	
LION	2-6	08^h	$11^h/16^h$	0.3/1.1	7d	
EPHIN	4-8	08^h	$11^h/16^h$	0.78/3.2	7d	
EPHIN	8-25	08^h	$11^h/16^h$	0.22/0.7	6d	
EPHIN	25-41	08^h	$11^h/16^h$	0.053/0.06	6d	
EPHIN	41-53	- “ -	- “ -	- “ -	- “ -	

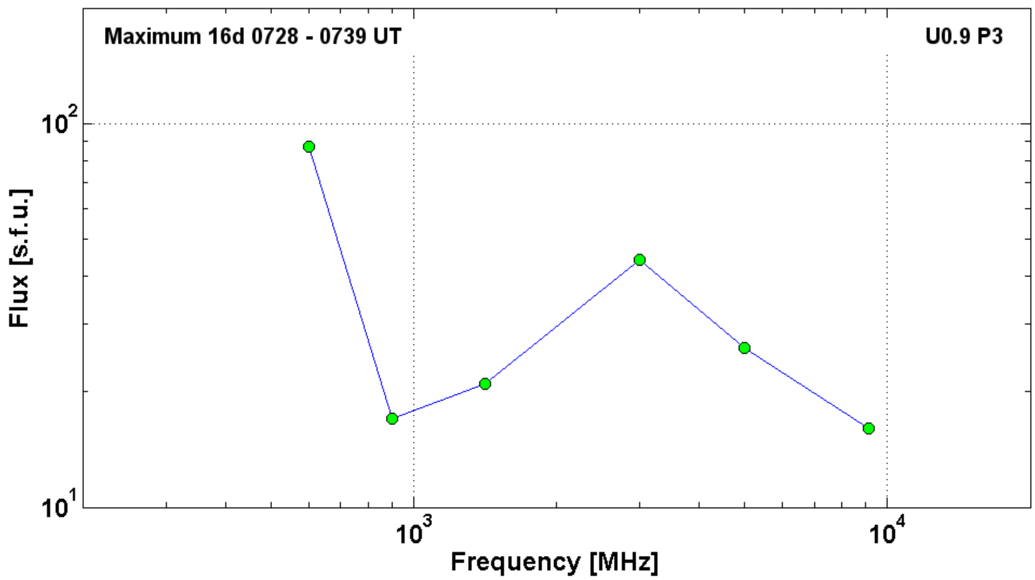
Electromagnetic and other phenomena that are sources and/or accompanying for the event of 2000 October 16

2000 October 16 ⊡ AR9182 To event 379

Hα		No Data			n05w90*		
1 -12.5	keV	0640	0728	0911		M2.5	1.6E-1
53 – 93	keV	0640	0709	0730		8	HXT Y

9.1	GHz	0658.5	0739.0	0839.0		1.20	
5	GHz	0728.0	0728.0	0729.0		1.41	
3	GHz	0722.9	0728.8	0732.0	U0.9 P3	1.64	
1.4	GHz	0728.0	0730.0	0732.0		1.32	
900	MHz	0718.0	0728.2	0909.0		1.23	
600	MHz	0722.5	0728.0	0744.3		1.94	
DS II	20-60	0705		0718	UE	2	
DS IV	25-146	0704		0820		1	
DS III	45-95	0718		~0916	N	1	
DS CONT	800-2000	0722		0741		1	
CME	WL	0727	1366 km/s	9.9 km/s^2	360º	2270º	

* − probable localization of the flare event



Event 2000.10.25 – (2000-299) **№ 380**

Particle event: To(Ep>10 MeV) – 25d13^h

Tmax(Ep>10 MeV) – 25d23^h, Jmax (Ep>10 MeV) – 4.1 /cm^2.s.sr

Duration of the event – 3 days

Quasimaximal energy of protons in the event – Eqm = 95 MeV

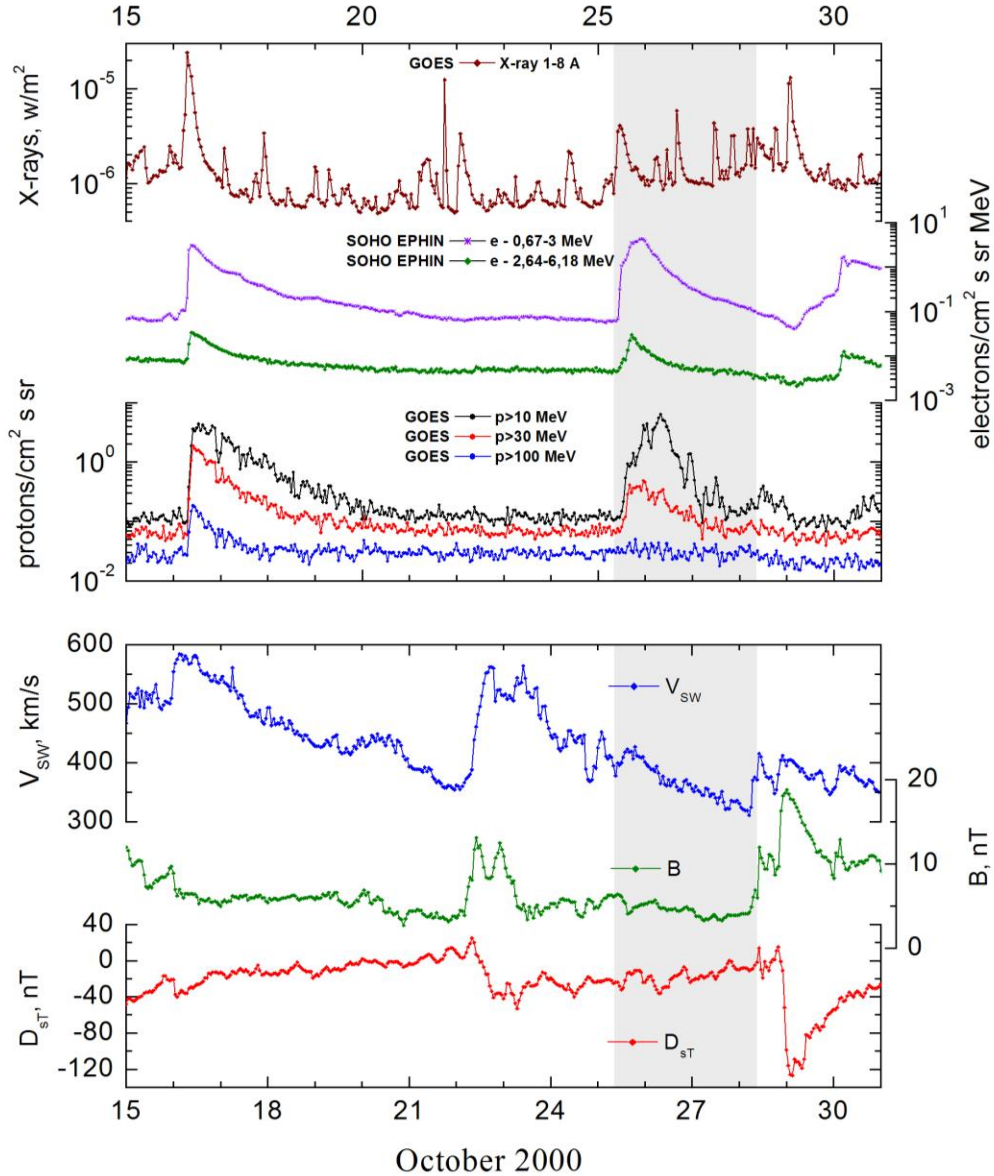
Sources: ⊡ solar flare 25d08^{h}45^m, C4.0/…, … W90, AR– unknown

Main X-ray burst 1-8 Å : onset – 25d08^h 45^m, max – 25d11^{h}25^m, Φ = 0.065 J/m^2

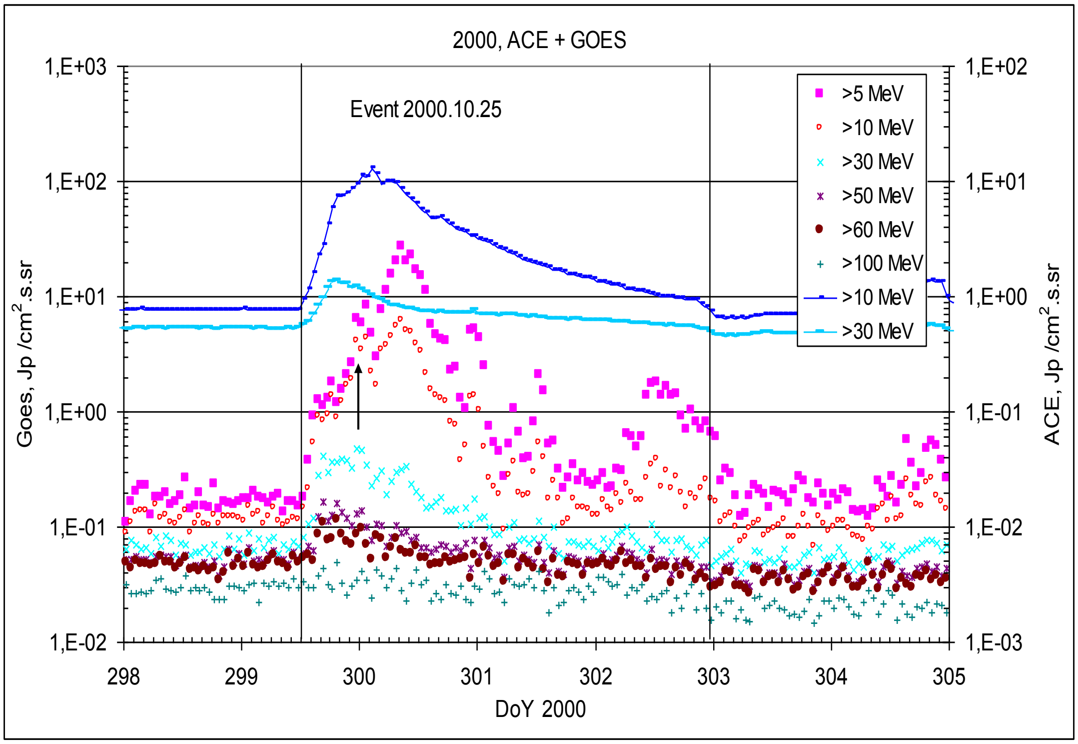
CME: 25d08^{h}26^m, V= 0770 km/s, Δφ = 360^o, dA = 275^o

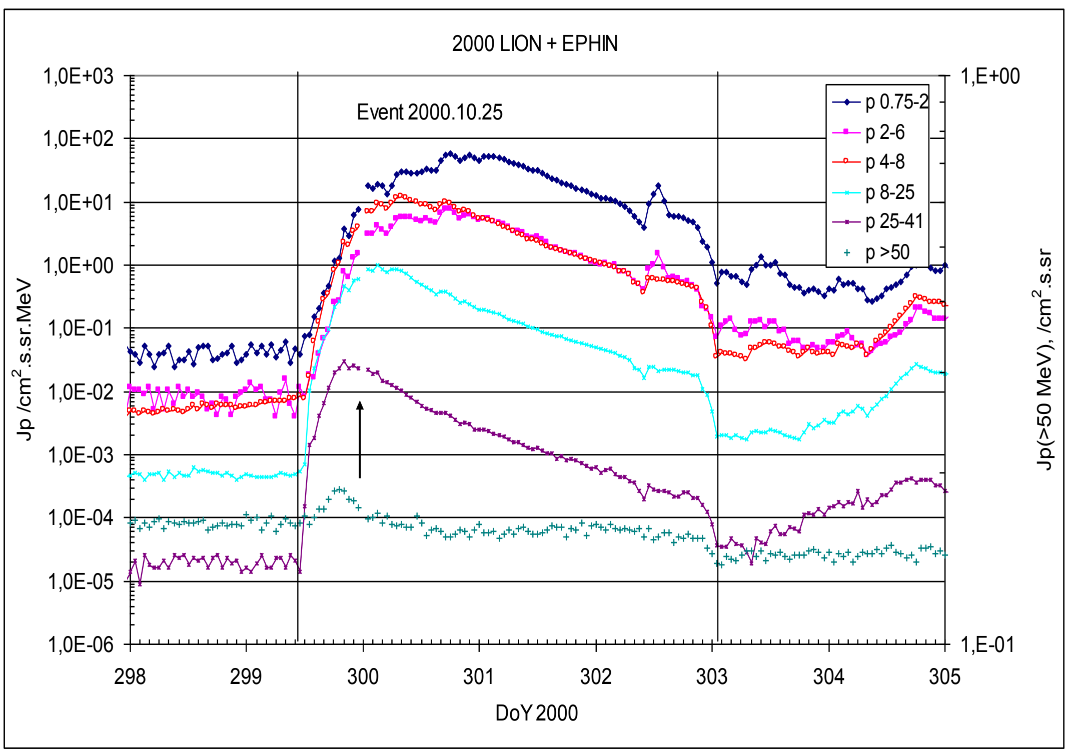
▲SC 28d09^{h}54^m

Particle fluxes and associated phenomena



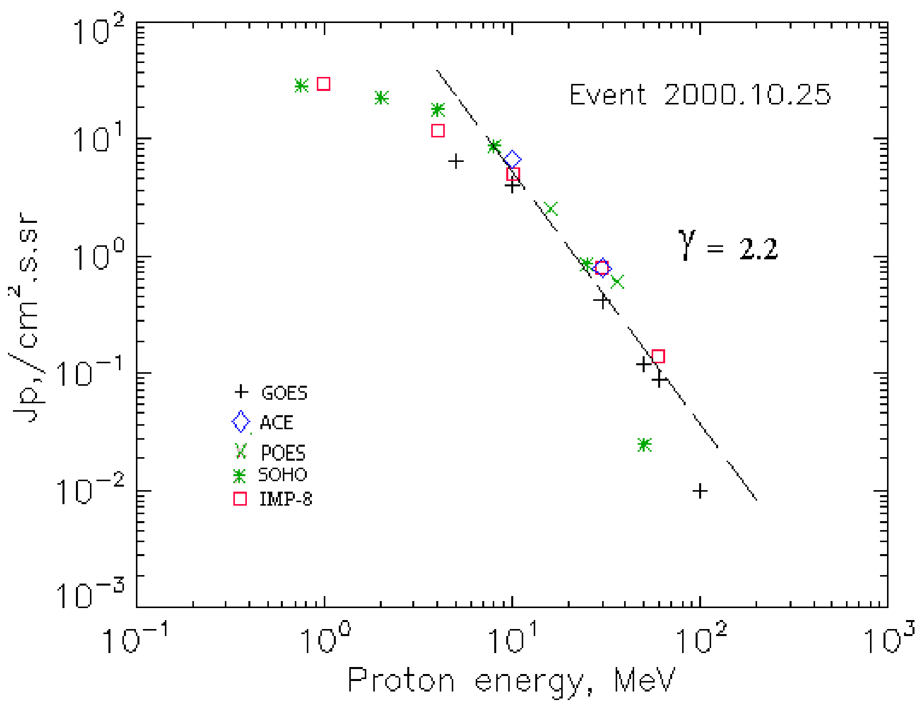
Time profiles of the proton fluxes for the event of 2000 October 25





Arrows on the profiles of the events indicate the time of the proton flux maxima, taken to build the proton spectra (see below)

Integral time-of-maximum proton spectrum



Integral fluxes of protons for the event of 2000 October 25

S/c, instruments	Ep, MeV	To	Tmax	Jmax, /cm^2.s.sr	Duration	Comments
GOES-10						
EPS	>5	13^h	23^h	6.5	3d	
EPS	>10	13^h	23^h	4.1	3d	
EPS	>30	13^h	23^h	0.42	2d	
EPS	>50	13^h	23^h	0.12	2d	
EPS	>60	-	24^h	0.09	1.5d	
EPS	>100	-	24^h	0.01	-	
POES-16						
MEPED	>0.24	-	-	-	-	
MEPED	>0.8	-	-	-	-	
MEPED	>2.5	-	-	-	-	
MEPED	>6.9	-	-	-	-	
MEPED	>16	-	19^h	2.52	3d	
MEPED	>36	-	19^h	0.6	2d	
MEPED	>70	-	-	-	-	
MEPED	>140	-	-	-	-	
IMP-8						
CPME	>1	13^h	23^h	30	3d	
CPME	>4	13^h	23^h	12	3d	
CPME	>10	13^h	22^h	5	3d	
CPME	>30	13^h	21^h	0.8	1d	
CPME	>60	13^h	21^h	0.14	1d	
ACE						
SIS	>10	12^h	20^h	6.8	2 d	
SIS	>30	12^h	19^h	0.8	5 h	

SOHO						
EPHIN (INT)	>50	12^h	20^h	0.025	0.5d	

Differential fluxes of protons for the event of 2000 October 25

S/c, instruments	ΔE, MeV	To	Tmax	Jmax /cm^2.s.sr.MeV	Dura-tion	Comments
IMP-8						
CPME	1-2	13^h	$26d02^h$	19	3d	
CPME	2-4.6	13^h	$26d02^h$	8.5	3d	
CPME	4.6-15	13^h	22^h	0.8	3d	
CPME	15-25	13^h	22^h	024	3d	
CPME	25-48	13^h	21^h	0.026	1.5d	
CPME	48-96	13^h	19^h	0.002	1.5d	
CPME	96-145	-	-	-	-	
CPME	145-440	-	-	-	-	
SOHO						
LION	0,75-2	12^h	20^h	3.6	3.5d	
LION	2-6	12^h	19^h	1.1	3.5d	
EPHIN	4-8	12^h	20^h	2.3	3.5d	
EPHIN	8-25	12^h	20^h	0.47	3.5d	
EPHIN	25-41	12^h	20^h	0.031	3.5d	
EPHIN	41-53	- “ -	- “ -	- “ -	- “ -	

Electromagnetic and other phenomena that are sources and/or accompanying for the event of 2000 October 25

2000 October 25 ⊡ AR To event 380

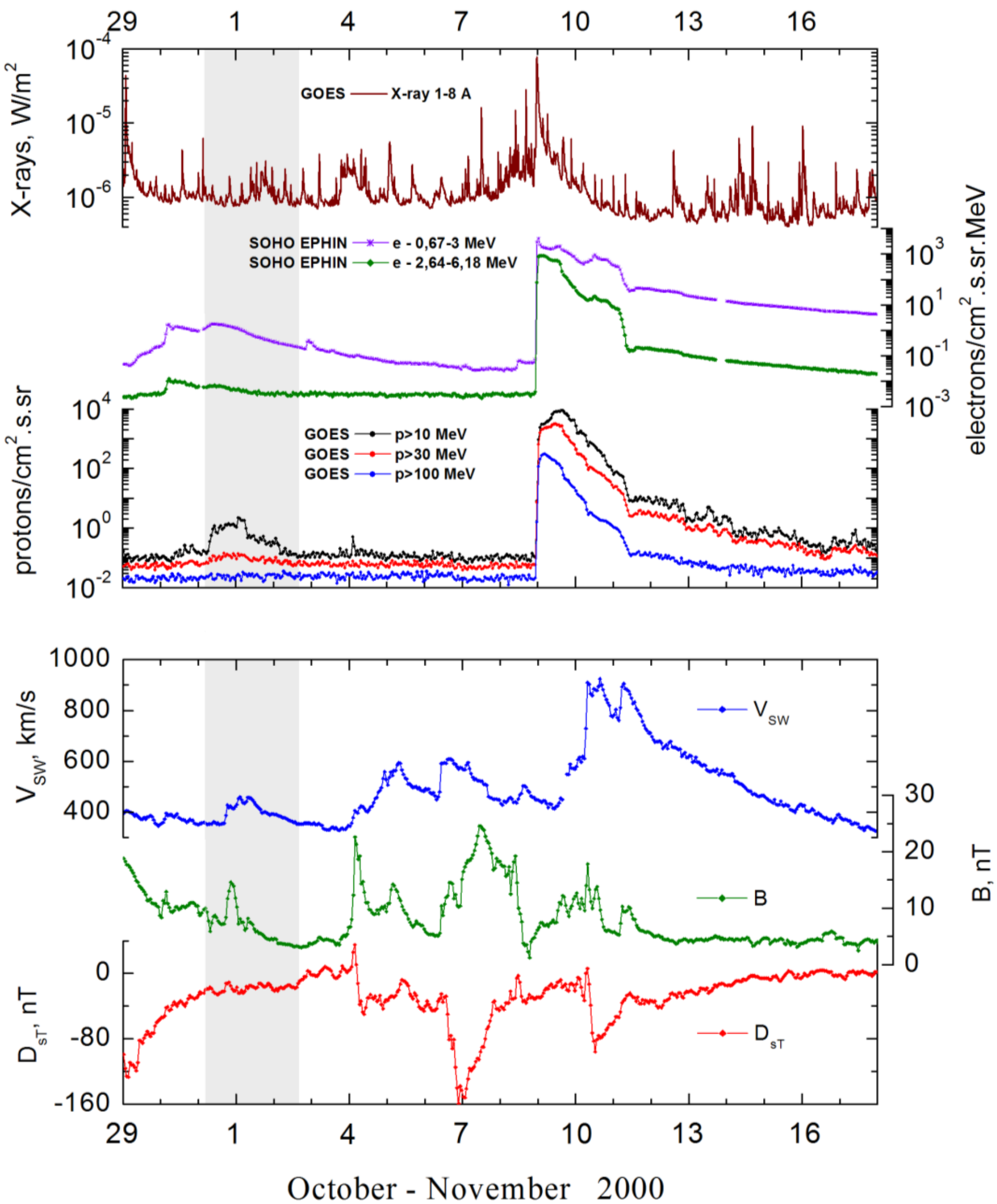
Hα	6563 Å	No Flare					
1 -12.5	keV	0845	1125	1521		C4.0	6.5E-2
CME	WL	0826	0770 km/s	17.4km/s^2	360º	275º	

Event 2000.10.31 – (2000-305) **№ 381**

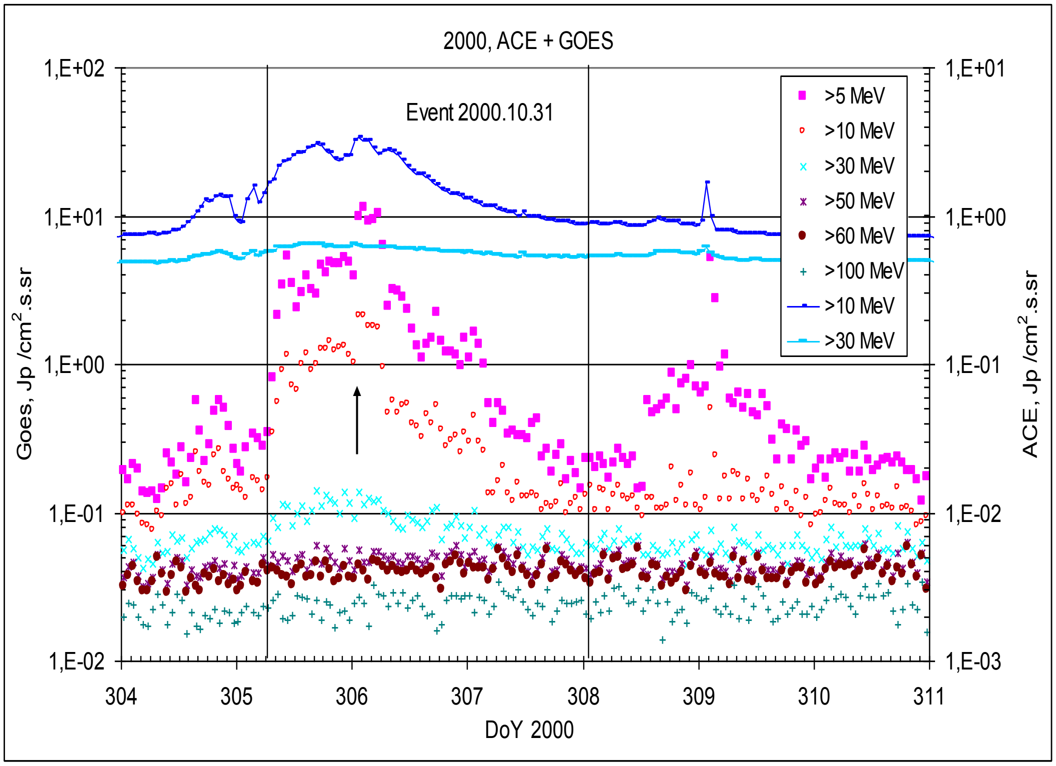
Particle event: To(Ep>10 MeV) – 31d07^h
Tmax(Ep>10 MeV) – 01d03^h, Jmax (Ep>10 MeV) – 2.1/cm^2.s.sr
Duration of the event – 3 days
Quasimaximal energy of protons in the event – Eqm = 70 MeV

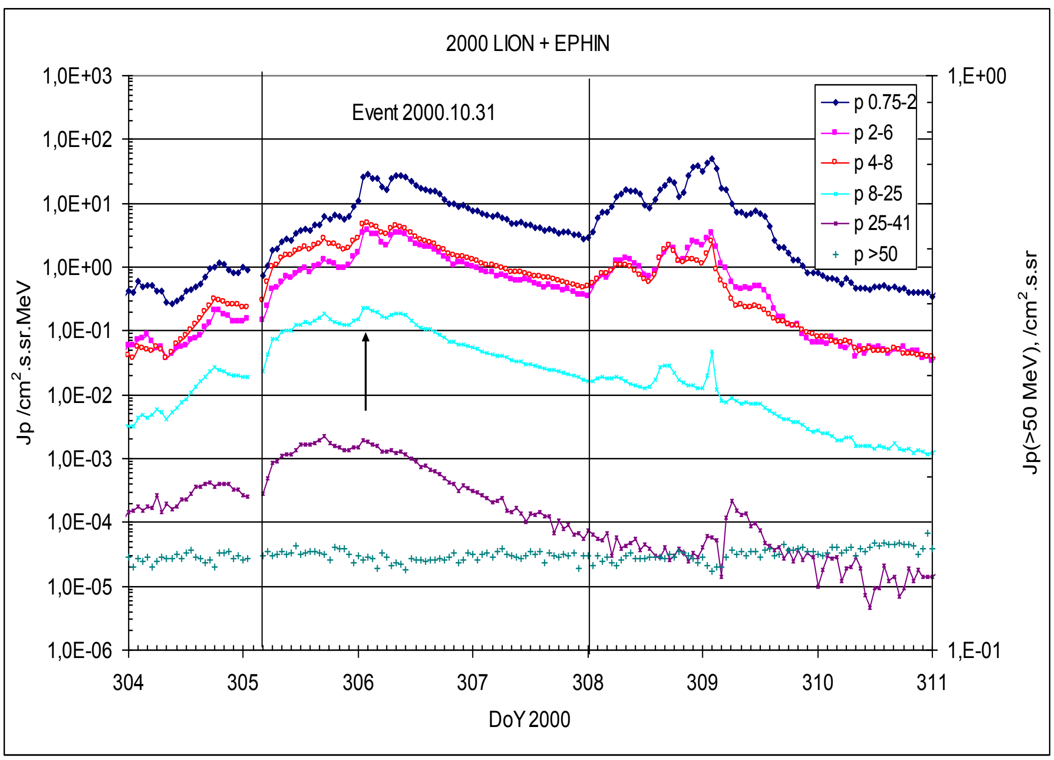
Sources: o solar flare 31d02^{h}51^m, C6.0/1N, S20E08, AR9209
Main X-ray burst 1-8 Å: onset – 31d02^{h}51^m, max – 31d03^{h}00^m, Φ = 0.0036 J/m^2
CME: 31d03^{h}50^m, V = 0074 km/s, Δφ = 189^o, dA = 113^o
▲SC 31d17^{h}14^m

Particle fluxes and associated phenomena



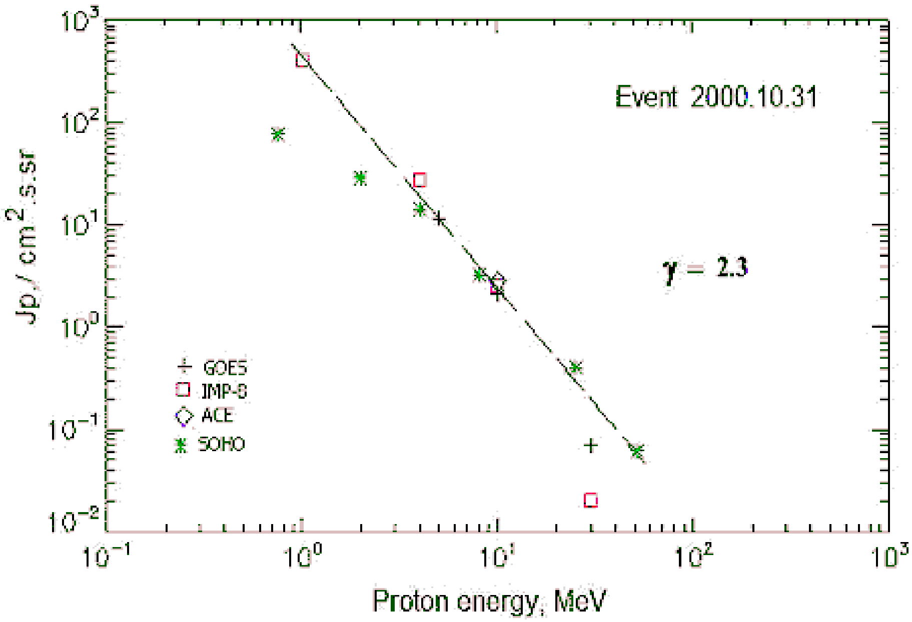
Time profiles of the proton fluxes for the event of 2000 October 31





Arrows on the profiles of the events indicate the time of the proton flux maxima, taken to build the proton spectra (see below)

Integral time-of-maximum proton spectrum



Integral fluxes of protons for the event of 2000 October 31

S/c, instruments	Ep, MeV	To	Tmax	Jmax, $/cm^2.s.sr$	Dura-tion	Comments
GOES 10						
EPS	>5	07^h	$01d03^h$	11.5	3d	
EPS	>10	07^h	$01d03^h$	2.1	3d	
EPS	>30	07^h	$01d01^h$	0.07	2d	
EPS	>50	-	-	-	-	
EPS	>60	-	-	-	-	
EPS	>100	-	-	-	-	
IMP-8						
CPME	>1	03^h	$01d02^h$	420	3d	
CPME	>4	03^h	$01d02^h$	28	3d	
CPME	>10	03^h	$01d02^h$	2.6	2d	
CPME	>30	03^h	$01d02^h$	0.02	-	
CPME	>60	-	-	-	-	
ACE						
SIS	>10	03^h	$01d02^h$	2.8	2d	
SIS	>30	-	--	-	-	
SOHO						
EPHIN (INT)	>50	-	21^h	0.006	-	

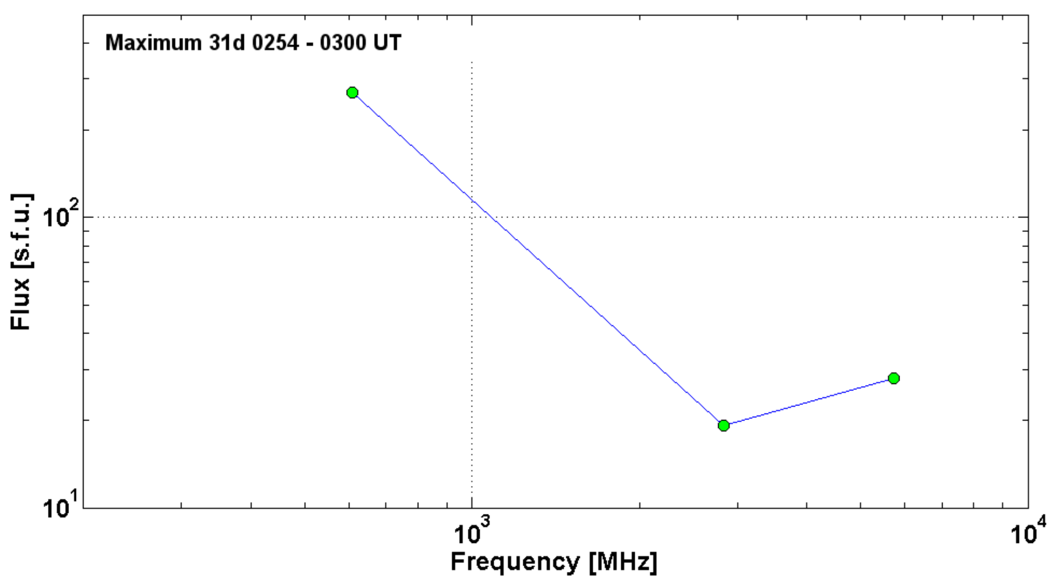
Differential fluxes of protons for the event of 2000 October 31

S/c, instruments	ΔE, MeV	To	Tmax	Jmax /cm^2.s.sr.MeV	Dura-tion	Comments
IMP-8						
CPME	1-2	06^h	01d02^h	315	3d	
CPME	2-4.6	06^h	01d02^h	43.8	3d	
CPME	4.6-15	06^h	01d02^h	1.9	3d	
CPME	15-25	06^h	01d02^h	0.06	3d	
CPME	25-48	06^h	01d02^h	0.0018	2d	
CPME	48-96	-	-	-	-	
CPME	96-145	-	-	-	-	
CPME	145-440	-	-	-	-	
SOHO						
LION	0,75-2	05^h	01d02^h	28	3d	
LION	2-6	05^h	01d02^h	3.7	3d	
EPHIN	4-8	05^h	01d02^h	4.7	3d	
EPHIN	8-25	05^h	01d02^h	0.22	3d	
EPHIN	25-41	05^h	01d02^h	0.002	3d	
EPHIN	41-53	- “ -	- “ -	- “ -	- “ -	

Electromagnetic and other phenomena that are sources and/or accompanying for the event of 2000 October 31

2000 **October 31** O **AR9209** **To event 381**

Hα		0253	0300	0320	S20E08	1N	EF
1 -12.5	keV	0251	0300	0307		C6.0	3.6E-03
5.7	GHz	0252.7	0300.0	0321.5		1.45	
2.8	GHz	0251.0	0254.8	0306.0		1.28	
610	MHz	0259.0	0259.0	~0259.0		2.43	
CME	WL	0350	0074km/s	2.5km/s^2	189°	113°	

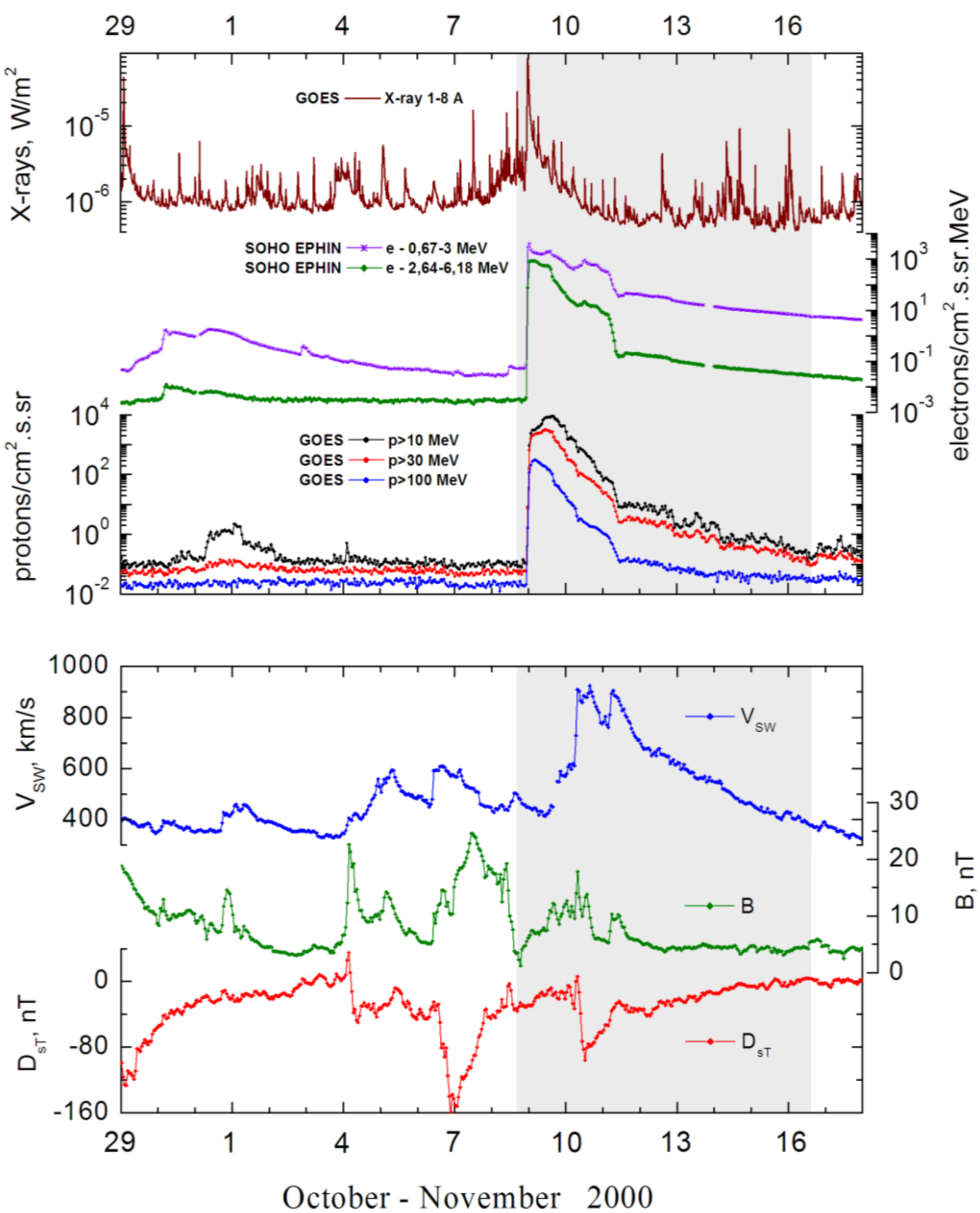


Event 2000.11.08 – (2000-313) **№ 382**

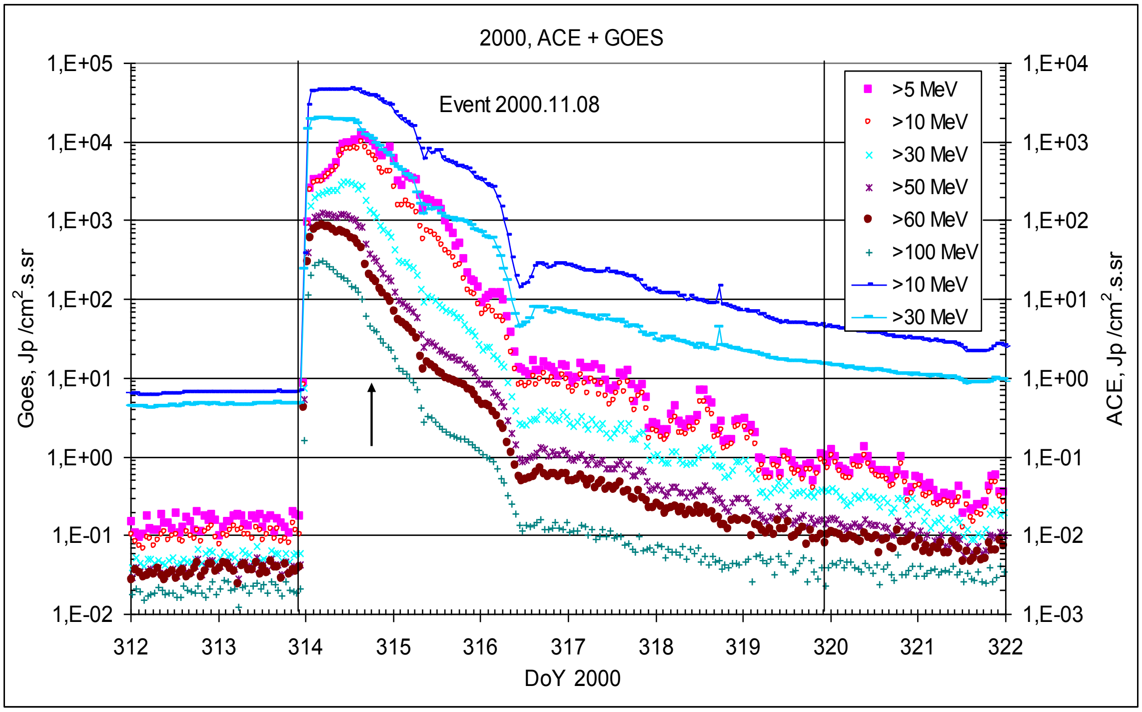
Particle event: To(Ep>10 MeV) – 08d23^{h}
Tmax(Ep>10 MeV) – 09d15^{h}, Jmax (Ep>10 MeV) –9.7·10^{3}/cm^{2}.s.sr
Duration of the event – 8 days
Quasimaximal energy of protons in the event – Eqm = 650 MeV

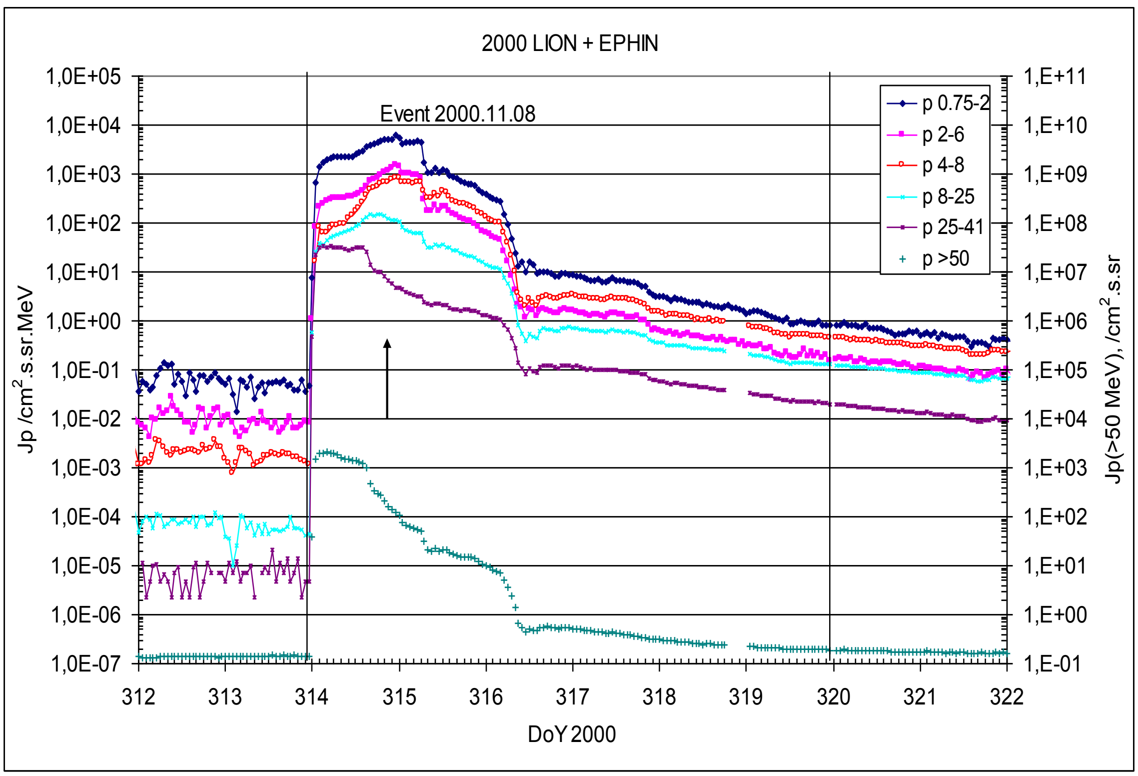
Sources: ● solar flare 08d22^{h}40^{m}, 3F/M7.4, N20W66, AR9213
Main X-ray burst 1-8 Å: onset – 08d22^{h} 42^{m}, max – 08d23^{h} 28^{m}, Φ = 0.21 J/m^{2}
CME: 08d23^{h}06^{m} , V = 1738 km/s, Δφ = 170^{o}, dA = 299^{o}
▲SC 10d06^{h}28^{m}

Particle fluxes and associated phenomena



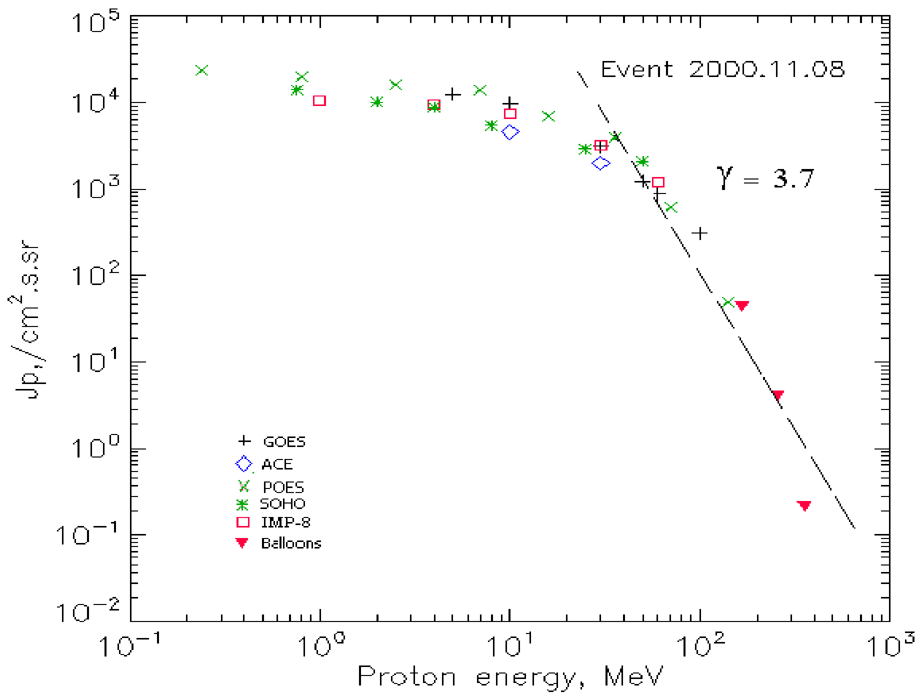
Time profiles of the proton fluxes for the event of 2000 November 08





Arrows on the profiles of the events indicate the time of the proton flux maxima, taken to build the proton spectra (see below)

Integral time-of-maximum proton spectrum



Integral fluxes of protons for the event of 2000 November 08

S/c, instruments	Ep, MeV	To	Tmax	Jmax, /cm^2.s.sr	Dura-tion	Comments
GOES-10						
EPS	>5	23^h	09d15^h	12524	8d	
EPS	>10	23^h	09d15^h	9740	6d	
EPS	>30	23^h	09d11^h	3113	6d	
EPS	>50	23^h	09d04^h	1239	6d	
EPS	>60	23^h	09d04^h	877	5d	
EPS	>100	23^h	09d04^h	306	5d	
POES-16						
MEPED	>0.24	-	09d04^h	23230	8d	
MEPED	>0.8	-	09d04^h	19670	8d	
MEPED	>2.5	-	09d04^h	15740	6d	
MEPED	>6.9	-	09d04^h	13670	6d	
MEPED	>16	-	09d04^h	7000	8d	
MEPED	>36	-	09d04^h	3884	6d	
MEPED	>70	-	09d04^h	625	5d	
MEPED	>140	-	09d04^h	50	5d	
IMP-8						
CPME	>1	23^h	09d09^h	10500	8 d	
CPME	>4	23^h	09d08^h	9320	8 d	
CPME	>10	23^h	09d08^h	7310	8 d	
CPME	>30	23^h	09d04^h	3220	6 d	
CPME	>60	23^h	09d04^h	1200	6 d	
ACE						
SIS	>10	23^h	09d06^h	4570	6d	
SIS	>30	23^h	09d05^h	1980	6d	

SOHO						
EPHIN (INT)	>50	23^h	$09d04^h$	2080	5d	
BALLOONS						
Mi-1	>167		$09d09^h$	43.2		
Mi-1	>259		$09d09^h$	4.0		
Mi-1	>356		$09d09^h$	0.21		

Differential fluxes of protons for the event of 2000 November 08

S/c, instruments	ΔE, MeV	To	Tmax	Jmax /cm^2.s.sr.MeV	Dura-tion	Comments
IMP-8						
CPME	1-2	23^h	$09d03^h$	200	8d	
CPME	2-4.6	23^h	$09d03^h$	260	8d	
CPME	4.6-15	23^h	$09d03^h$	167	8d	
CPME	15-25	23^h	$09d03^h$	200	8d	
CPME	25-48	23^h	$09d03^h$	79	8d	
CPME	48-96	23^h	$09d03^h$	32	7d	
CPME	96-145	23^h	$09d03^h$	10	6d	
CPME	145-440	23^h	$09d00^h$	1.1	5d	
SOHO						
LION	0,75-2	23^h	$09d07^h$	2320	8d	
LION	2-6	23^h	$09d07^h$	320	8d	
EPHIN	4-8	23^h	$09d06^h$	85	8d	
EPHIN	8-25	23^h	$09d06^h$	55	8d	
EPHIN	25-41	23^h	$09d05^h$	35	6d	
EPHIN	41-53	- “ -	- “ -	- “ -	- “ -	

References:

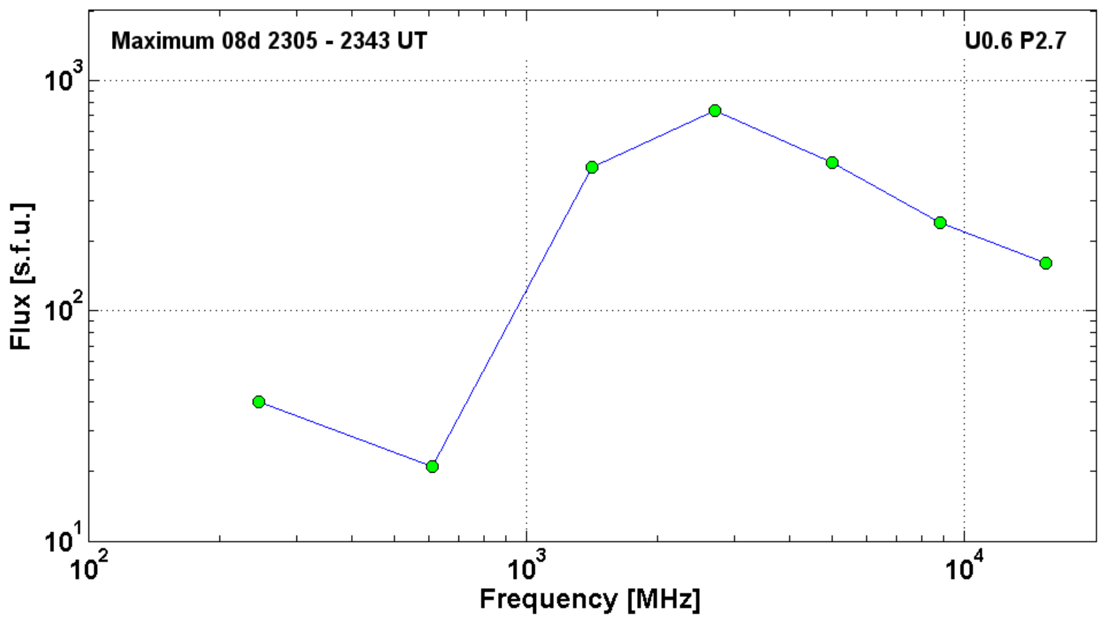
El-Borie M.A., 2003a.
El-Borie M.A., 2003b.
Struminsky A.B., 2003.
Nitta N.V., E.W. Cliver, A.J. Tylka, and P. Smit, 2003.
Al-Thoyaib S.S., 2005.
Rawat R., S. Alex, and G.S. Lakhina., 2006.
Kuwabara T., J.W. Bieber, J. Clem et al., 2006.
Lario D., R.B. Decker, and A. Aran., 2008.
Lario D., A. Aran, R.B. Decker, 2009.

Electromagnetic and other phenomena that are sources and/or accompanying for the event of 2000 November 08

2000 November 08 ● AR9213 To event 382

Hα	6563 Å	2240	2323	0030	N20W66	3F	F
1 -12.5	keV	2242	2328	0005		M7.4	2.1E-1
50 – 150	keV	<2316	~2316	2355		236	HXT Y

15.4	GHz	2306.0	2343.0	0012.0		2.20	
8.8	GHz	2305.0	2318.0	0041.0		2.38	
5	GHz	2300.0	2318.0	0041.0		2.64	
2.7	GHz	2258.0	2318.0	0052.0	U0.6 P2.7	2.87	
1.4	GHz	2258.0	2318.0	0027.0		2.62	
610	MHz	2326.0	2326.0	~2326.0		1.32	
245	MHz	2304.0	2305.0	2305.0		1.60	
DS IV	25-180	2251		2330		1	
DS IV	500-2000	2306		2345		1	
DS III	25-400	2249		2324	G	2	
DS III	25-106	2330		0002	N	1	
DS UNCLF	100-200	2316		2322		2	
CME	WL	2306	1738 km/s	69.9km/s^2	170º	299º	

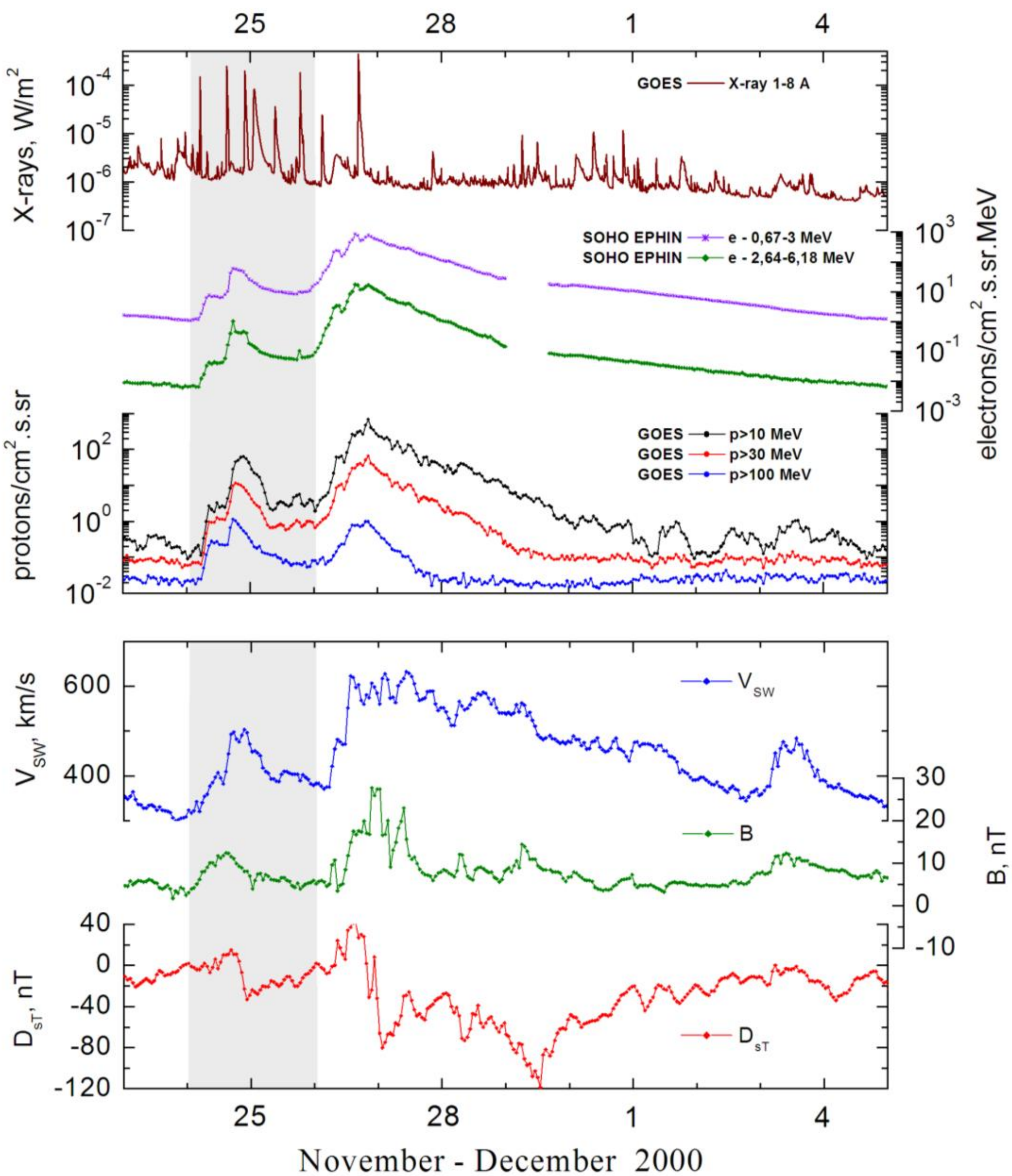


Event 2000.11.24 – (2000-329) **№ 383**

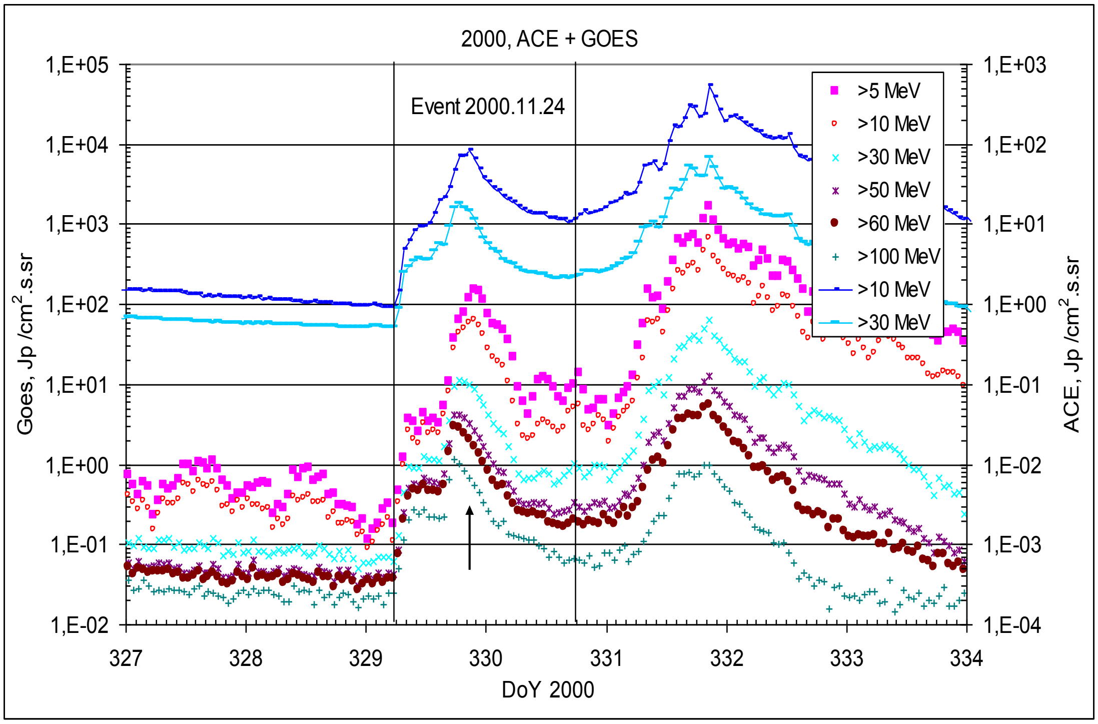
Particle event: To(Ep>10 MeV) – 24d07^h
Tmax(Ep>10 MeV) – 24d21^h, Jmax (Ep>10 MeV) – 65 /cm^2.s.sr
Duration of the event – 1.5 days
Quasimaximal energy of protons in the event – Eqm = 460 MeV

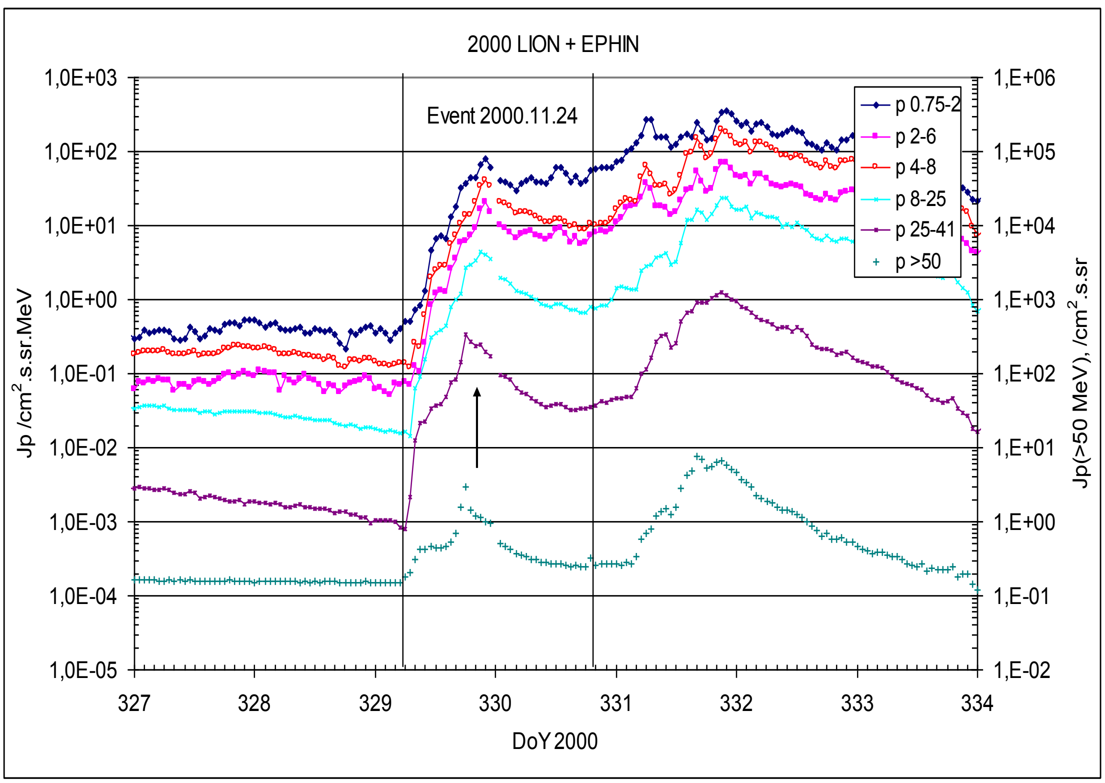
Sources: ● solar flare 24d04^{h}55^m, X2.0/3B, N20W05, AR9236
Ø solar flare 24d14^{h}51^m, X2.3/2B, N20W08, AR9236
Main X-ray burst 1-8 Å: onset –24d04^{h}55^m, max – 24d05^{h}02^m, Φ = 0.083 J/m^2
CME: 24d05^{h}30^m, V = 1298 km/s, Δφ = 360^o, dA = 313^o

Particle fluxes and associated phenomena



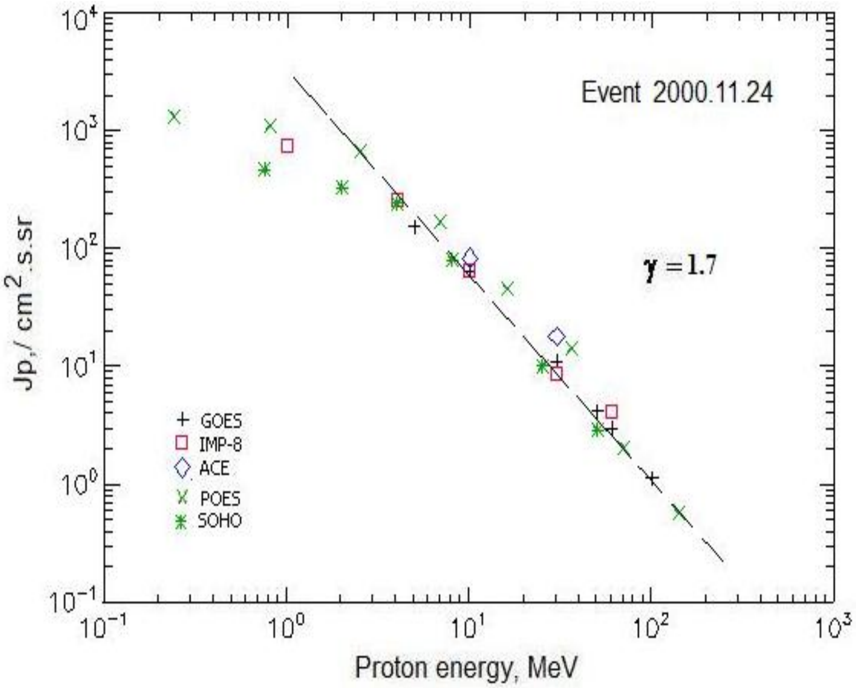
Time profiles of the proton fluxes for the event of 2000 November 24





Arrows on the profiles of the events indicate the time of the proton flux maxima, taken to build the proton spectra (see below)

Integral time-of-maximum proton spectrum



Integral fluxes of protons for the event of 2000 November 24

S/c, instruments	Ep, MeV	To	Tmax	Jmax, /cm^2.s.sr	Dura-tion	Comments
GOES-10						
EPS	>5	07^h	21^h	153	1.5d	
EPS	>10	07^h	21^h	65	1.5d	
EPS	>30	07^h	18^h	11	1.5d	
EPS	>50	07^h	18^h	4.2	1.5d	
EPS	>60	07^h	17^h	3	1.5d	
EPS	>100	07^h	17^h	1.1	1.5d	
POES-16						
MEPED	>0.24	-	24^h	1360	1.5d	
MEPED	>0.8	-	24^h	1100	1.5d	
MEPED	>2.5	-	24^h	660	1.5d	
MEPED	>6.9	-	24^h	170	1.5d	
MEPED	>16	-	18^h	46	1.5d	
MEPED	>36	-	18^h	14.3	1.5d	
MEPED	>70	-	18^h	2.05	1.5d	
MEPED	>140	-	18^h	0.56	1.5d	
IMP-8						
CPME	>1	06^h	21^h	748	1.5 d	
CPME	>4	06^h	21^h	255	1.5 d	
CPME	>10	06^h	21^h	66	1.5 d	
CPME	>30	06^h	20^h	8.7	1.5 d	
CPME	>60	06^h	18^h	4.2	1.5 d	
ACE						
SIS	>10	06^h	20^h	83	1.5 d	
SIS	>30	06^h	18^h	18	1.5 d	

SOHO						
EPHIN (INT)	>50	07^h	18^h	3	1.5d	

Differential fluxes of protons for the event of 2000 November 24

S/c, instruments	ΔE, MeV	To	Tmax	Jmax /cm^2.s.sr.MeV	Dura-tion	Comments
IMP-8						
CPME	1-2	07^h	21^h	243	1.5d	
CPME	2-4.6	07^h	21^h	115	1.5d	
CPME	4.6-15	07^h	21^h	17.9	1.5d	
CPME	15-25	07^h	19^h	2.6	1,5d	
CPME	25-48	07^h	19^h	0.33	1.5d	
CPME	48-96	07^h	18^h	0.08	1.5d	
CPME	96-145	-	-	-	-	
CPME	145-440	-	-	-	-	
SOHO						
LION	0,75-2	07^h	21^h	78	1.5d	
LION	2-6	07^h	21^h	20.6	1.5d	
EPHIN	4-8	07^h	21^h	41.3	1.5d	
EPHIN	8-25	07^h	21^h	4.1	1.5d	
EPHIN	25-41	07^h	18^h	0.34	1.5d	
EPHIN	41-53	- “ -	- “ -	- “ -	- “ -	

References:

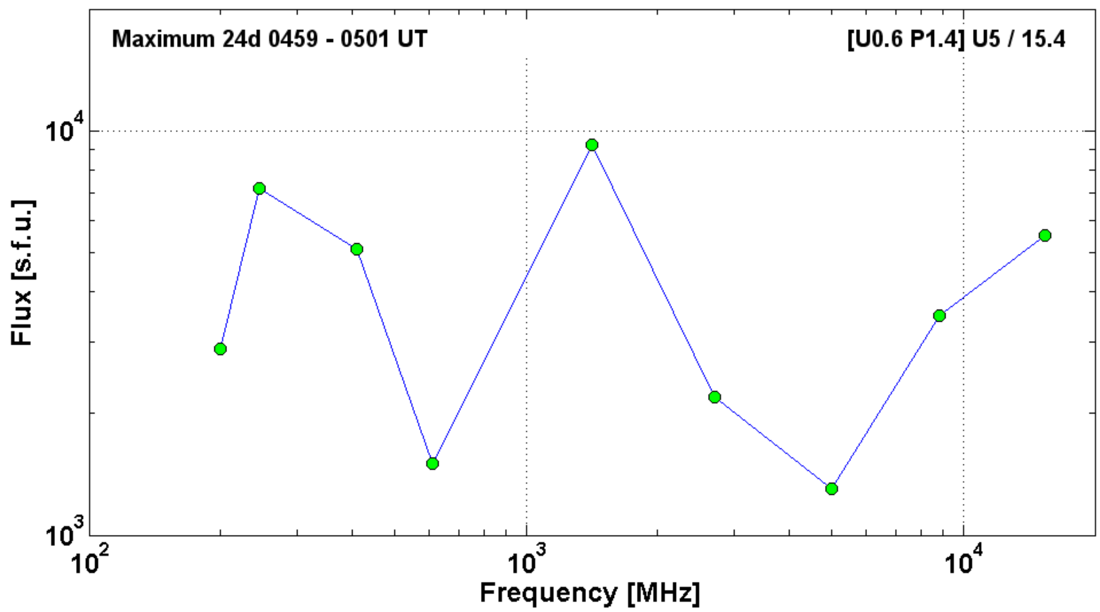
Kuwabara T., J.W. Bieber, J. Clem et al., 2006.

Electromagnetic and other phenomena that are sources and/or accompanying for the event of 2000 November 24

2000 November 24 • AR9236 To event 383

Hα	6563 Å	0457	0501	0535	N20W05	3B	EF
1 -12.5	keV	0455	0502	0508		X2.0	8.3E-2
15.4	GHz	0458.0	0500.0	0516.0	U5 / 15.4	3.74	
8.8	GHz	0458.0	0500.0	0520.0		3.54	
5	GHz	0458.0	0501.0	0512.0		3.11	
2.7	GHz	0458.0	0459.0	0507.0		3.34	
1.4	GHz	0458.0	0459.0	0507.0	[U0.6 P1.4]	3.96	

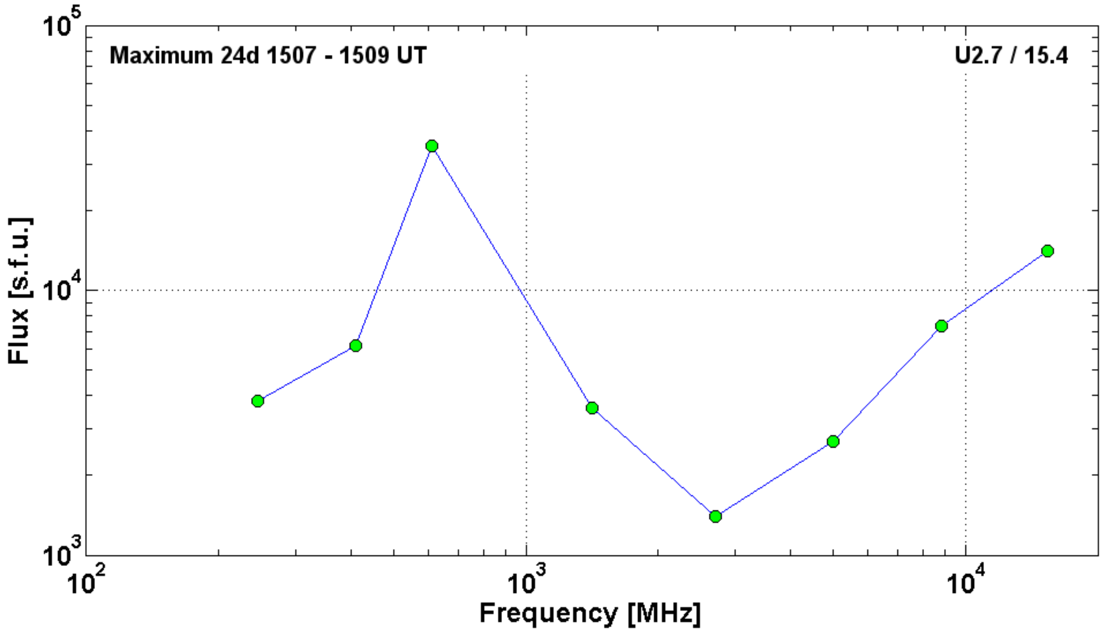
610	MHz	0458.0	0501.0	0510.0		3.18	
410	MHz	0458.0	0459.0	0506.0		3.71	
245	MHz	0458.0	0501.0	0506.0		3.86	
200	MHz	0459.0	0459.0	0514.0		3.46	
DS II	25-180	0502		0529		3	
DS III	18-900	0459		0502	G	3	
DS III	18-80	0510		0516	G	3	
CME	WL	0530	1298 km/s	2.1km/s^2	360º	313º	



2000 November 24 Ø AR9213 To event 383

Hα	6563 Å	1454	1510	1601	N20W08	2B	FH
1 -12.5	keV	1451	1513	1521		X2.3	1.6E-1
53 – 93	keV	1454	1511	1536		1498	HXT Y
1.2 – 5.6	MeV	1454	1508	1536		195	GRS Y
15.4	GHz	1500.0	1508.0	1612.0	U2.7 / 15.4	4.15	
8.8	GHz	1454.0	1509.0	1612.0		3.86	
5	GHz	1453.0	1508.0	1609.0		3.43	
2.7	GHz	1455.0	1508.0	1612.0		3.15	
1.4	GHz	1454.0	1508.0	1525.0		3.56	
610	MHz	1454.0	1508.0	1612.0		4.54	
410	MHz	1453.0	1509.0	1612.0		3.79	
245	MHz	1453.0	1507.0	1612.0		3.58	
DS II	30-80	1512		1523		3	
DS III	30-80	1457		1523	N	3	

°n						Bolivia	
CME	WL	1530	1454 km/s	-3.3km/s^2	360º	324º	



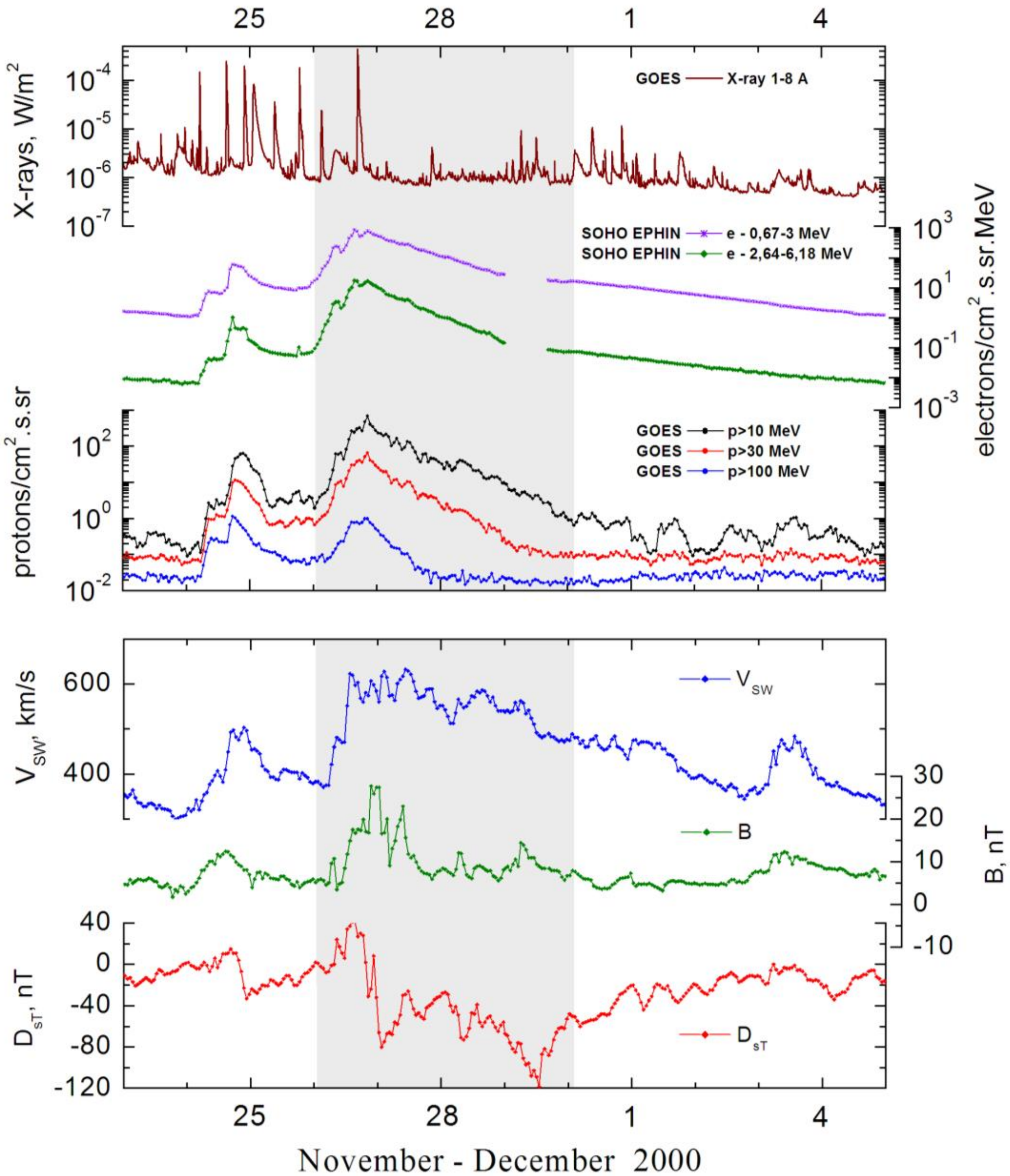
Список 2000 г.

Event 2000.11.26 – (2000-331) **№ 384**

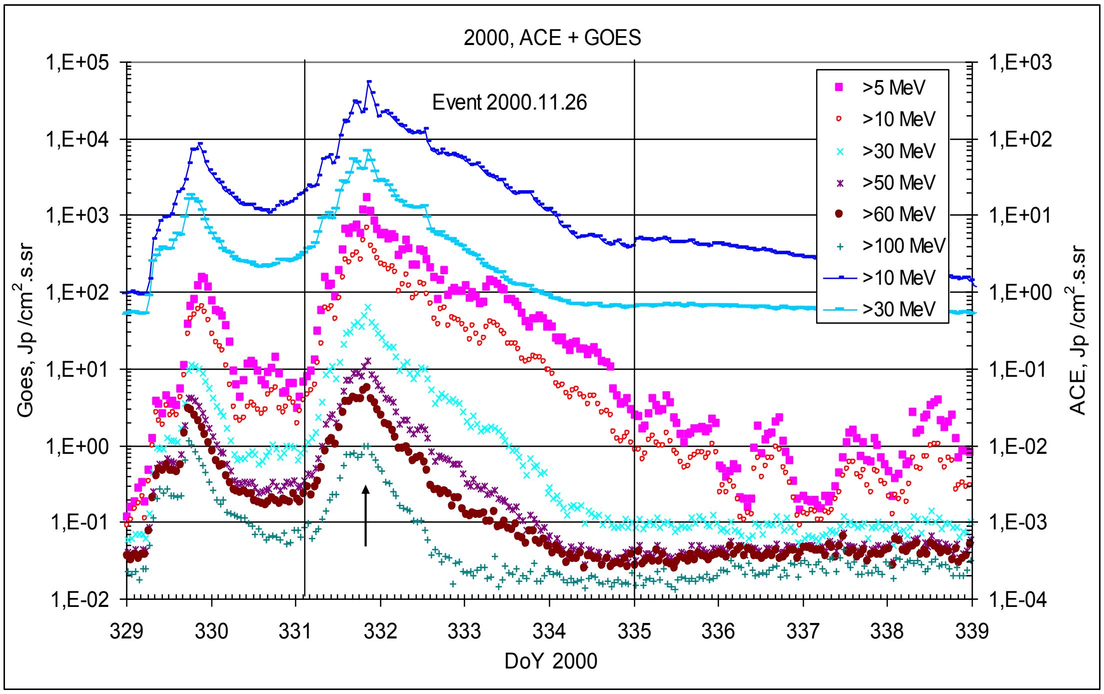
Particle event: To(Ep>10 MeV) – 26d03^h
Tmax(Ep>10 MeV) – 26d20^h, Jmax (Ep>10 MeV) – 670 /cm^2.s.sr
Duration of the event – 4 days
Quasimaximal energy of protons in the event – Eqm = 400 MeV

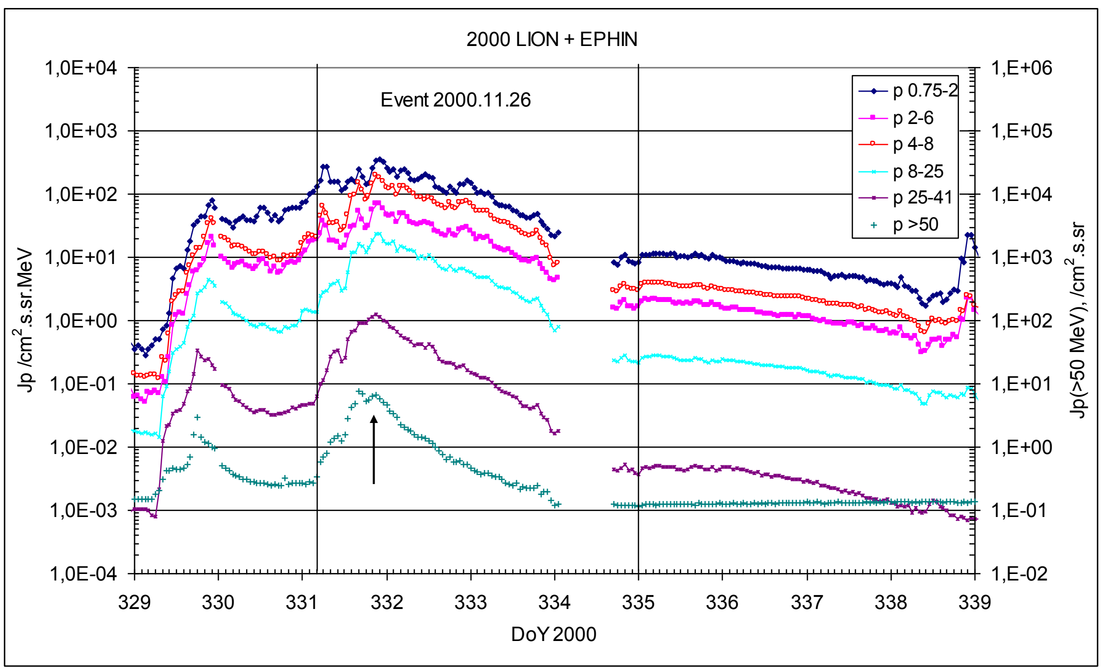
Sources: ● solar flare 25d00^{h}59^m, M8.2/2N, N07E50, AR9240
Ø solar flare 25d18^{h}33^m, X1.9/2B, N19W24, AR9236
Main X-ray burst 1-8 Å: onset – 25d00^{h}59^m, max – 25d01^{h}31^m, Φ = 0.21 J/m^2
CME: 26d01^{h}31^m , V = 2519 km/s, Δφ = 360^o , dA = 082^o
▲SC 26d07^{h}58^m, ▲SC 26d11^{h}58^m, ▲SC 28d05^{h}31^m

Particle fluxes and associated phenomena



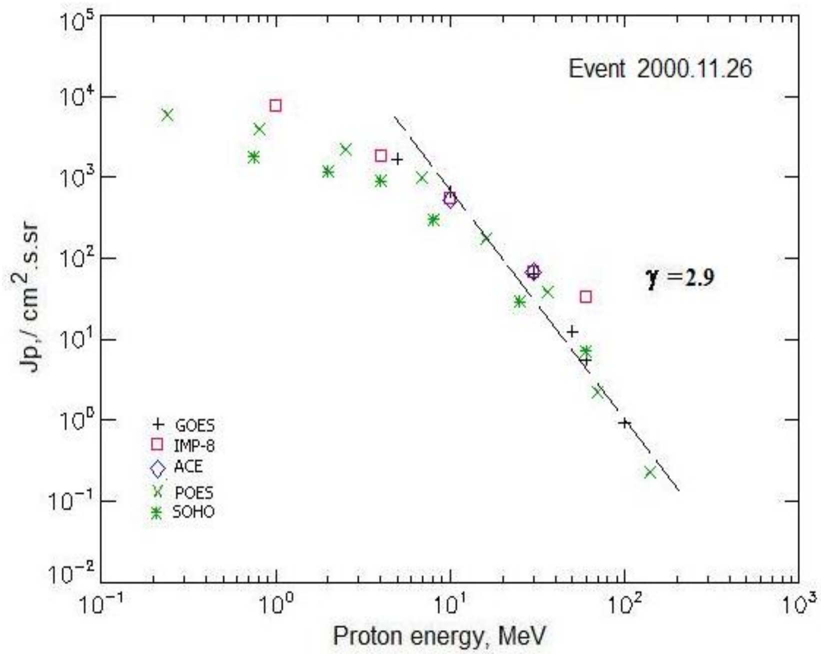
Time profiles of the proton fluxes for the event of 2000 November 26





Arrows on the profiles of the events indicate the time of the proton flux maxima, taken to build the proton spectra (see below)

Integral time-of-maximum proton spectrum



Integral fluxes of protons for the event of 2000 November 26

S/c, instruments	Ep, MeV	To	Tmax	Jmax, /cm^2.s.sr	Duration	Comments
GOES 10						
EPS	>5	03^h	20^h	1705	5d	
EPS	>10	03^h	20^h	670	4d	
EPS	>30	03^h	20^h	64.5	3d	
EPS	>50	03^h	20^h	12.6	2d	
EPS	>60	03^h	20^h	5.6	2d	
EPS	>100	03^h	20^h	0.95	1.5d	
POES 16						
MEPED	>0.24	-	17^h	5910	5d	
MEPED	>0.8	-	17^h	3820	5d	
MEPED	>2.5	-	17^h	2145	5d	
MEPED	>6.9	-	17^h	900	4d	
MEPED	>16	-	17^h	179.5	3d	
MEPED	>36	-	17^h	38	2d	
MEPED	>70	-	17^h	2.25	2d	
MEPED	>140	-	17^h	0.23	1.5d	
IMP-8						
CPME	>1	02^h	20^h	7600	5d	
CPME	>4	02^h	20^h	1900	5d	
CPME	>10	02^h	20^h	568	4d	
CPME	>30	02^h	20^h	70	4d	
CPME	>60	02^h	20^h	34	3d	
ACE						
SIS	>10	02^h	20^h	532	4d	
SIS	>30	02^h	20^h	68.5	3d	

SOHO						
EPHIN (INT)	>50	04^h	21^h	6.5	3d	

Differential fluxes of protons for the event of 2000 November 26

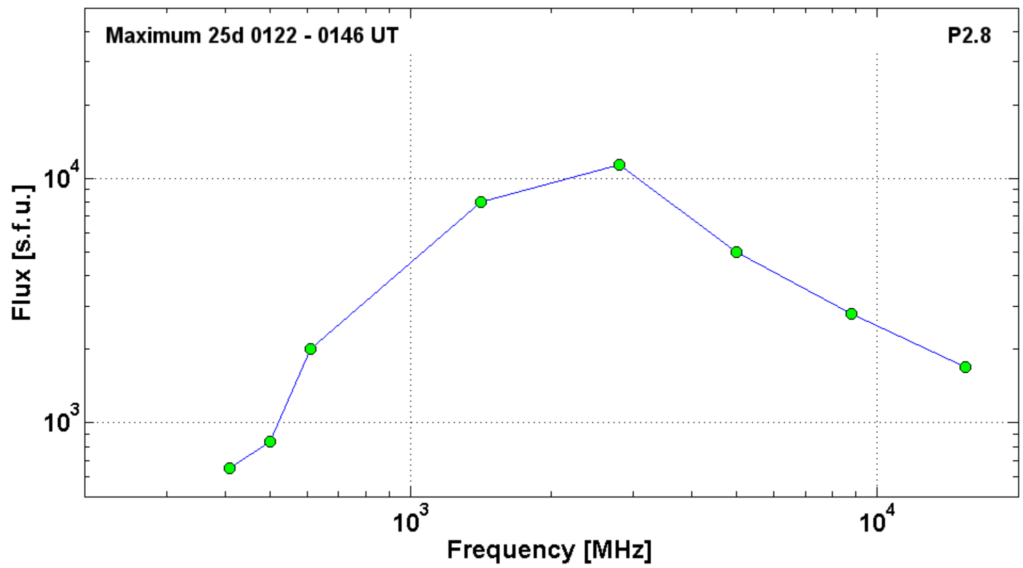
S/c, instruments	ΔE, MeV	To	Tmax	Jmax /cm^2.s.sr.MeV	Dura-tion	Comments
IMP-8						
CPME	1-2	01^h	20^h	3350	7d	
CPME	2-4.6	01^h	20^h	1110	7d	
CPME	4.6-15	01^h	20^h	124	6d	
CPME	15-25	01^h	20^h	24	5d	
CPME	25-48	01^h	20^h	2.2	4d	
CPME	48-96	01^h	20^h	0.24	4d	
CPME	96-145	-	-	-	-	
CPME	145-440	-	-	-	-	
SOHO						
LION	0,75-2	04^h	21^h	345	7d	
LION	2-6	04^h	21^h	70	7d	
EPHIN	4-8	04^h	21^h	193	7d	
EPHIN	8-25	04^h	21^h	23.7	6d	
EPHIN	25-41	04^h	21^h	1.1	6d	
EPHIN	41-53	- “ -	- “ -	- “ -	- “ -	

Electromagnetic and other phenomena that are sources and/or accompanying for the event of 2000 November 26

2000 November 25 ● AR9240 To event 384

Hα	6563 Å	0100	0106	0324	N07E50	2N	FU
1 -12.5	keV	0059	0131	0201		M8.2	2.1E-1
53 – 93	keV	0056	0122	0133		81	HXT Y
1.2 – 5.6	MeV	005535	012226	013239		1911	GRS Y
410	MHz	0113.0	0113.0	0125.0		2.73	
245	MHz	0107.0	0108.0	0225.0		2.94	
200	MHz	0108.0	0114.0	0130.0		2.56	
DS II	25-146	0107		0137		3	
DS IV	25-180	0107		1031		2	
DS IV	400-2000	0118		0259		2	
DS III	25-180	0104		0215	N	3	
15.4	GHz	0104.0	0122.0	0201.0		3.23	
8.8	GHz	0100.0	0122.0	0235.0		3.45	
5	GHz	0058.0	0122.0	0249.0		3.70	
2.8	GHz	0057.0	0131.0	0247.0	P2.8	4.05	
1.4	GHz	0055.0	0142.0	0245.0		3.90	

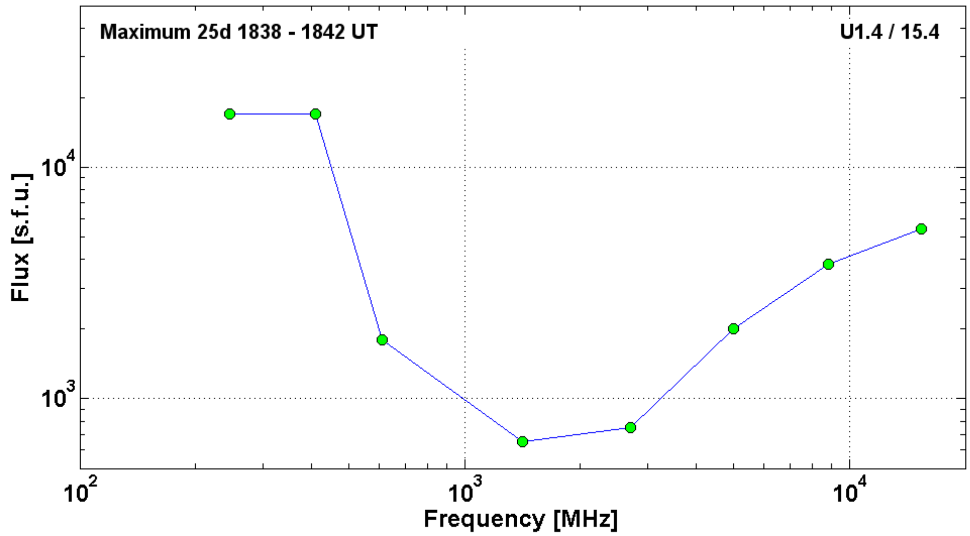
610	MHz	0103.0	0145.0	0239.0		3.30	
500	MHz	0059.0	0146.0	0221.0		2.92	
410	MHz	0113.0	0146.0	0223.0		2.81	
CME	WL	0131	2519 km/s	-5.0km/s^2	360º	082º	

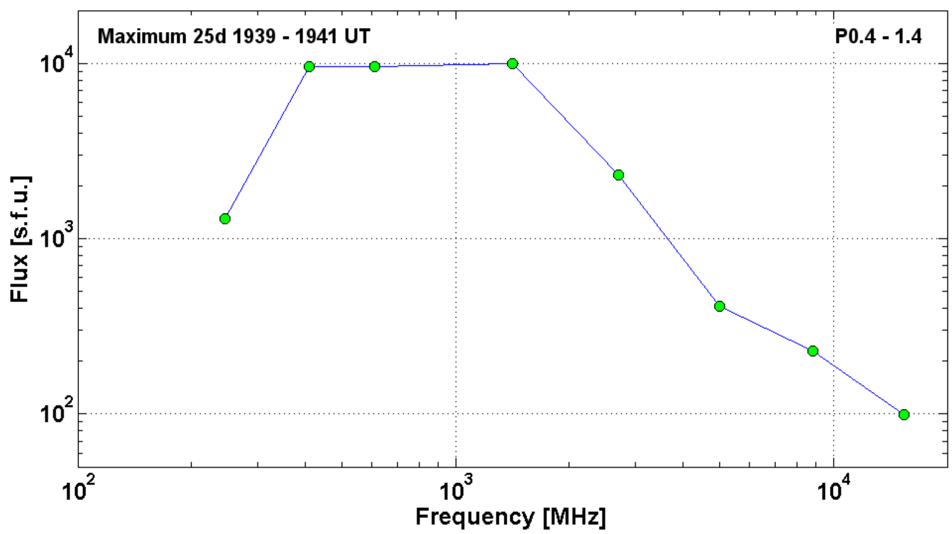


2000 November 25 Ø AR9236 To event 384

Hα	6563 Å	1836	1841	2016	N19W24	2B	EFU
1 -12.5	keV	1833	1844	1855		X1.9	1.5E-1
53 – 93	keV	1836	1842	1948		170	HXT Y
1.2 – 5.6	MeV	1836	1838	1948		137	GRS Y
15.4	GHz	1833.0	1838.0	1841.0	U1.4 / 15.4	3.73	
8.8	GHz	1835.0	1838.0	1907.0		3.58	
5	GHz	1833.0	1842.0	1843.0		3.30	
2.7	GHz	1834.0	1838.0	1841.0		2.88	
1.4	GHz	1833.0	1838.0	1841.0		2.81	
610	MHz	1836.0	1838.0	1907.0		3.26	
410	MHz	1835.0	1838.0	1841.0		4.23	
245	MHz	1833.0	1838.0	1841.0		4.23	
DS II	25-180	1839		1849		2	
DS II	30-80	1845		1857		3	
DS III	25-180	1838		1842		2	
2.7	GHz	1836.0	1904.0	1907.0		3.04	
1.4	GHz	1902.0	1903.0	1904.0		3.11	
610	MHz	1902.0	1904.0	1904.0		2.82	
410	MHz	1902.0	1903.0	1904.0		3.46	
245	MHz	1902.0	1902.0	1905.0		3.00	

15.4	GHz	1939.0	1941.0	1943.0		2.00	
8.8	GHz	1938.0	1941.0	1947.0		2.36	
5	GHz	1938.0	1941.0	1945.0		2.61	
2.7	GHz	1937.0	1941.0	1944.0		3.36	
1.4	GHz	1927.0	1939.0	1947.0	P0.4 - 1.4	4.00	
610	MHz	1932.0	1941.0	1947.0		3.98	
410	MHz	1938.0	1941.0	1945.0		3.98	
245	MHz	1938.0	1939.0	1942.0		3.11	
DS III	20-160	<2000		2210	S	1	
CME	WL	1932	1932 km/s	-10.8 km/s^2	360º	348º	





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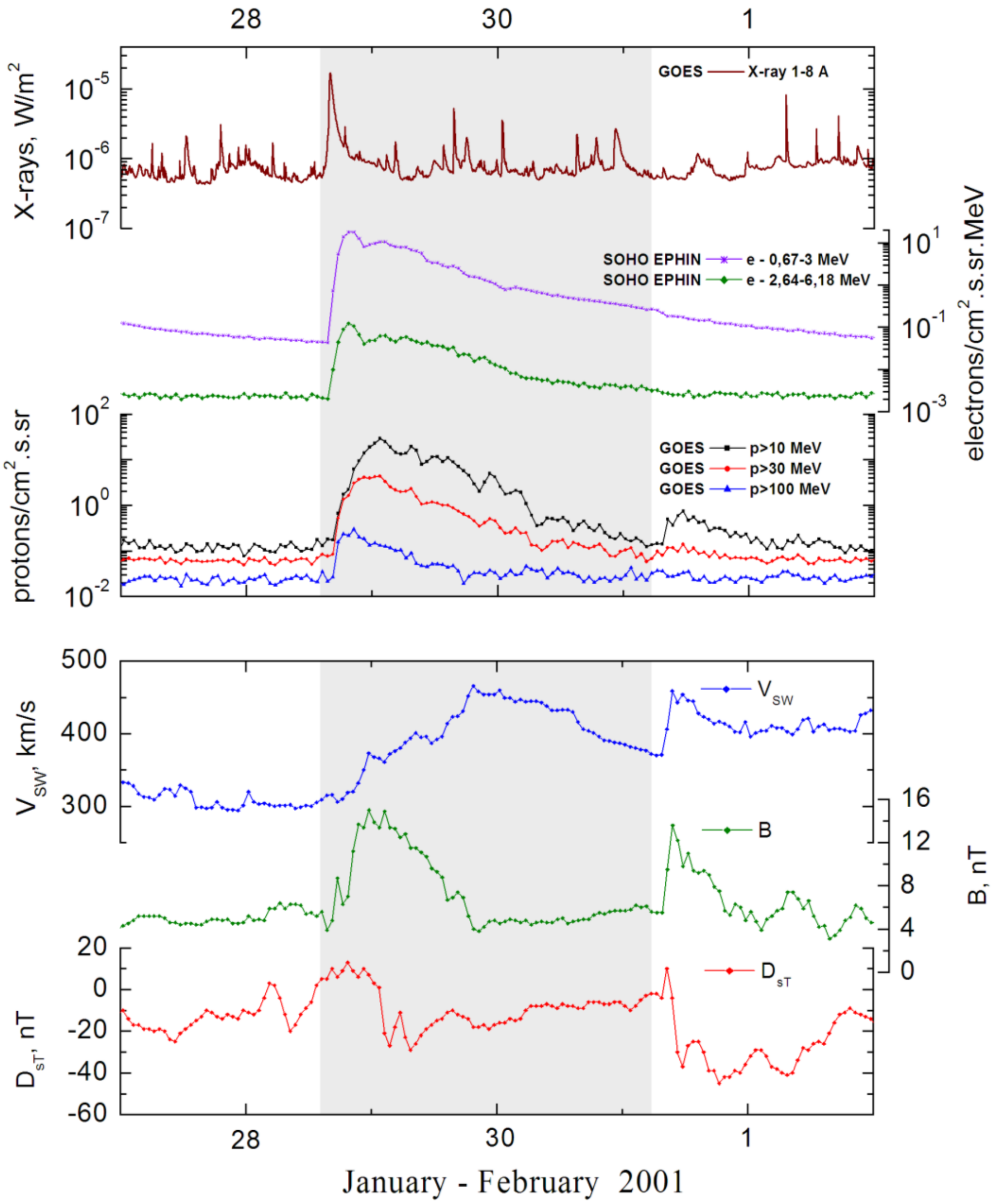
Event 2001.01.28 – (2001-028) **№ 385**

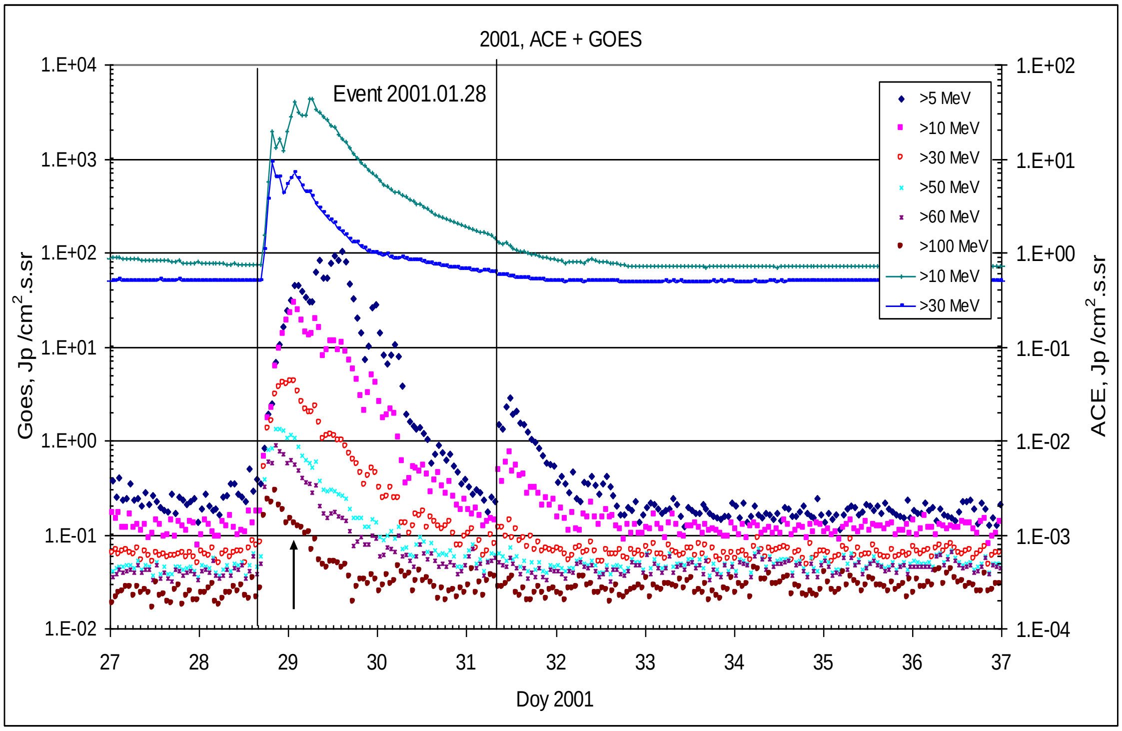
Particle event: To(Ep>10 MeV) – 28d18^h
Tmax(Ep>10 MeV) – 29d01^h, Jmax (Ep>10 MeV) – 29 /cm^2.s.sr
Duration of the event – 3 days
Quasimaximal energy of protons in the event – Eqm = 325 MeV

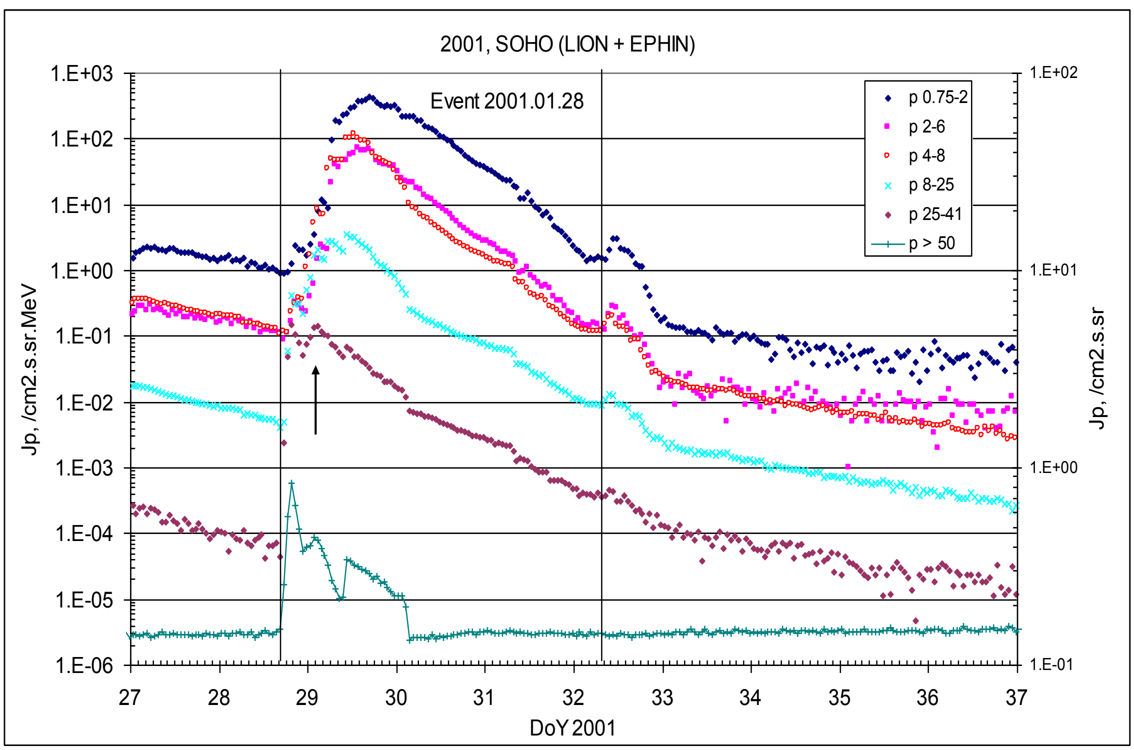
Sources: ● solar flare 28d15^{h}08^m, 1N/ M1.5, S04W59, AR9313
Main X-ray burst 1-8 Å: 28d15^{h}40^m, max – 28d16^{h}40^m, Φ = 0.03 J/m^2
CME: 28d15^{h}54^m, V=0916 km/s, Δφ = 360^o; dA = 254^o;

Particle fluxes and associated phenomena



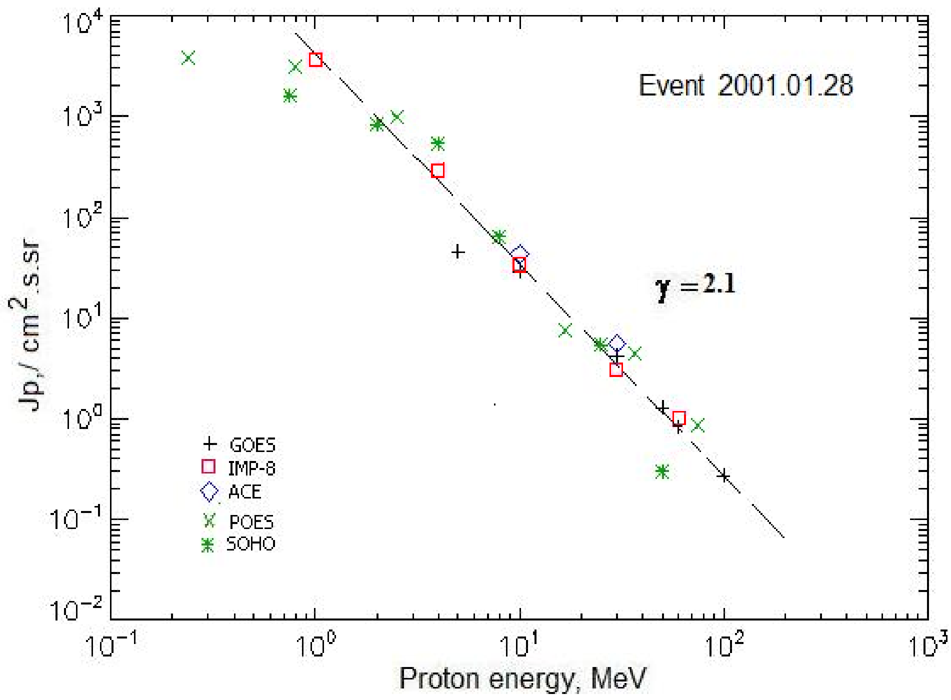
Time profiles of the proton fluxes for the event of 2001 January 28





Arrows on the profiles of the events indicate the time of the proton flux maxima, taken to build the proton spectra (see below)

Integral time-of-maximum proton spectrum



Integral fluxes of protons for the event of 2001 January 28

S/c, instruments	Ep, MeV	To	Tmax	Jmax, /cm^2.s.sr	Duration	Comments
GOES-10						
EPS	>5	18^h	29d02^h	45.3	3d	
EPS	>10	18^h	29d01^h	29.0	3d	
EPS	>30	18^h	29d01^h	4.2	2d	
EPS	>50	18^h	21^h	1.3	2d	
EPS	>60	18^h	21^h	0.84	2d	
EPS	>100	18^h	20^h	0.27	2d	
POES-16						
MEPED	>0.24	-	29d11^h	3805	3d	
MEPED	>0.8	-	29d11^h	3090	3d	
MEPED	>2.5	-	29d11^h	970	3d	
MEPED	>6.9	-	-	-	-	
MEPED	>16	-	20^h	8.3	2d	
MEPED	>36	-	20^h	4.8	2d	
MEPED	>70	-	20^h	0.7	2d	
MEPED	>140	-	-	-	-	
IMP-8						
CPME	>1	23^h	29d16^h	3610	4 d	
CPME	>4	17^h	29d07^h	295	3 d	
CPME	>10	17^h	29d06^h	34.3	3 d	
CPME	>30	17^h	29d02^h	3.1	2 d	
CPME	>60	17^h	29d02^h	1	2 d	

ACE						
SIS	>10	16^h	$29d06^h$	43	3 d	
SIS	>30	16^h	$29d02^h$	5.6	2 d	
SOHO						
EPHIN (INT)	>50	17^h	$29d02^h$	0,3	2d	

Differential fluxes of protons for the event of 2001 January 28

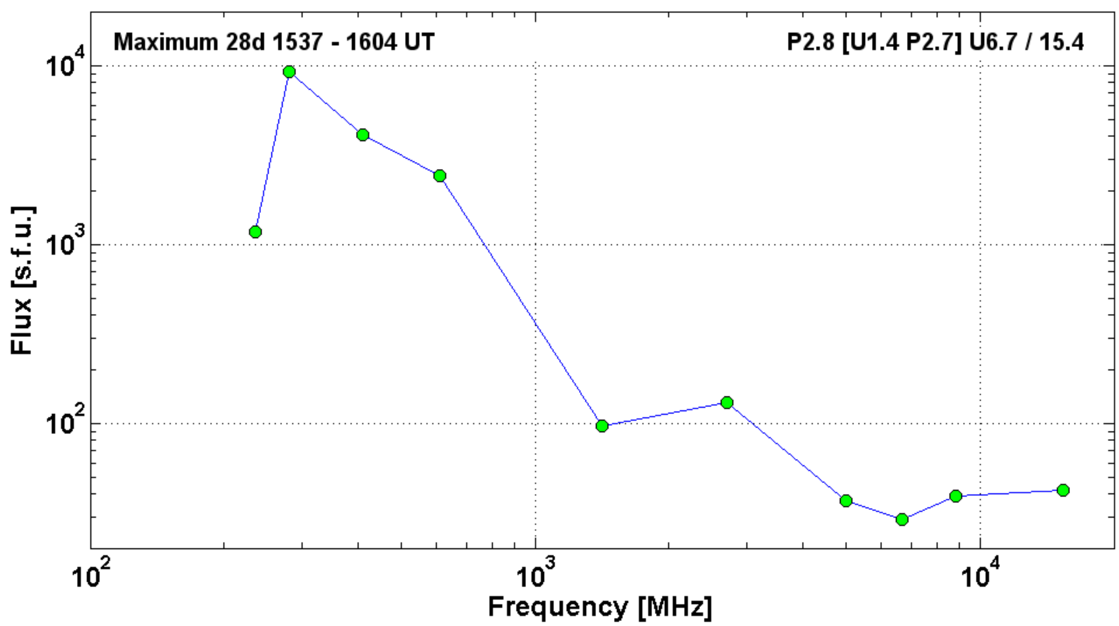
S/c, instruments	ΔE, MeV	To	Tmax	Jmax. /cm^2.s.sr.MeV	Dura-tion	Comments
IMP-8						
CPME	1-2	$29d03^h$	$29d21^h$	2520	6d	
CPME	2-4.6	$29d00^h$	$29d15^h$	550	6d	
CPME	4.6-15	19^h	$29d13^h$	23,3	5d	
CPME	15-25	17^h	$29d07^h$	1,2	4d	
CPME	25-48	17^h	$29d06^h$	0,11	4d	
CPME	48-96	17^h	$29d02^h$	0,02	3d	
CPME	96-145	-	-	-	-	
CPME	145-440	-	-	-	-	
SOHO						
LION	0.75-2	19^h	$29d16^h$	440	5d	
LION	2-6	19^h	$29d13^h$	72	5d	
EPHIN	4-8	19^h	$29d12^h$	118	5d	
EPHIN	8-25	18^h	$29d10^h$	3.6	5d	
EPHIN	25-41	17^h	$29d02^h$	0.145	5d	
EPHIN	41-53	- “ -	- “ -	- “ -	- “ -	

Electromagnetic and other phenomena that are sources and/or accompanying for the event of 2001 January 28

2001 January 28 ● AR9313 To event 385

Hα	6563 Å	1508	1546	1730	S04 W59	1N	FH
1 – 12	keV	1540	1600	1624		M1.5	3.0E-2

15.4	GHz	1551.0	1604.0	1607.0	P2.8 [U1.4 P2.7]	1.62	
8.8	GHz	1548.0	1602.0	1607.0	U6.7/15.4	1.59	
6.7	GHz	1527.0	1553.0	2112.0		1.46	
5	GHz	1548.0	1552.0	1607.0		1.57	
2.7	GHz	1542.0	1552.0	1607.0		2.11	
1.4	GHz	1542.0	1553.0	1607.0		1.98	
610	MHz	1534.0	1537.0	1607.0		3.38	
410	MHz	1534.0	1539.0	1607.0		3.61	
280	MHz	1536.2	1543.2	1615.5		3.97	
235	MHz	1536.2	1541.5	1615.5		3.07	
DS DCIM	2000-4000	1522		1527	C	1	
CME	WL	1554	0916km/s	3.5 km/s^2	360˚	254˚	

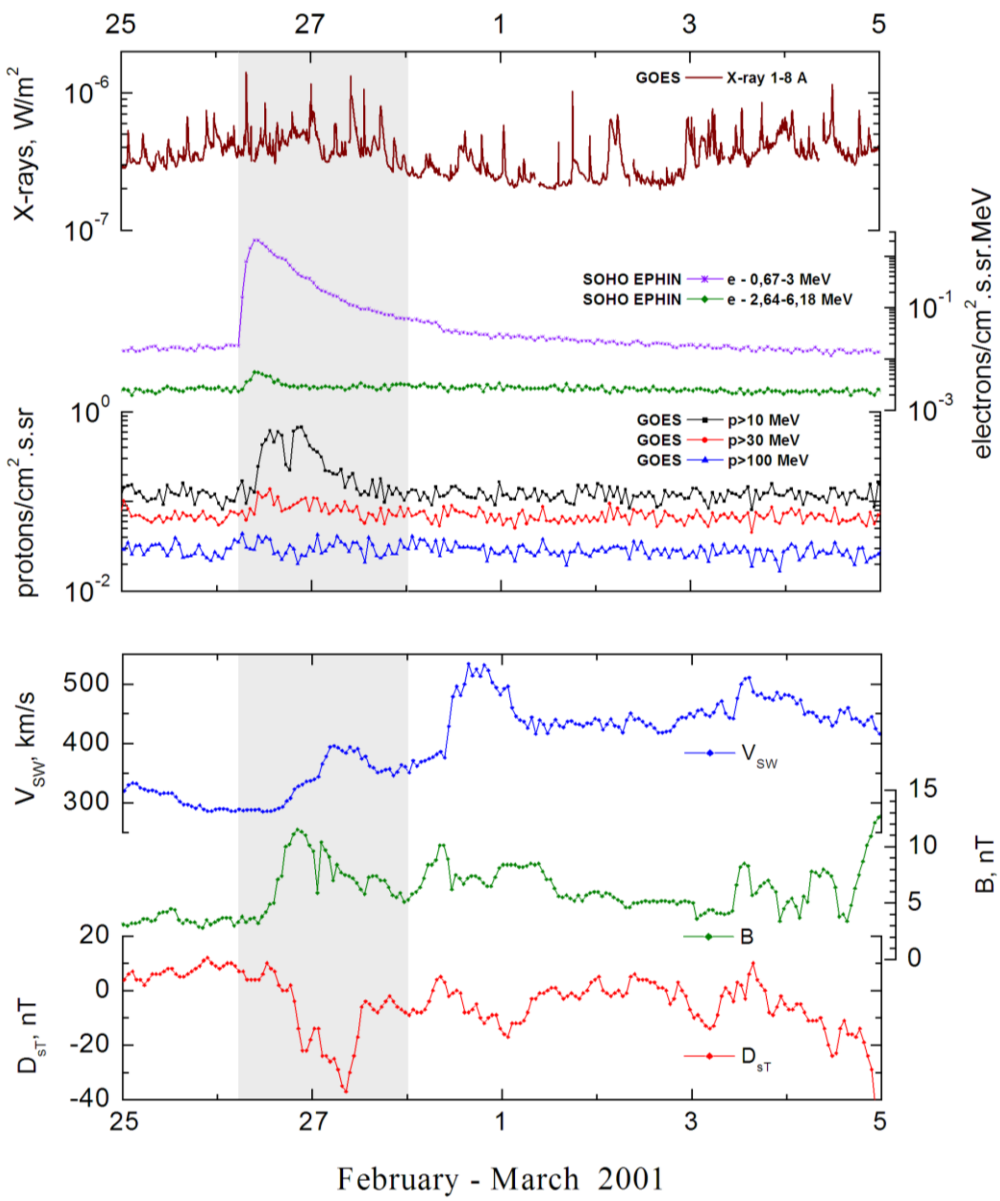


Event 2001.02.26 – (2001-057) **№386**

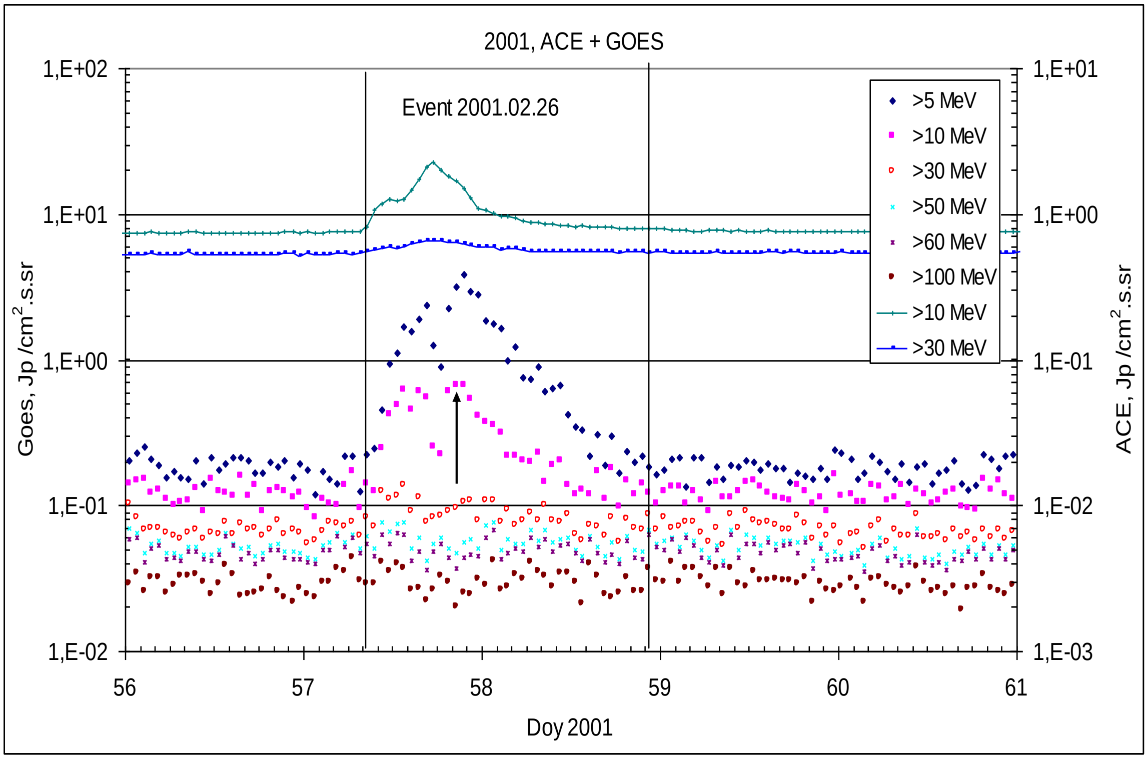
Particle event: To(Ep>10 MeV) – 26d09^h
Tmax(Ep>10 MeV) – 26d20^h, Jmax (Ep>10 MeV) – 1 /cm^2.s.sr *)
Duration of the event – 2 days
Quasimaximal energy of protons in the event – Eqm = 65 MeV
*) The data from all s/c

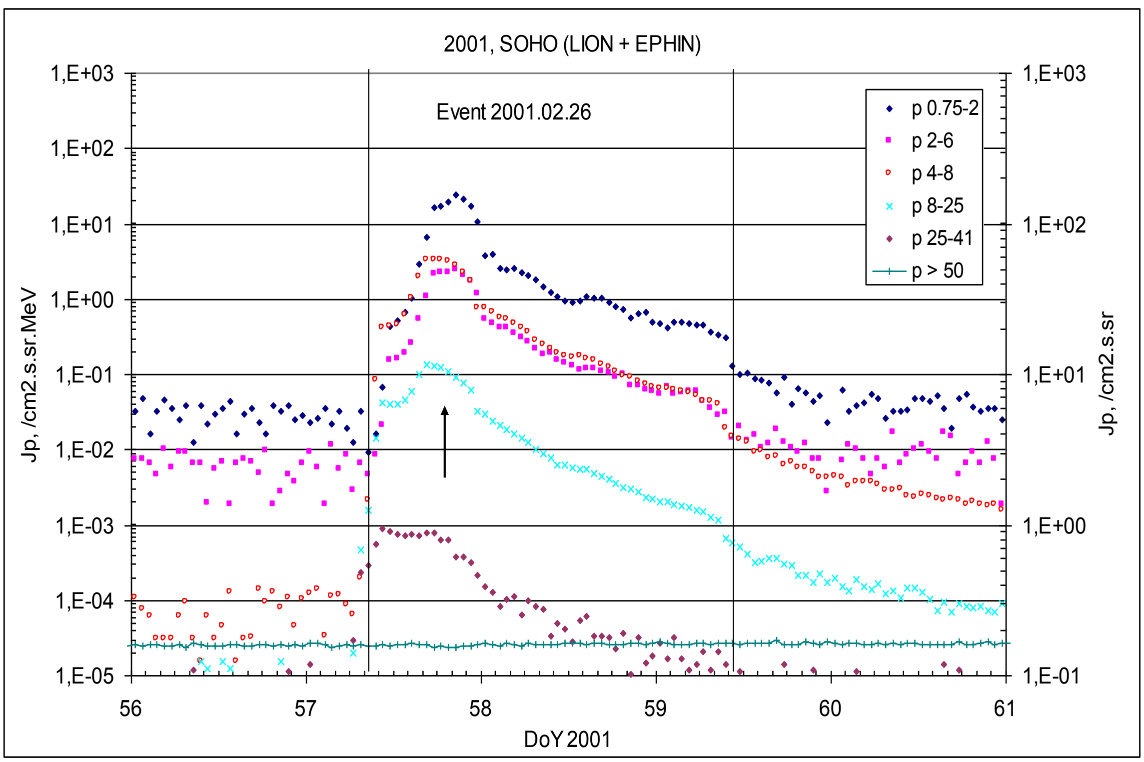
Sources: ⊡ solar flare 26d05^{h}14^m, C1.6/…, s04w90*, AR9354
Main X-ray burst 1-8 Å: onset – 26d05^{h}14^m, max – 26d07^{h}41^m, Φ = 0.0042 J/m^2
CME: 26d05^{h}30^m , V=0851 km/s, Δφ = 152^o, dA = 263^o;
* − probable localization of the flare event

Particle fluxes and associated phenomena



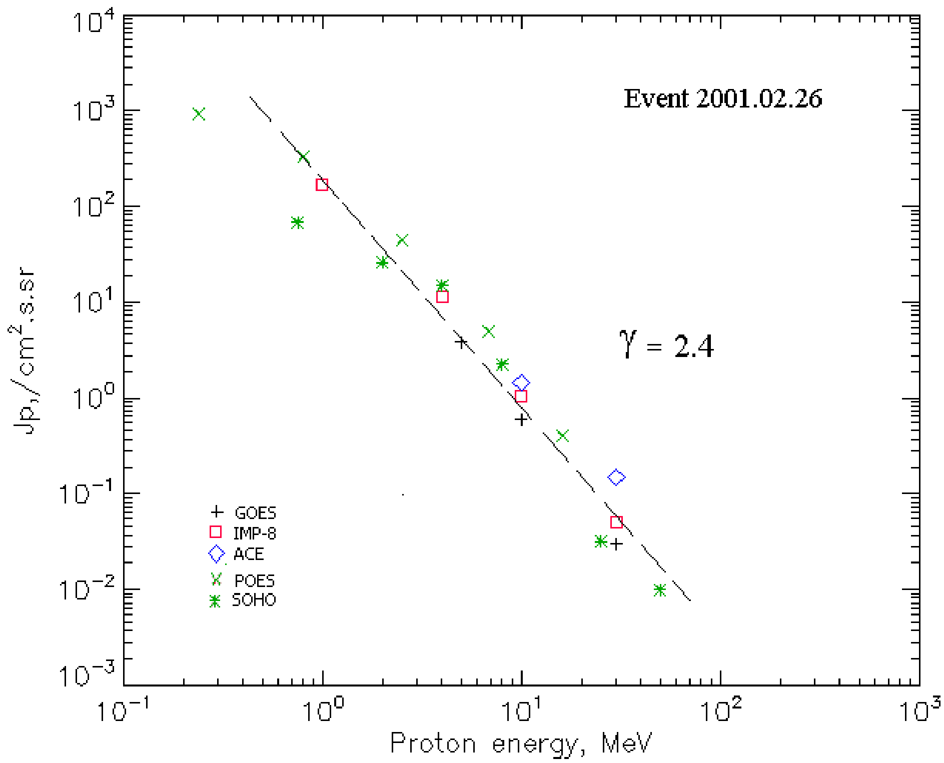
Time profiles of the proton fluxes for the event of 2001 February 26





Arrows on the profiles of the events indicate the time of the proton flux maxima, taken to build the proton spectra (see below)

Integral time-of-maximum proton spectrum



Integral fluxes of protons for the event of 2001 February 26

S/c, instruments	Ep, MeV	To	Tmax	Jmax, /cm^2.s.sr	Dura-tion	Comments
GOES-10						
EPS	>5	10^h	21^h	3.8	1.5d	
EPS	>10	10^h	21^h	0.6	1.5d	
EPS	>30	10^h	21^h	0.03	1d	
EPS	>50	-	-	-	-	
EPS	>60	-	-	-	-	
EPS	>100	-	-	-	-	
POES-16						
MEPED	>0.24	-	22^h	930	2.5 d	
MEPED	>0.8	-	22^h	334	2.5 d	
MEPED	>2.5	-	22^h	45	2.5 d	
MEPED	>6.9	-	22^h	5	2 d	
MEPED	>16	-	22^h	0.4	2 d	
MEPED	>36	-	-	-	-	
MEPED	>70	-	-	-	-	
MEPED	>140	-	-	-	-	
IMP-8						
CPME	>1	9^h	20^h	170	2.5 d	
CPME	>4	9^h	20^h	11.5	2 d	
CPME	>10	9^h	20^h	1.05	2 d	
CPME	>30	-	15^h	0.05	-	
CPME	>60	-	-	-	-	

ACE						
SIS	>10	8^h	17^h	1.45	1.5 d	
SIS	>30	8^h	17^h	0.15	1 d	
SOHO						
EPHIN (INT)	>50	09^h	15^h	0.01	0.3d	

Differential fluxes of protons for the event of 2001 February 26

S/c, instruments	ΔE, MeV	To	Tmax	Jmax. /cm^2.s.sr.MeV	Dura-tion	Comments
IMP-8						
CPME	1-2	10^h	20^h	118	5d	
CPME	2-4.6	10^h	20^h	18.7	5d	
CPME	4.6-15	10^h	19^h	0.77	2d	
CPME	15-25	10^h	18^h	0.018	1d	
CPME	25-48	-	21^h	0.003	-	
CPME	48-96	-	21^h	0.0004	-	
CPME	96-145	-	-	-	-	
CPME	145-440	-	-	-	-	
SOHO						
LION	0.75-2	09^h	20^h	24.2	2.5d	
LION	2-6	09^h	20^h	2.75	2.5d	
EPHIN	4-8	09^h	19^h	3.2	7d	
EPHIN	8-25	09^h	17^h	0.13	5d	
EPHIN	25-41	09^h	16^h	0.0008	2.5d	
EPHIN	41-53	- “ -	- “ -	- “ -	- “ -	

Electromagnetic and other phenomena that are sources and/or accompanying for the event of 2001 February 26

2001 February 26 ⊡ AR9354 To event 386

Hα				No Flare	s04w90*		
1 – 12	keV	0514	0741	0749		C1.6	4.2E-03
CME	WL	0530	0851 km/s	8.1km/s^2	152˚	263˚	

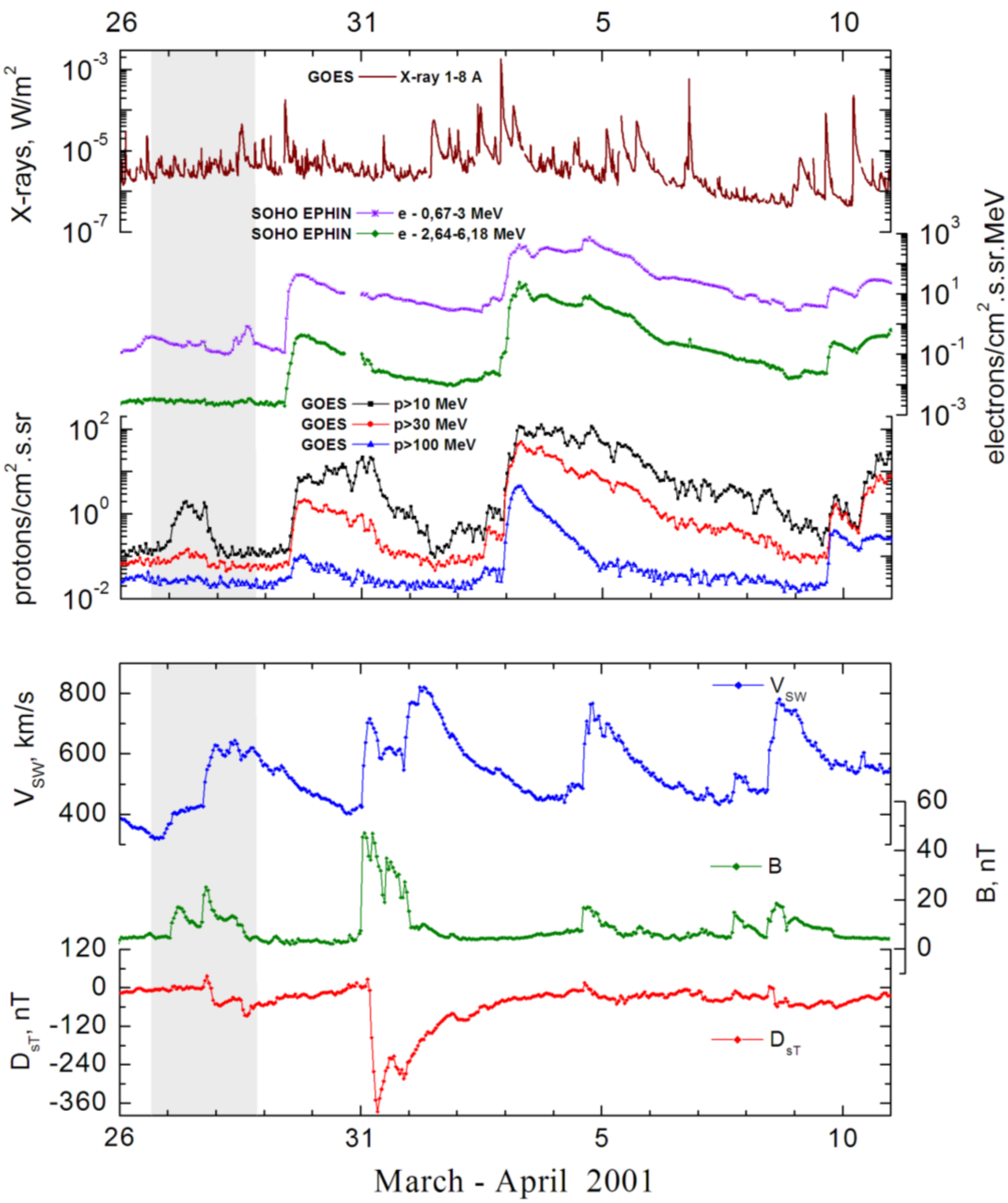
* − probable localization of the flare event

Event 2001.03.26 – (2001- 085) **№ 387**

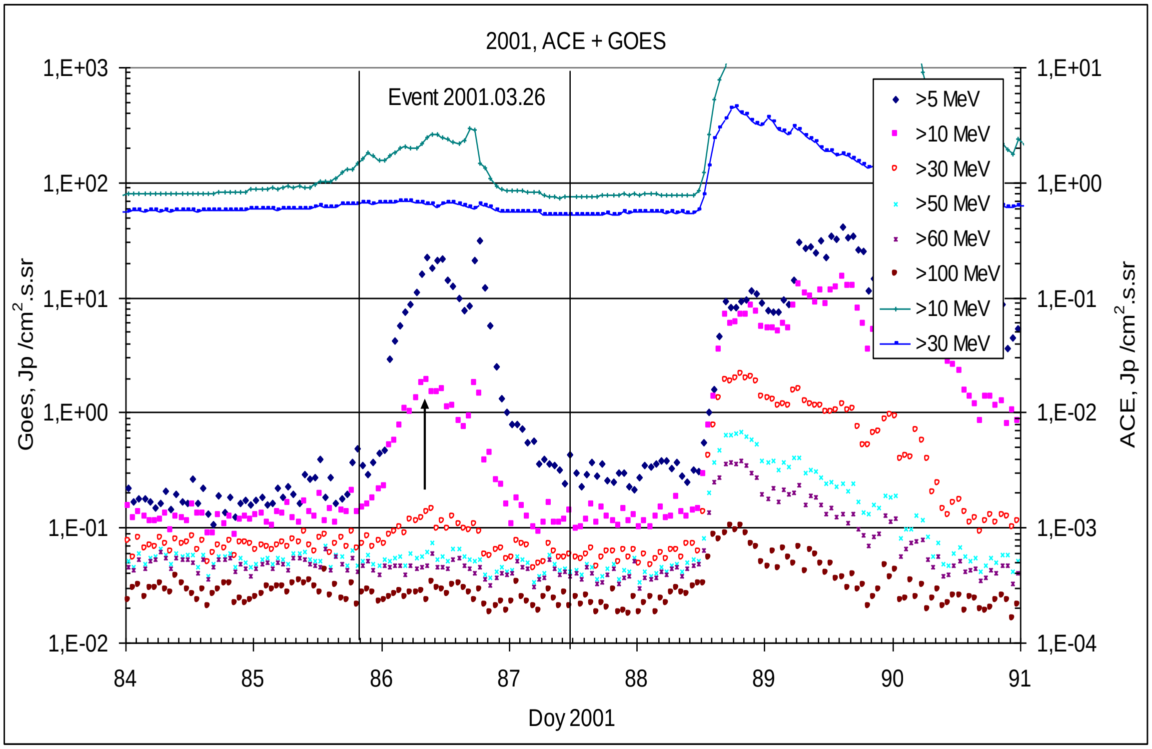
Particle event: To(Ep>10 MeV) – 26d20h
Tmax(Ep>10 MeV) – 27d08h, Jmax (Ep>10 MeV) – 1.8 /cm2.s.sr
Duration of the event –1.5 days
Quasimaximal energy of protons in the event – Eqm = 55 MeV

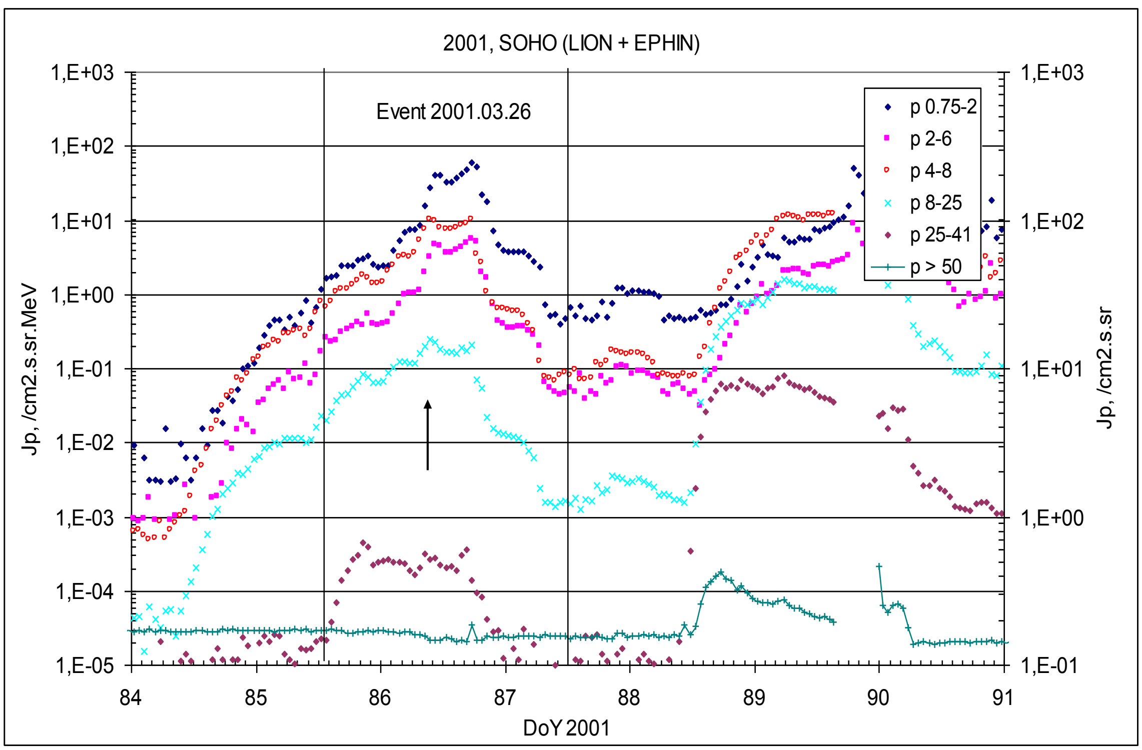
Sources: ⊙ solar flare 26d13h03m, M2.2/1F, N15E27, AR9393
Main X-ray burst 1-8 Å: onset – 26d13h03m, max – 26d13h26m, Φ = 0.037 J/m2;
CME: 26d13h50m, V = 0541 km/s, Δφ = 055o, dA = 104º
▲SC 27d17^{h}47^{m}

Particle fluxes and associated phenomena



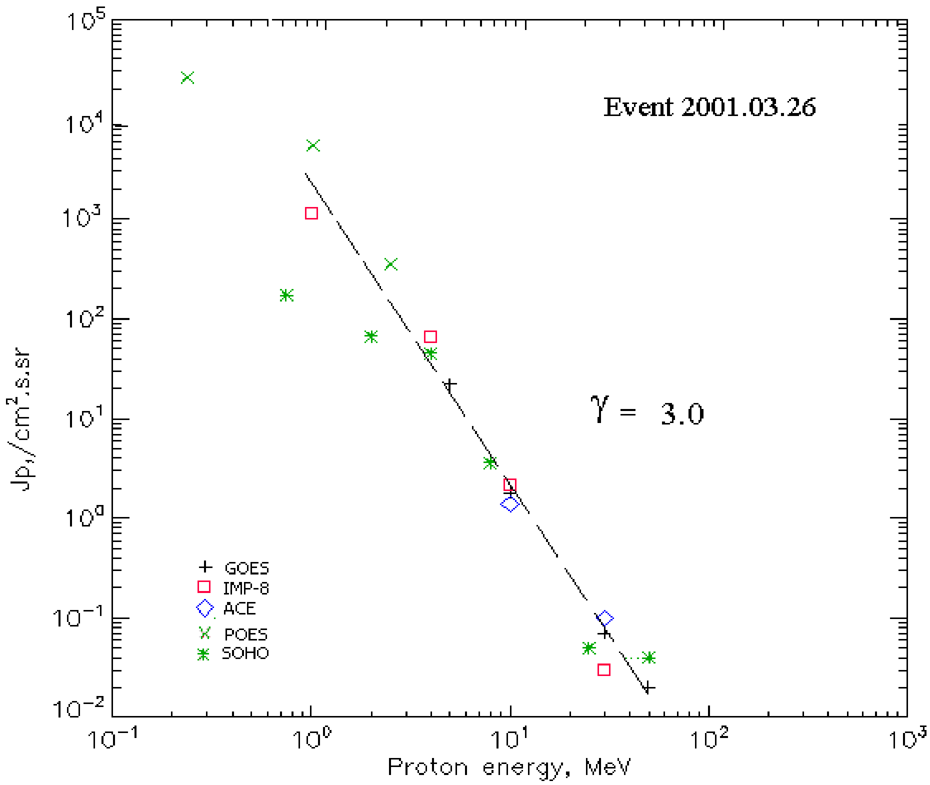
Time profiles of the proton fluxes for the event of 2001 March 26





Arrows on the profiles of the events indicate the time of the proton flux maxima, taken to build the proton spectra (see below)

Integral time-of-maximum proton spectrum



Integral fluxes of protons for the event of 2001 March 26

S/c, instruments	Ep, MeV	To	Tmax	Jmax, /cm^2.s.sr	Duration	Comments
GOES-10						
EPS	>5	20^h	08^h	22.2	2.5d	
EPS	>10	20^h	08^h	1.8	2.5d	
EPS	>30	21^h	09^h	0.07	2d	
EPS	>50	-	09^h	0.02	-	
EPS	>60	-	-	-	-	
EPS	>100	-	-	-	-	
POES-16						
MEPED	>0.24	-	18^h	$2.5 \cdot 10^4$	3 d	
MEPED	>0.8	-	18^h	$6.2 \cdot 10^3$	3 d	
MEPED	>2.5	-	18^h	355	3 d	
MEPED	>6.9	-	-	-	-	
MEPED	>16	-	-	-	-	
MEPED	>36	-	-	-	-	
MEPED	>70	-	-	-	-	
MEPED	>140	-	-	-	-	
IMP-8						
CPME	>1	01^h	12^h	1160	3 d	
CPME	>4	01^h	12^h	66	3 d	
CPME	>10	01^h	11^h	2.2	3 d	
CPME	>30	-	11^h	0.03	-	
CPME	>60	-	-	-	-	

ACE						
SIS	>10	16^h	10^h-	1.4	1.5d	
SIS	>30		10^h	0.1	1d	
SOHO						
EPHIN (INT)	>50	23^h	17^h	0.04 *)	-	*) The increase on Forbush

Differential fluxes of protons for the event of 2001 March 26

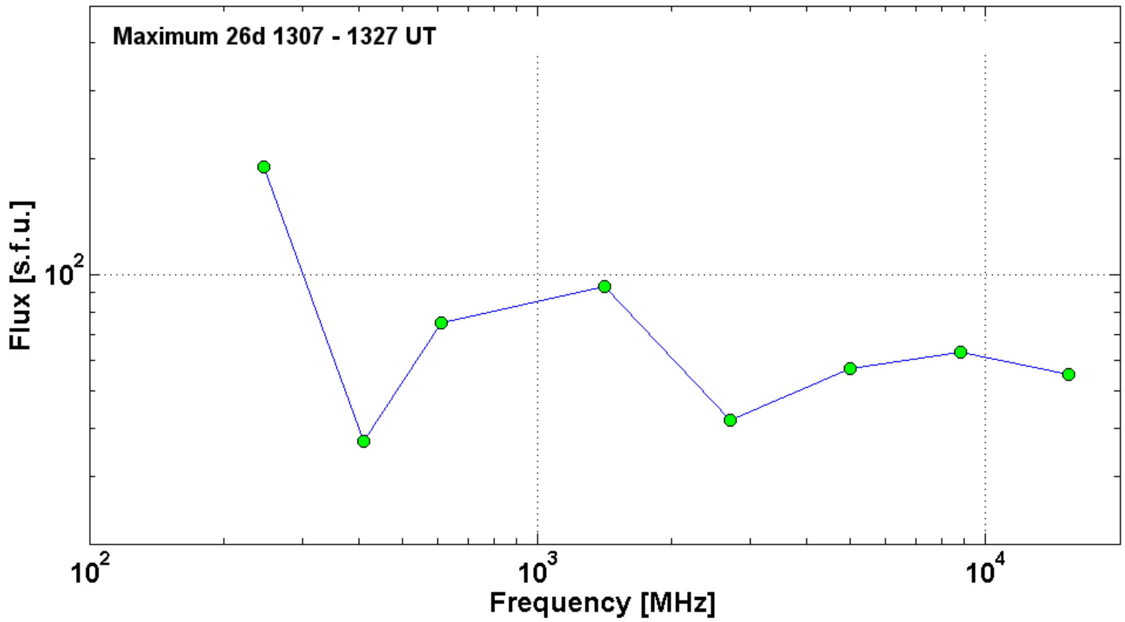
S/c, instruments	ΔE, MeV	To	Tmax	Jmax. /cm^2.s.sr.MeV	Dura-tion	Comments
IMP-8						
CPME	1-2	13^h	12^h	867	3,5d	
CPME	2-4.6	12^h	12^h	112	3d	
CPME	4.6-15	16^h	12^h	3.2	3d	
CPME	15-25	08^h	11^h	0.029	2,5d	
CPME	25-48	-	-	-	-	
CPME	48-96	-	-	-	-	
CPME	96-145	-	-	-	-	
CPME	145-440	-	-	-	-	
SOHO						
LION	0.75-2	17^h	17^h	60	2d	
LION	2-6	17^h	17^h	5.6	2d	
EPHIN	4-8	17^h	17^h	10.3	2d	
EPHIN	8-25	17^h	17^h	0.21	2d	
EPHIN	25-41	17^h	16^h	$3.6 \cdot 10^{-4}$	2d	
EPHIN	41-53	- “ -	- “ -	- “ -	- “ -	

Electromagnetic and other phenomena that are sources and/or accompanying for the event of 2001 March 26

2001 March 26 ⊙ AR9393 To event 387

Hα	6563Å	1306	1321	1423	N15E27	1F	F
1 – 12	keV	1303	1326	1344		M2.2	3.7E-2
53 – 93	keV	<131310	~131622	>132018		8	HXT Y

15.4	GHz	1309.0	1327.0	1408.0		1.74	
8.8	GHz	1309.0	1326.0	1408.0		1.80	
5	GHz	1309.0	1314.0	1359.0		1.76	
2.7	GHz	1309.0	1313.0	1351.0		1.62	
1.4	GHz	1320.0	1320.0	1322.0		1.97	
610	MHz	1312.0	1323.0	1328.0		1.88	
410	MHz	1312.0	1314.0	1328.0		1.57	
245	MHz	1307.0	1307.0	1308.0		2.28	
DS DCIM	800-2000	1310		1326	G	2	
DS DCIM	1415-4000	1312		1322	C	3	
CME	WL	1350	0541km/s	4.8 km/s^2	055°		



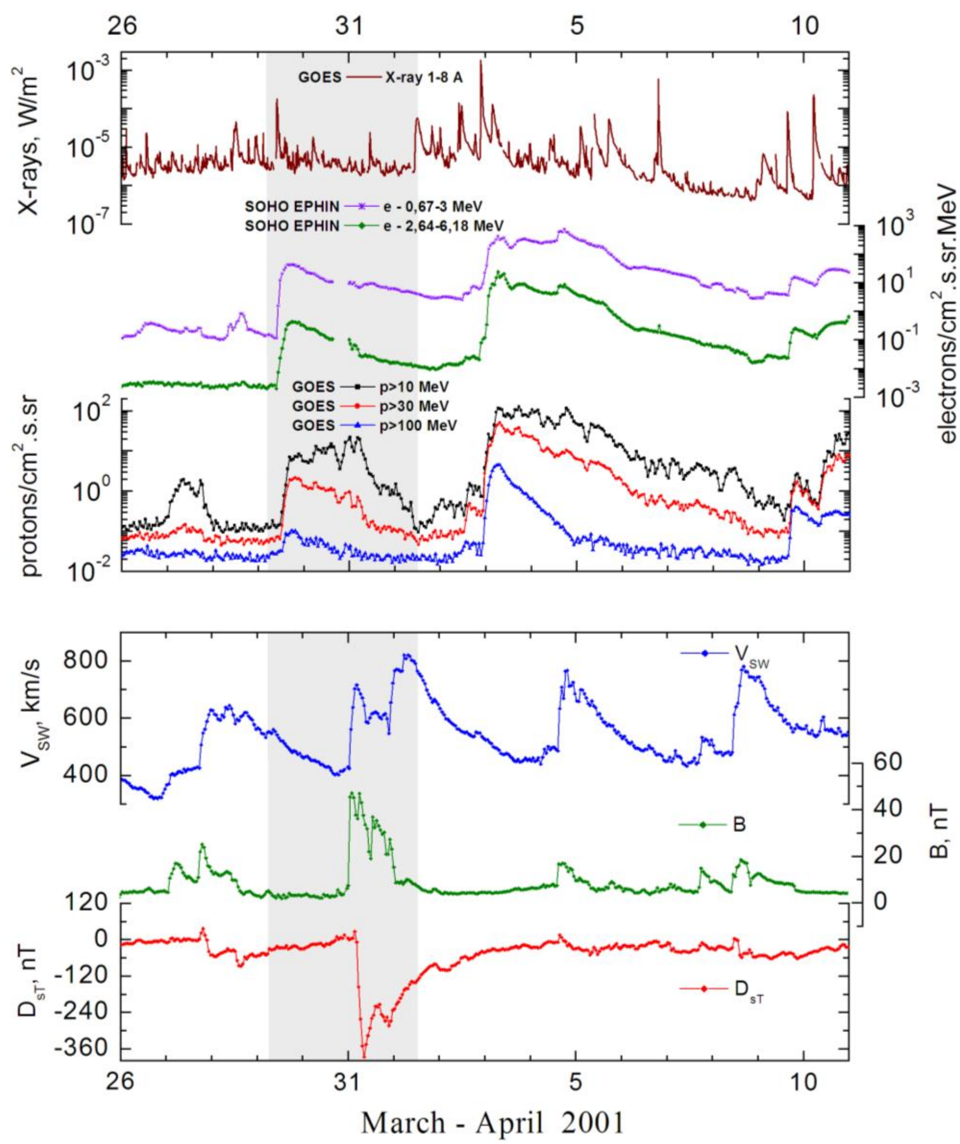
Список 2001 г.

Event 2001.03.29 – (2001-088) **№ 388**

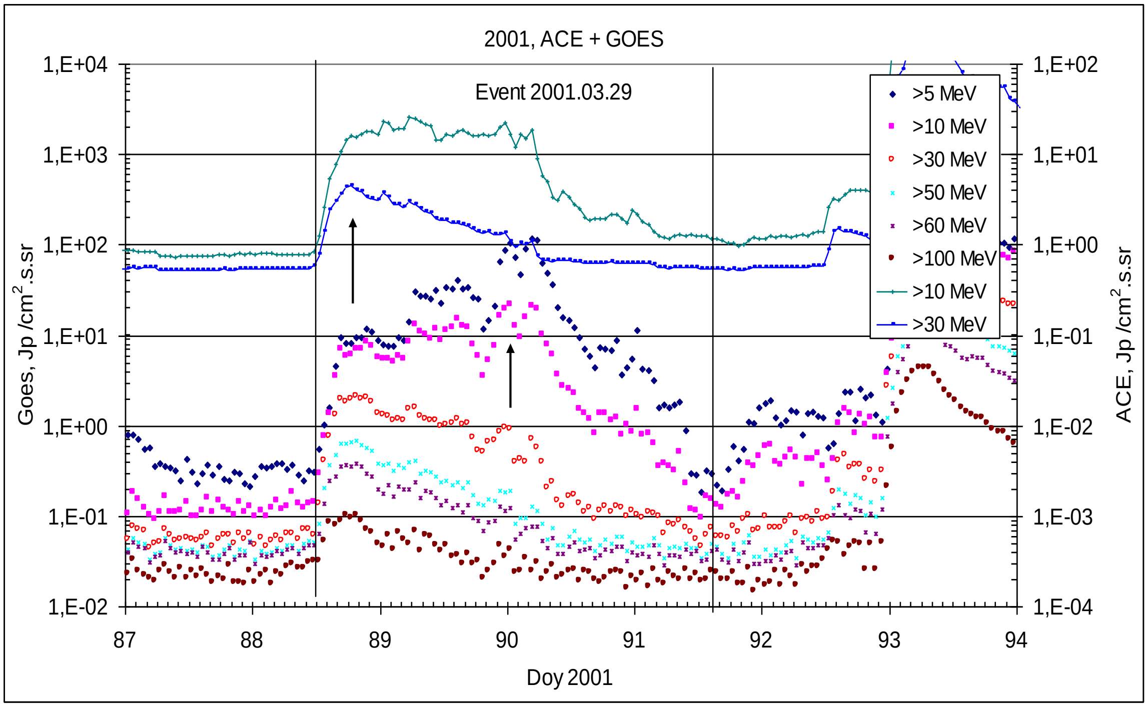
Particle event: To(Ep>10 MeV) – 29d13^h
Tmax$_1$(Ep>10 MeV) –29d19^h, Jmax$_1$(Ep>10 MeV) – 7 /cm^2.s.sr
Tmax$_2$(Ep>10 MeV) – 31d00^h, Jmax$_2$(Ep>10 MeV) – 22 /cm^2.s.sr
Duration of the event – 3 days
Quasimaximal energy of protons in the event – Eqm$_1$ = 215 MeV
– Eqm$_2$ = 115 MeV

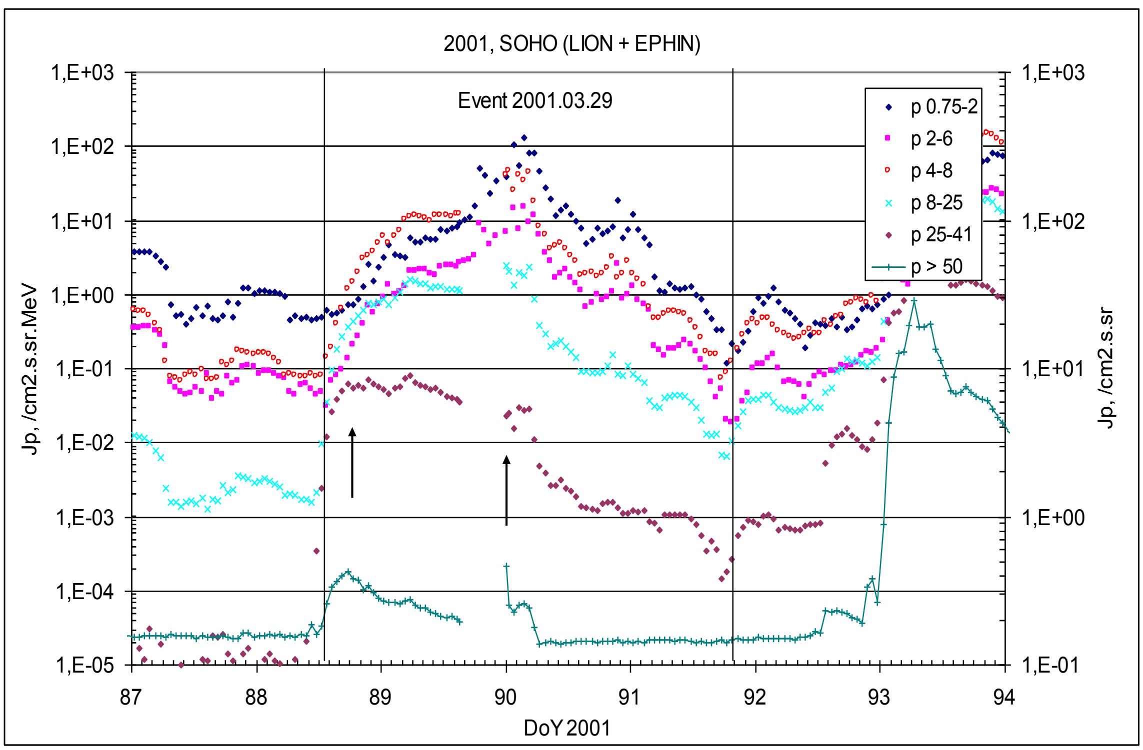
Sources: ● solar flare 29d09^{h}55^m, 1N/X1.7, N16W12, AR9393
Main X-ray burst 1-8 Å: onset – 29d09^{h}55^m, max – 29d10^{h}15^m, Φ = 0.22 J/m^2
CME: 29d10^{h}26^m , V = 0942 km/s, Δφ = 360º, dA= 071º
▲SC 31d00^{h}52^m

Particle fluxes and associated phenomena



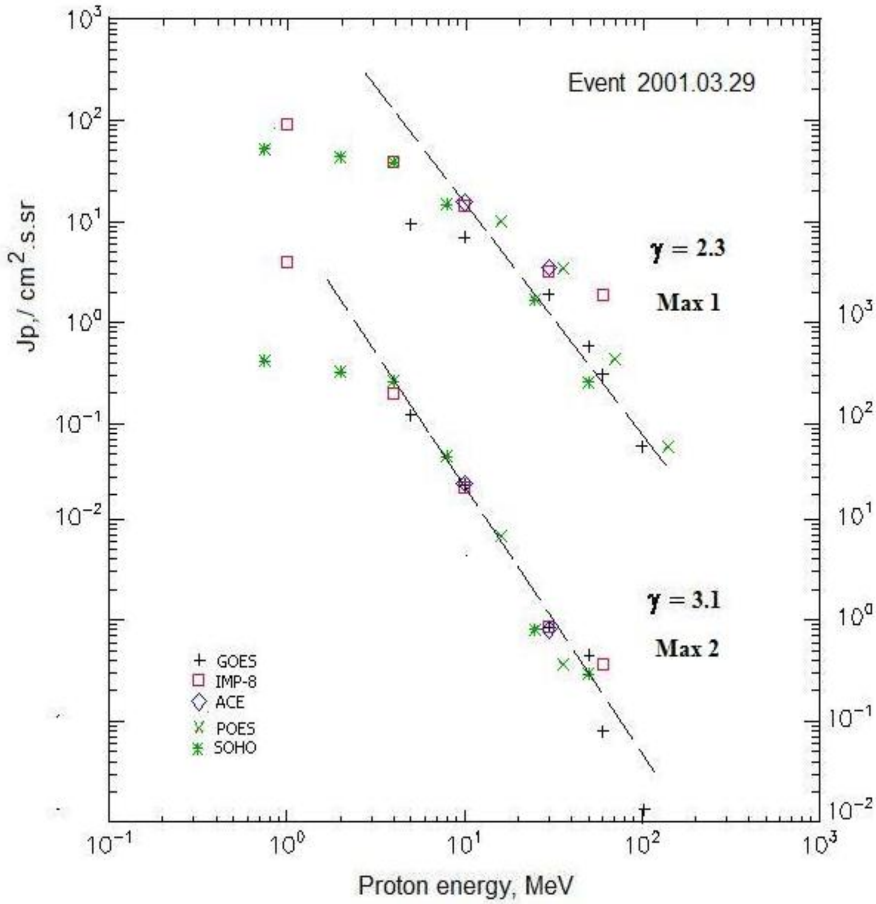
Time profiles of the proton fluxes for the event of 2001 March 29





Arrows on the profiles of the events indicate the time of the proton flux maxima, taken to build the proton spectra (see below)

Integral time-of-maximum proton spectrum



Integral fluxes of protons for the event of 2001 March 29

S/c, instruments	Ep, MeV	To	Tmax	Jmax, /cm^2.s.sr	Dura-tion	Comments
GOES-10						
EPS	>5	13^h	$19^h/31d00^h$	9.4/106.5	3d	
EPS	>10	13^h	$19^h/31d00^h$	7/22	3d	
EPS	>30	13^h	$19^h/31d00^h$	1.9 /0.85	2d	
EPS	>50	13^h	$18^h/31d00^h$	0.59/0.45	2d	
EPS	>60	13^h	$18^h/31d00^h$	0.31/0.08	2d	
EPS	>100	13^h	$17^h/31d00^h$	0.06/0.01	2d	
POES-16						
MEPED	>0.24	-	-	-	-	
MEPED	>0.8	-	-	-	-	
MEPED	>2.5	-	-	-	-	
MEPED	>6.9	-	-	-	-	
MEPED	>16	-	$18^h/31d00^h$	10.2/6.5	2d	
MEPED	>36	-	$18^h/31d00^h$	3.5/0.4	2d	
MEPED	>70	-	18^h/ -	0.44/ -	2d	
MEPED	>140	-	18^h/ -	0.06/ -	2d	

IMP-8						
CPME	>1	12^h	$23^h/31d01^h$	91/3500	2.5 d	
CPME	>4	11^h	$23^h/31d00^h$	38.7/173	2.5 d	
CPME	>10	11^h	$21^h/30d23^h$	14.5/20.5	2.5 d	
CPME	>30	11^h	$17^h/30d23^h$	3.2/0.85	2.5 d	
CPME	>60	11^h	$17^h/30d23^h$	1.9/0.37	2.5 d	
ACE						
SIS	>10	11^h	$19^h/30d23^h$	15.5/22.2	2.5 d	
SIS	>30	11^h	$19^h/30d23^h$	3.5/0.8	2.5 d	
SOHO						
EPHIN (INT)	>50	13^h	$17^h/31d00^h$	0.26/0.29	1.5d	

Differential fluxes of protons for the event of 2001 March 29

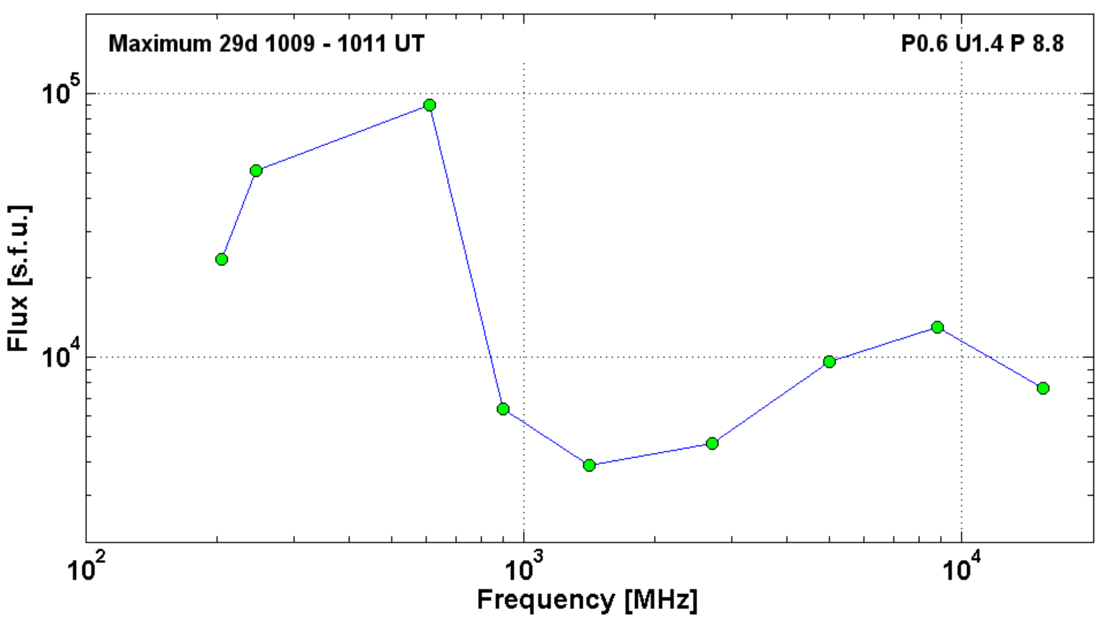
S/c, instruments	ΔE, MeV	To	Tmax	Jmax. /cm^2.s.sr.MeV	Dura-tion	Comments
IMP-8						
CPME	1-2	17^h	$30d01^h/31d00^h$	44/2720	3d	
CPME	2-4.6	15^h	$30d01^h/31d00^h$	18.4/308	3d	
CPME	4.6-15	13^h	$30d01^h/31d00^h$	3.35/13.5	3d	
CPME	15-25	12^h	$23^h/31d00^h$	0.88/0.61	2d	
CPME	25-48	11^h	$20^h/31d00^h$	0.09/0.033	2d	
CPME	48-96	11^h	$17^h/31d00^h$	0.013/0.003	2d	
CPME	96-145	11^h	-	-	-	
CPME	145-440	11^h	-	-	-	
SOHO						
LION	0.75-2	16^h	$30d01^h/31d00^h$	4.8/46.2	3d	
LION	2-6	16^h	$30d01^h/31d00^h$	1.3/14.4	3d	
EPHIN	4-8	13^h	$30d01^h/31d00^h$	6/46.4	3d	
EPHIN	8-25	13^h	$21^h/31d00^h$	0.76/2.4	3d	
EPHIN	25-41	11^h	$21^h/31d00^h$	0.072/0.025	1.5d	
EPHIN	41-53	- " -	- " -	- " -	- " -	

Electromagnetic and other phenomena that are sources and/or accompanying for the event of 2001 March 29

2001 March 29 ● AR9393 To event 388

Hα	6563 Å	0955	1005	1108	N16 W12	2N	EFZ
1 – 12	keV	0957	1015	1032		X1.7	2.2E-1

15.4	GHz	0959.0	1010.0	1019.0		3.88	
8.8	GHz	0958.0	1011.0	1019.0	P0.6 U1.4 P 8.8	4.11	
5	GHz	0958.0	1011.0	1020.0		3.98	
2.7	GHz	0958.0	1011.0	1019.0		3.67	
1.4	GHz	1004.0	~1009.0	1029.0		3.59	
900	MHz	0957.0	1010.4	1021.0		3.81	
610	MHz	1004.0	~1011.0	1033.0		4.95	
245	MHz	1000.0	1011.0	1020.0		4.71	
204	MHz	1003.0	1010.8	1013.6		4.37	
DS II	HARM	1003		~1007	HARM	2	
DS II	UE	~1004		~1010	UE	3	
DS IV		0958		~1038		3	
DS I	GG,DC	1000		1001	GG,DC	2	
DS III	G	1006		1012	G	2	
DS III	GG,C	1008		1012	GG,C	2	
DS III	GG,RS	1012		1014	GG,RS	2	
DS III	G,C	1025		1025	G,C	2	
DS CONT		~1005		>1158		2	
DS DCIM	GG,FS	0956		1034	GG,FS	3	
DS DCIM	GG,FS	0956		1023	GG,FS	3	
n°							Swiss(A,T)
CME	WL	1026	0942 km/s	3.5 km/s^2	360°	071°	

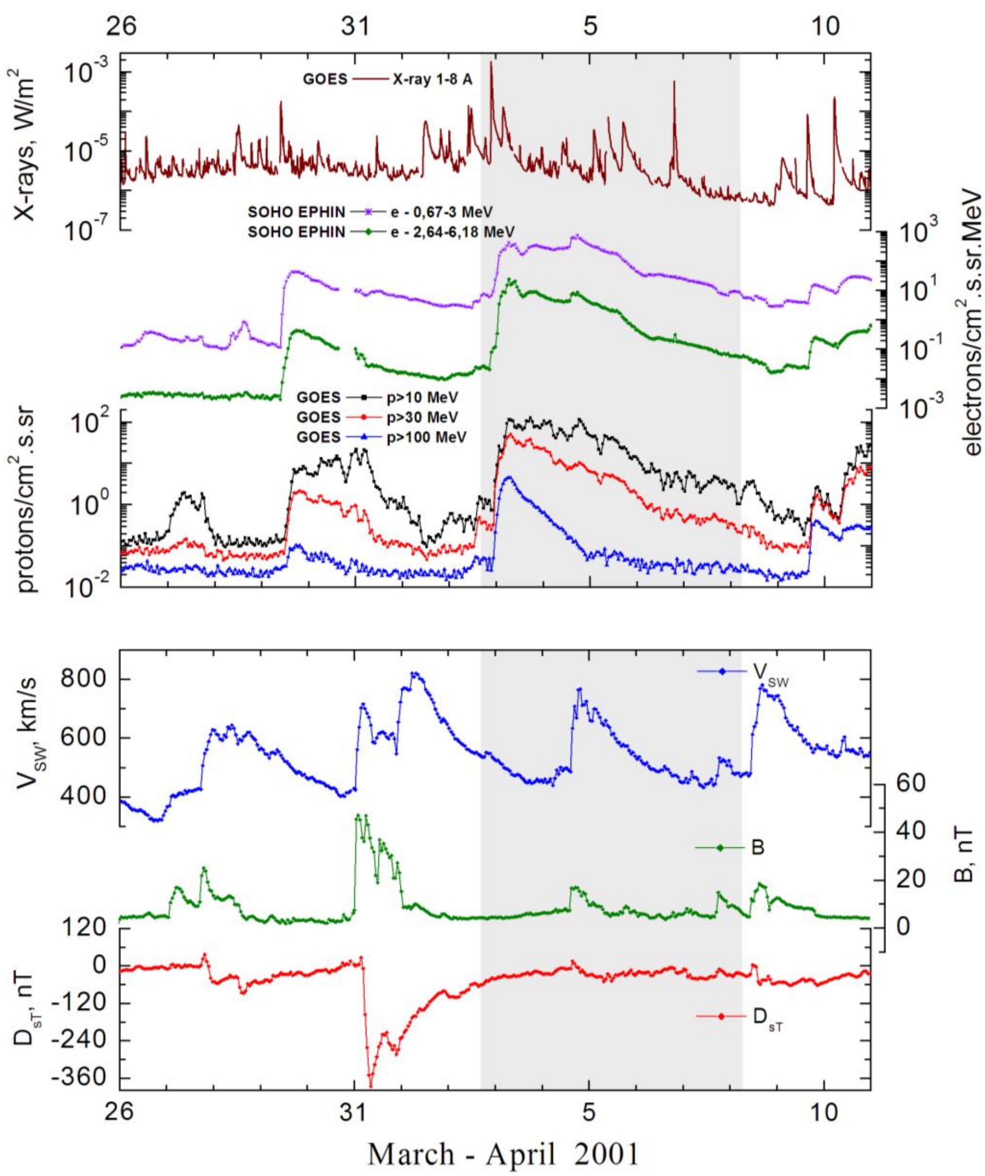


Event 2001.04.02 – (2001-092) **№ 389**

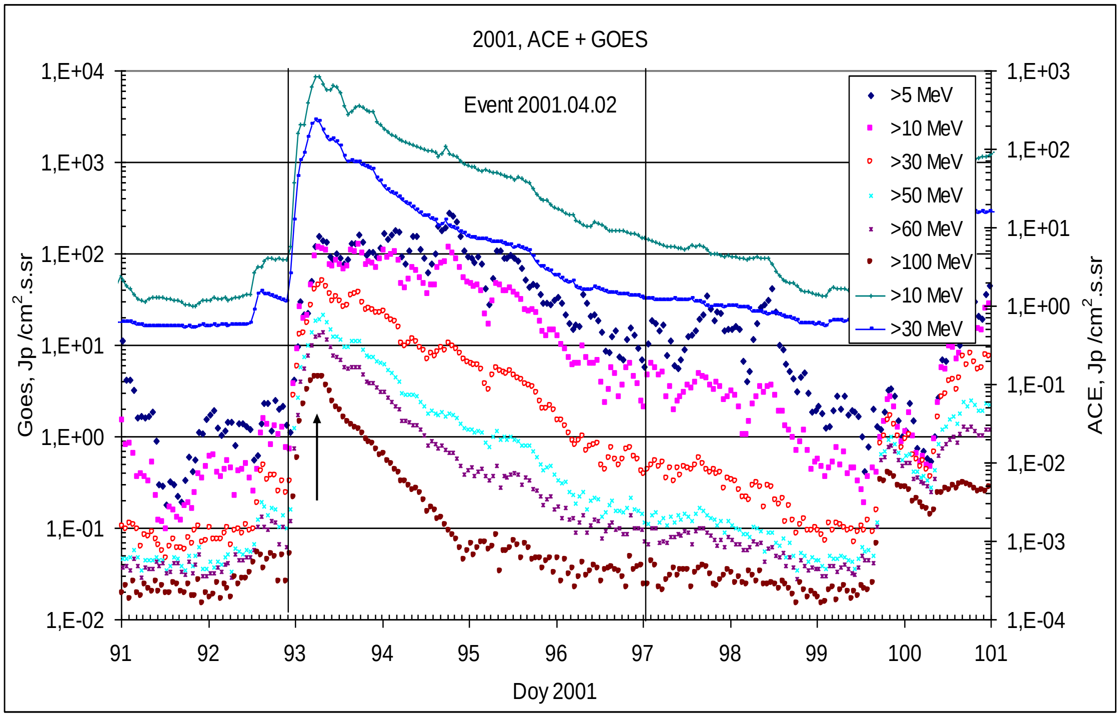
Particle event: To(Ep>10 MeV) – $02d23^h$
Tmax(Ep>10 MeV) – $03d07^h$, Jmax (Ep>10 MeV) – 112 $/cm^2$.s.sr
Duration of the event – 5 days
Quasimaximal energy of protons in the event – Eqm = 575 MeV

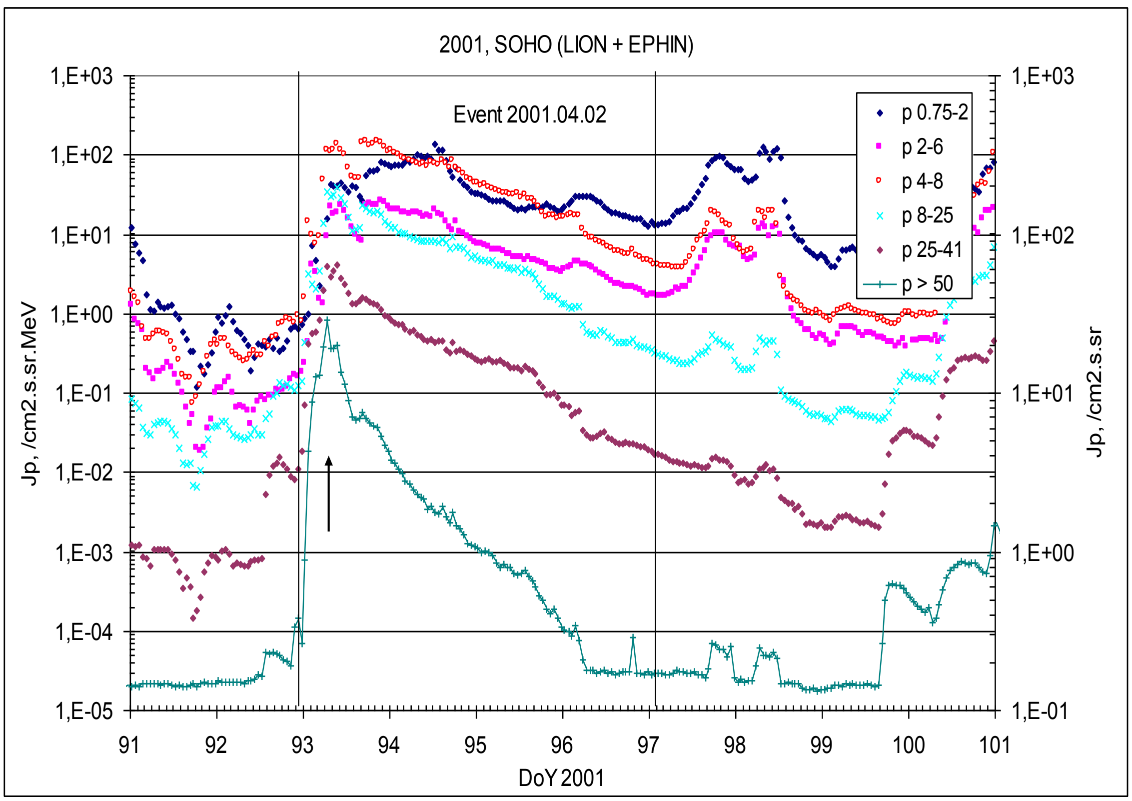
Sources: ■ solar flare $02d21^h32^m$, X>17.5/…, n19w90*, AR9393
Main X-ray burst 1-8 Å: onset – $02^d\ 21^h\ 32^m$, max – $02d21^h51^m$, Φ = 1.5 J/m^2
CME: $02d22^h06^m$, V= 2505 km/s, $\Delta\varphi = 244^o$, dA = 293^o
▲SC $04d14^h55^m$
* − probable localization of the flare event

Particle fluxes and associated phenomena



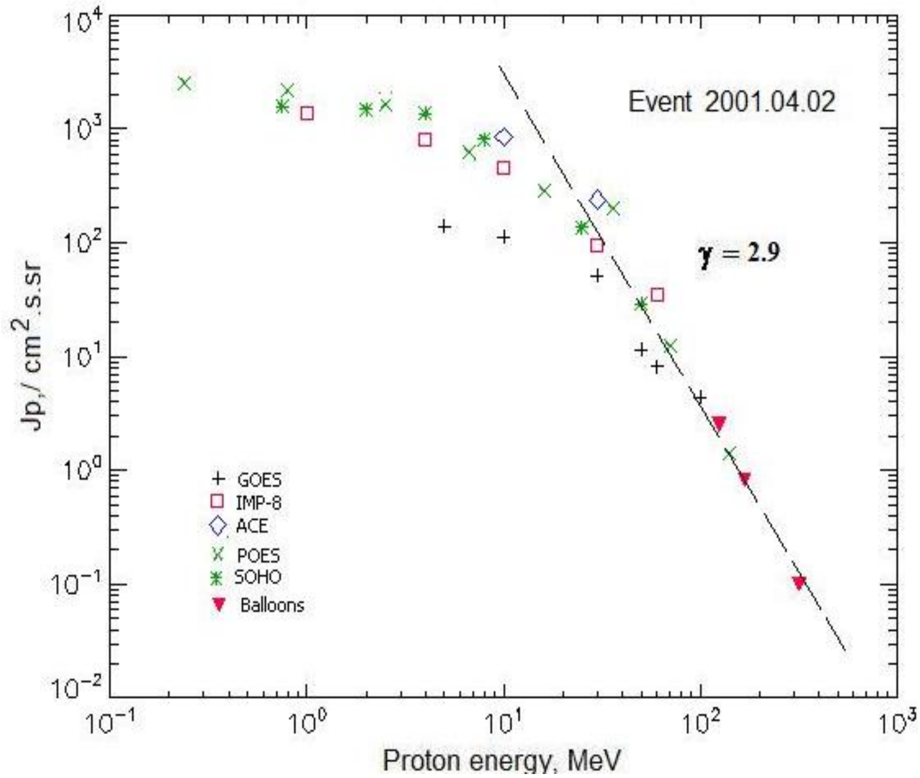
Time profiles of the proton fluxes for the event of 2001 April 02





Arrows on the profiles of the events indicate the time of the proton flux maxima, taken to build the proton spectra (see below)

Integral time-of-maximum proton spectrum



Integral fluxes of protons for the event of 2001 April 02

S/c, instruments	Ep, MeV	To	Tmax	Jmax, /cm^2.s.sr	Dura-tion	Comments
GOES-10						
EPS	>5	23^h	03d07^h	140	5d	
EPS	>10	23^h	03d07^h	112	5d	
EPS	>30	23^h	03d07^h	51	4d	
EPS	>50	23^h	03d07^h	11.5	3d	
EPS	>60	23^h	03d06^h	13	2d	
EPS	>100	23^h	03d06^h	4.4	2d	
POES-16						
MEPED	>0.24	-	03d03^h	2035	5d	
MEPED	>0.8	-	03d03^h	1670	5d	
MEPED	>2.5	-	03d03^h	1330	5d	
MEPED	>6.9	-	03d03^h	560	5d	
MEPED	>16	-	03d03^h	282	4d	
MEPED	>36	-	03d03^h	200	3d	
MEPED	>70	-	03d03^h	12.4	2d	
MEPED	>140	-	03d03^h	1.4	2d	
IMP-8						
CPME	>1	23^h	03d07^h	1370	5d	
CPME	>4	23^h	03d07^h	815	5d	
CPME	>10	23^h	03d07^h	452	5d	
CPME	>30	23^h	03d07^h	95	5d	
CPME	>60	23^h	03d07^h	34.6	5d	

ACE						
SIS	>10	22^h	$03d06^h$	845	5d	
SIS	>30	22^h	$03d06^h$	237	5d	
SOHO						
EPHIN (INT)	>50	23^h	$03d06^h$	29	3d	
BALLOONS						
Mi	>125		$03d(09^h30^m\text{-}10^h12^m)$	2.5		
Mi	>168		$03d(09^h30^m\text{-}10^h12^m)$	0.8		
Mi	>320			0.1		

Differential fluxes of protons for the event of 2001 April 02

S/c, instruments	ΔE, MeV	To	Tmax	Jmax. /cm^2.s.sr.MeV	Dura-tion	Comments
IMP-8						
CPME	1-2	19^h	$03d06^h$	236	□4d	
CPME	2-4.6	18^h	$03d07^h$	144	□4d	
CPME	4.6-15	23^h	$03d07^h$	40.3	□4d	
CPME	15-25	23^h	$03d07^h$	21.9	□4d	
CPME	25-48	23^h	$03d07^h$	3.4	□4d	
CPME	48-96	23^h	$03d07^h$	0.59	□4d	
CPME	96-145	-	-	-	-	
CPME	145-440	-	-	-	-	
SOHO						
LION	0.75-2	23^h	$03d07^h$	43.3	7d	
LION	2-6	23^h	$03d07^h$	30.5	7d	
EPHIN	4-8	23^h	$03d07^h$	120	7d	
EPHIN	8-25	23^h	$03d07^h$	34	7d	
EPHIN	25-41	23^h	$03d07^h$	3.9	7d	
EPHIN	41-53	- “ -	- “ -	- “ -	- “ -	

References:

Kuwabara T., J.W. Bieber, J. Clem et al., 2006.

Veselovskij I.S., I.N. Myagkova, O.S. Yakovchuk, 2012.

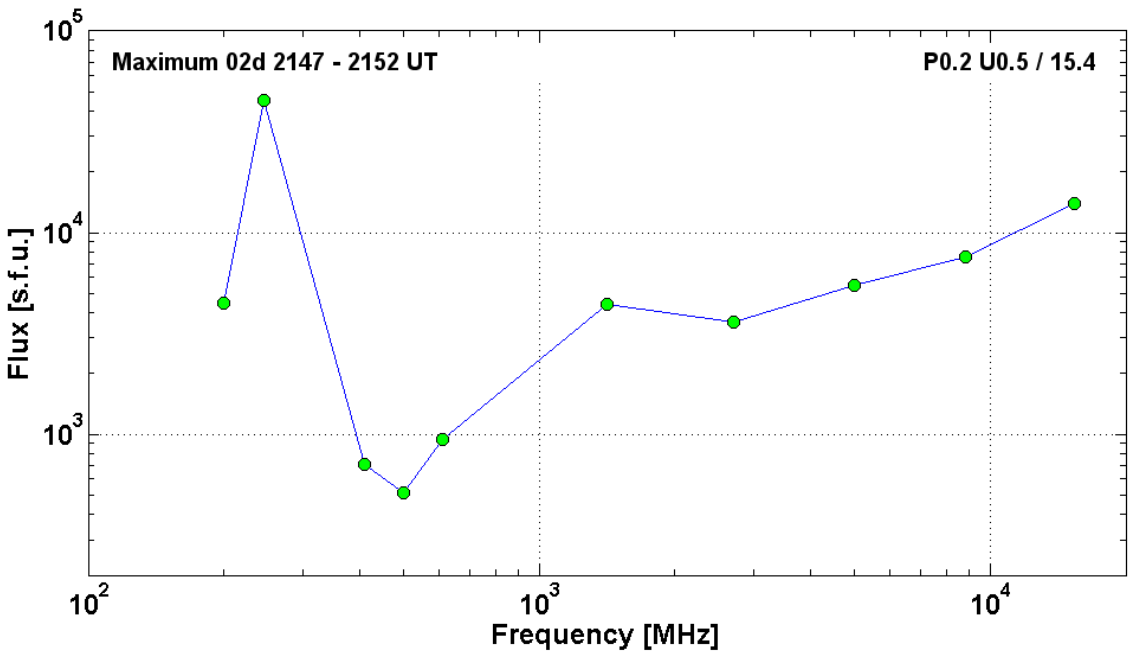
Electromagnetic and other phenomena that are sources and/or accompanying for the event of 2001 April 02

2001 April 02 ■ **AR9393** **To event 389**

Hα	6563 Å	No Flare Patrol			n19w90*		
1 – 12	keV	2132	2151	2203		X>17.5	1.5E00
53 – 93	keV	212902	213634	>213750		55	HXT Y
53 – 93	keV	<221334	~221334	>005640		11	HXT Y

15.4	GHz	2132.0	2149.0	2316.0	P0.2 U0.5/15.4	4.15	15.4
8.8	GHz	2135.0	2147.0	2321.0		3.88	8.8
5	GHz	2135.0	2147.0	2210.0		3.74	5
2.7	GHz	2143.0	2148.0	2212.0		3.56	2.7
1.4	GHz	2144.0	2148.0	2323.0		3.64	1.4
610	MHz	2146.0	2150.0	2205.0		2.97	610
500	MHz	2146.0	2150.0	2203.0		2.71	500
410	MHz	2148.0	2149.0	2201.0		2.85	410
245	MHz	2146.0	2152.0	2214.0		4.65	245
200	MHz	2149.0	2152.0	2207.0		3.65	200
DS II	25-280	2152		2157		3	DS II
DS III	25-180	2135		0156	N	1	DS III
DS III	70-120	2149		2150	B	2	DS III
n°							Armenia(S)
CME	WL	2206	2505 km/s	108.5 km/s^2	244˚	293˚	

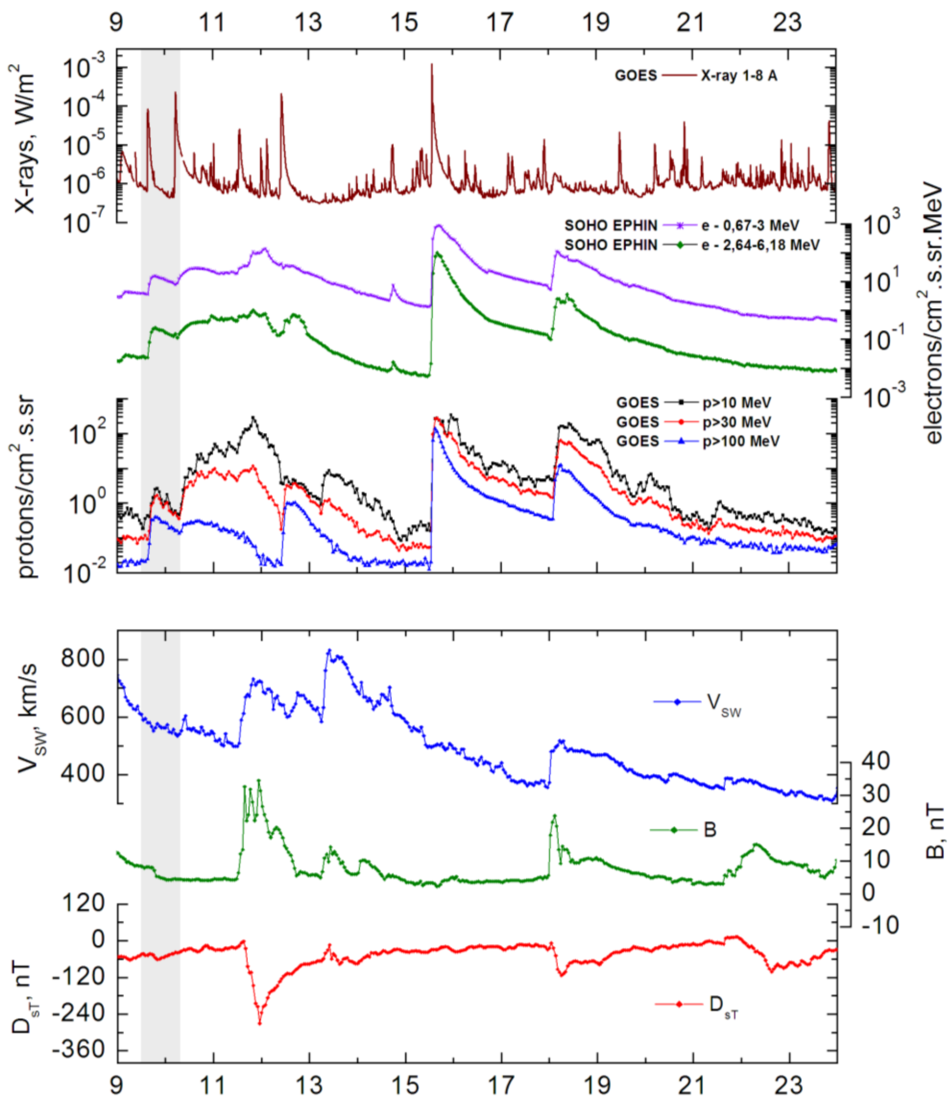
* − probable localization of the flare event



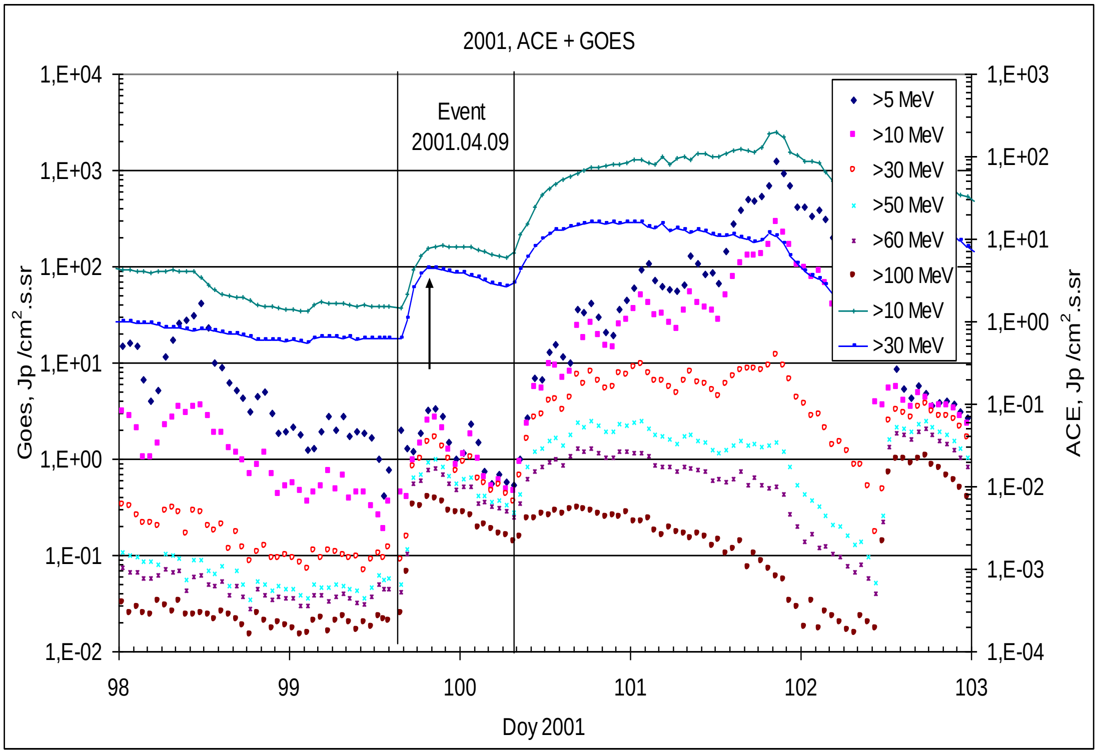
Particle event: To(Ep>10 MeV) – 09d17^h
Tmax(Ep>10 MeV) – 09d20^h, Jmax (Ep>10 MeV) – 2.2 /cm^2.s.sr
Duration of the event – 0.6 days
Quasimaximal energy of protons in the event – Eqm = 390 MeV

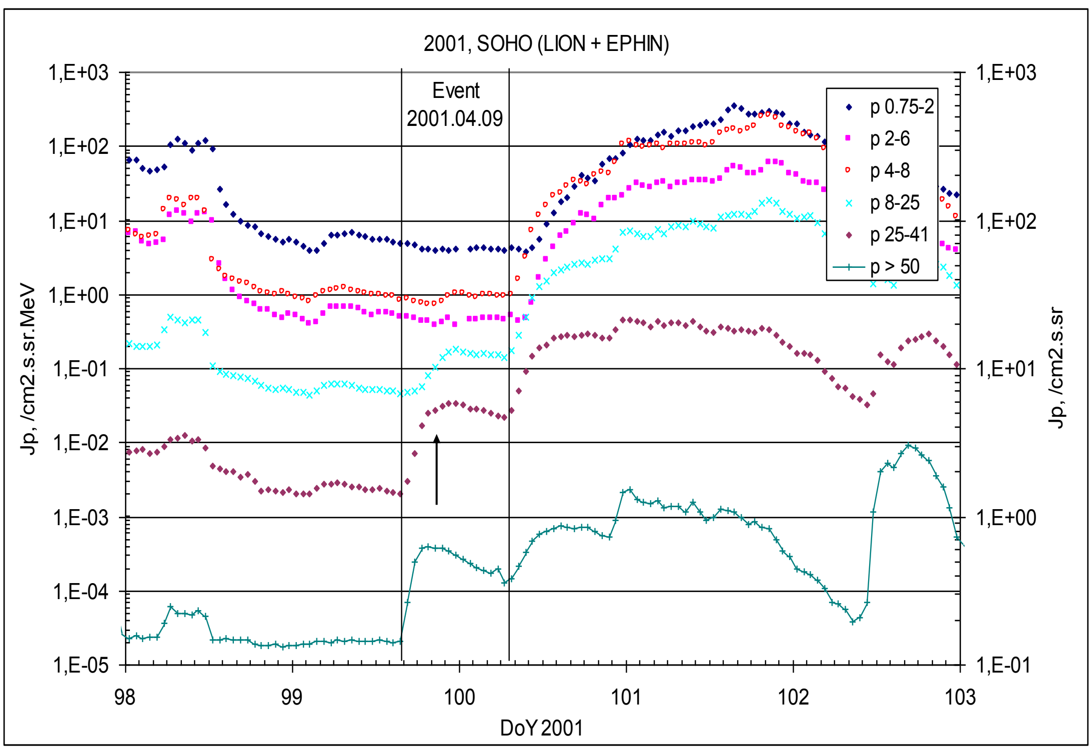
Sources: ● solar flare 09d15^{h}20^m, M7.9/1B, S21W04, AR9415
Main X-ray burst 1-8 Å: onset – 09d15^{h}20^m, max – 09d15^{h}34^m, Φ = 0.13 J/m^2
CME: 09d15^{h}54^m, V=1192 km/s, Δφ =360^o, dA= 211^o

Particle fluxes and associated phenomena



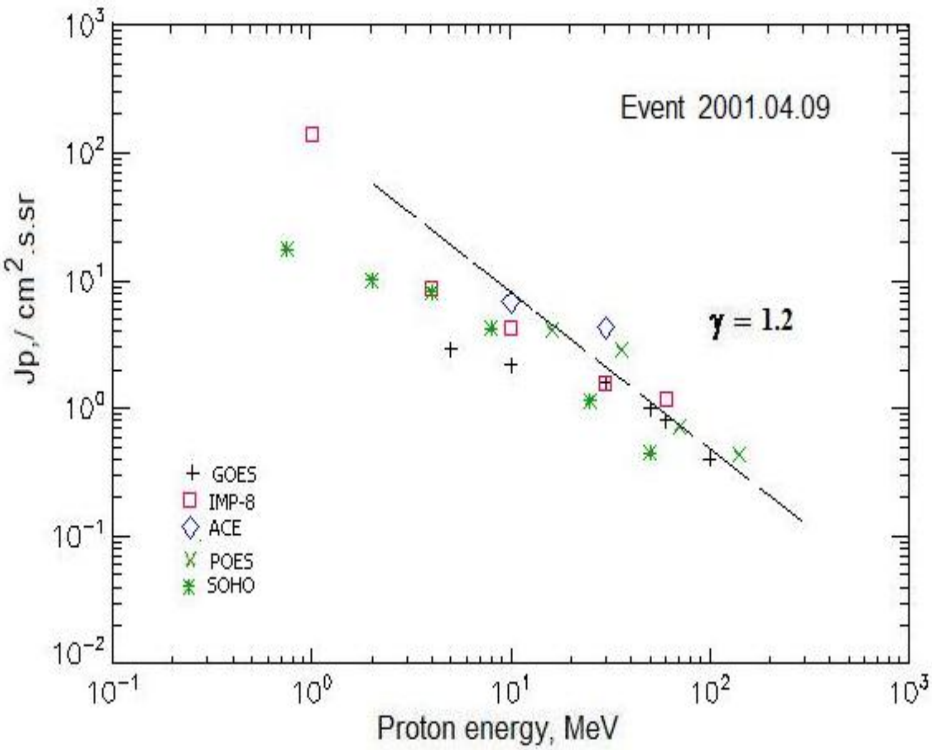
Time profiles of the proton fluxes for the event of 2001 April 09





Arrows on the profiles of the events indicate the time of the proton flux maxima, taken to build the proton spectra (see below)

Integral time-of-maximum proton spectrum



Integral fluxes of protons for the event of 2001 April 09

S/c, instruments	Ep. MeV	To	Tmax	Jmax, /cm^2.s.sr	Dura-tion	Comments
GOES-10						
EPS	>5	17^h	20^h	2.9	0.6d	
EPS	>10	17^h	20^h	2.2	0.6d	
EPS	>30	17^h	20^h	1.6	0.6d	
EPS	>50	17^h	20^h	1.0	0.6d	
EPS	>60	17^h	20^h	0.8	0.6d	
EPS	>100	17^h	20^h	0.4	0.6d	
POES-16						
MEPED	>0.24	-	-	-	-	
MEPED	>0.8	-	-	-	-	
MEPED	>2.5	-	-	-	-	
MEPED	>6.9	-	-	-	-	
MEPED	>16	-	20^h	4.1	0.6d	
MEPED	>36	-	20^h	2.8	0.6d	
MEPED	>70	-	20^h	0.7	0.6d	
MEPED	>140	-	20^h	0.4	0.6d	
IMP-8						
CPME	>1	17^h	20^h	139	0.6d	
CPME	>4	17^h	20^h	8.8	0.6d	
CPME	>10	17^h	20^h	4.3	0.6d	
CPME	>30	17^h	20^h	1.6	0.6d	
CPME	>60	17^h	20^h	1.2	0.6d	

ACE						
SIS	>10	17^h	23^h	6.8	0.5d	
SIS	>30	17^h	22^h	4.3	0.5d	
SOHO						
EPHIN (INT)	>50	16^h	20^h	0.45	0.5d	

Differential fluxes of protons for the event of 2001 April 09

S/c, instruments	ΔE, MeV	To	Tmax	Jmax. /cm^2.s.sr.MeV	Dura-tion	Comments
IMP-8						
CPME	1-2	-	10d01 ^{h}	148	0.5d	
CPME	2-4.6	-	10d01 ^{h}	11.5	0.5d	
CPME	4.6-15	-	10d01 ^{h}	0.42	0.5d	
CPME	15-25	-	23^h	0.155	0.5d	
CPME	25-48	-	23^h	0.037	0.5d	
CPME	48-96	-	23^h	0.0127	0.5d	
CPME	96-145	-	-	-	-	
CPME	145-440	-	-	-	-	
SOHO						
LION	0.75-2	-	21^h	4.2	0.5d	
LION	2-6	-	22^h	0.47	0.5d	
EPHIN	4-8	19^h	23^h	1	0.5d	
EPHIN	8-25	18^h	23^h	0.18	0.5d	
EPHIN	25-41	17^h	23^h	0.034	0.5d	
EPHIN	41-53	- “ -	- “ -	- “ -	- “ –	

References:

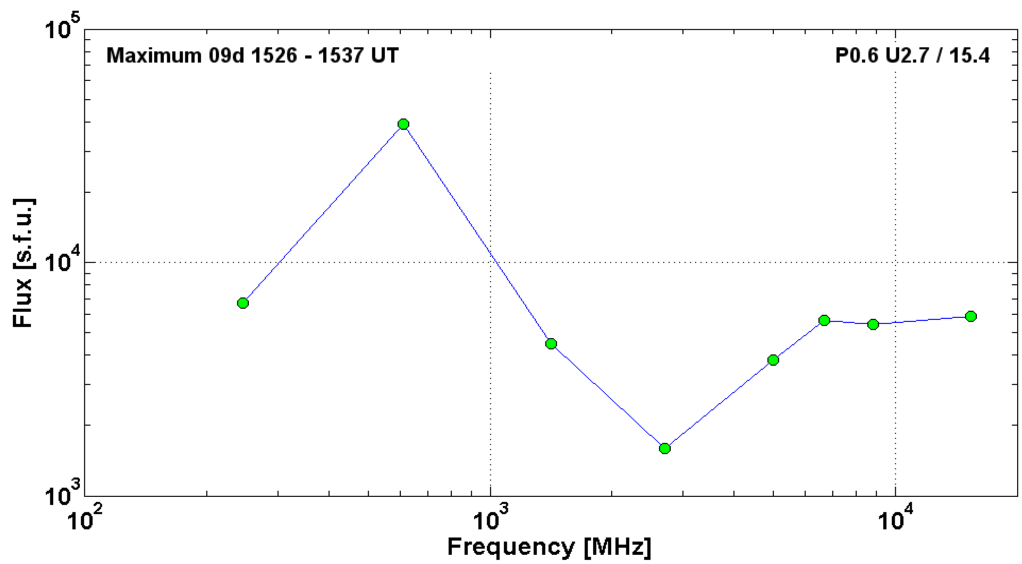
Veselovskij I.S., I.N. Myagkova, O.S. Yakovchuk, 2012.

Electromagnetic and other phenomena that are sources and/or accompanying for the event of 2001 April 09

2001 April 09 ● AR9415 To event 390

Hα	6563Å	1524	1534	1712	S21W04	1B	EFH
1 – 12	keV	1520	1534	1600		M7.9	1.3E-1
53 – 93	keV	152259	~152459	>152513		25	HXT Y

15.4	GHz	1522.0	1526.0	1614.0	P0.6 U2.7/15.4	3.77	
8.8	GHz	1522.0	1530.0	1609.0		3.73	
6.7	GHz	1522.8	1536.2	1603.8		3.75	
5	GHz	1522.0	1535.0	1614.0		3.58	
2.7	GHz	1523.0	1537.0	1614.0		3.20	
1.4	GHz	1524.0	1526.0	1614.0		3.65	
610	MHz	1524.0	1530.0	1614.0		4.59	
245	MHz	1524.0	1529.0	1614.0		3.83	
DS II	25-180	1528		1549		3	
DS IV	40-800	1523		~1606	P	3	
DS III	25-180	1527		1550	N	2	
DS DCIM	2000-4500	1522		1605	GG	3	
DS DCIM	800-2000	1524		1609	GG,SP,FS	3	
CME	WL	1554	1192km/s	108.5km/s^2	360˚	211˚	

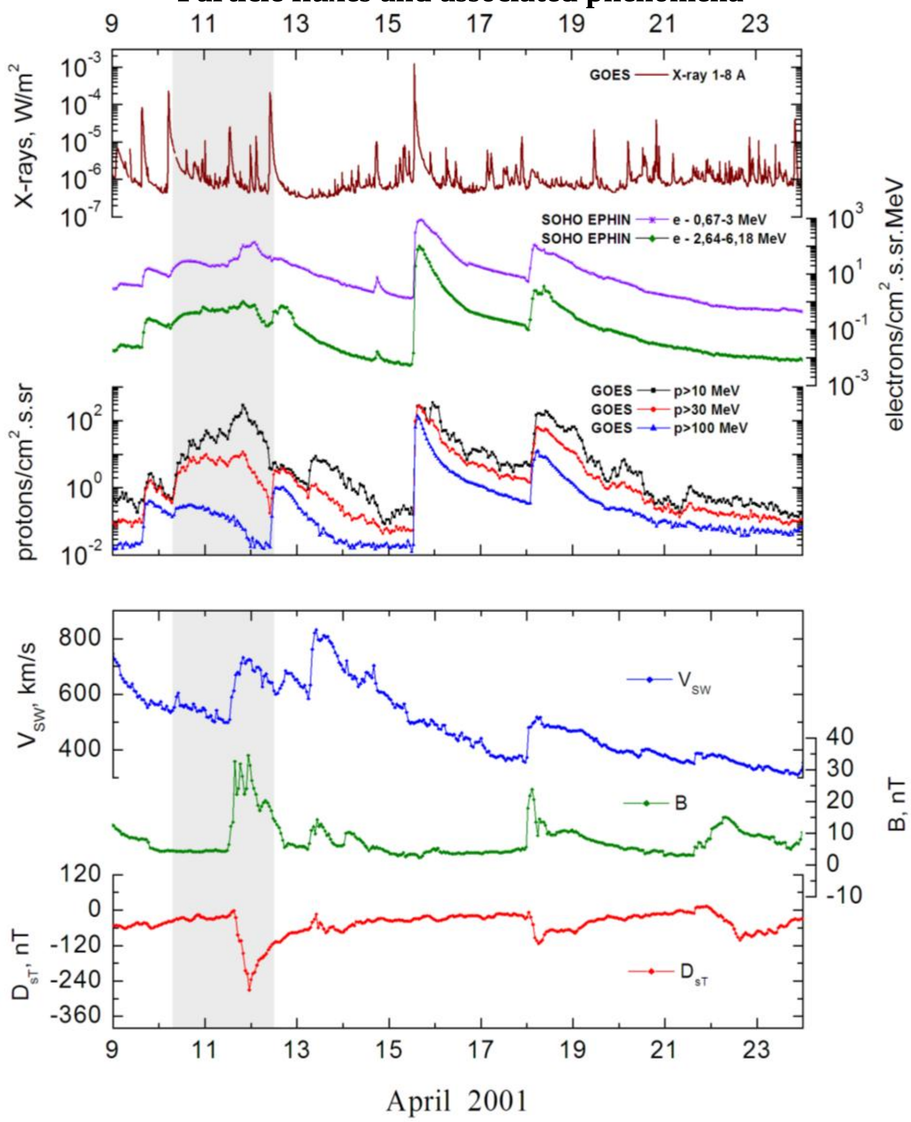


Event 2001.04.10 – (2001-100) **№ 391**

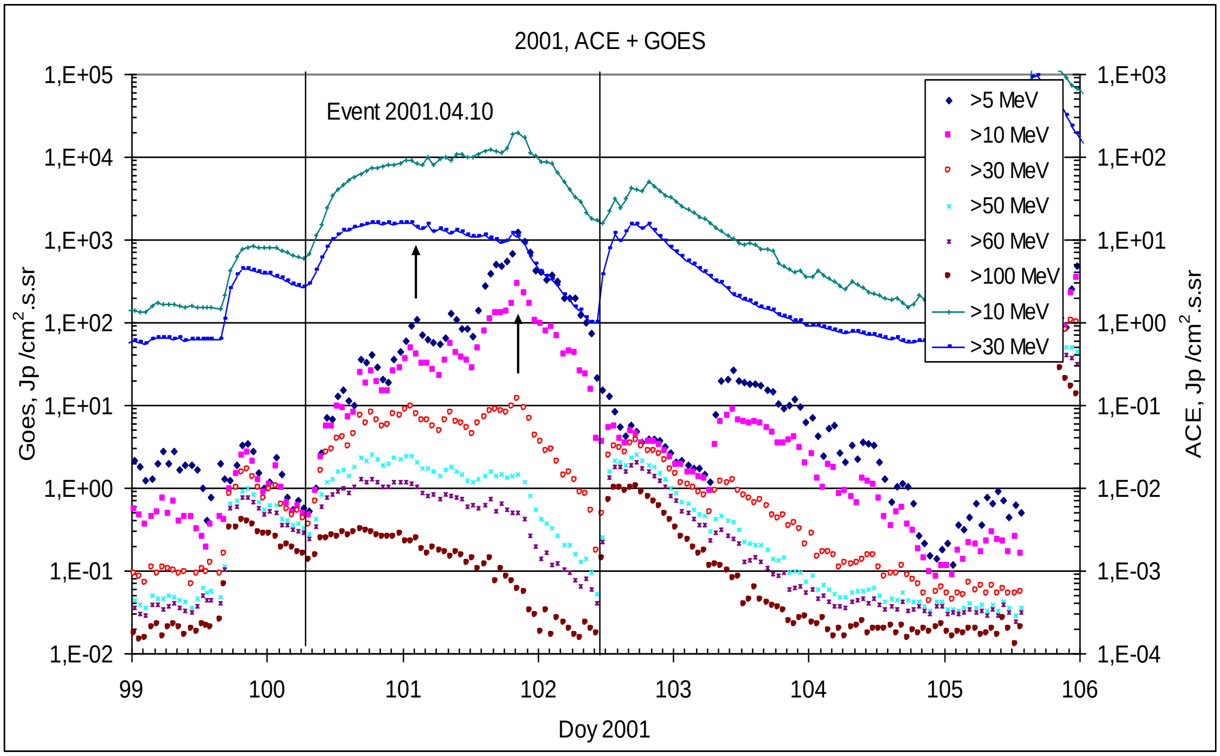
Particle event: To(Ep>10 MeV) – 10d08^h
Tmax$_1$(Ep>10 MeV) – 11d01^h, Jmax$_1$(Ep>10 MeV) – 50 /cm^2.s.sr
Tmax$_2$(Ep>10 MeV) – 11d20^h, Jmax$_2$(Ep>10 MeV) – 280 /cm^2.s.sr
Duration of the event – 2 days
Quasimaximal energy of protons in the event – Eqm$_1$ = 350 MeV
– Eqm$_2$ = 260 MeV

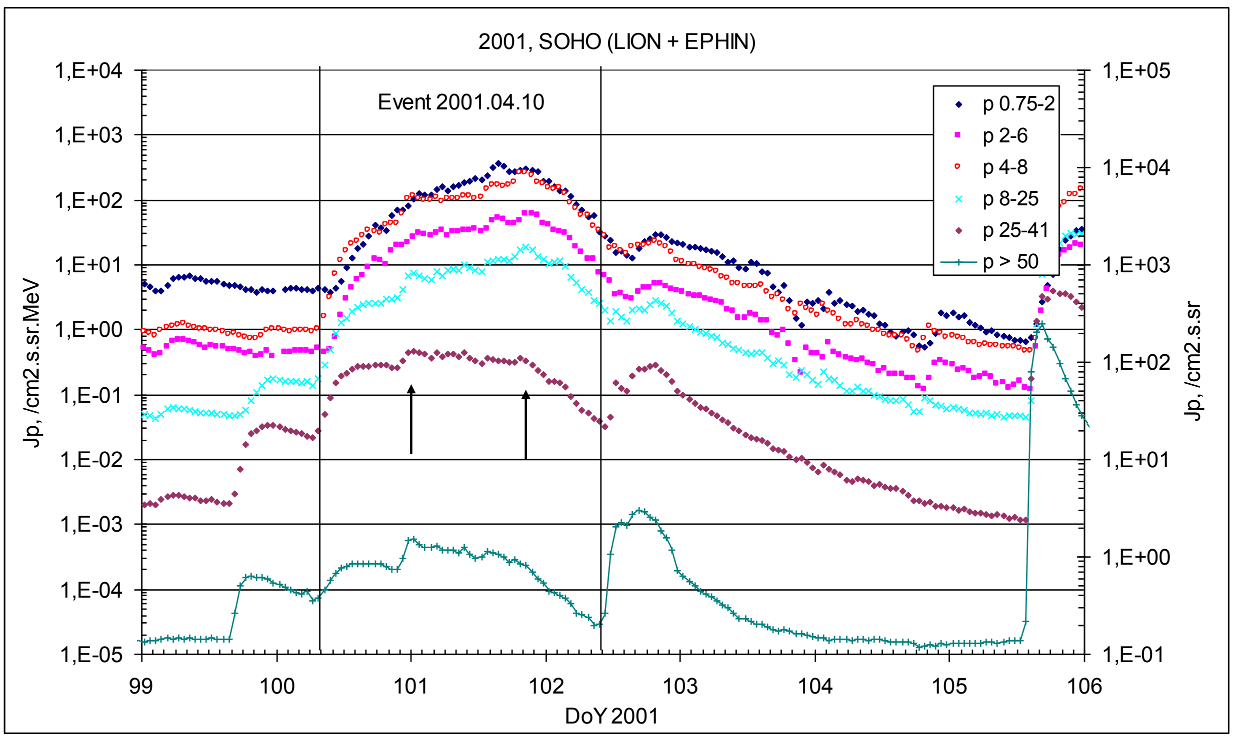
Sources: ● solar flare 10d04^{h}59^m, 3N/X2.3, S23W09, AR9415
ø solar flare 11d12^{h}56^m, M2.3/1F, S20W28 AR9415
Main X-ray burst 1-8 Å: onset – 10d05^{h}06^m, max – 10d05^{h}26^m, Φ = 0.3 J/m^2
CME 10d05^{h}30^m, V=2411 km/s, Δφ =360^o, dA= 166^o
ΔSC 11d13 ^{h}43 ^{m}, Δ SC 11d15 ^{h}19 ^{m}

Particle fluxes and associated phenomena



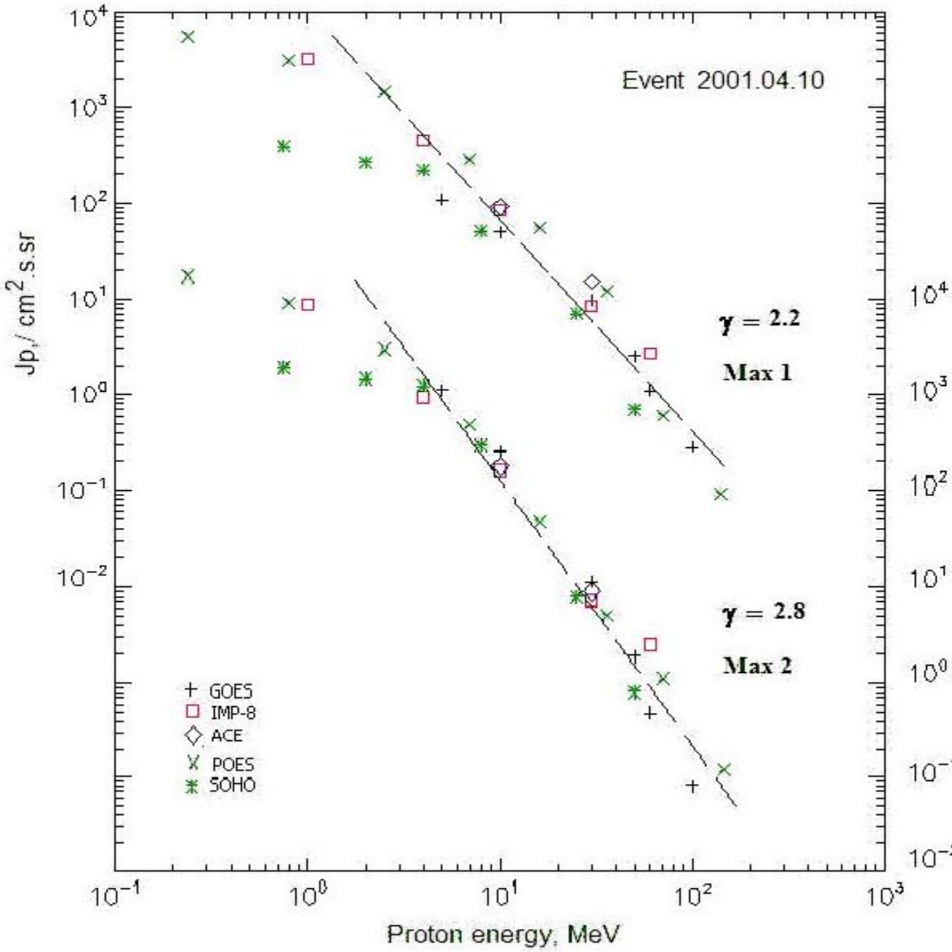
Time profiles of the proton fluxes for the event of 2001 April 10





Arrows on the profiles of the events indicate the time of the proton flux maxima, taken to build the proton spectra (see below)

Integral time-of-maximum proton spectrum



Integral fluxes of protons for the event of 2001 April 10

S/c, instruments	Ep, MeV	To	Tmax	Jmax, **/cm^2.s.sr**	Dura-tion	Comments
GOES-10						
EPS	>5	08^h	11d01 ^{h}/11d20^h	109/1256	2d	
EPS	>10	08^h	11d01 ^{h}/11d20^h	50/280	2d	
EPS	>30	08^h	11d01 ^{h}/11d20^h	9.6/11.6	2d	
EPS	>50	08^h	21^h/11d20^h	2.5/ 1.9	2d	
EPS	>60	08^h	19^h/11d18^h	1.1/0.47	2d	
EPS	>100	08^h	17^h/11d17^h	0.28/0.08	2d	
POES-16						
MEPED	>0.24	08^h	11d01^h/11d20^h	5500/20230	2d	
MEPED	>0.8	08^h	11d01^h/11d20^h	3085/10330	2d	
MEPED	>2.5	08^h	11d01^h/11d20^h	1485/3340	2d	
MEPED	>6.9	09^h	11d01^h/11d20^h	285/540	2d	
MEPED	>16	09^h	11d01^h/11d20^h	55/50	2d	
MEPED	>36	08^h	11d01^h/11d20^h	11/8.05	2d	
MEPED	>70	08^h	11d01^h/11d20^h	0.6/1.1	2d	
MEPED	>140	08^h	11d01^h/11d20^h	0.09/0.12	2d	

IMP-8						
CPME	>1	09^h	11d01^h/11d20^h	3230/9760	2d	
CPME	>4	08^h	11d00^h/11d20^h	450/1060	2d	
CPME	>10	08^h	11d00^h/11d20^h	86/172	2d	
CPME	>30	08^h	20^h/11d20^h	8.4/7.5	2d	
CPME	>60	08^h	16^h/11d20^h	2.7/2.5	2d	
ACE						
SIS	>10	08^h	11d01^h/11d20^h	92/195	2d	
SIS	>30	08^h	20^h/11d20^h	15/9.2	2d	
SOHO						
EPHIN (INT)	>50	08^h	16^h/11d18^h	0.7/0.8	2d	

Differential fluxes of protons for the event of 2001 April 10

S/c, instruments	ΔE, MeV	To	Tmax	Jmax. /cm^2.s.sr.MeV	Dura-tion	Comments
IMP-8						
CPME	1-2	11^h	11d02^h/11d18^h	1680/8070	2d	
CPME	2-4.6	09^h	11d01^h/11d20^h	536/1200	2d	
CPME	4.6-15	08^h	11d01 ^{h}/11d20^h	30.8/80	2d	
CPME	15-25	08^h	11d01 ^{h}/11d20^h	3.3/6.1	2d	
CPME	25-48	08^h	11d01 ^{h}/11d20^h	0.4/0.33	2d	
CPME	48-96	08^h	11d01^h/11d20^h	0.05/0.025	2d	
CPME	96-145	08^h	-	-	-	
CPME	145-440	08^h	-	-	-	
SOHO						
LION	0.75-2	10^h	21^h/11d21^h	69.6/285	2d	
LION	2-6	10^h	19^h/11d21^h	11.5/59.6	2d	
EPHIN	4-8	08^h	21^h/11d20^h	42.7/265	2d	
EPHIN	8-25	08^h	18^h/11d20^h	2.6/18.9	2d	
EPHIN	25-41	08^h	18^h/11d20^h	0.29/0.36	2d	
EPHIN	41-53	- “ -	- “ -	- “ -	- “ -	

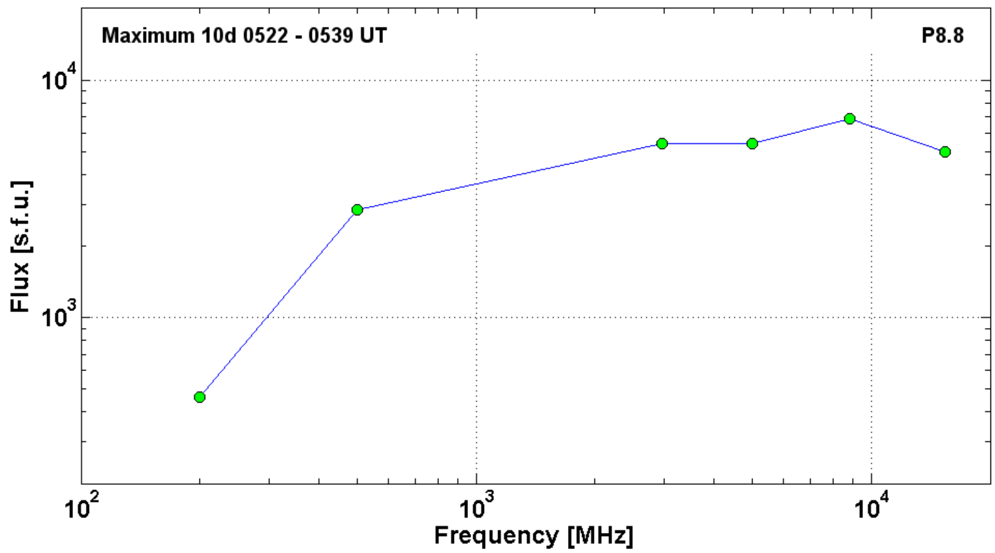
References:

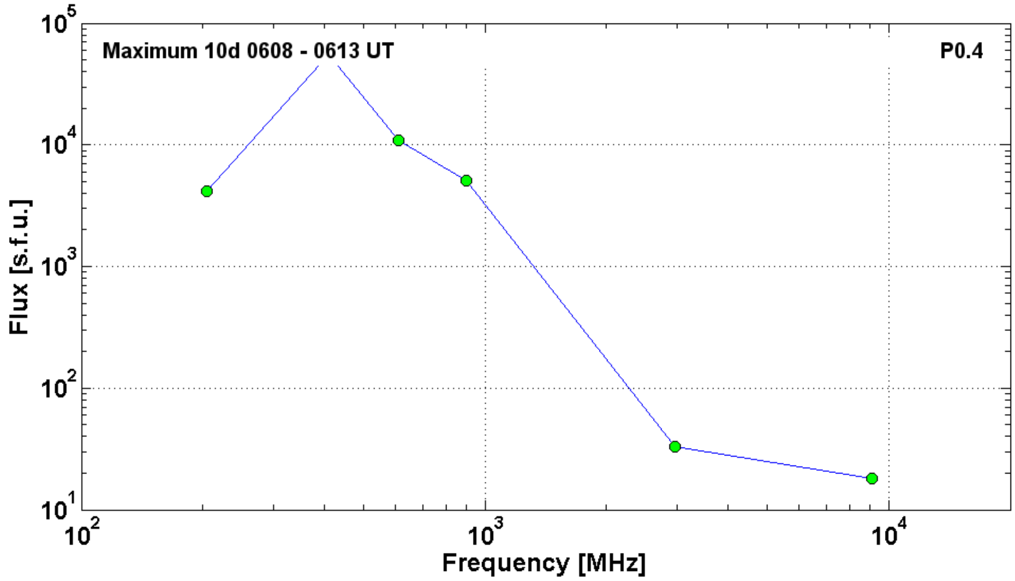
Veselovskij I.S., I.N. Myagkova, O.S. Yakovchuk, 2012.

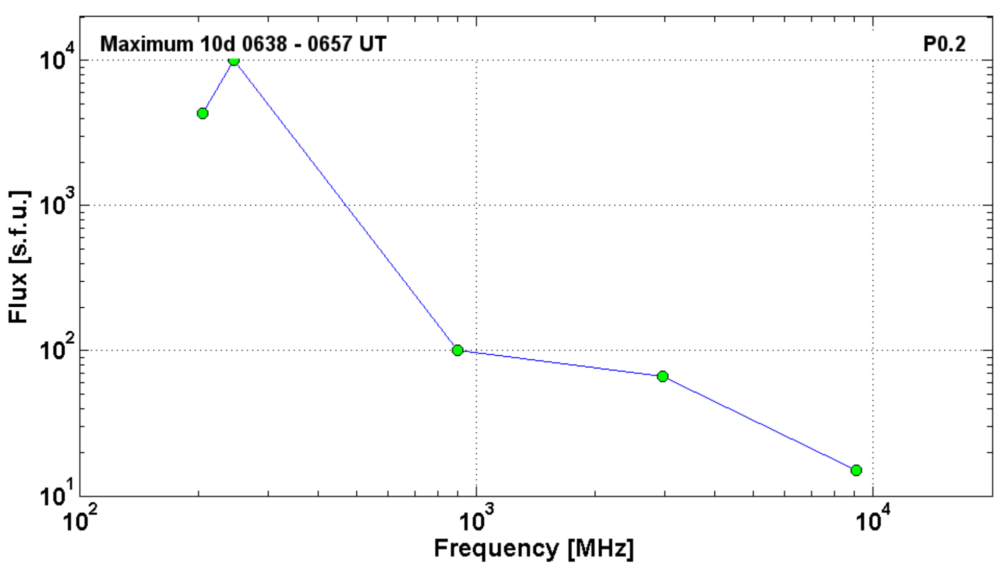
Electromagnetic and other phenomena that are sources and/or accompanying for the event of 2001 April 10

2001 April 10 ● AR9415 To event 391

Hα	6563Å	0459	0520	0810	S23W09	3N	UZ
1 – 12	keV	0506	0526	0542		X2.3	3.0E-1
53 – 93	keV	<051343	~051907	055729		89	HXT Y
15.4	GHz	0510.0	0523.0	0651.0		3.70	
8.8	GHz	0509.0	0522.0	0707.0	P8.8	3.84	
5	GHz	0509.0	0523.0	0706.0		3.73	
3	GHz	0504.4	0525.8	0541.1		3.73	
500	MHz	0504.0	0539.0	0700.0		3.45	
200	MHz	0504.0	0526.0			2.66	
DS II	25-180	0518		0536		3	
DS IV	25-600	0515		0535		3	
DS IV	40-800	<0518		~1010		3	
DS III	25-180	0509		0535	N	3	
DS CONT	23-130	0515		0534		3	
9.1	GHz	0607.2	0608.5	0612.5		1.26	
3	GHz	0606.4	0608.8	0622.8		1.52	
900	MHz	<0504.2	0613.0	>0617.9		3.71	
610	MHz	0524.0	0612.0	0706.0		4.04	
410	MHz	0524.0	0612.0	0743.0	P0.4	4.74	
204	MHz	0606.0	0612.3	0614.2		3.62	
DS I	45-270	<0559		>1200	S,C	2	
DS III	45-270	<0559		0659	S	2	
DS III	25-180	0656		0658		3	
DS CONT	220-270	0605		0724		2	
DS DCIM	800-2000	0556		0619	GG,SP	3	
9.1	GHz	0656.9	0657.4	0657.9		1.18	
3	GHz	0634.5	0638.3	0642.0		1.83	
900	MHz	0645.1	0648.8			2.00	
245	MHz	0451.0	0648.0	0743.0	P0.2	4.00	
204	MHz	0629.4	0657.9	0707.1		3.63	
DS III		0656		0658	25-180	3	
DS DCIM	GG,SP	0623		0706	800-2000	1	
n°						Arm, Tib, Nor	
CME	WL	0530	2411km/s	211.6*km/s^2	360°	166°	







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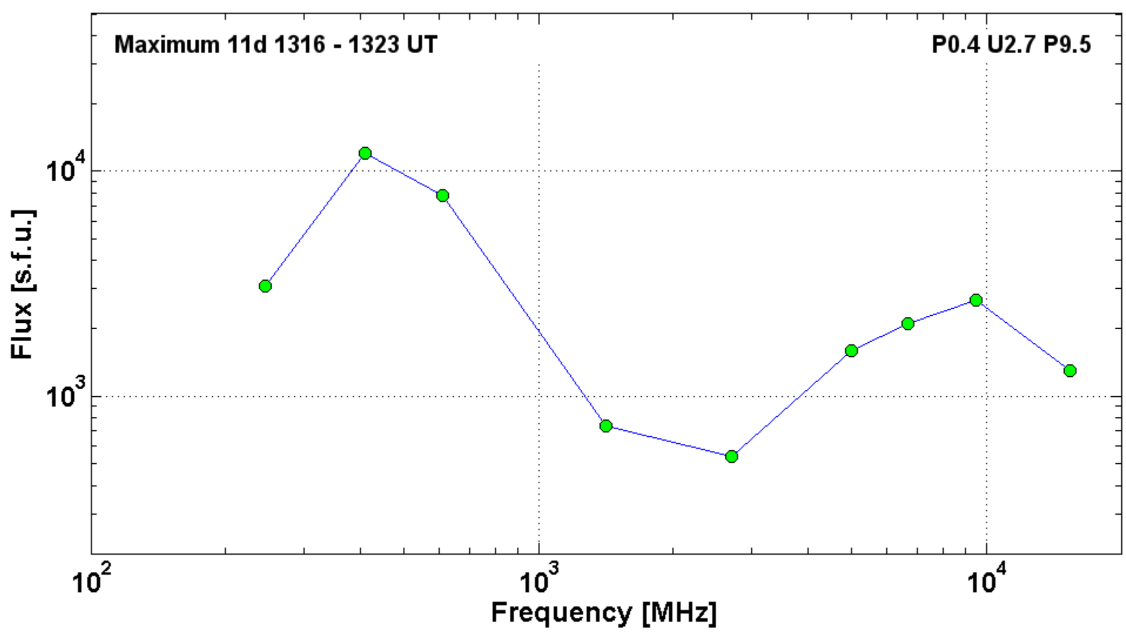
2001 April 11 Ø AR9415 To event 391

Hα	6563Å	1309	1321	1424	S20W28	1F	FU
1 – 12	keV	1256	1326	1349		M2.3	4.8E-2
53 – 93	keV	<132529	~132531	134203		9	HXT Y
15.4	GHz	1303.0	1317.0	1354.0		3.11	
9.5	GHz	1257.0	1317.4	1324.0	P0.4 U2.7 P9.5	3.43	
6.7	GHz	1310.0	1318.0	1330.8		3.32	
5	GHz	1259.0	1317.0	1340.0		3.20	
2.7	GHz	1300.0	1317.0	1404.0		2.73	
1.4	GHz	1300.0	1316.0	1402.0		2.87	
610	MHz	1305.0	1323.0	1354.0		3.89	
410	MHz	1259.0	1318.0	1411.0		4.08	
245	MHz	1300.0	1318.0	1354.0		3.49	
DS II	40-70	1303		1304	UE	3	
DS IV	40-800	1304		~1420	P	3	
DS III	25-180	1300		1321	N	3	
DS III	1415-3150	1303		1316	GG	3	
DS DCIM	2000-3768	1343		1401	GG	1	
CME	WL	1332	1103km/s	-13.0 km/s^2	360˚	224˚	



Event 2001.04.12– (2001-102) **№ 392**

Particle event: To(Ep>10 MeV) – 12d12^{h}

$Tmax_1$(Ep>10 MeV) – 12d17^{h}, $Jmax_1$ (Ep>10 MeV) – 4.3 /cm^2.s.sr

$Tmax_2$(Ep>10 MeV) – 13d10^{h}, $Jmax_2$ (Ep>10 MeV) – 8.7 /cm^2.s.sr

Duration of the event – 2 days

Quasimaximal energy of protons in the event – Eqm_1 = 410 MeV

– Eqm_2 = 275 MeV

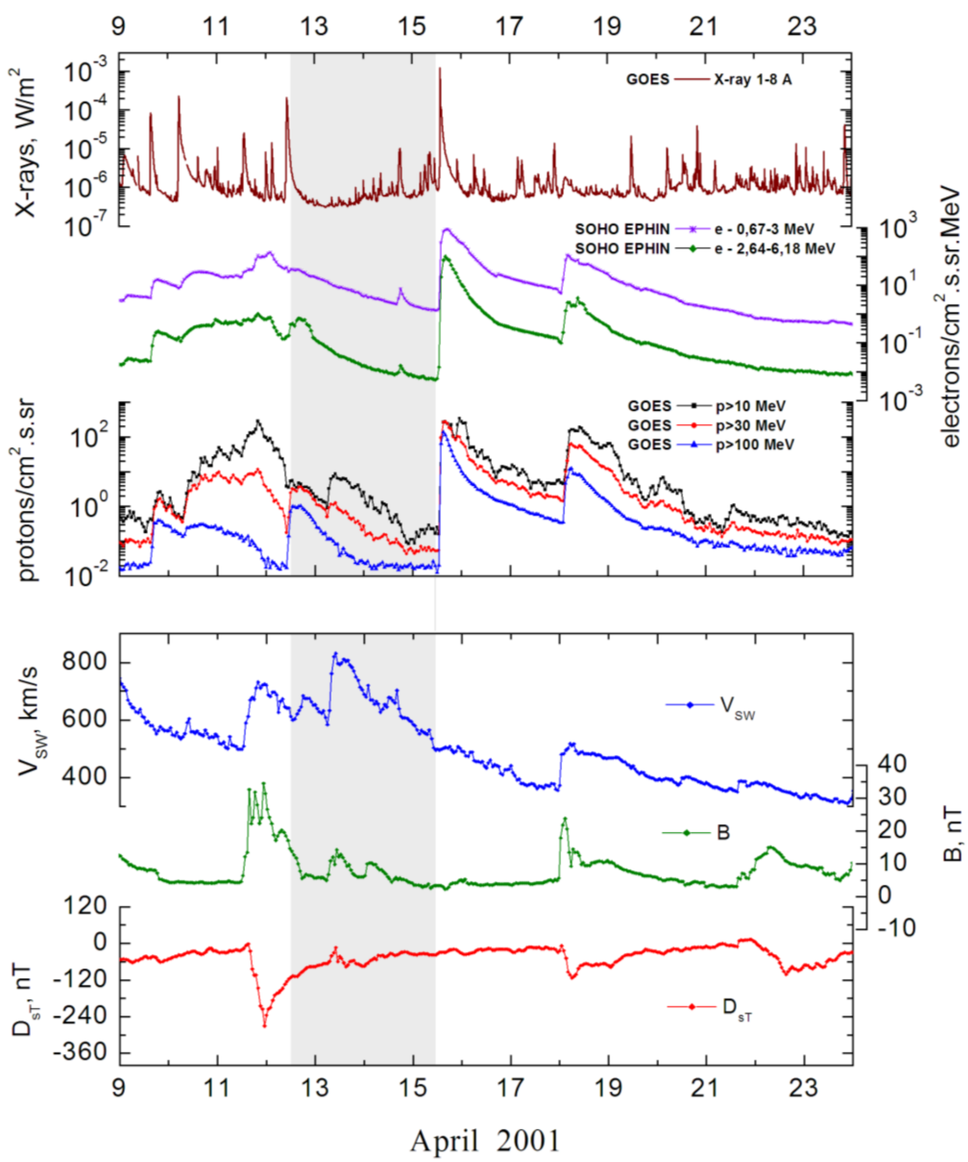
Sources: ● solar flare 12d09^{h}39^{m}, X2.0/2B, S20W42, AR9415

Main X-ray burst 1-8 Å: onset – 12d09^{h}39^{m}, max – 12d10^{h}28^{m}, Φ = 0.3 J/m^2

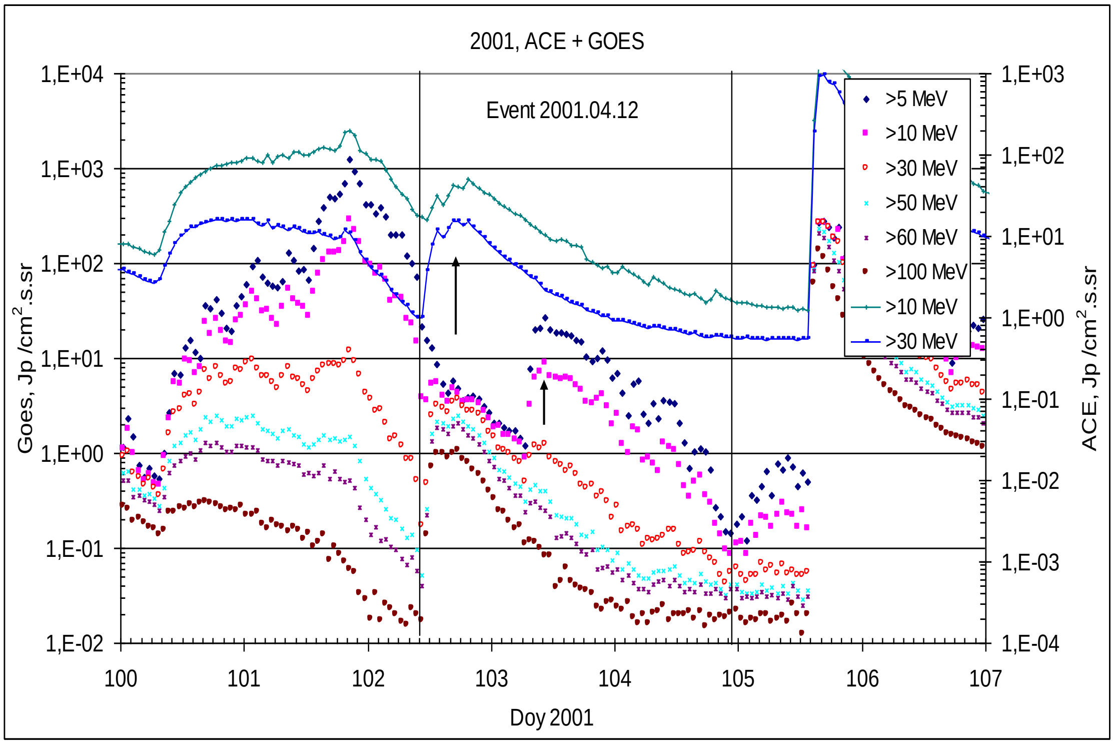
CME: 12d10^{h}31^{m}, V= 1184km/s, Δφ = 360º, dA = 221º

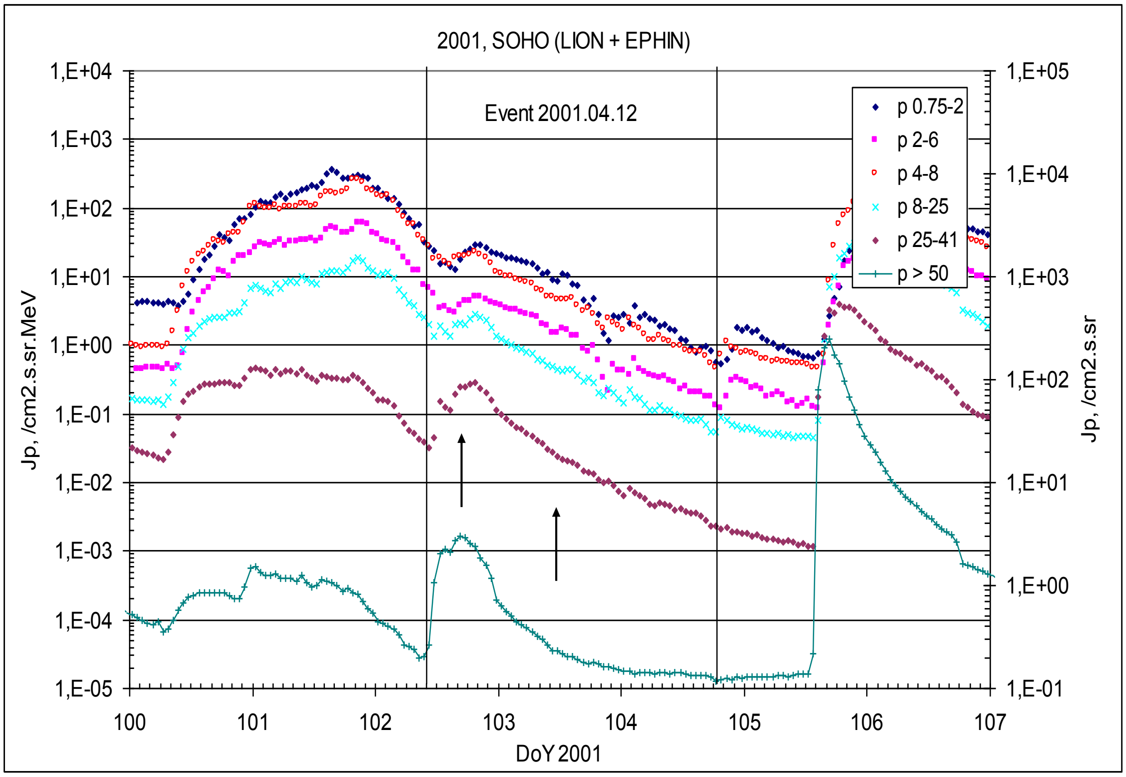
▲ SC 13d07^{h}34^{m}

Particle fluxes and associated phenomena



Time profiles of the proton fluxes for the event of 2001 April 12





Arrows on the profiles of the events indicate the time of the proton flux maxima, taken to build the proton spectra (see below)

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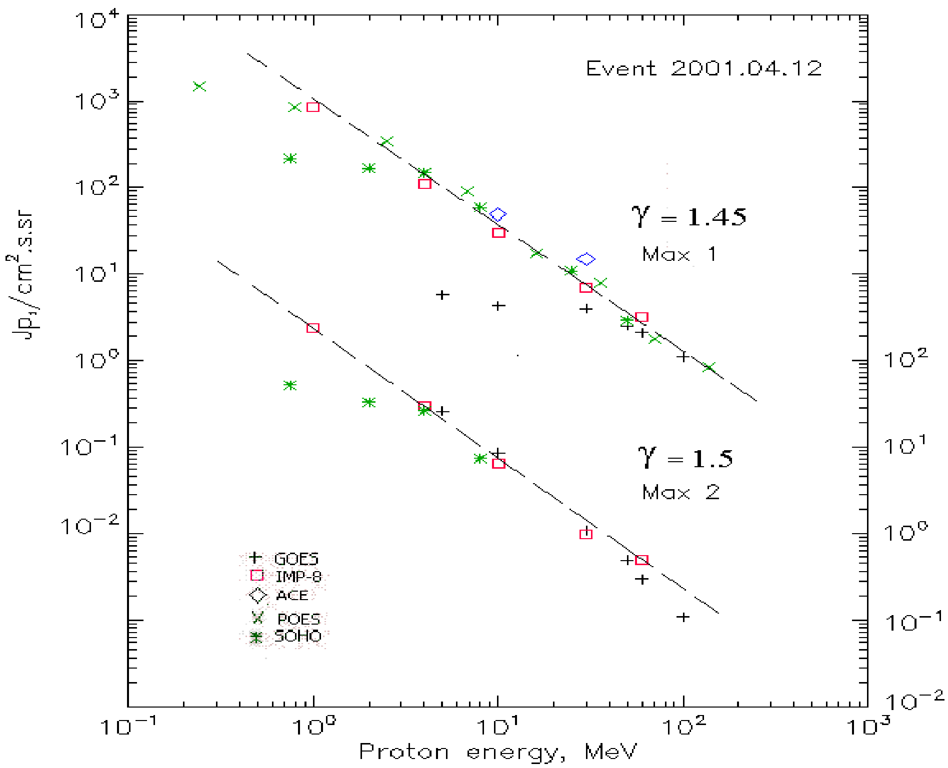
Integral time-of-maximum proton spectrum



Integral fluxes of protons for the event of 2001 April 12

S/c, instruments	Ep, MeV	To	Tmax	Jmax, /cm^2.s.sr	Dura-tion	Comments
GOES-10						
EPS	>5	-	$17^h/13d10^h$	5.8/26.2	2d	
EPS	>10	12^h	$17^h/13d10^h$	4.3/8.7	2d	
EPS	>30	12^h	$17^h/13d10^h$	4/1.1	2d	
EPS	>50	12^h	$17^h/13d10^h$	2.6/0.5	2d	
EPS	>60	12^h	$17^h/13d08^h$	2.1/0.3	2d	
EPS	>100	11^h	$17^h/13d08^h$	1.1/0.11	2d	
POES-16						
MEPED	>0.24	14^h	18^h/ -	1470/-	1d	
MEPED	>0.8	14^h	18^h/ -	850/-	1d	
MEPED	>2.5	14^h	18^h/ -	345/-	1d	
MEPED	>6.9	14^h	18^h/ -	90/-	-	
MEPED	>16	14^h	18^h/ -	17.5/-	-	
MEPED	>36	14^h	18^h/ -	7.8/-	-	
MEPED	>70	14^h	18^h/ -	1.8/-	-	
MEPED	>140	14^h	18^h/ -	0.83/-	-	
IMP-8						
CPME	>1	12^h	$19^h/13d10^h$	840/240	2d	
CPME	>4	12^h	$17^h/13d10^h$	110/30	2d	
CPME	>10	12^h	$17^h/13d14^h$	30/6.6	2d	
CPME	>30	12^h	$17^h/13d14^h$	7/1	2d	
CPME	>60	12^h	$17^h/13d14^h$	3.2/0.5	2d	

ACE						
SIS	>10	12^h	19^h/ -	49/ -	2d	
SIS	>30	12^h	19^h/ -	15/ -	2d	
SOHO						
EPHIN (INT)	>50	10^h	18^h/ -	2.7/ -	1.5d	

Differential fluxes of protons for the event of 2001 April 12

S/c, instruments	ΔE, MeV	To	Tmax	Jmax. /cm^2.s.sr.MeV	Dura-tion	Comments
IMP-8						
CPME	1-2	10^h	19^h/13d14 ^{h}	610/156	3d	
CPME	2-4.6	10^h	19^h/13d14 ^{h}	94.5/26.8	3d	
CPME	4.6-15	10^h	19^h/13d14 ^{h}	6.5/2	3d	
CPME	15-25	10^h	19^h/13d14 ^{h}	1.33/0.22	3d	
CPME	25-48	10^h	19^h/ -	0.24/ -	3d	
CPME	48-96	10^h	19^h/ -	0.057/ -	2d	
CPME	96-145	10^h	19^h/ -	0.052/ -	2d	
CPME	145-440	10^h	19^h/ -	0.0036/ -	1d	
SOHO						
LION	0.75-2	10^h	20^h/13d12 ^{h}	28.7/10.8	3d	
LION	2-6	10^h	19^h/13d12 ^{h}	5/1.7	3d	
EPHIN	4-8	10^h	19^h/13d14 ^{h}	22.8/4.8	3d	
EPHIN	8-25	10^h	19^h/13d14 ^{h}	2.8/0.44	3d	
EPHIN	25-41	10^h	19^h/ -	0.29/ -	3d	
EPHIN	41-53	- " -	- " -	- " -	- " -	

References:

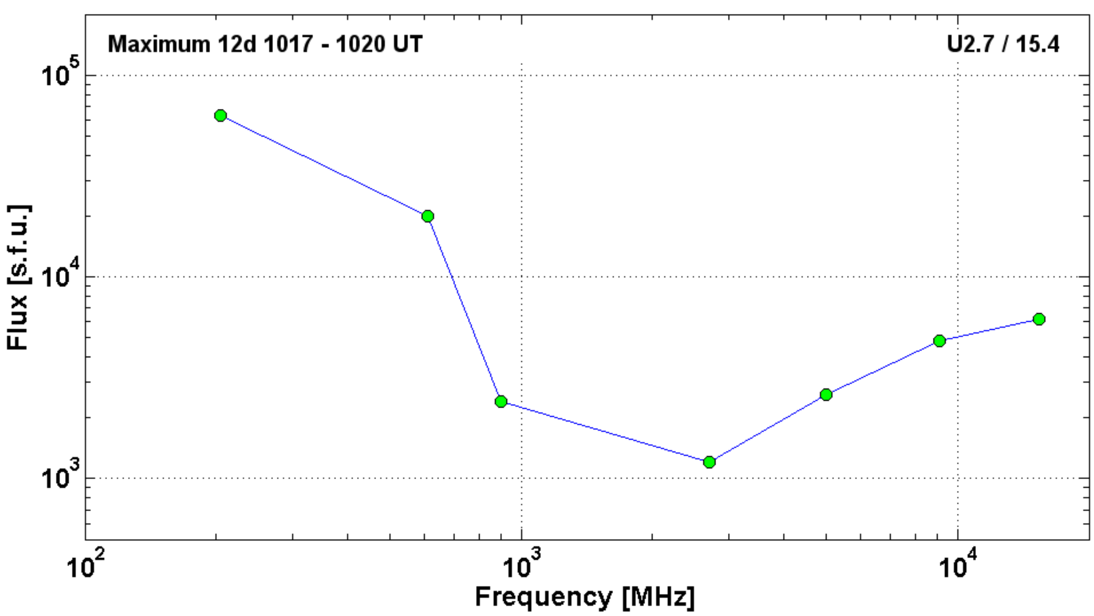
Veselovskij I.S., I.N. Myagkova, O.S. Yakovchuk, 2012.

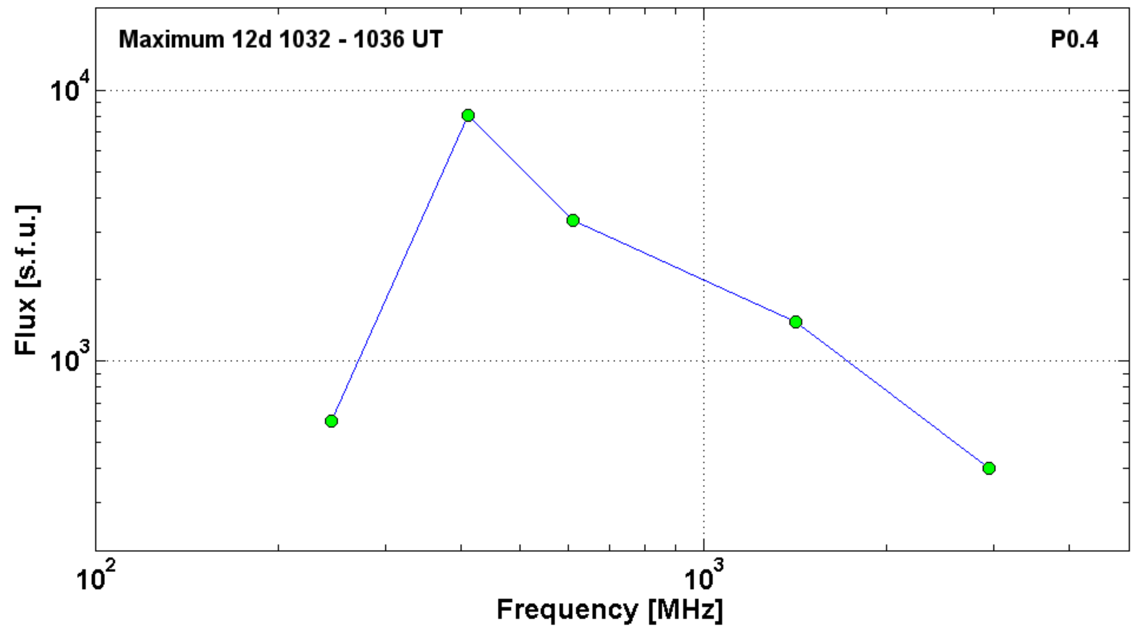
Electromagnetic and other phenomena that are sources and/or accompanying for the event of 2001 April 12

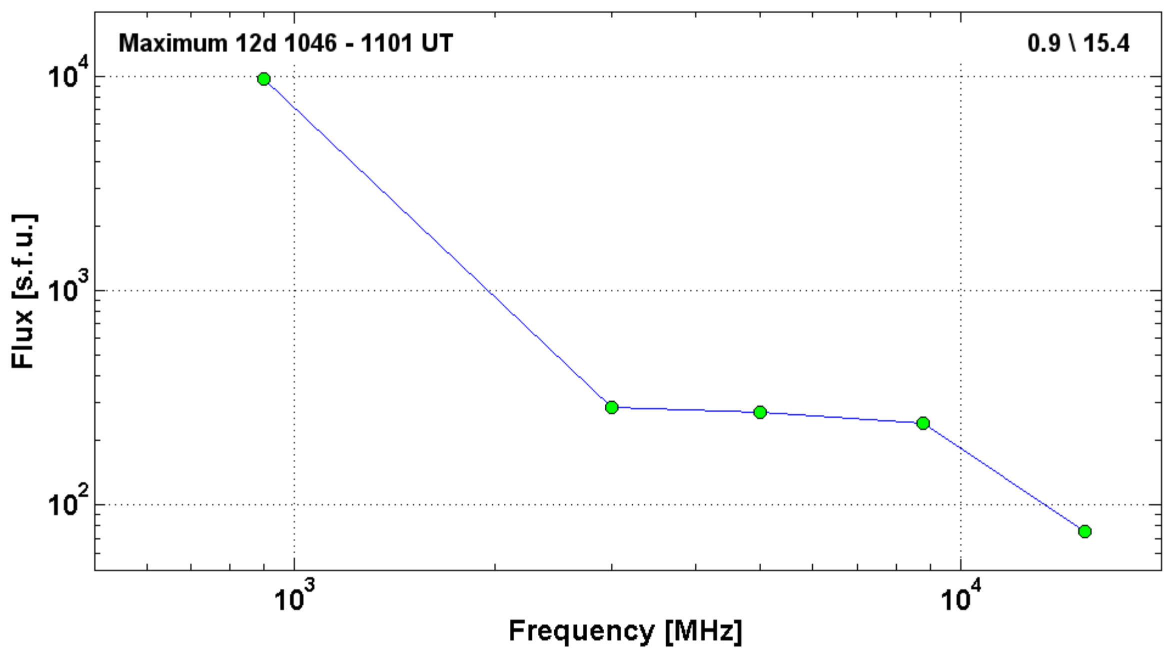
2001 April 12 ● AR9415 To event 392

Hα	6563 Å	<1018	1040	1130	S23W42	2B	E
1 – 12	keV	0939	1028	1049		X2.0	3.0E-1
53 – 93	keV	101058	102042	115042		79	HXT Y
15.4	GHz	1014.0	1017.0	1050.0	U2.7/15.4	3.79	
9.1	GHz	1009.0	1020.5			3.68	
5	GHz	1014.0	1020.0	1052.0		3.41	
2.7	GHz	1014.0	1017.0	1052.0		3.08	
900	MHz	1013.6	1018.2	1110.0		3.38	
610	MHz	1014.0	1020.0	1100.0		4.30	
204	MHz	1014.8	1018.5	1022.1		4.80	

DS II	40-250	~1017		~1038	SH,H	3	
DS IV	40-800	1014		~1116		3	
DS I	25-270	1019		>1230	N,C	2	
DS III	1415-3200	1014		1038	GG,RS	2	
DS III	25-180	1017		1047	N	3	
DS DCIM	2000-4500	1014		1055	GG	3	
DS DCIM	800-2000	1014		1059	GG,FS	3	
3	GHz	1013.8	1032.3			2.60	
1.4	GHz	1014.0	1036.0	1052.0		3.15	
610	MHz	<1029.0	~1036.0	>1100.0		3.52	
410	MHz	1015.0	1036.0	1101.0	P0.4	3.91	
245	MHz	<1029.0	~1033.0	>1100.0		2.78	
245	MHz	1028.0	1033.0	0000.0		2.78	
DS II	135-210	1031		1034	HARM	2	
DS IV	25-180	1032		1341		1	
DS III	130-270	1027		1038	S	2	
15.4	GHz	<1046.0	~1101.0	>1102.0	0.9 \ 15.4	1.88	
8.8	GHz	<1029.0	~1047.0	>1102.0		2.38	
5	GHz	<1029.0	~1047.0	>1056.0		2.43	
3	GHz	1045.8	1047.3	1158.6		2.46	
900	MHz	1013.6	1046.5			3.99	
DS III	40-155	1046		1047	G	3	
DS CONT	30-80	1046		2233		2	
DS DCIM	800-2000	1102		1129	GG	2	
CME	WL	1031	1184 km/s	-20.0 km/s^2	360˚	221˚	







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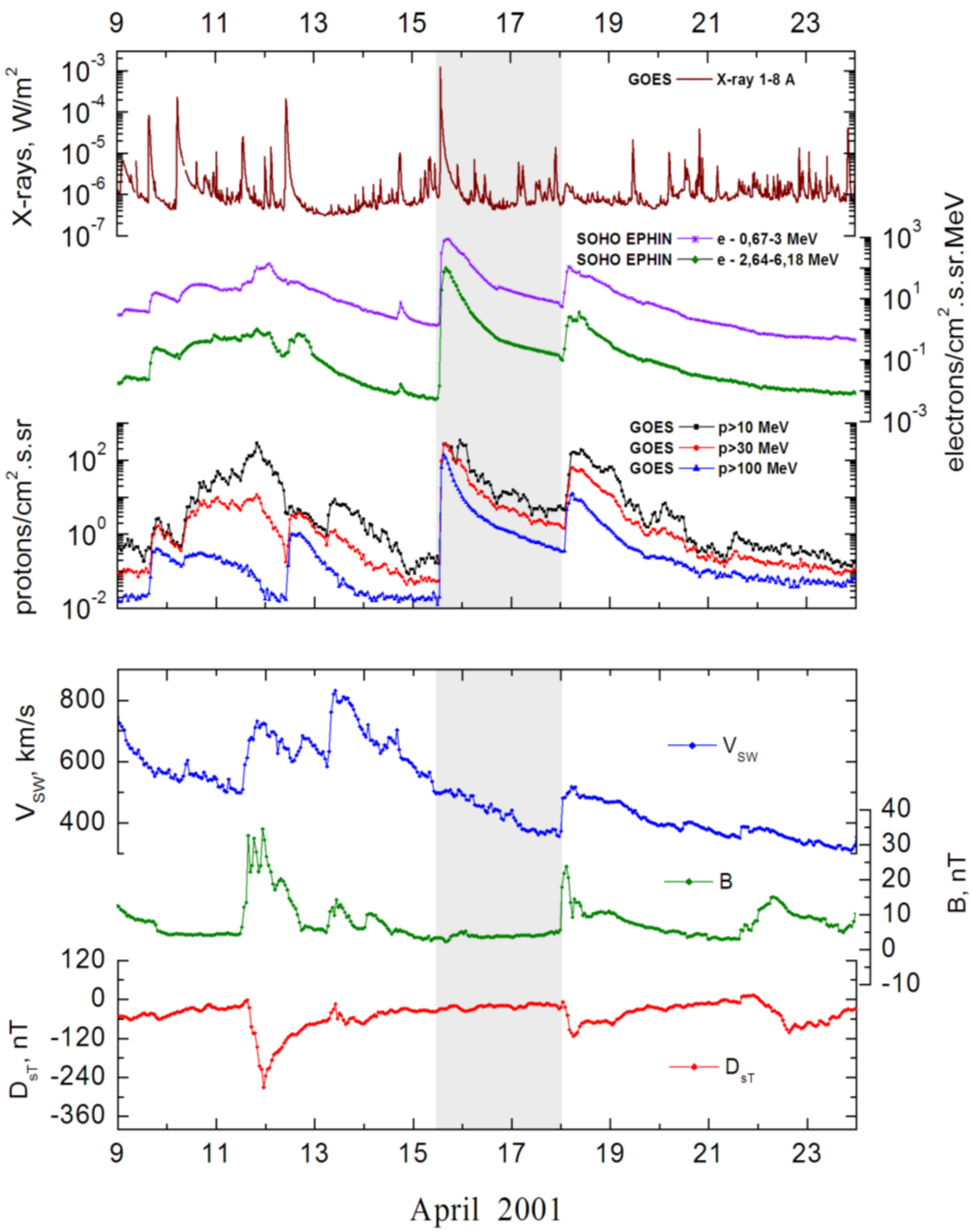
Event 2001.04.15 – (2001-105) – GLE-60 **№ 393**

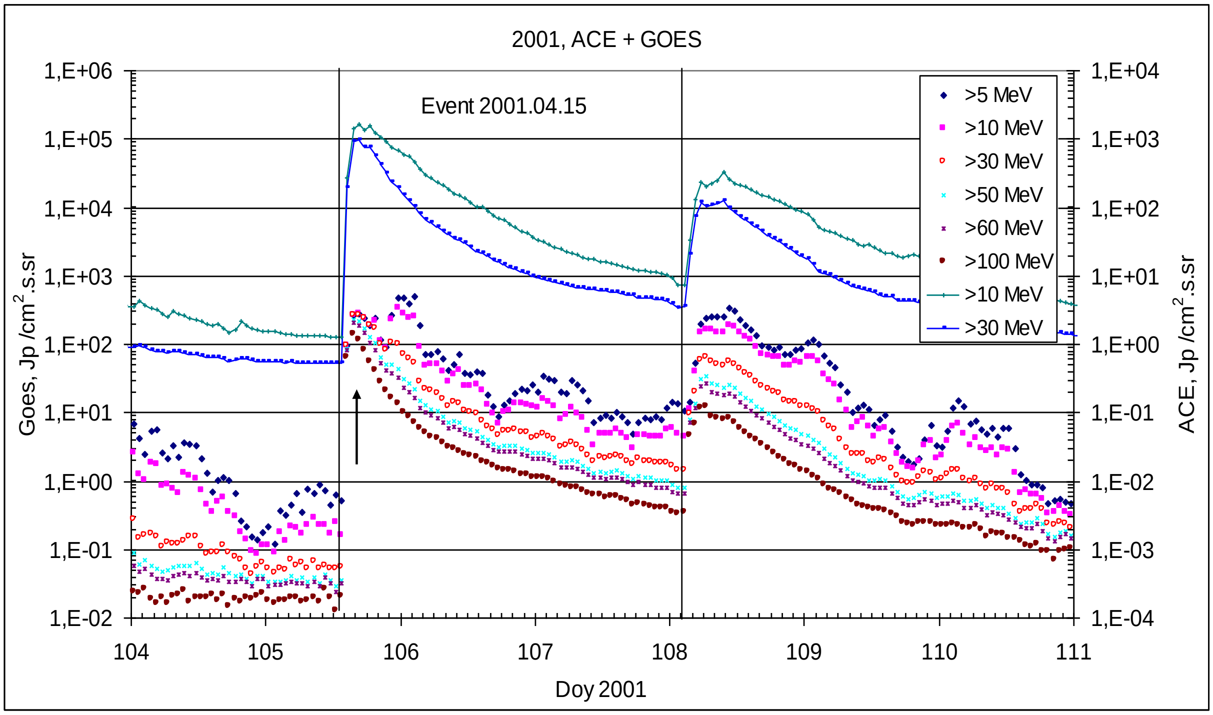
Particle event: To(Ep>10 MeV) – 15d14^h
Tmax(Ep>10 MeV) – 15d16^h, JmaxEp>10 MeV) – 270 /cm^2.s.sr
Duration of the event – 3 days
Quasimaximal energy of protons in the event – Eqm = 3480 MeV

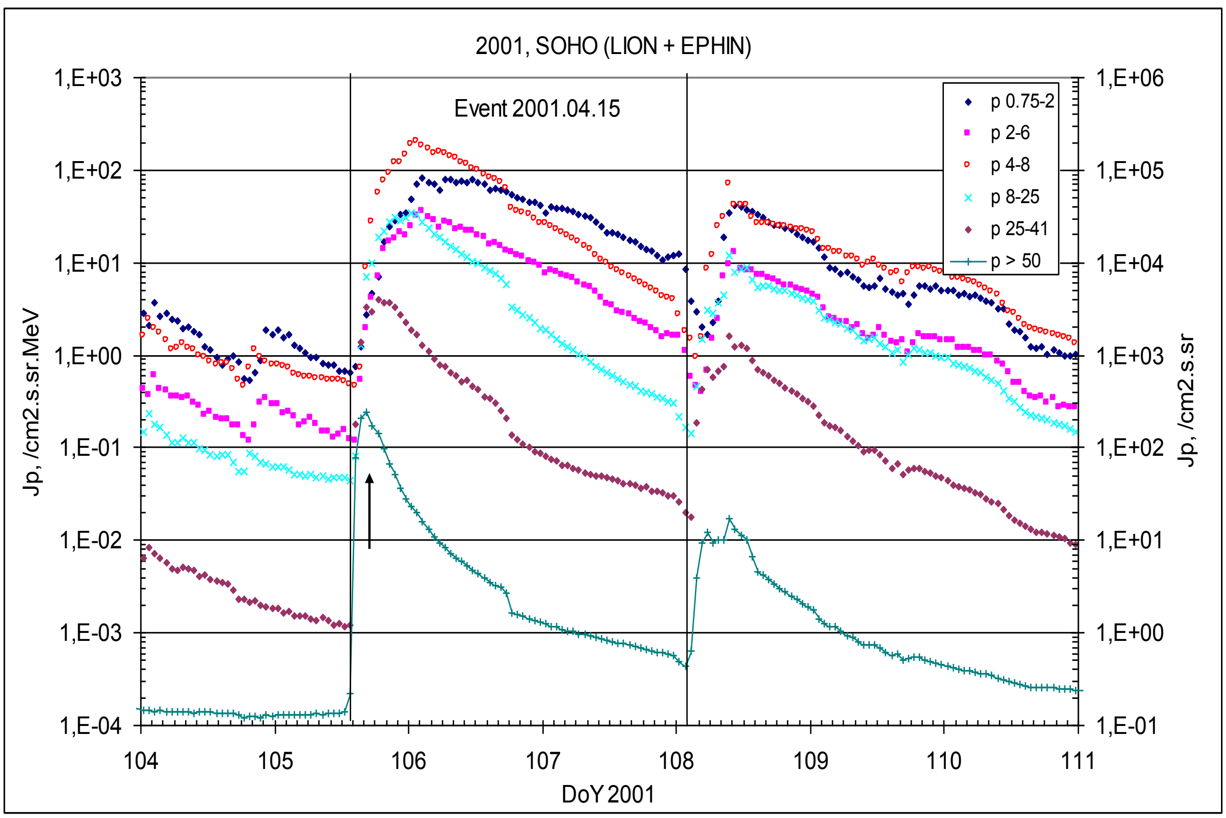
Sources: ● solar flare 15d13^{h}19^m, X14.4/2B, S20W84, AR9415
Main X-ray burst 1-8 Å onset – 15d13^{h}19^m, max – 15d13^{h}50^m, Φ = 0.3 J/m^2
CME: 15d14^{h}06^m , V=1199 km/s, Δφ =167^o, dA= 268º
Δ SC 18d00 ^{h}46 ^{m}

Particle fluxes and associated phenomena



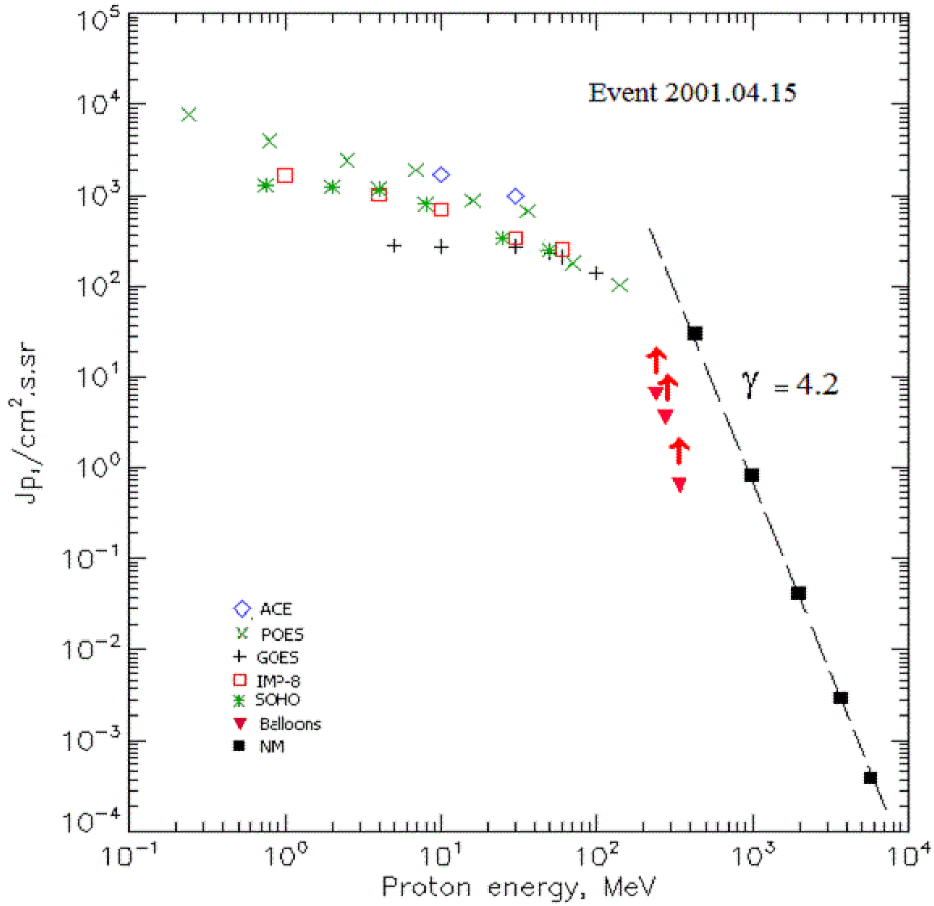
Time profiles of the proton fluxes for the event of 2001 April 15





Arrows on the profiles of the events indicate the time of the proton flux maxima, taken to build the proton spectra (see below)

Integral time-of-maximum proton spectrum



Integral fluxes of protons for the event of 2001 April 15

S/c, instruments	Ep, MeV	To	Tmax	Jmax, /cm^2.s.sr	Dura-tion	Comments
GOES-10						
EPS	>5	14^h	16^h	275	2.5d	
EPS	>10	14^h	16^h	273	2.5d	
EPS	>30	14^h	16^h	271	2.5d	
EPS	>50	14^h	15^h	231	2.5d	
EPS	>60	14^h	15^h	210	2.5d	
EPS	>100	14^h	15^h	138	2.5d	
POES-16						
MEPED	>0.24	15^h	15^h	7750	> 2d	
MEPED	>0.8	15^h	15^h	3940	> 2d	
MEPED	>2.5	15^h	15^h	2410	> 2d	
MEPED	>6.9	15^h	15^h	1900	> 2d	
MEPED	>16	15^h	15^h	885	> 2d	
MEPED	>36	15^h	15^h	675	> 2d	
MEPED	>70	15^h	15^h	180	> 2d	
MEPED	>140	15^h	15^h	102	> 2d	

IMP-8						
CPME	>1	14^h	22^h	1650	2.5d	
CPME	>4	14^h	19^h	1030	2.5d	
CPME	>10	14^h	19^h	699	2.5d	
CPME	>30	14^h	17^h	334	2.5d	
CPME	>60	14^h	16^h	253	2.5d	
ACE						
SIS	>10	14^h	16^h	1680	2.5d	
SIS	>30	14^h	16^h	980	2.5d	
SOHO						
EPHIN (INT)	>50	13^h	16^h	247	2,5d	
BALLOONS						
Mi	>241		16d(07^h-08^h)	6.4		After
Mi	>279		16d(07^h-07^h)	3.5		maximum
Mi	>341		16d(07^h-07^h)	0.64		- " -
NM						
Network	>433		15^h	29.8		
Network	>1000		15^h	0.814		
Network	>2000		15^h	0.0413		
Network	>3700		15^h	0.0029		
Network	>5800		15^h	0.00038		

Differential fluxes of protons for the event of 2001 April 15

S/c, instruments	ΔE, MeV	To	Tmax	Jmax. /cm^2.s.sr.MeV	Dura-tion	Comments
IMP-8						
CPME	1-2	16^h	23^h	262	2.5d	
CPME	2-4.6	14^h	23^h	214	2.5d	
CPME	4.6-15	14^h	23^h	47.2	2.5d	
CPME	15-25	14^h	20^h	25.4	2.5d	
CPME	25-48	14^h	19^h	6	2.5d	
CPME	48-96	14^h	17^h	2.4	2.5d	
CPME	96-145	14^h	17^h	1.3	2.5d	
CPME	145-440	14^h	16^h	0.4	2.5d	
SOHO						
LION	0.75-2	14^h	21^h	28.2	2.5d	
LION	2-6	14^h	20^h	16.5	2.5d	
EPHIN	4-8	14^h	20^h	90.8	2.5d	
EPHIN	8-25	14^h	20^h	27.2	2.5d	
EPHIN	25-41	14^h	19^h	4.1	2.5d	

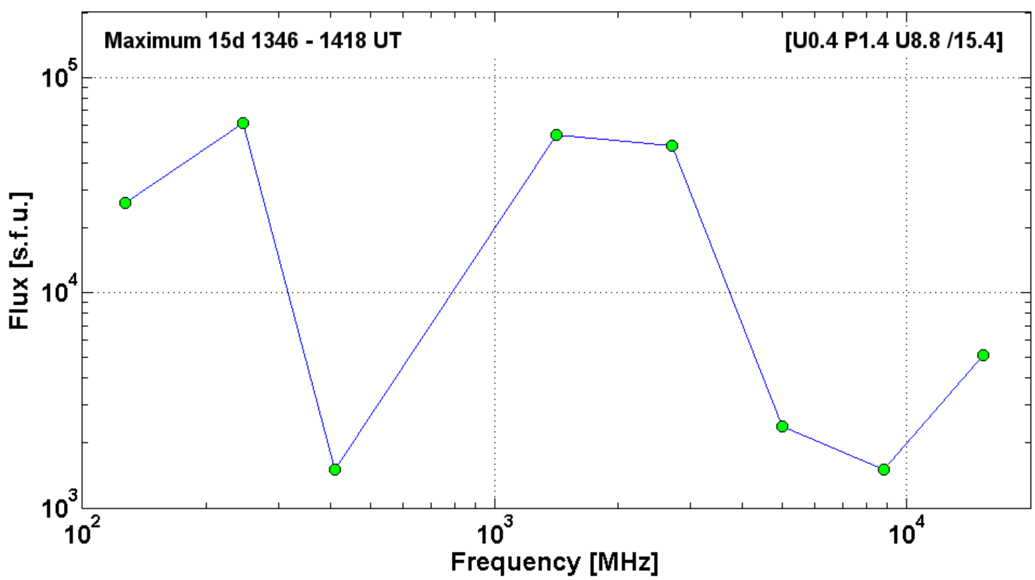
References:

Quack M., M.-B. Kallenrode, M. von König et al., 2001
Perez-Peraza J., A. Gallegos-Cruz, E.V. Vashenyuk et al., 2003.
Struminsky A.B., 2003.
Bieber J.W., P. Evenson, W. Dröge et al., 2004.
Kuwabara T., Bieber J.W., Clem J., et.al., 2006.
Bombardieri D.J., M.L. Duldig, K.J. Michael et al., 2007.
Miroshnichenko L.I. and J. Perez-Peraza, 2008.

Electromagnetic and other phenomena that are sources and/or accompanying for the event of 2001 April 15

2001 April 15 • AR9415 To event 393

Hα	6563Å	1336	1349	1529	S20W84	2B	FHY
1 – 12	keV	1319	1350	1355		X14.4	3.0E-1
53 – 93	keV	133534	134902	144407		376	HXT Y
1.2 – 5.6	MeV	133534	134634	144407		116	GRS Y
15.4	GHz	1334.0	1349.0	1521.0		3.71	
8.8	GHz	1334.0	1349.0	1521.0		3.18	
5	GHz	1333.0	1346.0	1521.0		3.38	
2.7	GHz	1333.0	1417.0	1521.0		4.68	
1.4	GHz	1345.0	1418.0	1521.0	[U0.4 P1.4 U8.8/15.4]	4.73	
410	MHz	1346.0	1347.0	1514.0		3.18	
245	MHz	1346.0	1347.0	1424.0		4.79	
127	MHz	1346.5	1349.4	1406.5		>4.41	
DS II	25-180	1347		1350		3	
DS IV	30-80	1352		1505		3	
DS IV	40-800	~1406		~1519	RS	3	
DS III	25-180	1344		1522	N	2	
DS DCIM	2000-4500	1331		1552	GG	3	
DS DCIM	800-2000	1332		1615	GG	2	
^{o}n						Bolivia	
CME	WL	1031	1184 km/s	-35.9 km/s^2	360˚	221˚	

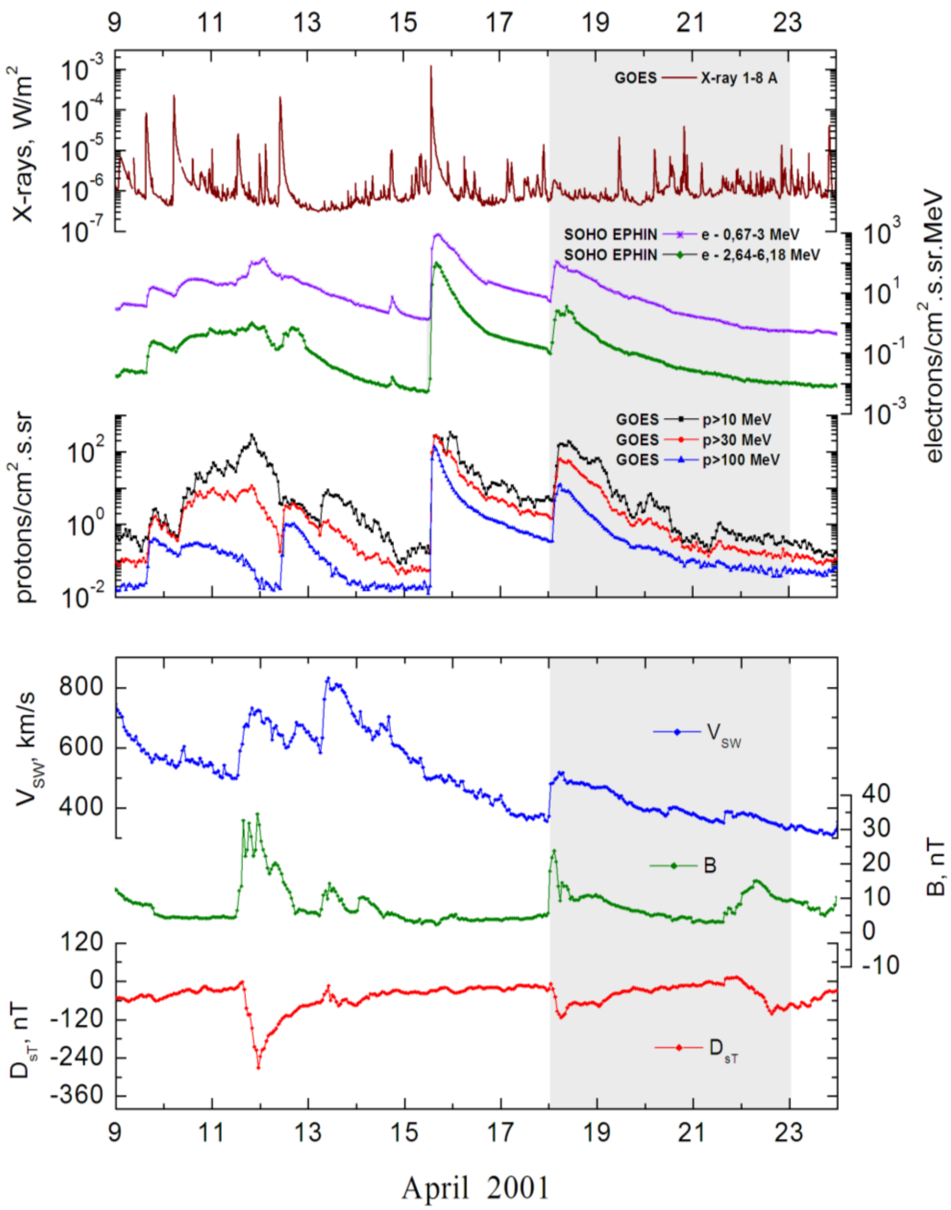


Event 2001.04.18 – (2001-108) − GLE-61 **№ 394**

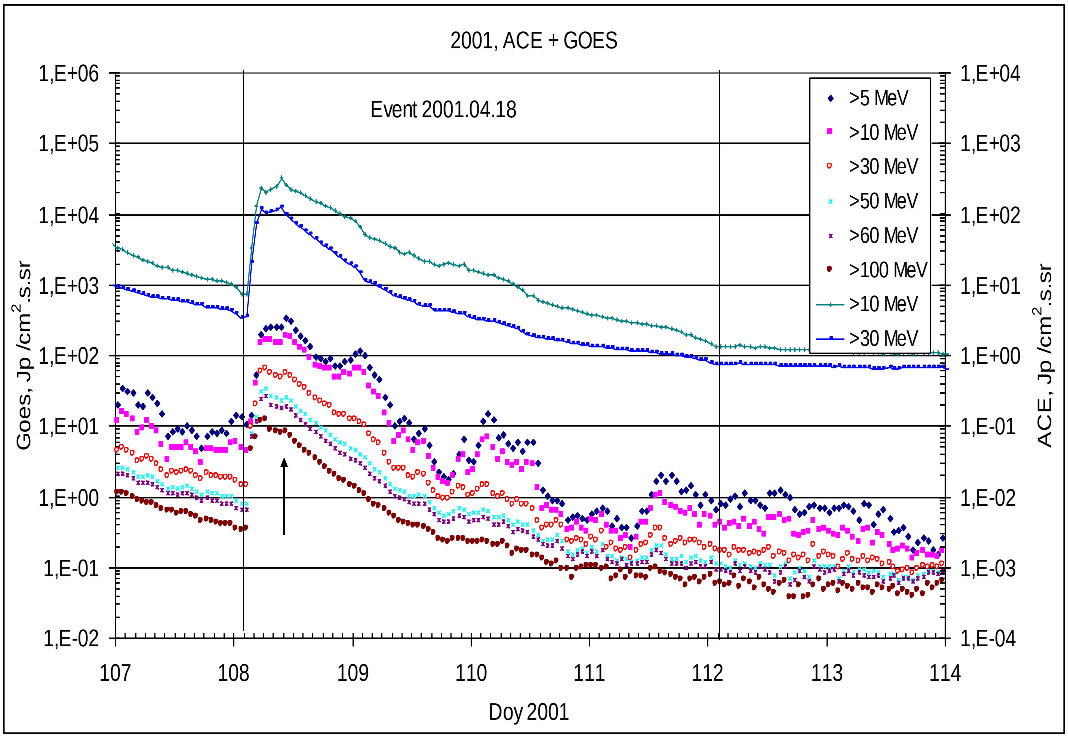
Particle event: To(Ep>10 MeV) – 18d03^h
Tmax(Ep>10 MeV) – 18d10^h, Jmax (Ep>10 MeV) – 190 /cm^2.s.sr
Duration of the event – 4 days
Quasimaximal energy of protons in the event – Eqm = 2100 MeV

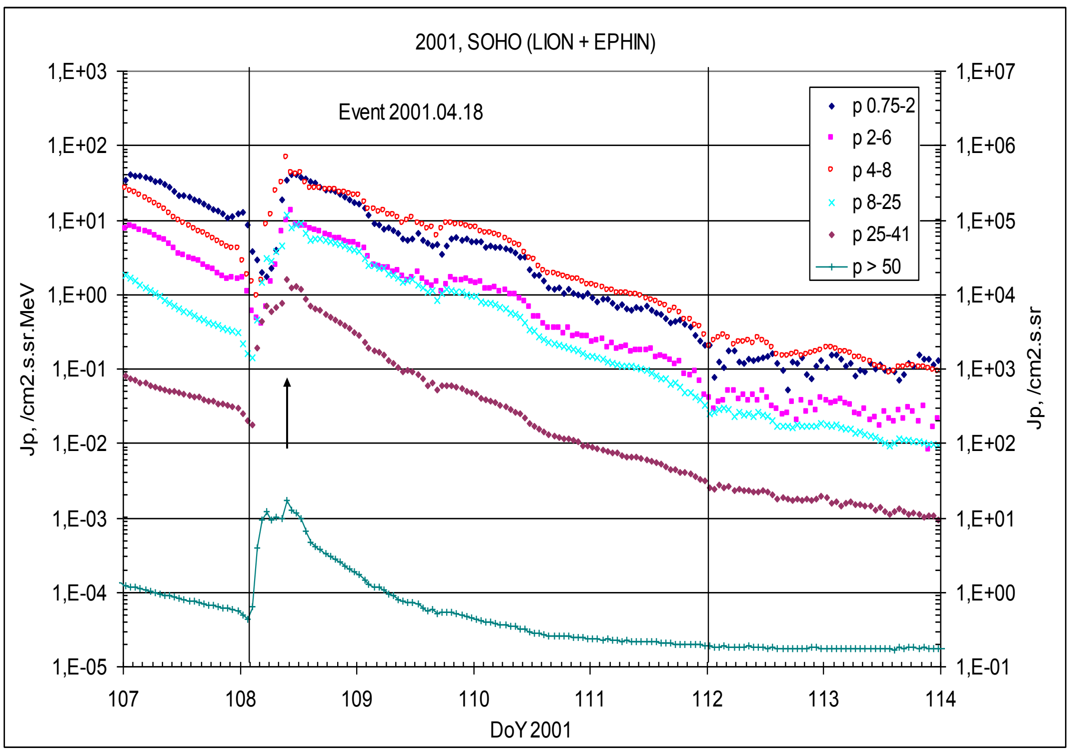
Sources: ⊡ solar flare 18d02^{h}11^m, C2.2, s20w90*, AR9415
Main X-ray burst 1-8 Å: onset – 18d02^{h}11^m, max – 18d02^{h}14^m, Φ = 0.0004 J/m^2
CME: 18d02^{h}30^m, V=2465 km/s, Δφ = 360^o, dA = 263$^°$
ΔSC 21d16^{h}01^m
* − probable localization of the flare event

Particle fluxes and associated phenomena



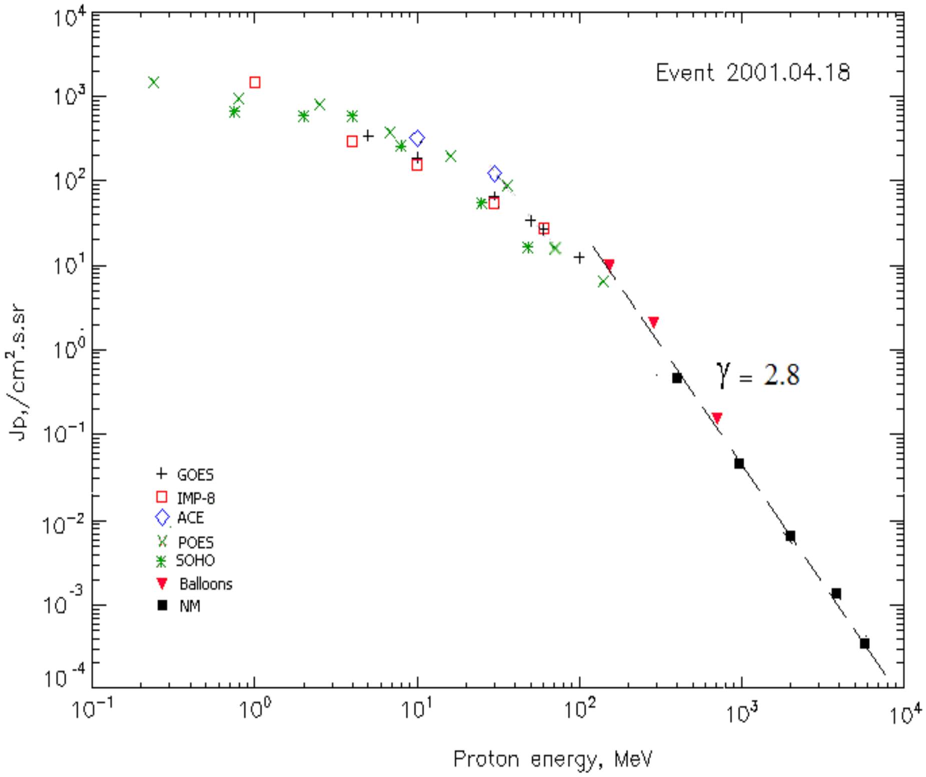
Time profiles of the proton fluxes for the event of 2001 April 18





Arrows on the profiles of the events indicate the time of the proton flux maxima, taken to build the proton spectra (see below)

Integral time-of-maximum proton spectrum



Integral fluxes of protons for the event of 2001 April 18

S/c, instruments	Ep, MeV	To	Tmax	Jmax, /cm^2.s.sr	Duration	Comments
GOES-10						
EPS	>5	03^h	10^h	342	3d	
EPS	>10	03^h	10^h	190	3d	
EPS	>30	03^h	06^h	64.5	3d	
EPS	>50	03^h	06^h	33.9	3d	
EPS	>60	03^h	06^h	26.4	3d	
EPS	>100	03^h	06^h	12.4	3d	
POES-16						
MEPED	>0.24	03^h	05^h	1572	3d	
MEPED	>0.8	03^h	05^h	1004	3d	
MEPED	>2.5	03^h	05^h	830	3d	
MEPED	>6.9	03^h	05^h	620	3d	
MEPED	>16	03^h	05^h	197	3d	
MEPED	>36	03^h	05^h	90	3d	
MEPED	>70	03^h	05^h	15.4	3d	
MEPED	>140	03^h	05^h	6.5	3d	
IMP-8						
CPME	>1	-	07^h	1470	-	
CPME	>4	-	07^h	296	-	
CPME	>10	-	07^h	156	-	
CPME	>30	03^h	06^h	54.2	4 d	
CPME	>60	03^h	06^h	27.4	4 d	

ACE						
SIS	>10	03^h	09^h	320	4 d	
SIS	>30	03^h	09^h	126	4 d	
SOHO						
EPHIN (INT)	>50	03^h	09^h	16.9	3d	
BALLOONS						
Mi	>153		06^h45^m -07^h39^m	9.7		
Mi	>287		06^h45^m -07^h39^m	2.07		
Mi	>707		06^h45^m -07^h39^m	0.15		
NM						
Network	>433	-	04^h20^m	0.41	-	
Network	>1000	-	04^h20^m	0.046	-	
Network	>2000	-	04^h20^m	0.0075	-	
Network	>3700	-	04^h20^m	0.0014	-	
Network	>5800	-	04^h20^m	0.00036	-	

Differential fluxes of protons for the event of 2001 April 18

S/c, instruments	ΔE, MeV	To	Tmax	Jmax. /cm^2.s.sr.MeV	Dura-tion	Comments
IMP-8						
CPME	1-2	04^h	10^h	771	7d	
CPME	2-4.6	06^h	10^h	269	7d	
CPME	4.6-15	03^h	10^h	30.3	6d	
CPME	15-25	03^h	12^h	8.2	5d	
CPME	25-48	03^h	10^h	1.6	5d	
CPME	48-96	03^h	10^h	0.4	4d	
CPME	96-145	03^h	10^h	0.34	4d	
CPME	145-440	02^h	10^h	0.026	3d	
SOHO						
LION	0.75-2	05^h	10^h	41	6d	
LION	2-6	04^h	10^h	13	6d	
EPHIN	4-8	03^h	09^h	70	6d	
EPHIN	8-25	02^h	09^h	11.9	6d	
EPHIN	25-41	03^h	09^h	1.6	6d	
EPHIN	41-53	- “ -	- “ -	- “ -	- “ -	

References:

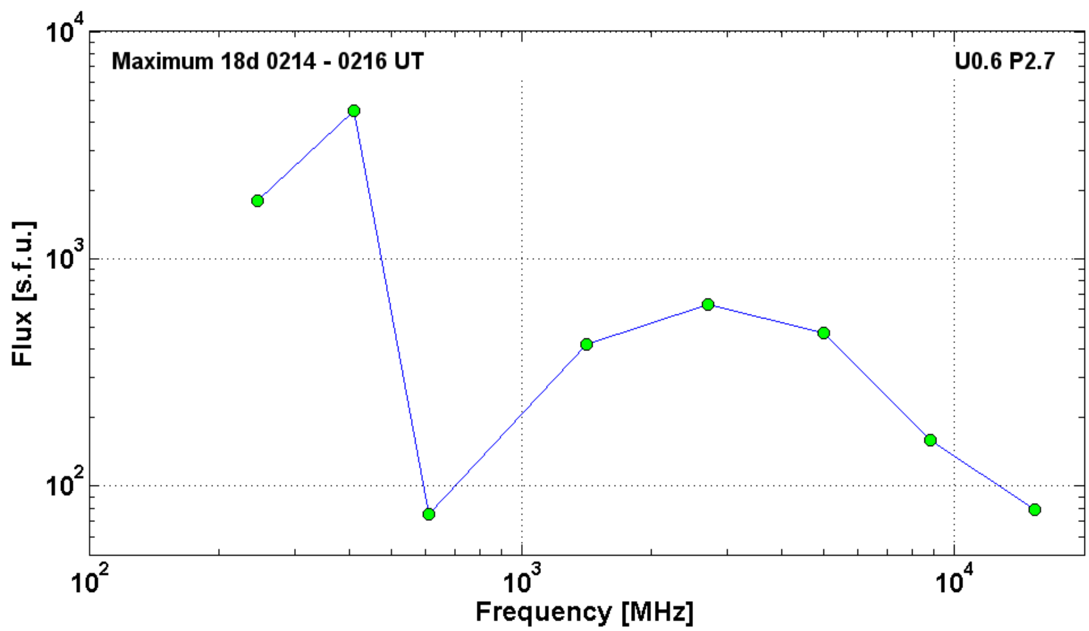
Struminsky A.B., 2003.
Matsubara Y., Y. Muraki, T. Sako et al., 2005.
Kuwabara T., J.W. Bieber, J. Clem et al., 2006.
Miroshnichenko L.I. and J. Perez-Peraza, 2008.
Veselovskij I.S., I.N. Myagkova, O.S. Yakovchuk, 2012.

Electromagnetic and other phenomena that are sources and/or accompanying for the event of 2001 April 18

2001 April 18 ⊡ AR9415 To event 394

Hα	6563 Å	No data			s20w90*		
1 – 12	keV	0211	0214	0216		C2.2	4.0E-4
53 – 93	keV	021343	021443	021755		20	HXT Y
15.4	GHz	0213.0	0214.0	0219.0		1.90	
8.8	GHz	0213.0	0214.0	0219.0		2.20	
5	GHz	0213.0	0214.0	0221.0		2.67	
2.7	GHz	0213.0	0215.0	0217.0	U0.6 P2.7	2.80	
1.4	GHz	0213.0	0215.0	0218.0		2.62	
610	MHz	0215.0	0216.0	0217.0		1.88	
410	MHz	0214.0	0214.0	0221.0		3.65	
245	MHz	0214.0	0214.0	0215.0		3.26	
DS II	25-500	0217		0246		3	
DS III	23-480	0214		0216	G	3	
DS CONT	300-470	0216		0221		1	
CME	WL	0230	2465 km/s	-9.5 km/s^2	360˚	263˚	

* − probable localization of the flare event

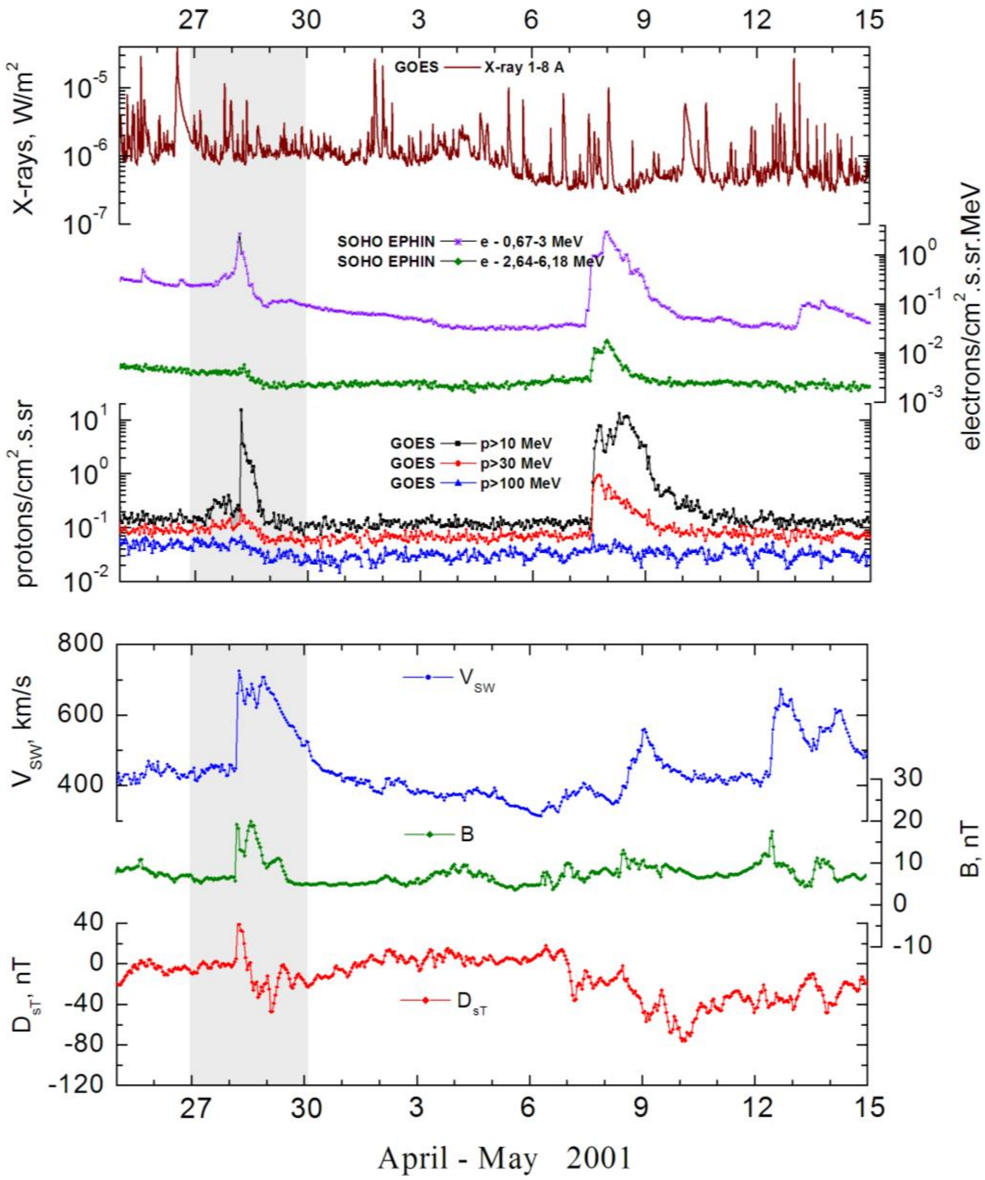


Event 2001.04.27 – (2001-117) **№ 395**

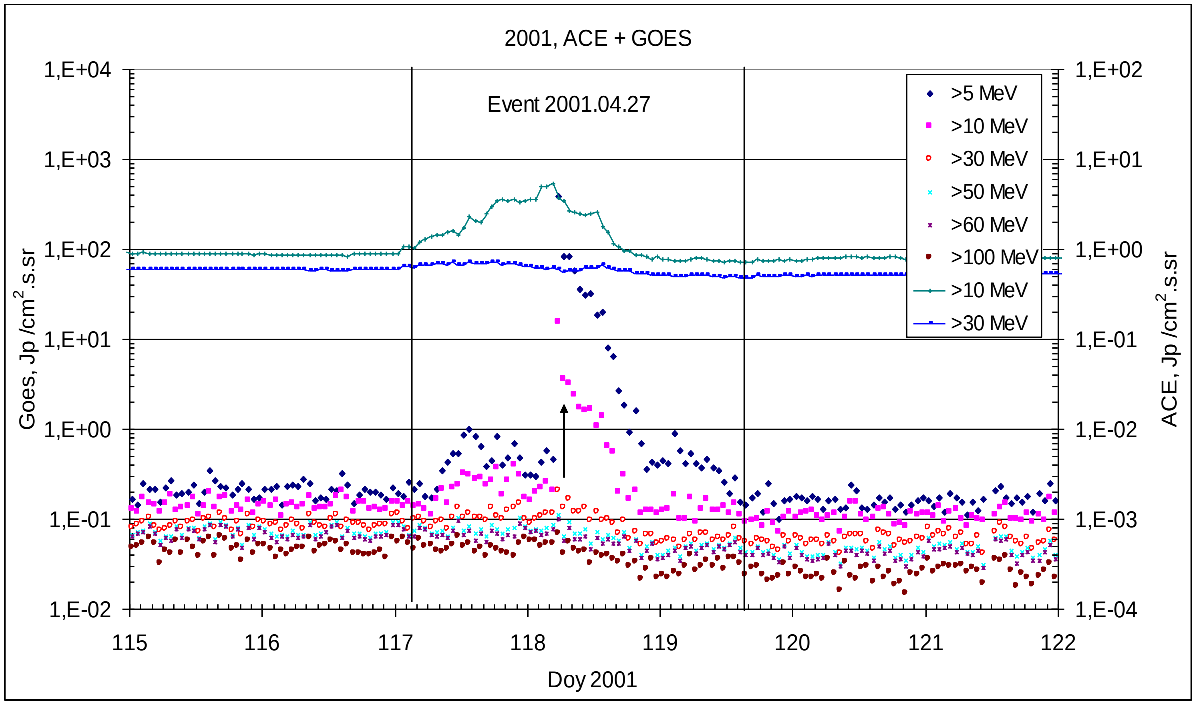
Particle event: To(Ep>10 MeV) – 27d03^h
Tmax(Ep>10 MeV) – 28d05^h, Jmax (Ep>10 MeV) – 15 /cm^2.s.sr
Duration of the event – 2 days
Quasimaximal energy of protons in the event – Eqm = 80 MeV

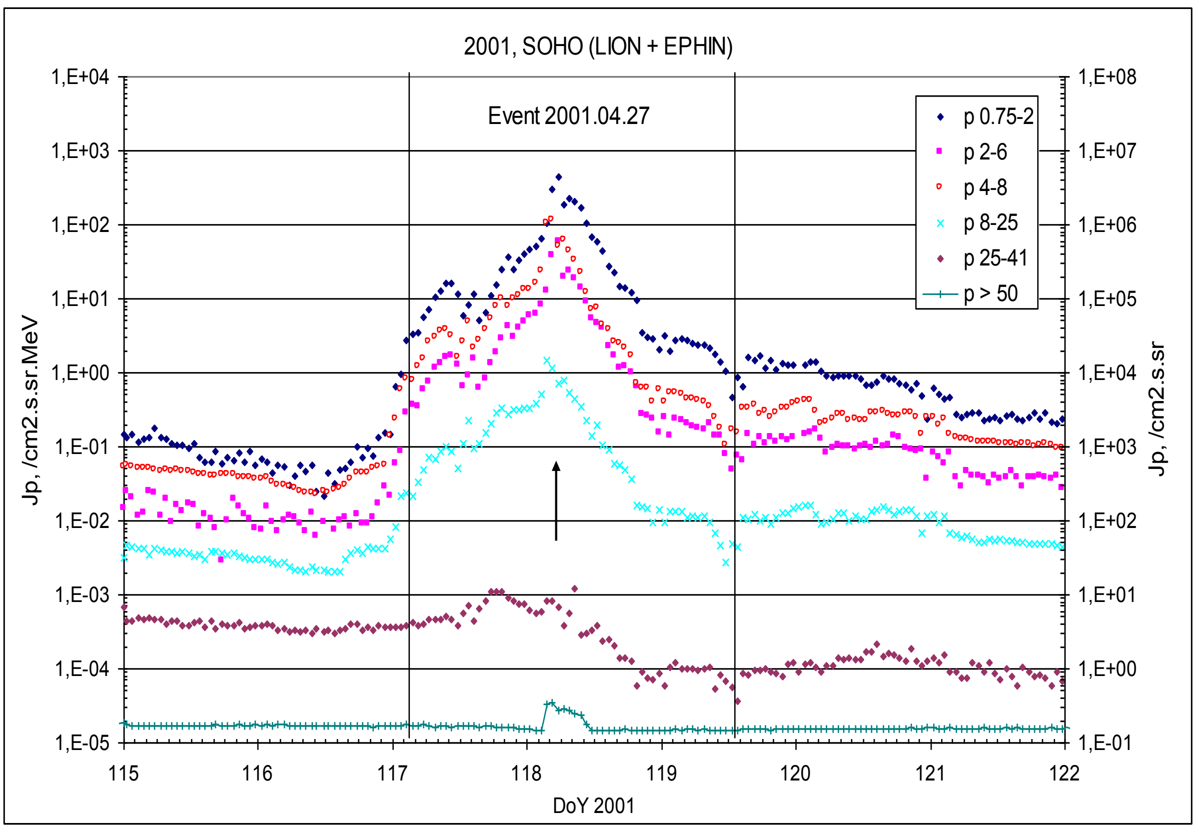
Sources: ●◊ solar flare 26d11^{h}26^m, M7.8/2B, N17W31, AR9433
Main X-ray burst 1-8 Å: onset – 26d11^{h}26^m, max – 26d13^{h}20^m, Φ = 0.092 J/m^2
CME 26d12^h 30^m , V=1006 km/s, Δφ = 360^o; dA = 037^o;
▲SC 28d05^{h}00^m

Particle fluxes and associated phenomena



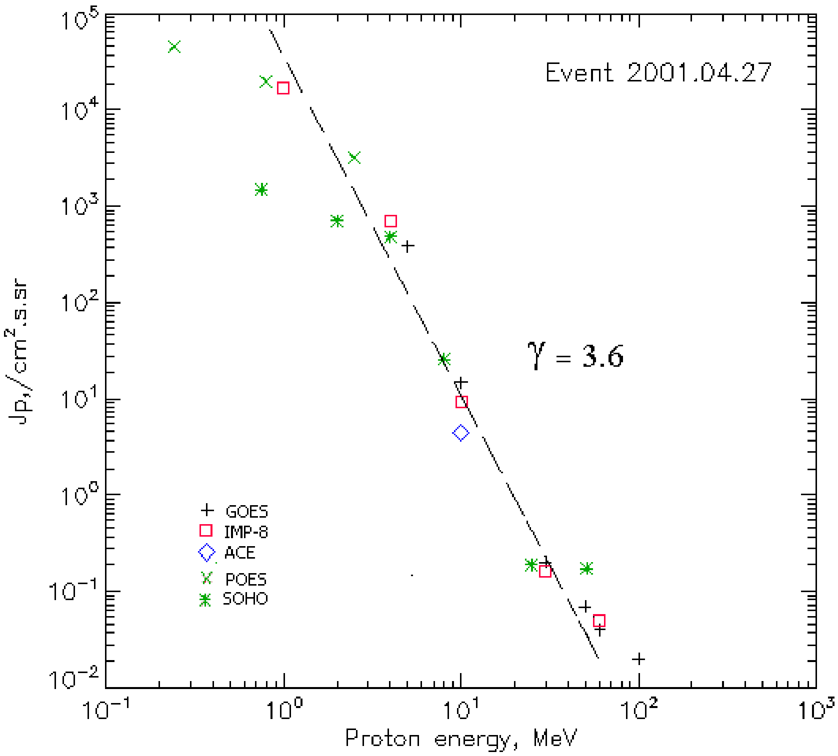
Time profiles of the proton fluxes for the event of 2001 April 27





Arrows on the profiles of the events indicate the time of the proton flux maxima, taken to build the proton spectra (see below)

Integral time-of-maximum proton spectrum



Integral fluxes of protons for the event of 2001 April 27

S/c, instruments	Ep, MeV	To	Tmax	Jmax, /cm^2.s.sr	Dura-tion	Comments
GOES-10						
EPS	>5	03^h	28d05^h	388	2d	
EPS	>10	03^h	28d05^h	15	2d	
EPS	>30	03^h	28d05^h	0.2	2d	
EPS	>50	03^h	28d05^h	0.07	-	
EPS	>60	03^h	28d05^h	0.04	-	
EPS	>100	03^h	28d05^h	0.02	-	
POES-16						
MEPED	>0.24	03^h	28d04^h	45520	4d	
MEPED	>0.8	03^h	28d04^h	19820	4d	
MEPED	>2.5	03^h	28d04^h	3170	4d	
MEPED	>6.9	-	-	-	-	
MEPED	>16	-	-	-	-	
MEPED	>36	-	-	-	-	
MEPED	>70	-	-	-	-	
MEPED	>140	-	-	-	-	
IMP-8						
CPME	>1	26d17^h	28d04^h	16700	3d	
CPME	>4	26d23^h	28d04^h	715	3d	
CPME	>10	26d23^h	28d04^h	9.5	2d	
CPME	>30	-	28d03^h	0.16	-	
CPME	>60	-	28d03^h	0.05	-	

ACE						
SIS	>10	03^h	28d04^h	4.5	2d	
SIS	>30	-	-	-	-	
SOHO						
EPHIN (INT)	>50	-	28d04^h	0.17	0.4d	

Differential fluxes of protons for the event of 2001 April 27

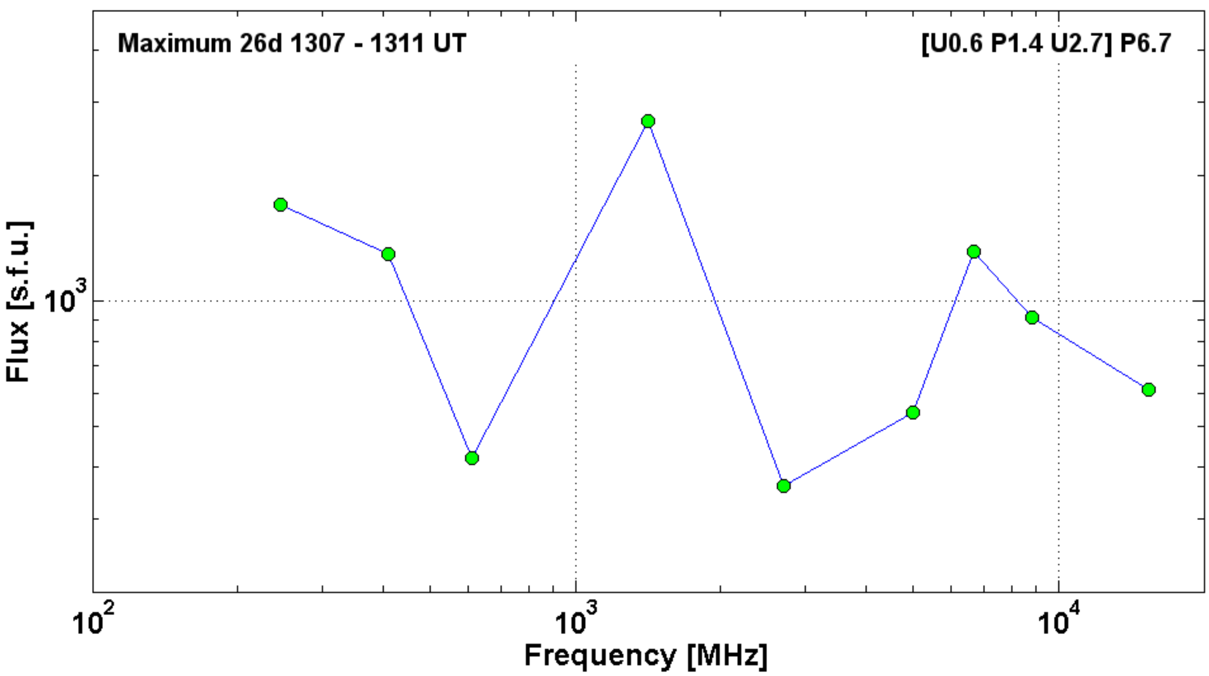
S/c, instruments	ΔE, MeV	To	Tmax	Jmax. /cm^2.s.sr.MeV	Dura-tion	Comments
IMP-8						
CPME	1-2	26d15^h	28d06^h	6560	6d	
CPME	2-4.6	26d17^h	28d04^h	2230	6d	
CPME	4.6-15	26d21^h	28d04^h	47.4	6d	
CPME	15-25	01^h	28d04^h	0.09	6d	
CPME	25-48	01^h	28d02^h	0.0015	2d	
CPME	48-96	-	-	-	-	
CPME	96-145	-	-	-	-	
CPME	145-440	-	-	-	-	
SOHO						
LION	0.75-2	26d21^h	28d04^h	444	6d	
LION	2-6	26d21^h	28d03^h	58	6d	
EPHIN	4-8	26d21^h	28d04^h	114	6d	
EPHIN	8-25	26d23^h	28d03^h	1.5	6d	
EPHIN	25-41	08^h	28d03^h	0.0008	4d	
EPHIN	41-53	- " -	- " -	- " -	- " -	

Electromagnetic and other phenomena that are sources and/or accompanying for the event of 2001 April 27

2001 April 26 ● AR9433 To event 395

Hα	6563 Å	1211	1311	1618	N17W31	2B	FZT
1 – 12	keV	1126	1312	1319		M7.8	9.2E-2
53 – 93	keV	<115658	~115658	122528		8	HXT Y
53 – 93	keV	<130816	131007	131904		26	HXT Y

15.4	GHz	1307.0	1310.0	1333.0		2.79	
8.8	GHz	1307.0	1310.0	1333.0		2.96	
6.7	GHz	1305.2	1310.2	1312.0	[U0.6 P1.4 U2.7] P6.7	3.12	
5	GHz	1307.0	1309.0	1333.0		2.73	
2.7	GHz	1307.0	1307.0	1317.0		2.56	
1.4	GHz	1307.0	1308.0	1333.0		3.43	
610	MHz	1307.0	1310.0	1333.0		2.62	
410	MHz	1307.0	1308.0	1312.0		3.11	
245	MHz	1307.0	1311.0	1323.0		3.23	
DS II	38-50	1335		1339		2	
DS IV	30-80	1341		2314		2	
DS III	30-80	1309		1310		2	
DS CONT	25-180	1241		1341		1	
DS DCIM	800-2000	1222		1312	GG	3	
DS DCIM	2000-4500	1307		1311	GG	3	
CME	WL	1230	1006km/s	21.1 km/s^2	360˚	037˚	

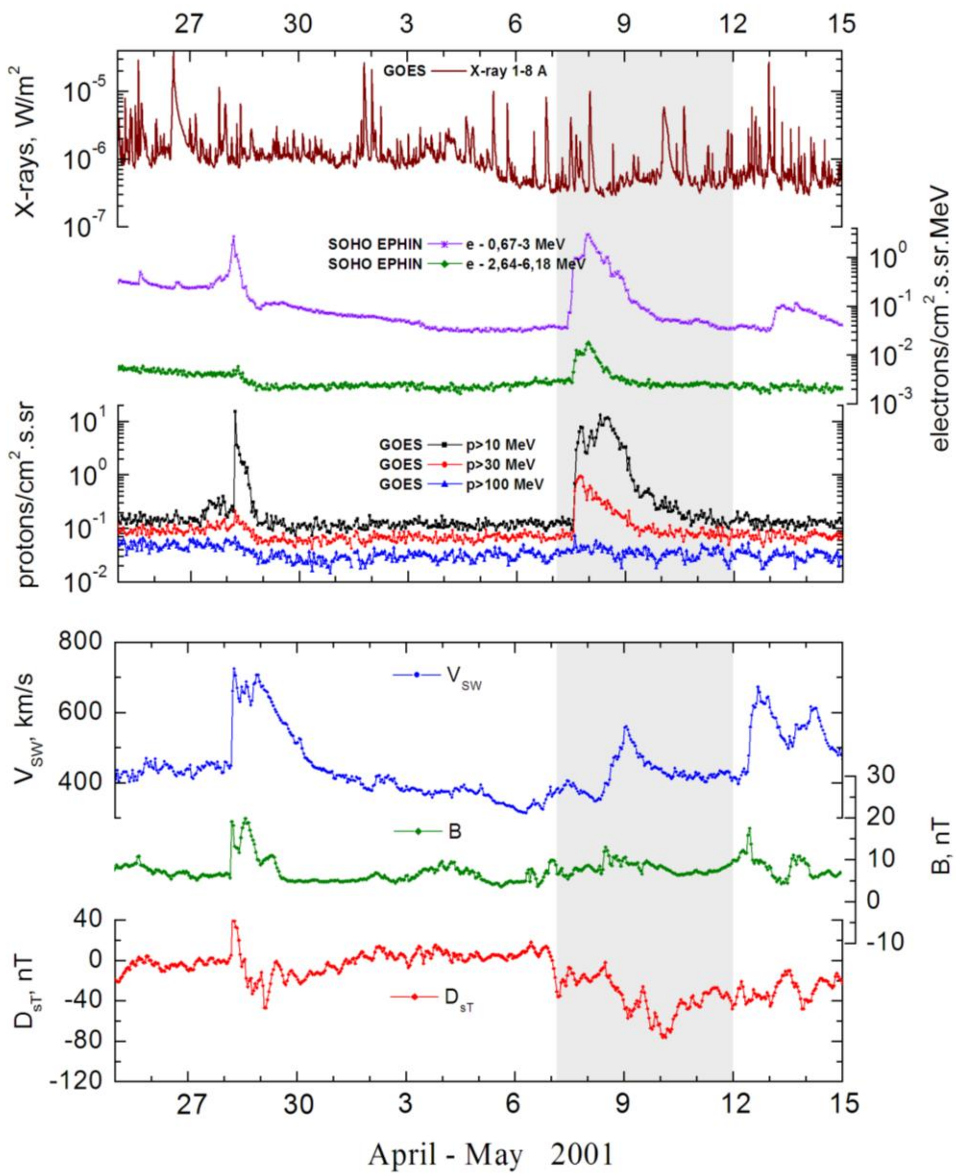


Event 2001.05.07 – (2001-127) **№ 396**

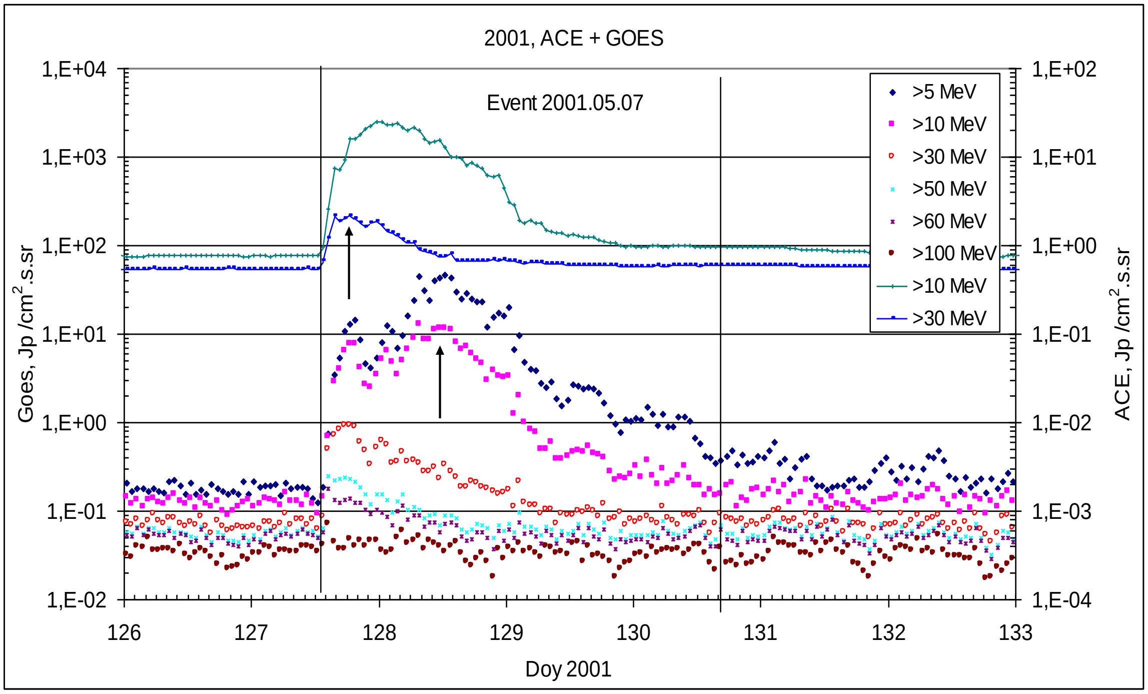
Particle event: To(Ep>10 MeV) – 07d14^h
Tmax$_1$(Ep>10 MeV) – 07d18^h, Jmax$_1$(Ep>10 MeV) – 7.7 /cm^2.s.sr
Tmax$_2$(Ep>10 MeV) – 08d12^h, Jmax$_2$(Ep>10 MeV) – 11.5 /cm^2.s.sr
Duration of the event – 3 days
Quasimaximal energy of protons in the event – Eqm$_1$ = 80 MeV
– Eqm$_2$ = 85 MeV

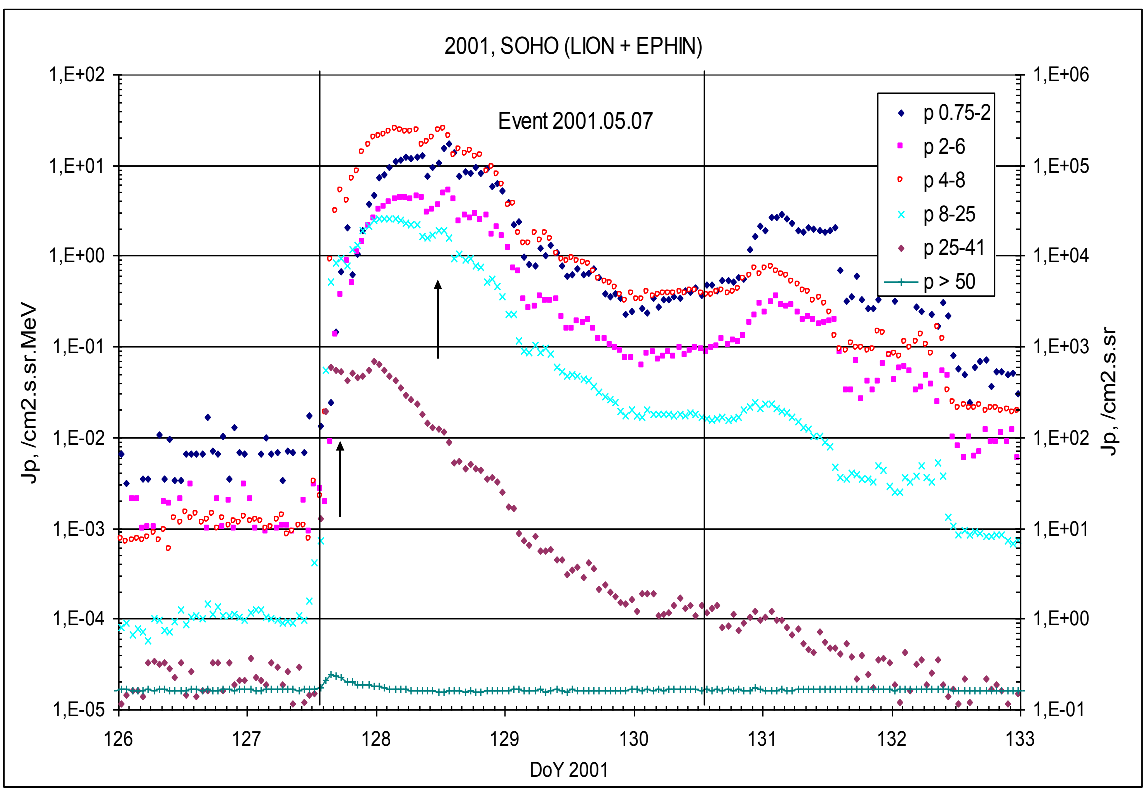
Sources: ⊡ back side solar flare event < 07d12^{h}06^m, AR unknown, behaind W$_L$
CME: 07d12^{h}06^m, V=1223 km/s, $\Delta\varphi$ =205^o , dA= 267^o

Particle fluxes and associated phenomena



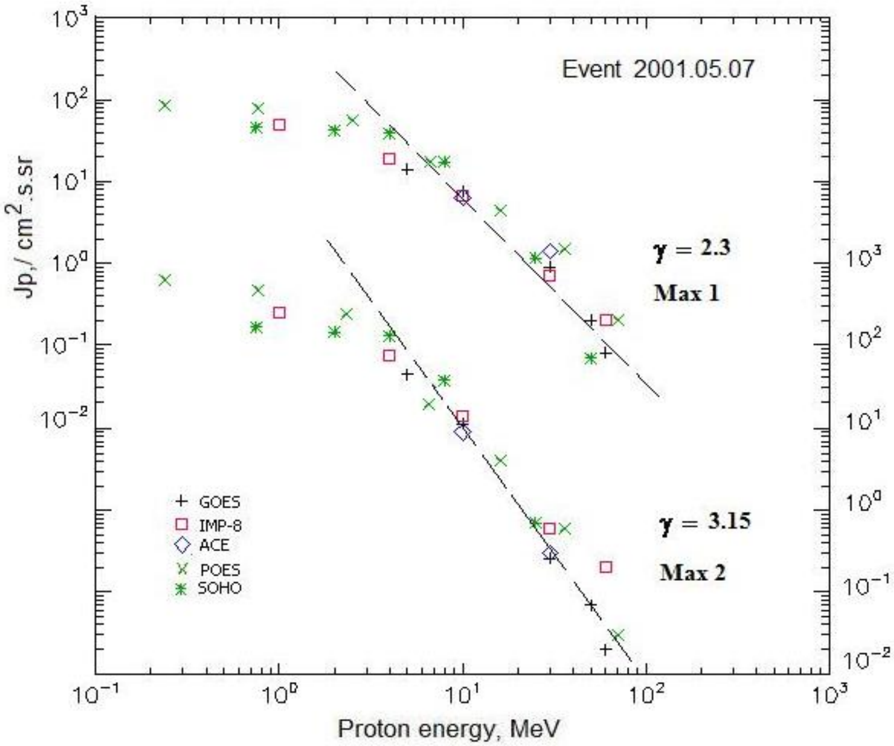
Time profiles of the proton fluxes for the event of 2001 May 07





Arrows on the profiles of the events indicate the time of the proton flux maxima, taken to build the proton spectra (see below)

Integral time-of-maximum proton spectrum



Integral fluxes of protons for the event of 2001 May 07

S/c, instruments	Ep, MeV	To	Tmax	Jmax, /cm^2.s.sr	Dura-tion	Comments
GOES-10						
EPS	>5	14^h	19^h/08d12^h	14.2/46.6	3d	
EPS	>10	14^h	18^h/08d12^h	7.7/11.5	3d	
EPS	>30	14^h	18^h/08d12^h	0.9/0.26	2d	
EPS	>50	14^h	14^h/08d12^h	0.2/0.07	1.5d	
EPS	>60	14^h	14^h/08d12^h	0.08/ 0.02	1d	
EPS	>100	-	-	-	-	
POES-16						
MEPED	>0.24	-	18^h/08d13^h	90/570	-	
MEPED	>0.8	-	18^h/08d13^h	80/440	-	
MEPED	>2.5	-	18^h/08d13^h	50/215	-	
MEPED	>6.9	-	18^h/08d13^h	24/16	-	
MEPED	>16	-	18^h/08d13^h	4.4 /4	-	
MEPED	>36	-	18^h/08d13^h	1.5/0.6	-	
MEPED	>70	-	18^h/08d13^h	0.2/0.03	-	
MEPED	>140	-	-	-	-	
IMP-8						
CPME	>1	14^h	19^h/08d12^h	50.3/268	2.5d	
CPME	>4	14^h	19^h/08d11^h	18.7/79	2.5d	
CPME	>10	14^h	18^h/08d09^h	6.8/14	2d	
CPME	>30	14^h	18^h/08d08^h	0.7/0.6	1d	
CPME	>60	14^h	18^h/08d08^h	0.2/0.2	1d	

ACE						
SIS	>10	14^h	$18^h/08d13^h$	6.4/9	2d	
SIS	>30	14^h	$18^h/08d13^h$	1.4/0.3	1d	
SOHO						
EPHIN (INT)	>50	14^h	16^h/ -	0.07/ -	0.4d	

Differential fluxes of protons for the event of 2001 May 07

S/c, instruments	ΔE, MeV	To	Tmax	Jmax. /cm^2.s.sr.MeV	Dura-tion	Comments
IMP-8						
CPME	1-2	16^h	$18^h/08d13^h$	15.3/107	5d	
CPME	2-4.6	15^h	$18^h/08d13^h$	7.5/43.7	5d	
CPME	4.6-15	13^h	$18^h/08d09^h$	1.2/5.7	5d	
CPME	15-25	13^h	$18^h/08d08^h$	0.33/0.67	3d	
CPME	25-48	12^h	$17^h/08d08^h$	0.03/0.026	2d	
CPME	48-96	12^h	$16^h/16^h$	0.0037/0.001	1d	
CPME	96-145	13^h	-	-	-	
CPME	145-440	-	-	-	-	
SOHO						
LION	0.75-2	14^h	$19^h/08d09^h$	2.1/12.8	5d	
LION	2-6	14^h	19^h /$08d09^h$	0.87/4.4	5d	
EPHIN	4-8	14^h	$17^h/08d08^h$	5.34/24.1	5d	
EPHIN	8-25	14^h	$17^h/08d08^h$	0.96/2.24	5d	
EPHIN	25-41	14^h	$17^h/08d08^h$	0.5/0.024	5d	
EPHIN	41-53	- “ -	- “ -	- “ -	- “ -	

Electromagnetic and other phenomena that are sources and/or accompanying for the event of 2001 May.07

2001 May 7 ⊡ AR9433 To event 396

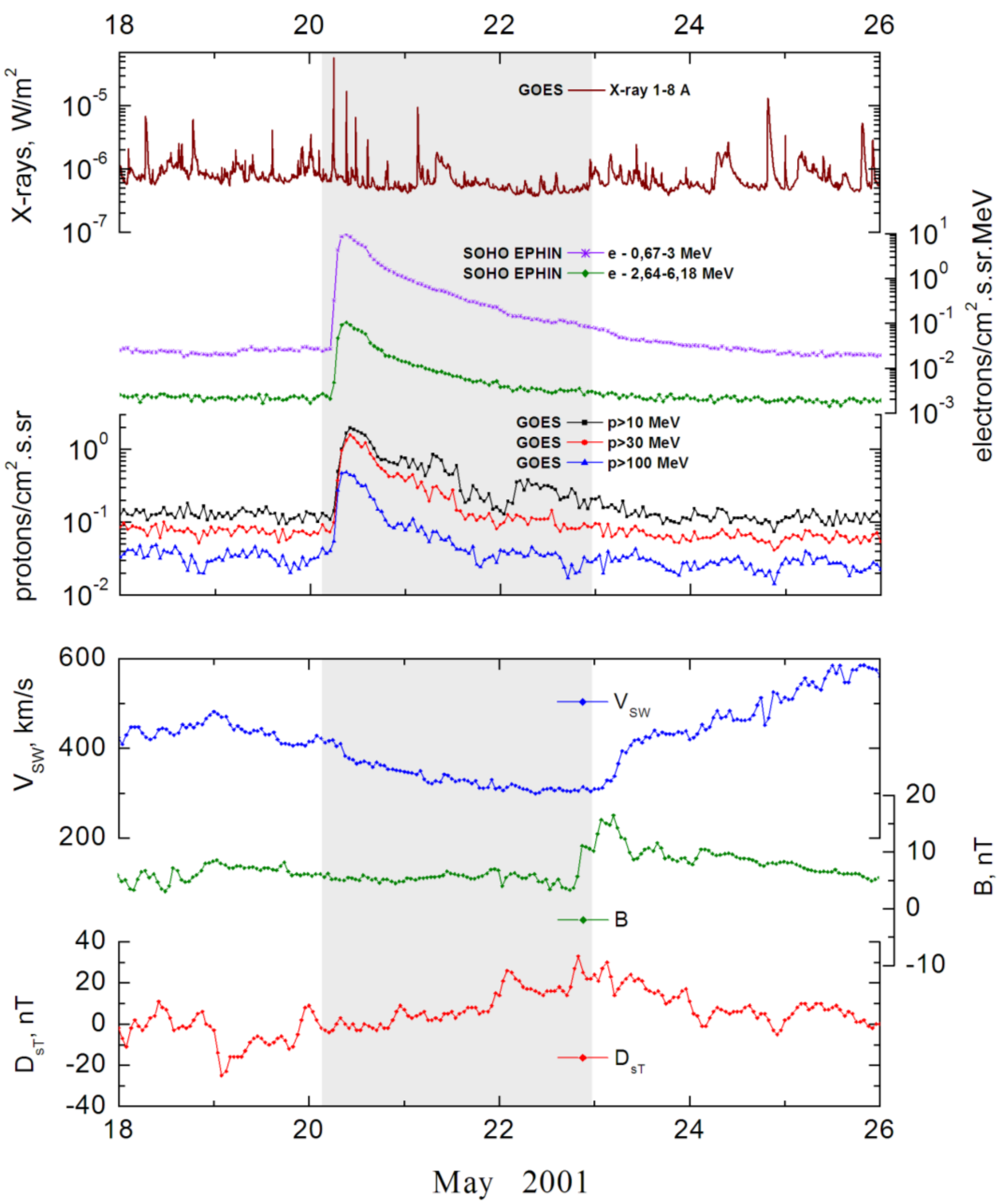
CME	WL	1206	1223 km/s	19.2 km/s^2	205˚	267˚	

Event 2001.05.20 – (2001-140) **№ 397**

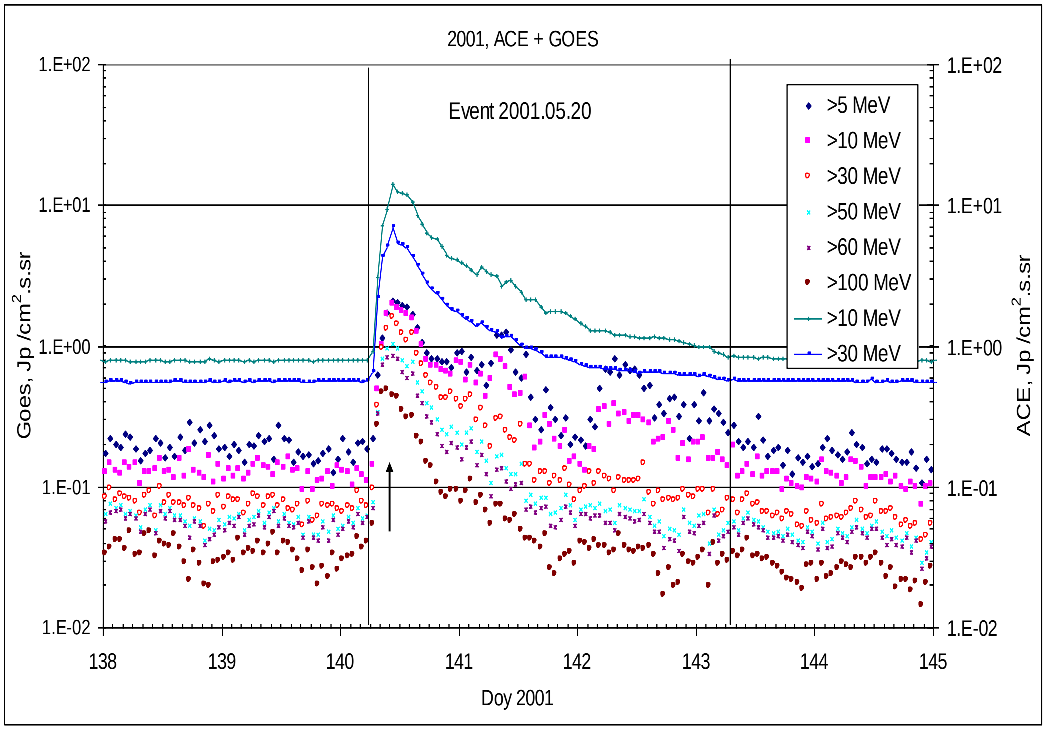
Particle event: To(Ep>10 MeV) – 20d07^{h}
Tmax(Ep>10 MeV) – 20d10^{h}, Jmax (Ep>10 MeV) – 1.8 /cm^{2}.s.sr
Duration of the event – 3 days
Quasimaximal energy of protons in the event – Eqm = 410 MeV

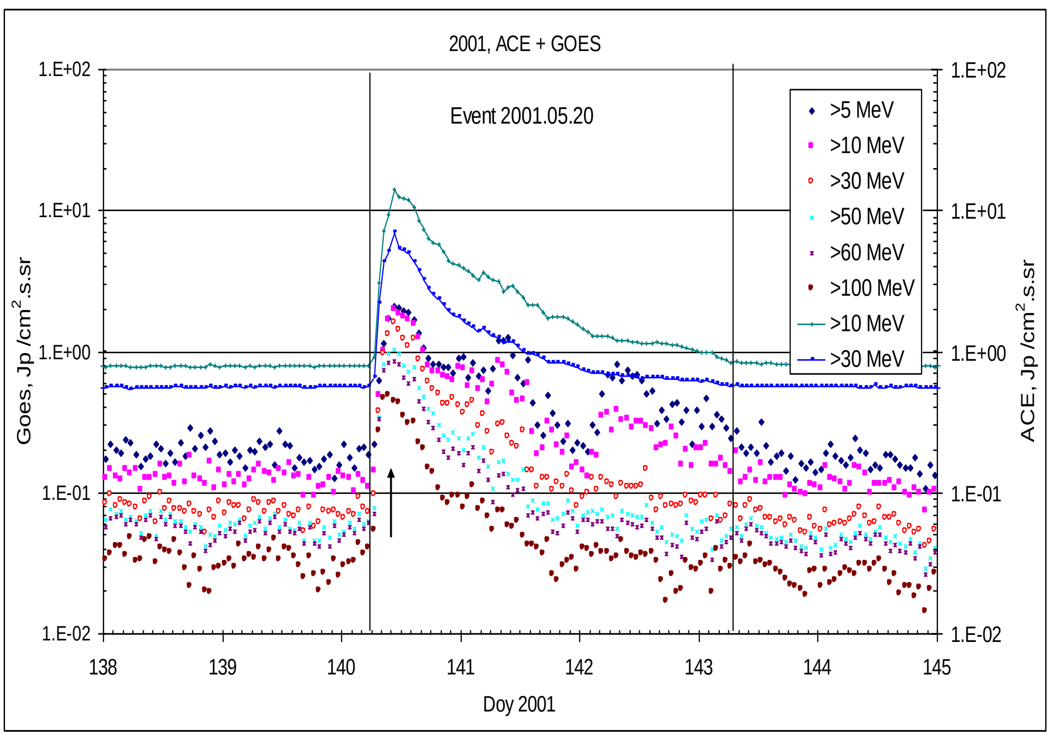
Sources: • solar flare 20d06^{h}00^{m}, M6.4/…, s18w90*, AR9455
Main X-ray burst 1-8 Å: onset – 20d06^{h} 00^{m}, max – 20d06^{h}03^{m}, Φ = 0.012 J/m^{2}
CME: 20d06^{h}26^{m}, V=546 km/s, Δφ = 179^{o}; dA = 231^{o}
* − probable localization of the flare event

Particle fluxes and associated phenomena



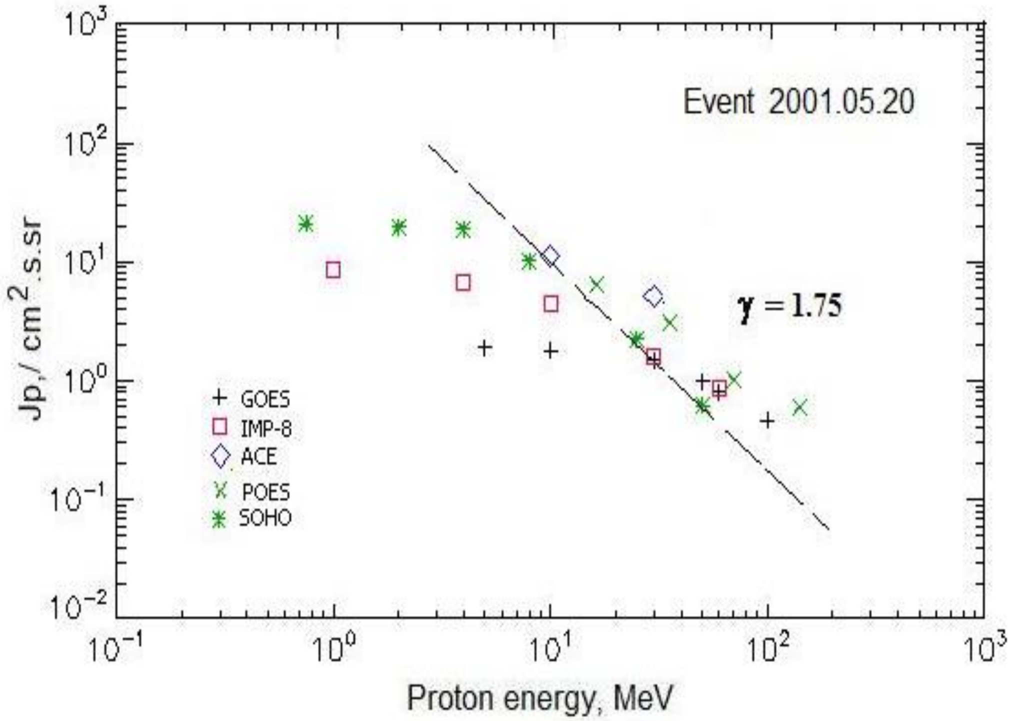
Time profiles of the proton fluxes for the event of 2001 May 20





Arrows on the profiles of the events indicate the time of the proton flux maxima, taken to build the proton spectra (see below)

Integral time-of-maximum proton spectrum



Integral fluxes of protons for the event of 2001 May 20

S/c, instruments	Ep, MeV	To	Tmax	Jmax, /cm^2.s.sr	Duration	Comments
GOES-10						
EPS	>5	07^h	10^h	1.9	3d	
EPS	>10	07^h	10^h	1.8	3d	
EPS	>30	07^h	10^h	1.5	2d	
EPS	>50	07^h	10^h	1	2d	
EPS	>60	07^h	10^h	0.8	2d	
EPS	>100	07^h	09^h	0.46	2d	
POES-16						
MEPED	>0.24	07^h	-	-	-	
MEPED	>0.8	07^h	-	-	-	
MEPED	>2.5	07^h	-	-	-	
MEPED	>6.9	07^h	-	-	-	
MEPED	>16	07^h	09^h	5.2	2d	
MEPED	>36	07^h	09^h	3.2	2d	
MEPED	>70	07^h	09^h	1.0	2d	
MEPED	>140	07^h	09^h	0.6	2d	
IMP-8						
CPME	>1	07^h	11^h	8.7	-	
CPME	>4	07^h	11^h	6.7	-	
CPME	>10	07^h	11^h	4.4	-	
CPME	>30	07^h	11^h	1.6	-	
CPME	>60	07^h	10^h	0.85	-	

ACE						
SIS	>10	07^h	11^h	11.2	2d	
SIS	>30	07^h	10^h	5.1	1.5 d	
SOHO						
EPHIN (INT)	>50	07^h	11^h	0.62	2d	

Differential fluxes of protons for the event of 2001 May 20

S/c, instruments	ΔE, MeV	To	Tmax	Jmax. /cm^2.s.sr.MeV	Dura-tion	Comments
IMP-8						
CPME	1-2	11^h	$<18^h$	>4.5	8d	
CPME	2-4.6	08^h	$<18^h$	>1.6	8d	
CPME	4.6-15	07^h	$>11^h$	>0.26	5d	
CPME	15-25	07^h	$>11^h$	>0.17	4d	
CPME	25-48	07^h	$>11^h$	>0.045	4d	
CPME	48-96	07^h	10^h	0.011	3d	
CPME	96-145	07^h	10^h	0.008	2d	
CPME	145-440	07^h	10^h	0.002	0,5d	
SOHO						
LION	0.75-2	08^h	14^h	0.7	6d	
LION	2-6	08^h	16^h	0.28	6d	
EPHIN	4-8	08^h	15^h	2.11	6d	
EPHIN	8-25	07^h	15^h	0.47	6d	
EPHIN	25-41	07^h	14^h	0.08	6d	
EPHIN	41-53	- “ -	- “ -	- “ -	- “ -	

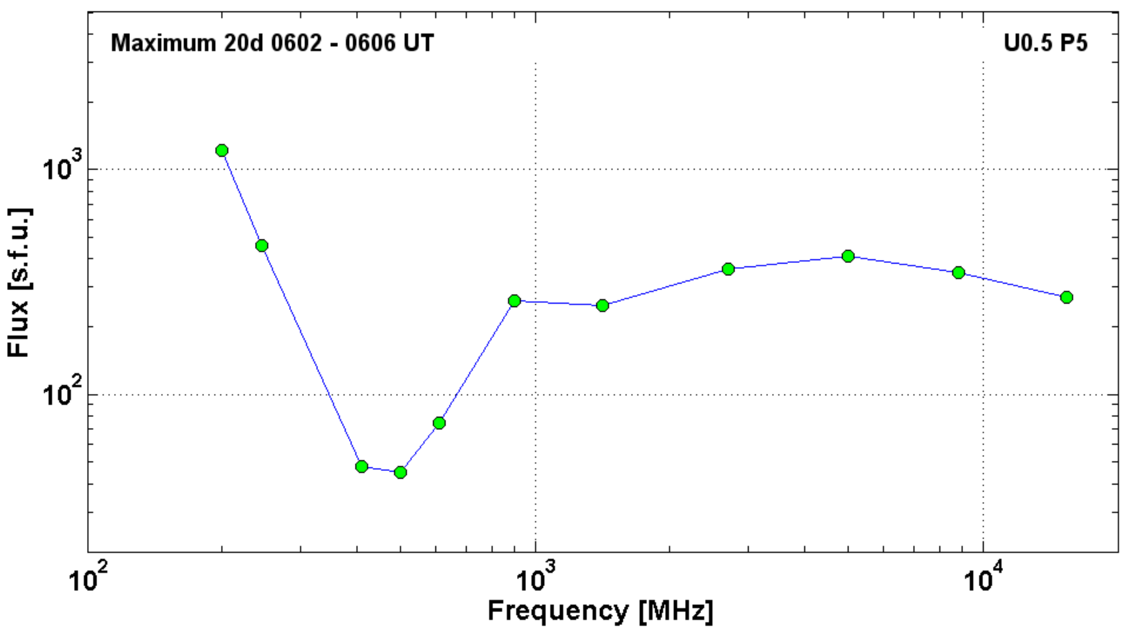
Electromagnetic and other phenomena that are sources and/or accompanying for the event of 2001 May 20

2001 May 20 ● AR9415 To event 397

Hα	6563 Å	No Flare			s18w90*		
1 – 12	keV	0600	0603	0606		M6.4	1.2E-2
53 – 93	keV	054613	060253	060739		52	HXT Y

15.4	GHz	0601.0	0602.0	0603.0		2.43	
8.8	GHz	0601.0	0602.0	0605.0		2.54	
5	GHz	0601.0	0602.0	0605.0	U0.5 P5	2.61	
2.7	GHz	0602.0	0602.0	0606.0		2.56	
1.4	GHz	0602.0	0602.0	0607.0		2.40	
900	MHz	0601.5	0603.4	0604.2		2.41	
610	MHz	0602.0	0603.0	0605.0		1.88	
500	MHz	0601.0	0604.0	0613.0		1.65	
410	MHz	0602.0	0602.0	0603.0		1.68	
245	MHz	0602.0	0605.0	0607.0		2.66	
200	MHz	0604.0	0606.0	0606.0		3.09	
DS II	25-340	0605		0624	SH	3	
DS III	25-300	0602		0604	G	3	
DS CONT	23-180	0613		0655		1	
DS DCIM	800-2000	0601		0605	G	2	
CME	WL	0626	546 km/s	-0.1 km/s^2	179˚	231˚	

* − probable localization of the flare event

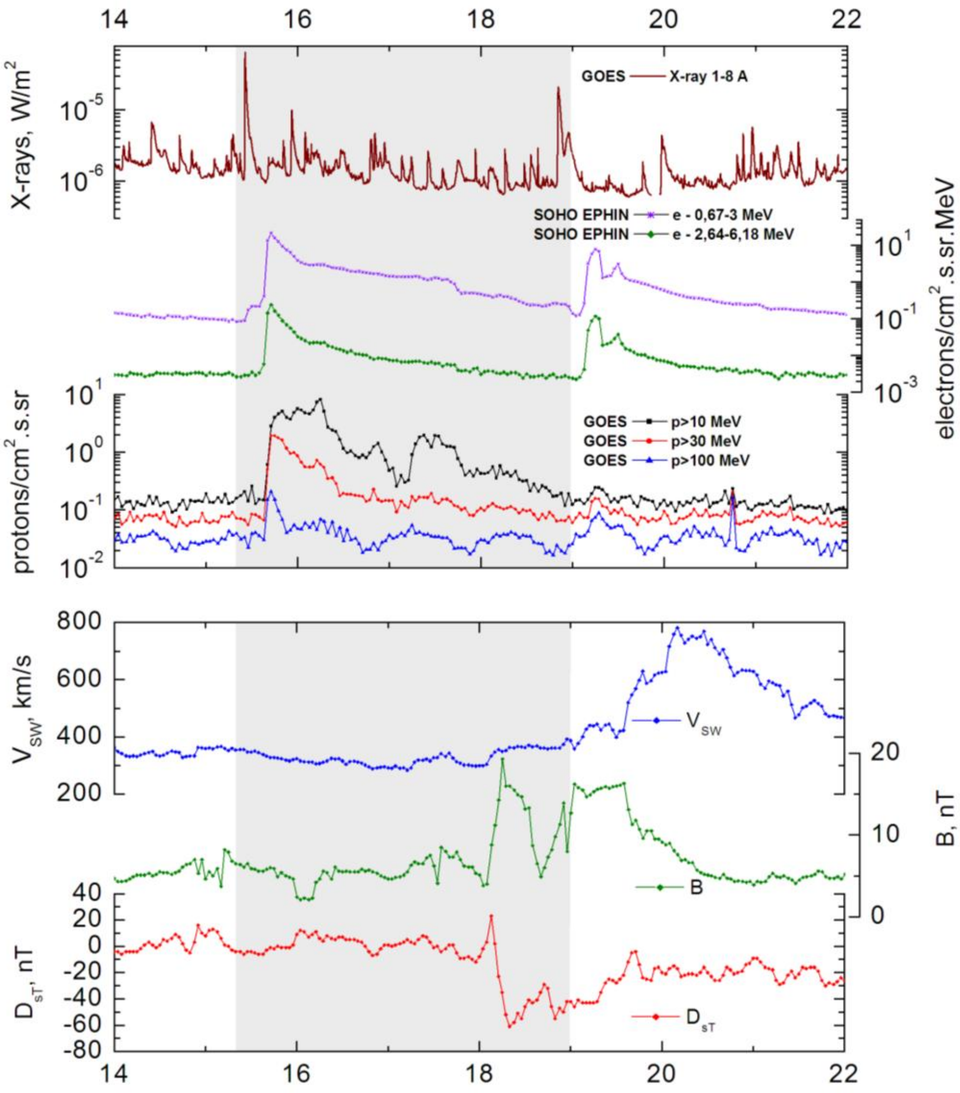


Event 2001.06.15 – (2001-166) **№ 398**

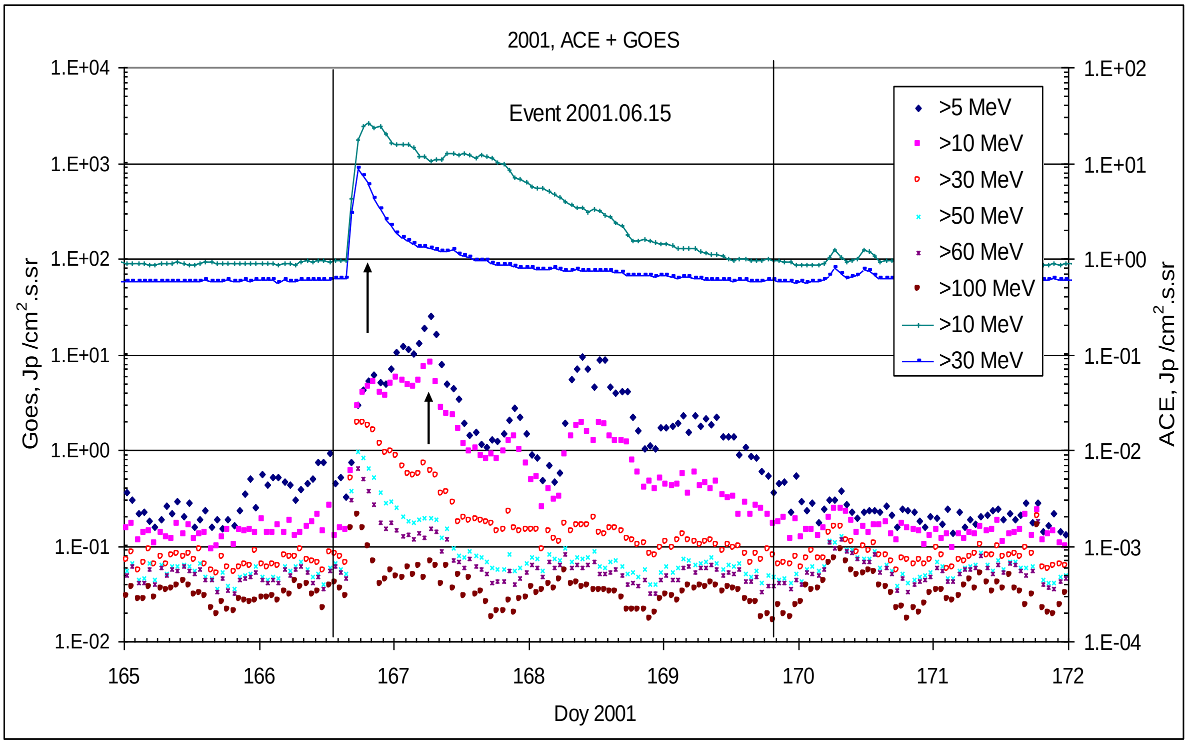
Particle event: To(Ep>10 MeV) – 15d16^h
Tmax$_1$(Ep>10 MeV) – 15d20^h, Jmax$_1$(Ep>10 MeV) – 5 /cm^2.s.sr
Tmax$_2$(Ep>10 MeV) – 16d06^h, Jmax$_2$(Ep>10 MeV) – 8.1 /cm^2.s.sr
Duration of the event – 3 days
Quasimaximal energy of protons in the event – Eqm$_1$ = 335 MeV
– Eqm$_2$ = 120 MeV

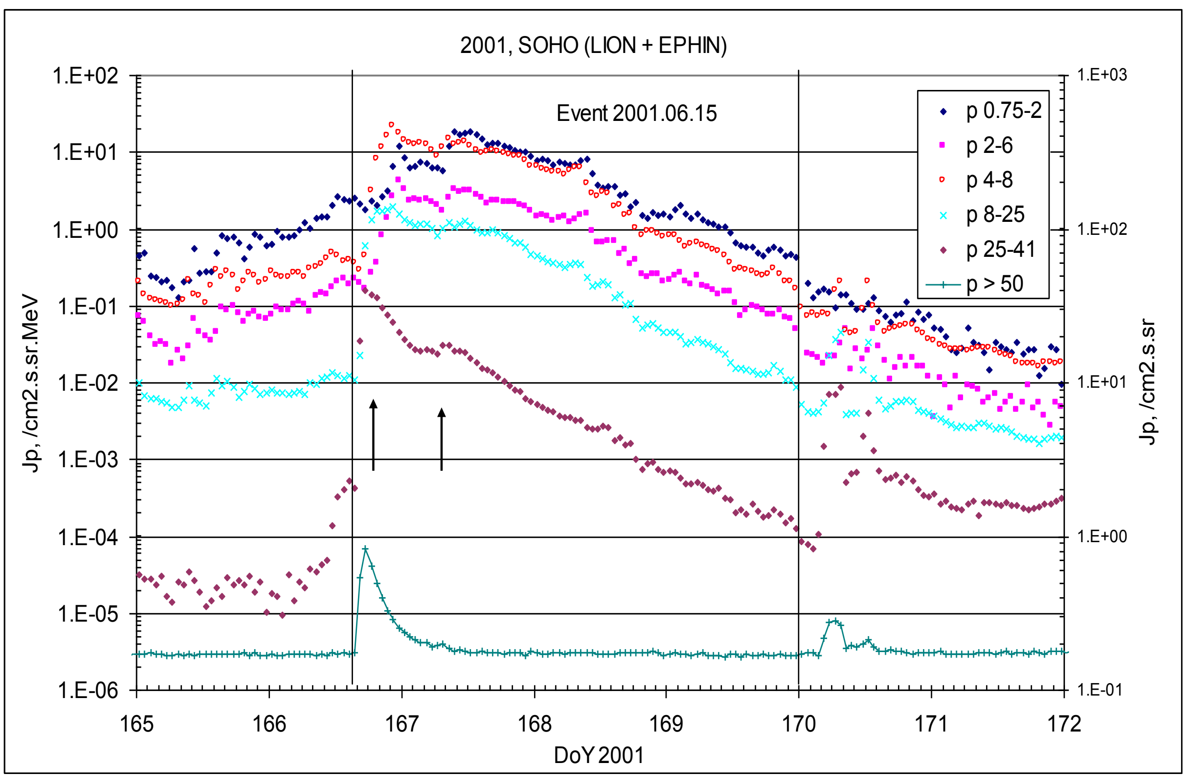
Sources: ⊡ back side solar flare event < 15d15^{h}56^m, AR unknown, behaind W$_L$
CME 15d15^{h}56^m, V=1701 km/s, $\Delta\varphi$ = 360^o; dA = 255^o;
o solar flare 15d10^{h}01^m, M6.3/1N, S26E42 AR9502

Particle fluxes and associated phenomena



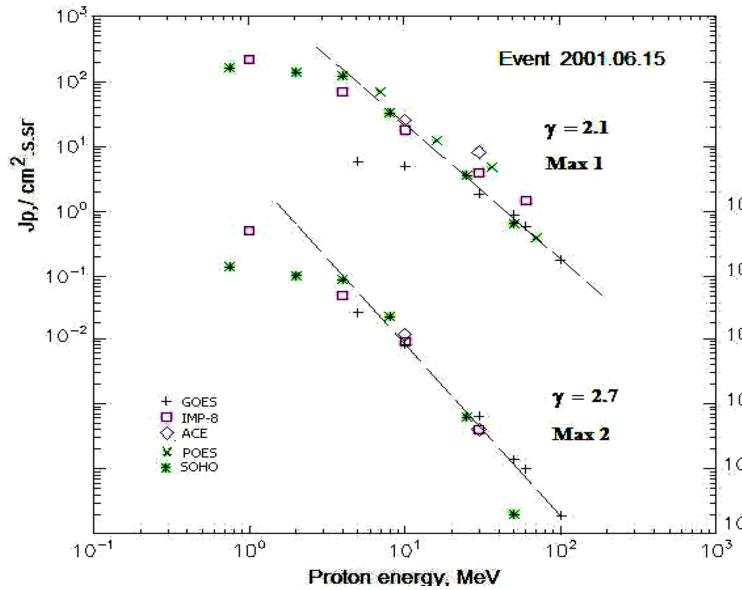
Time profiles of the proton fluxes for the event of 2001 June 15





Arrows on the profiles of the events indicate the time of the proton flux maxima, taken to build the proton spectra (see below)

Integral time-of-maximum proton spectrum



Integral fluxes of protons for the event of 2001 June 15

S/c, instruments	Ep, MeV	To	Tmax	Jmax, /cm^2.s.sr	Dura-tion	Comments
GOES-10						
EPS	>5	16^h	20^h/16d06^h	5.9/25.1	3d	
EPS	>10	16^h	20^h/16d06^h	5.0/8.1	3d	
EPS	>30	16^h	18^h/16d05^h	1.9/0.65	3d	
EPS	>50	16^h	17^h/16d05^h	0.9/0.14	2d	
EPS	>60	16^h	17^h/16d05^h	0.59/0.1	2d	
EPS	>100	16^h	17^h/16d05^h	0.18/0.02	2d	
POES-16						
MEPED	>0.24	-	-	-	-	
MEPED	>0.8	-	-	-	-	
MEPED	>2.5	-	-	-	-	
MEPED	>6.9	17^h	18^h/ -	70/ -	> 2d	
MEPED	>16	17^h	18^h/ -	12.5/ -	> 1d	
MEPED	>36	17^h	18^h/ -	4.9/ -	> 1d	
MEPED	>70	17^h	18^h/ -	0.4/ -	> 1d	
MEPED	>140	-	-	-	-	
IMP-8						
CPME	>1	17^h	23^h/16d06^h	218/450	5d	
CPME	>4	16^h	23^h/16d06^h	70/46	4.5d	
CPME	>10	16^h	19^h/16d06^h	18.2/8.8	4d	
CPME	>30	16^h	18^h/16d05^h	3.9/0.4	2d	
CPME	>60	16^h	18^h/ -	1.45/ -	2d	
ACE						
SIS	>10	16^h	19^h/16d10^h	25.2/11.5	3 d	
SIS	>30	16^h	19^h/16d10^h	8.2/4	2 d	
SOHO						
EPHIN (INT)	>50	16^h	17^h/16d08^h	0.66/0.02	1d	

Differential fluxes of protons for the event of 2001 June 15

S/c, instruments	ΔE, MeV	To	Tmax	Jmax. /cm^2.s.sr.MeV	Dura-tion	Comments
IMP-8						
CPME	1-2	19^h	23^h/16d10^h	99.5/289	-	
CPME	2-4.6	18^h	23^h/16d09^h	38.8/53.5	-	
CPME	4.6-15	17^h	23^h/16d09^h	5/3.5	-	
CPME	15-25	16^h	19^h/16d06^h	0.83/0.36	2d	
CPME	25-48	16^h	18^h/16d06^h	0.14/0.023	2d	
CPME	48-96	16^h	17^h/16d06^h	0.025/0.0025	1.5d	
CPME	96-145	16^h	-	-	-	
CPME	145-440	16^h	-	-	-	
SOHO						
LION	0.75-2	18^h	23^h/16d05^h	14.2/18.8	5d	
LION	2-6	18^h	23^h/16d05^h	4.2/3	5d	
EPHIN	4-8	18^h	22^h/16d08^h	22/14.7	5d	
EPHIN	8-25	16^h	20^h/16d08^h	1.7/1.24	4d	
EPHIN	25-41	16^h	19^h/16d08^h	0.14/0.03	3.5d	
EPHIN	41-53	- " -	- " -	- " -	- " -	

Electromagnetic and other phenomena that are sources and/or accompanying for the event of 2001 June 15

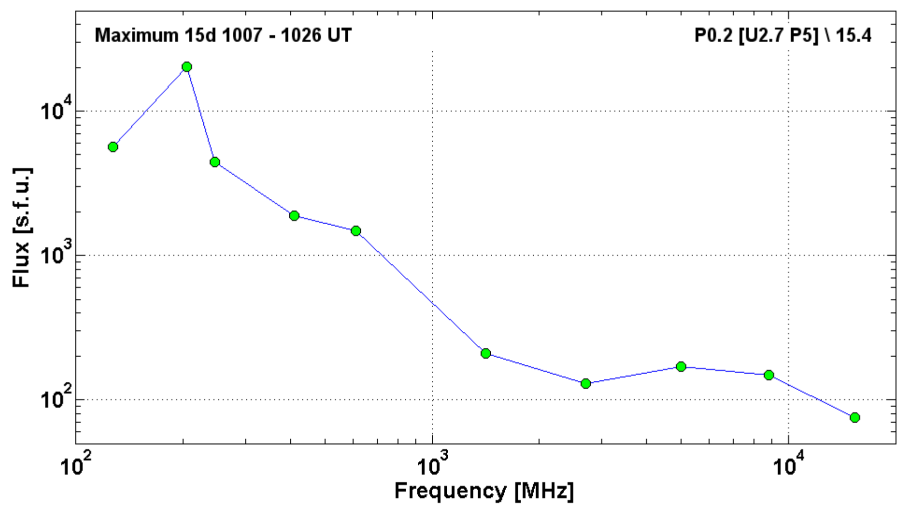
2001 June 15 ⊡ AR To event 398

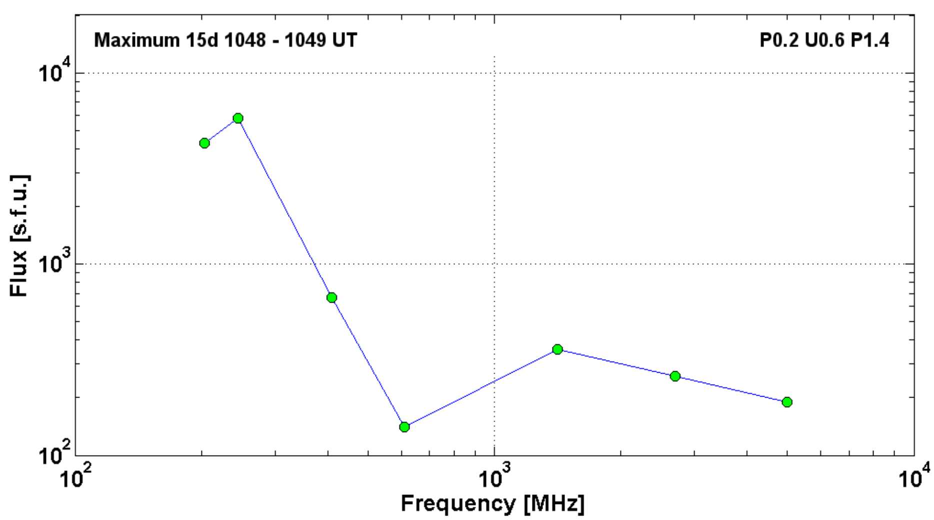
CME	WL	1556	1701 km/s	56.9* km/s^2	360°	255°	

2001 June 15 O AR9502 To event 398

Hα	6563 Å	1005	1008	1108	S26E41	1N	FH
1 – 12	keV	1001	1013	1020		M6.3	4.2E-2
53 – 93	keV	<102103	102103	104949		13	HXT Y
15.4	GHz	1006.0	1007.0	0000.0		1.88	
8.8	GHz	1005.0	1007.0	0000.0		2.18	
5	GHz	1004.0	1007.0	0000.0	P0.2 [U2.7 P5]\15.4	2.23	
2.7	GHz	1005.0	1011.0	0000.0		2.11	
1.4	GHz	1006.0	1012.0	1023.0		2.32	
610	MHz	1008.0	1010.0	1029.0		3.18	
410	MHz	1006.0	1012.0	0000.0		3.28	
245	MHz	1006.0	1013.0	0000.0		3.65	
204	MHz	1007.2	1008.2	1041.4		4.31	
127	MHz	1004.0	1026.0	1117.0		3.76	
DS II	110-460	1006		1011	H	3	
DS IV	45-270	1009		~1026		2	
DS III	25-270	1007		1011	G,HARM	2	

DS CONT	45-240	1008		~1010		2	
DS DCIM	2000-4500	1004		1038	GG	2	
DS DCIM	800-2000	1005		1037	GG	2	
DS DCIM	110-2800	1008		1121	P,S,F	3	
5	GHz	1047.0	1049.0	0000.0		2.28	
2.7	GHz	1047.0	1049.0	0000.0		2.41	
1.4	GHz	1047.0	1048.0	0000.0	P0.2 U0.6 P1.4	2.56	
610	MHz	1047.0	1048.0	0000.0		2.15	
410	MHz	1047.0	1049.0	0000.0		2.83	
245	MHz	1006.0	1048.0	0000.0		3.76	
204	MHz	1041.9	1048.5	1129.2		3.63	
DS II	54-65	1047		1049		2	
DS IV	45-270	1046		~1120		2	
DS III	25-100	1047		1048	G	2	
DS DCIM	2000-4500	1047		1118	GG	2	
DS DCIM	800-2000	1047		1121	GG	2	
CME	WL	1032	1090 km/s	9.7 km/s^2	119°	153°	



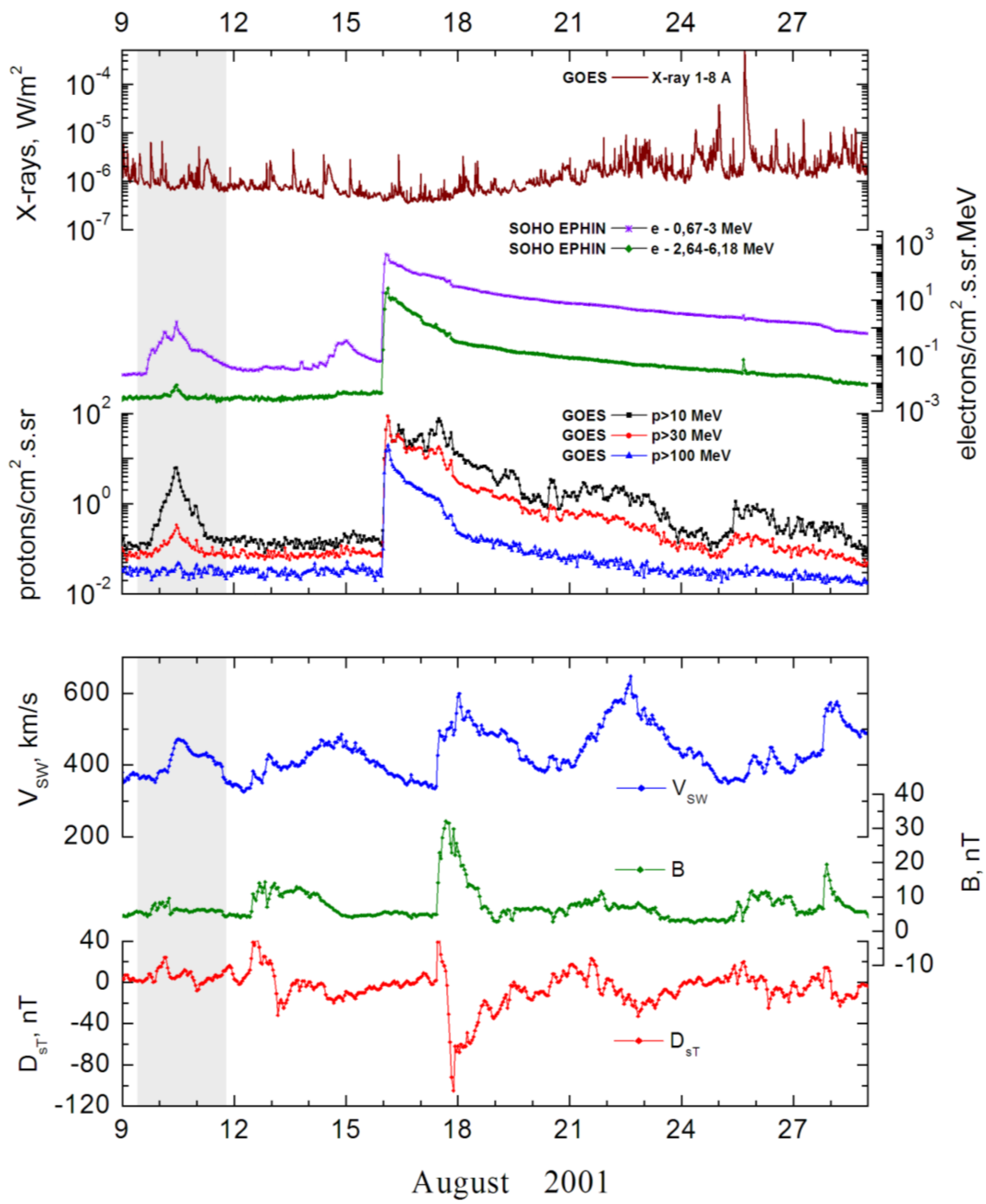


Event 2001.08.09 – (2001-221) **№ 399**

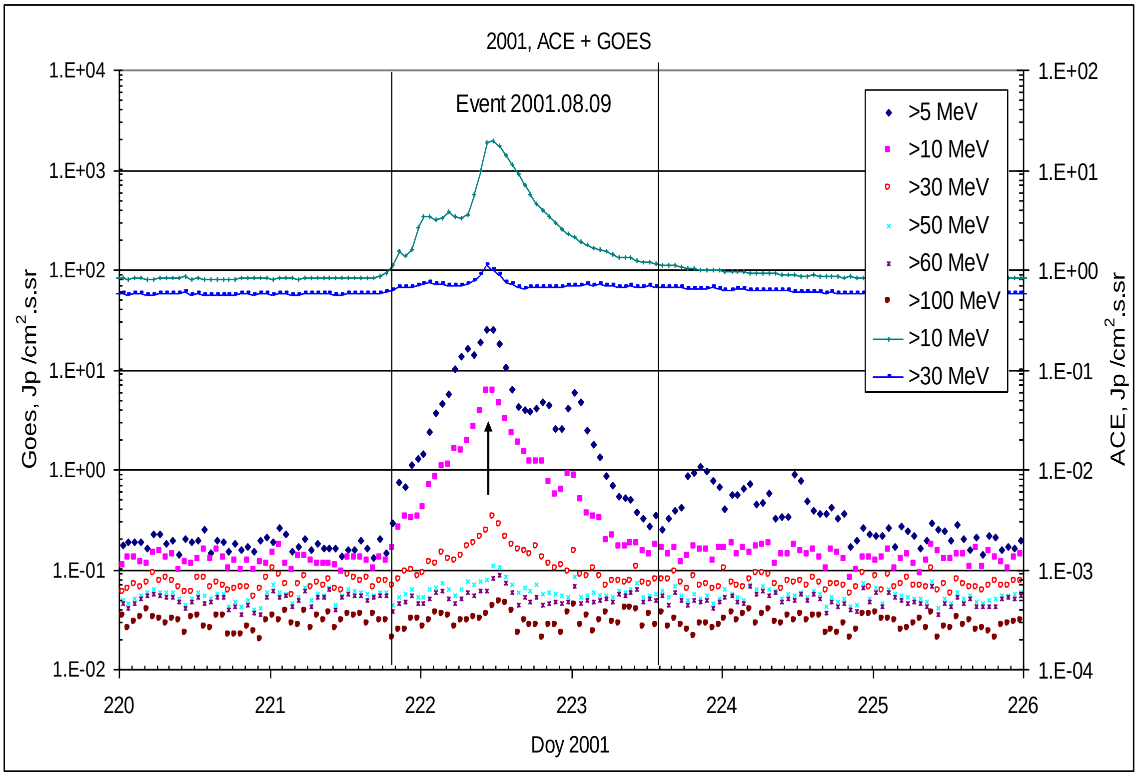
Particle event: To(Ep>10 MeV) – 09d20^h
Tmax(Ep>10 MeV) – 10d11^h, Jmax (Ep>10 MeV) – 6 /cm^2.s.sr
Duration of the event – 1.5 days
Quasimaximal energy of protons in the event – Eqm = 85 MeV

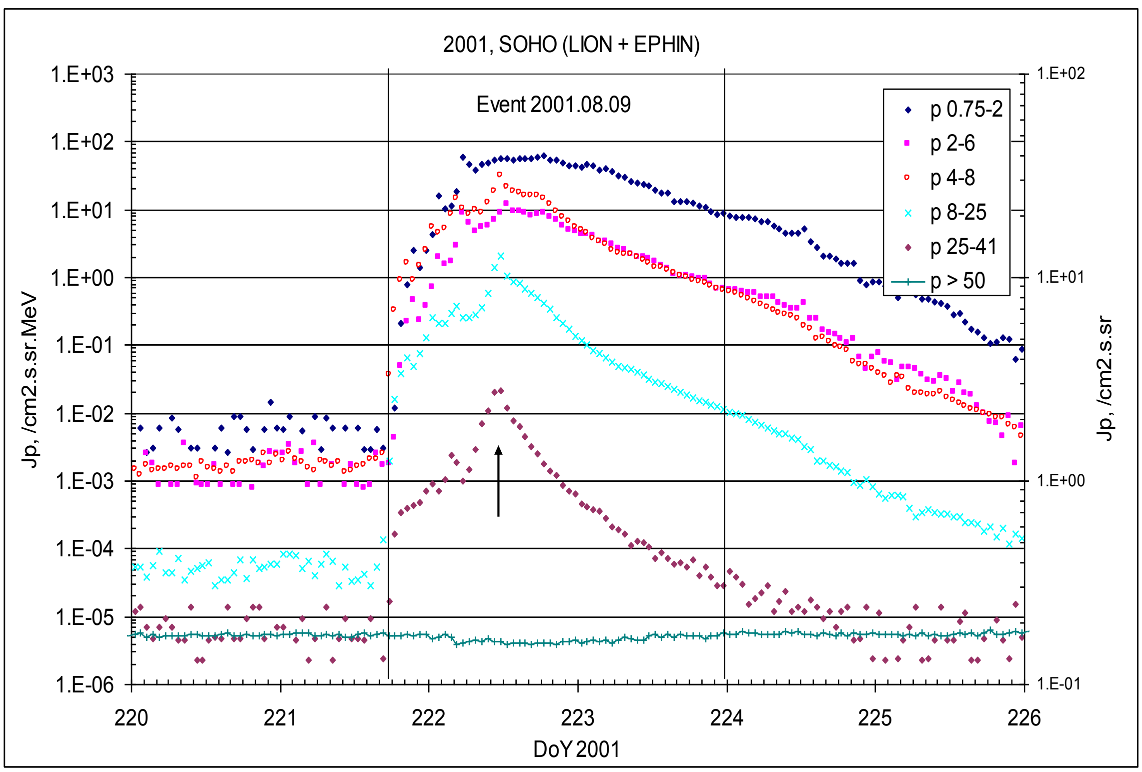
Sources: ⊙ solar flare 09d11^{h}16^m, C3.7/SF (DSF)
Main X-ray burst 1-8 Å: onset – 09d11^{h}16^m, max – 09d11^{h}22^m, Φ = 0.0021 J/m^2
CME 09d10^{h}32^m, V=0479 km/s, Δφ = 175^o, dA = 255^o

Particle fluxes and associated phenomena



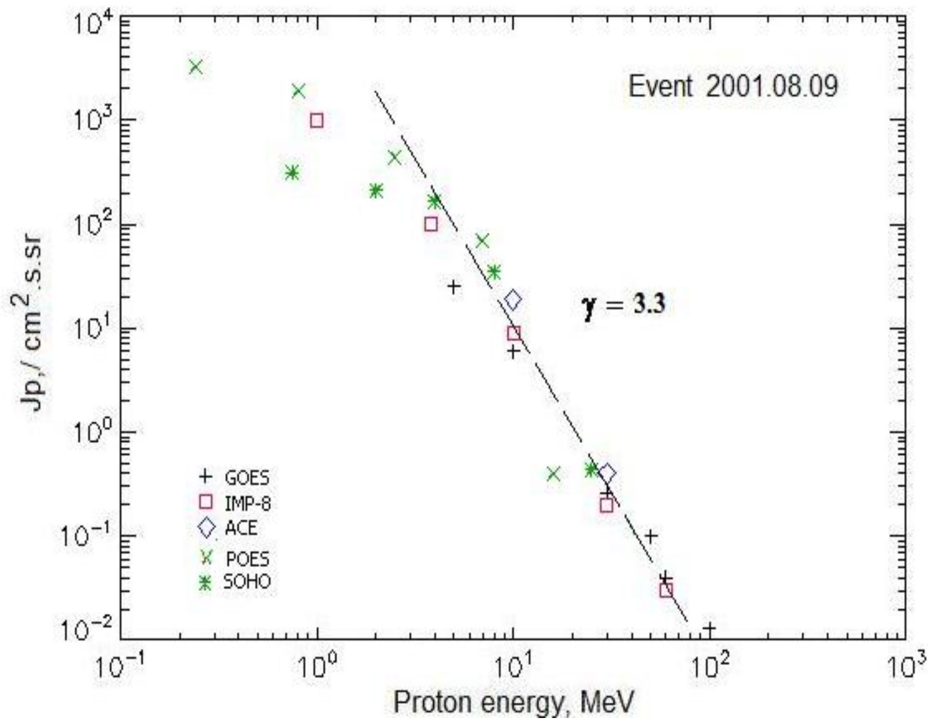
Time profiles of the proton fluxes for the event of 2001 August 09





Arrows on the profiles of the events indicate the time of the proton flux maxima, taken to build the proton spectra (see below)

Integral time-of-maximum proton spectrum



Integral fluxes of protons for the event of 2001 August 09

S/c, instruments	Ep, MeV	To	Tmax	Jmax, /cm^2.s.sr	Dura-tion	Comments
GOES-10						
EPS	>5	20^h	10d11^h	25.2	1.5d	
EPS	>10	20^h	10d11^h	6	1d	
EPS	>30	21^h	10d11^h	0.26	1d	
EPS	>50	-	10d11^h	0.1	0.5d	
EPS	>60	-	10d12^h	0.04	0.3d	
EPS	>100	-	10d12^h	0.013	0.3d	
POES-16						
MEPED	>0.24	-	10d10^h	3304	-	
MEPED	>0.8	-	10d10^h	1919	-	
MEPED	>2.5	-	10d10^h	437	-	
MEPED	>6.9	-	10d10^h	69	-	
MEPED	>16	-	10d10^h	0.4	-	
MEPED	>36	-	10d10^h	-	-	
MEPED	>70	-	10d10^h	-	-	
MEPED	>140	-	10d10^h	-	-	
IMP-8						
CPME	>1	18^h	10d12^h	970	5 d	
CPME	>4	18^h	10d12^h	98.7	4 d	
CPME	>10	18^h	10d11^h	8.8	3 d	
CPME	>30	18^h	10d11^h	0.2	0.5d	
CPME	>60	18^h	10d11^h	0.03	0.3d	

ACE						
SIS	>10	18^h	$10d11^h$	18.8	2d	
SIS	>30	18^h	$10d11^h$	0.4	5h	
SOHO						
EPHIN (INT)	>50	-	-	-	-	

Differential fluxes of protons for the event of 2001 August 09

S/c, instruments	ΔE, MeV	To	Tmax	Jmax. /cm^2.s.sr.MeV	Dura-tion	Comments
IMP-8						
CPME	1-2	23^h	$10d09^h$	820	5d	
CPME	2-4.6	23^h	$10d09^h$	109	5d	
CPME	4.6-15	23^h	$10d12^h$	5.9	5d	
CPME	15-25	23^h	$10d11^h$	0.26	2d	
CPME	25-48	23^h	$10d11^h$	0.011	1d	
CPME	48-96	23^h	$10d09^h$	0.0005	1d	
CPME	96-145	-	-	-	-	
CPME	145-440	-	-	-	-	
SOHO						
LION	0.75-2	18^h	$10d12^h$	57.4	5d	
LION	2-6	18^h	$10d12^h$	11.9	5d	
EPHIN	4-8	17^h	$10d11^h$	32,3	5d	
EPHIN	8-25	17^h	$10d11^h$	2,04	5d	
EPHIN	25-41	17^h	$10d11^h$	0,02	3d	

Electromagnetic and other phenomena that are sources and/or accompanying for the event of 2001 August 09

2001 August 09 ⊙ AR To event 399

Hα	6365 Å	1128	1136	1150	N10E54	SF	F
DSF		<1032					
1 – 12	keV	1116	1122	1127		C3.7	2.1E-3
3	GHz	1118.5	1118.9	1120.2		1.46	
DS CONT	2273-4500	1118		1119		1	
DS DCIM	2000-4000	1118		1119	C	2	
CME	WL	1032	479 km/s	4.4 km/s^2	175°	255°	

2001 August 09 □ AR9557 To event 399

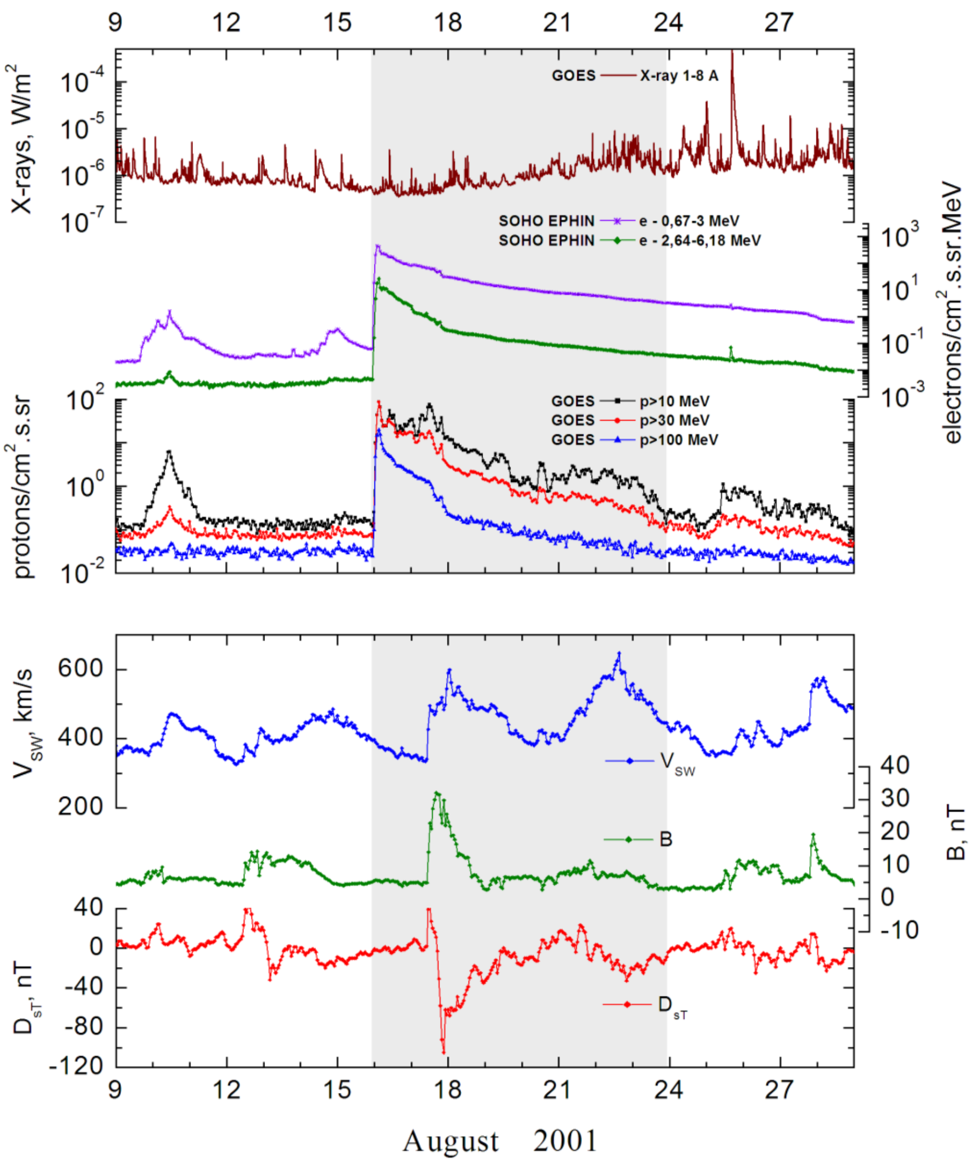
SPY	6365 Å	1045		>1101	S14W90		
CME	WL	1032	479 km/s	4.4 km/s^2	175°	255°	

Event 2001.08.16 – (2001-228) **№ 400**

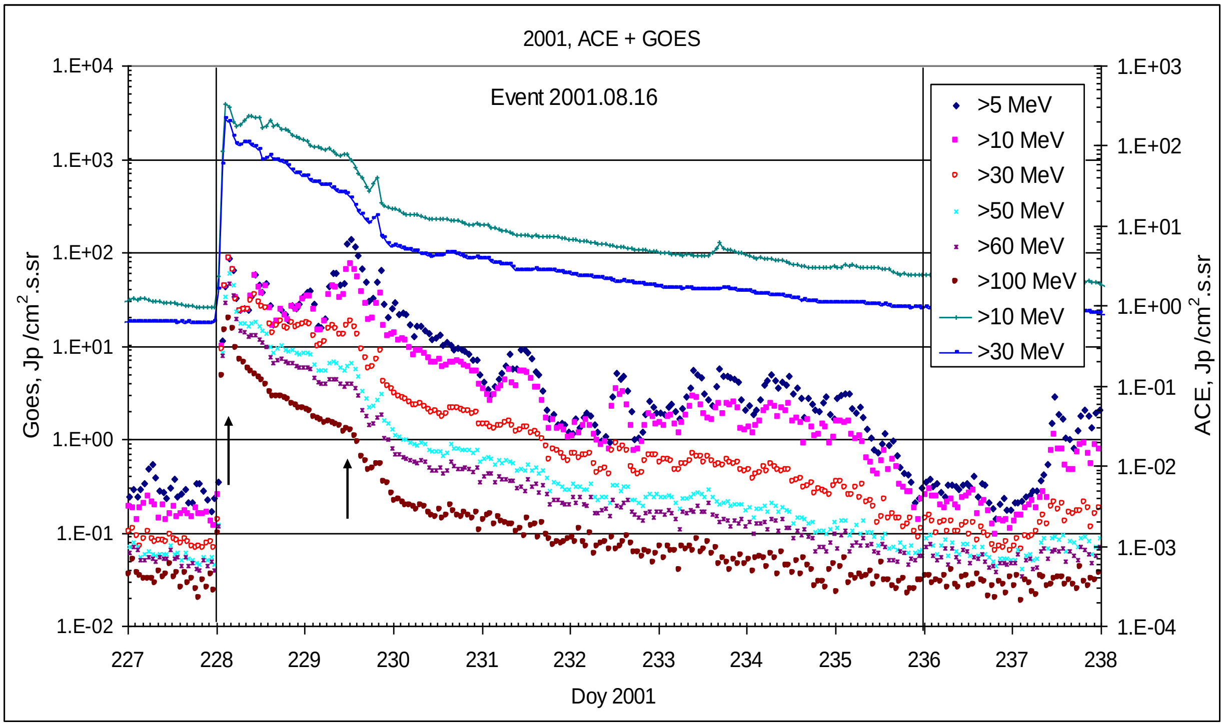
Particle event: To(Ep>10 MeV) – 16d00^h
Tmax$_1$(Ep>10 MeV) – 16d03^h, Jmax$_1$(Ep>10 MeV) – 87 /cm^2.s.sr
Tmax$_2$(Ep>10 MeV) – 17d12^h, Jmax$_2$(Ep>10 MeV) – 75 /cm^2.s.sr
Duration of the event – 8 days
Quasimaximal energy of protons in the event – Eqm$_1$ = 600 MeV
– Eqm$_2$ = 475 MeV

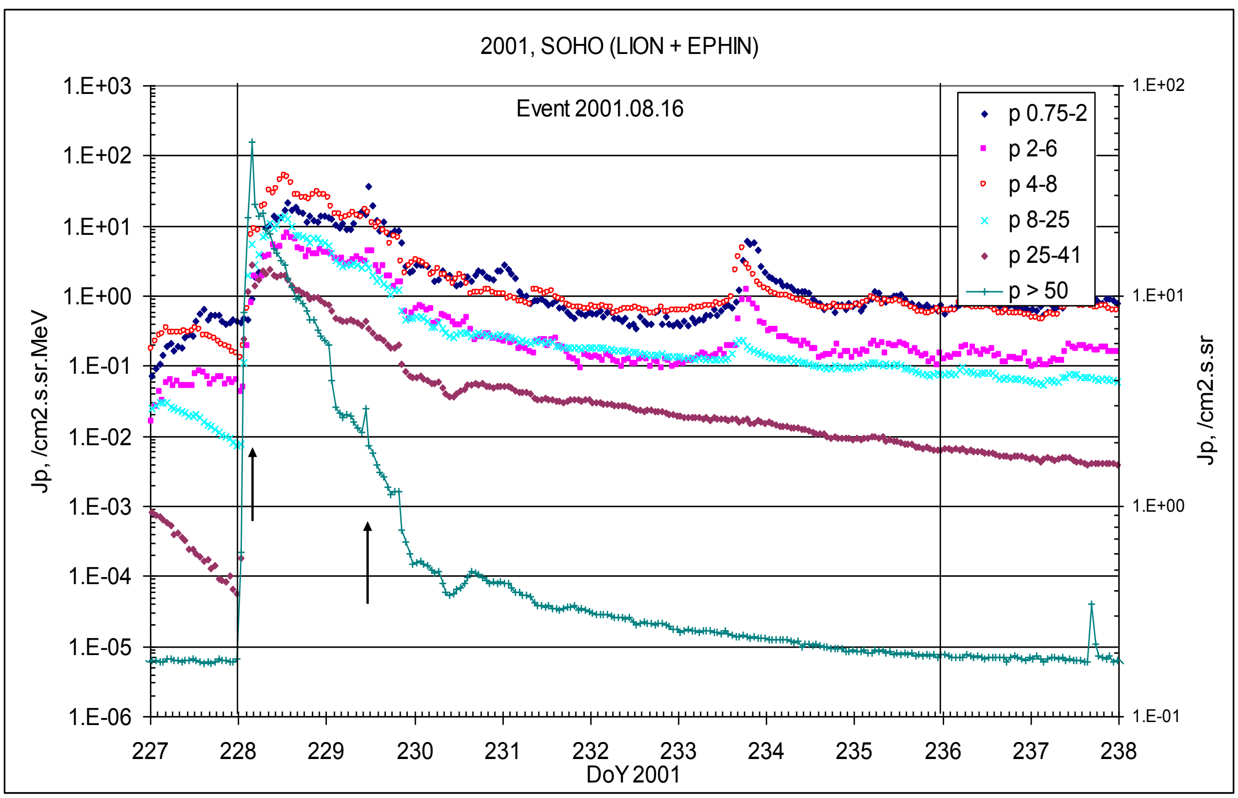
Sources: ⊡ back side solar flare event < 15d23^{h}54^m; AR9557?, 5d behind W-limb
CME: 15d23^{h}54^m, V=1575 km/s, Δφ = 360^o; dA = 189°
▲SC 17d11h03^m

Particle fluxes and associated phenomena



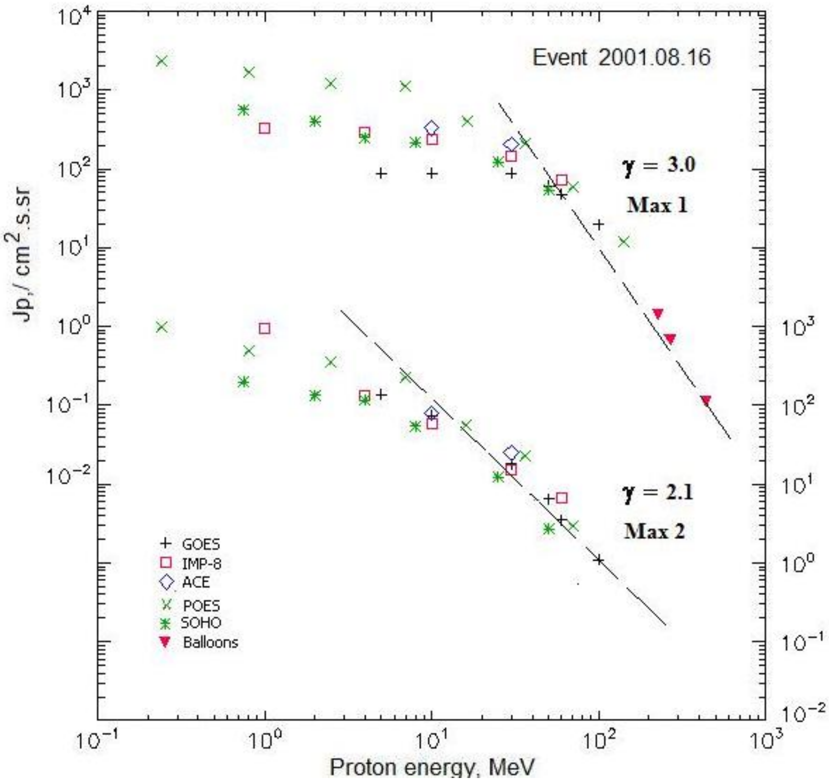
Time profiles of the proton fluxes for the event of 2001 August 16





Arrows on the profiles of the events indicate the time of the proton flux maxima, taken to build the proton spectra (see below)

Integral time-of-maximum proton spectrum



Integral fluxes of protons for the event of 2001 August 16

S/c, instruments	Ep, MeV	To	Tmax	Jmax, /cm^2.s.sr	Dura-tion	Comments
GOES-10						
EPS	>5	00^h	03^h/17d12^h	87.3/136	10d	
EPS	>10	00^h	03^h/17d12^h	87/75	8d	
EPS	>30	00^h	03^h/17d12^h	86.7/18	8d	
EPS	>50	00^h	03^h/17d12^h	60.6/6.5	8d	
EPS	>60	00^h	03^h/17d12^h	47.0/3.5	8d	
EPS	>100	00^h	03^h/17d12^h	19.8/1.1	7d	
POES-16						
MEPED	>0.24	-	02^h/17d12^h	2080/820	>2d	
MEPED	>0.8	-	02^h/17d12^h	1370/510	>2d	
MEPED	>2.5	-	02^h/17d12^h	900/310	>2d	
MEPED	>6.9	-	02^h/17d12^h	820/250	>2d	
MEPED	>16	-	02^h/ -	400/56	-	
MEPED	>36	-	02^h/ -	205.5/23	-	
MEPED	>70	-	02^h/ -	59.8/2.9	-	
MEPED	>140	-	02^h/ -	11.8/ -	-	
IMP-8						
CPME	>1	01^h	04^h /17d12^h	331/940	15d	
CPME	>4	00^h	04^h/ 17d12^h	289/132	14d	
CPME	>10	00^h	03^h/ 17d12^h	241/59	13d	
CPME	>30	00^h	03^h/17d12^h	144/15	11d	
CPME	>60	00^h	03^h/17d12^h	71.9/6.6	10d	

ACE						
SIS	>10	00^h	03^h/17d12^h	331/80	11d	
SIS	>30	00^h	03^h/17d12^h	203/25	10d	
SOHO						
EPHIN (INT)	>50	00^h	03^h	53.8/2.7	3d	
BALLOONS						
Mi	>227		07^h50^m -08^h23^m/ -	1.4/ -		
Mi	>268		07^h50^m -08^h23^m/ -	0.66/ -		
Mi	>439		07^h50^m -08^h23^m/ -	0.11/ -		

Differential fluxes of protons for the event of 2001 August 16

S/c, instruments	ΔE, MeV	To	Tmax	Jmax. /cm^2.s.sr.MeV	Dura-tion	Comments
IMP-8						
CPME	1-2	05^h	05^h/17d11^h	20.6/616	7d	
CPME	2-4.6	01^h	05^h/17d11^h	16.1/72.4	7d	
CPME	4.6-15	01^h	04^h/17d11^h	7.15/7	7d	
CPME	15-25	01^h	04^h/17d11^h	6.5/2.46	7d	
CPME	25-48	01^h	04^h/17d11^h	3.1/0.49	7d	
CPME	48-96	01^h	04^h/17d11^h	0.98/0.11	7d	
CPME	96-145	01^h	03^h/17d12^h	0.44/0.083	7d	
CPME	145-440	01^h	03^h/17d12^h	0.085/0.0125	6d	
SOHO						
LION	0.75-2	03^h	07^h/17d12^h	93.8/36.5	7d	
LION	2-6	02^h	04^h/17d12^h	36.8/4.3	7d	
EPHIN	4-8	01^h	04^h/17d11^h	8.5/15.3	7d	
EPHIN	8-25	01^h	03^h/17d11^h	5.6/2.5	7d	
EPHIN	25-41	01^h	03^h/17d10^h	2.7/0.43	7d	
EPHIN	41-53	- “ -	- “ -	- “ -	- “ -	

References:

Kuwabara T., J.W. Bieber, J. Clem et al., 2006.
Veselovskij I.S., I.N. Myagkova, O.S. Yakovchuk, 2012.
Tylka A.J., O.E. Malandraki, G. Dorrian et al., 2013.

Electromagnetic and other phenomena that are sources and/or accompanying for the event of 2001 August 16

2001 August 15 ⊡ AR To event 400

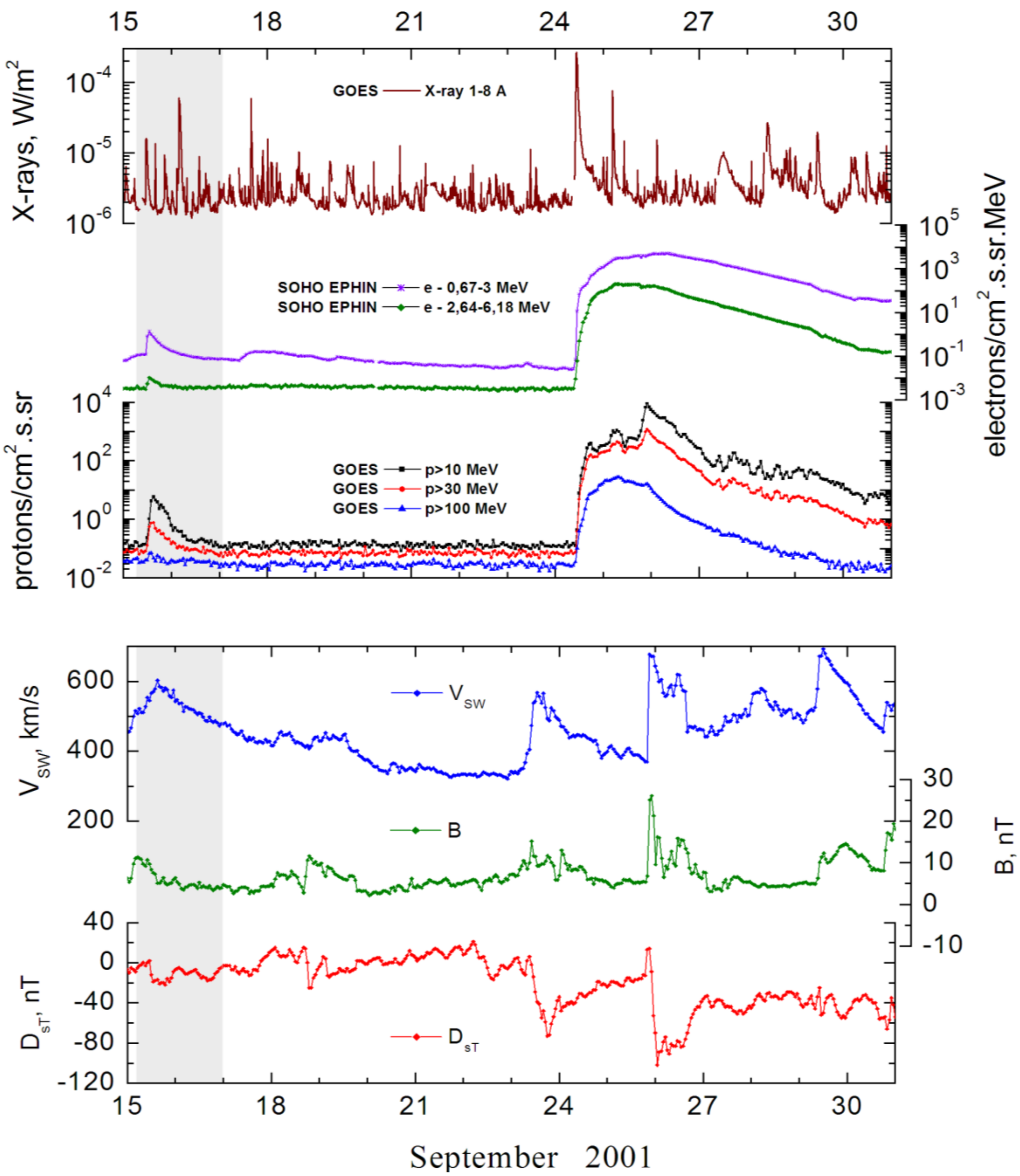
CME	WL	2354	1575 km/s	31.7 km/s^2	360˚	189˚	

Event 2001.09.15 – (2001-258) **№ 401**

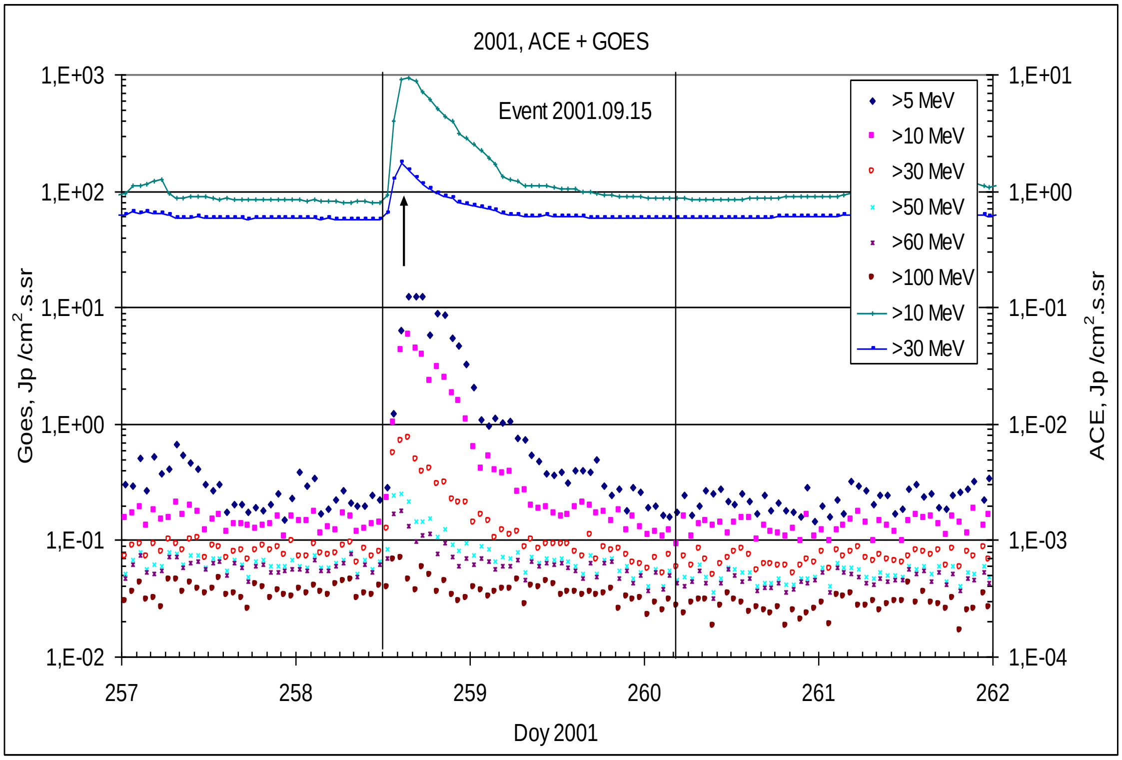
Particle event: To(Ep>10 MeV) – 15d12^h
Tmax(Ep>10 MeV) – 15d15^h, Jmax(Ep>10 MeV) – 6 /cm^2.s.sr
Duration of the event – 2 days
Quasimaximal energy of protons in the event – Eqm = 150 MeV

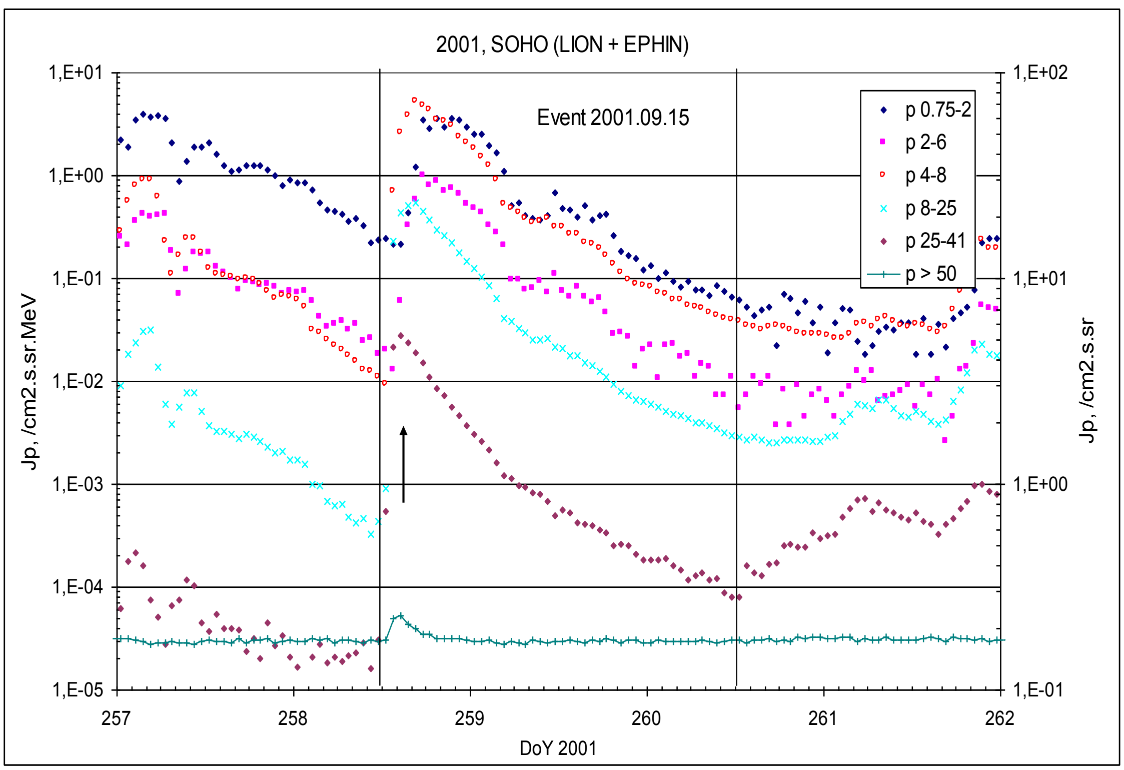
Sources: ● solar flare 15d11^{h}03^m, 1N/M1.5, S21W49, AR9608
Main X-ray burst 1-8 Å: onset – 15d11^{h}04^m, max – 15d11^{h}28^m, Φ = 0.037 J/m^2
●CME: 15d11^{h}54^m, V=0478 km/s, Δφ = 130^o, dA = 248˚

Particle fluxes and associated phenomena



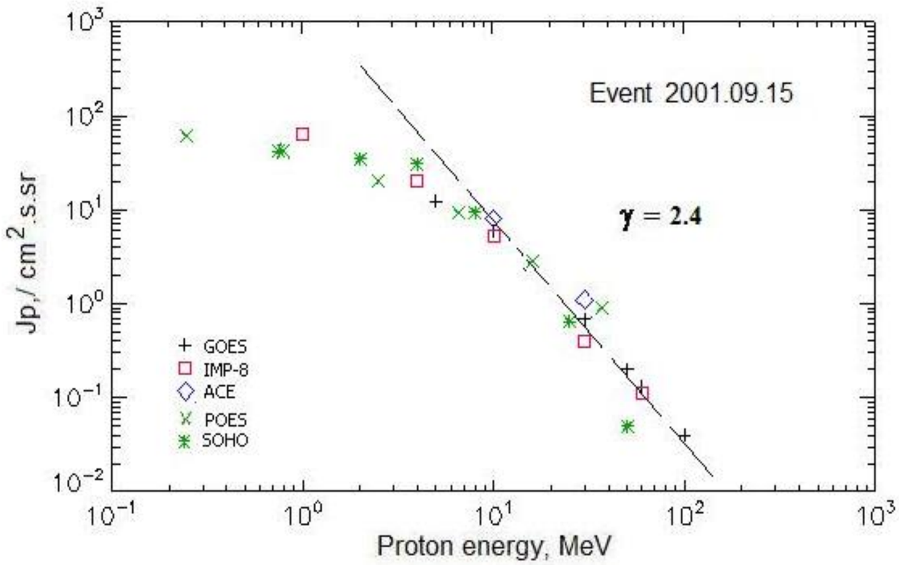
Time profiles of the proton fluxes for the event of 2001 September 15





Arrows on the profiles of the events indicate the time of the proton flux maxima, taken to build the proton spectra (see below)

Integral time-of-maximum proton spectrum



Integral fluxes of protons for the event of 2001 September 15

S/c, instruments	Ep, MeV	To	Tmax	Jmax, /cm^2.s.sr	Dura-tion	Comments
GOES-10						
EPS	>5	12^h	16^h	12.3	2d	
EPS	>10	12^h	15^h	6	2d	
EPS	>30	12^h	15^h	0.68	1.5d	
EPS	>50	12^h	14^h	0.20	1.5d	
EPS	>60	12^h	14^h	0.13	1d	
EPS	>100	12^h	14^h	0.04	1d	
POES-16						
MEPED	>0.24	15^h	15^h	61	2d	
MEPED	>0.8	15^h	15^h	41	2d	
MEPED	>2.5	15^h	15^h	22	2d	
MEPED	>6.9	15^h	15^h	9	2d	
MEPED	>16	15^h	15^h	3.5	2d	
MEPED	>36	15^h	15^h	0.9	2d	
MEPED	>70	15^h	-	-	-	
MEPED	>140	15^h	-	-	-	
IMP-8						
CPME	>1	12^h	16^h	65	2d	
CPME	>4	12^h	16^h	20	2d	
CPME	>10	12^h	15^h	5.2	1.5d	
CPME	>30	12^h	15^h	0.4	0.7d	
CPME	>60	12^h	15^h	0.11	0.5d	
ACE						
SIS	>10	12^h	16^h	8	1d	
SIS	>30	12^h	14^h	1.1	0.7d	
SOHO						
EPHIN (INT)	>50	12^h	13^h	0.05	0.3d	

Differential fluxes of protons for the event of 2001 September 15

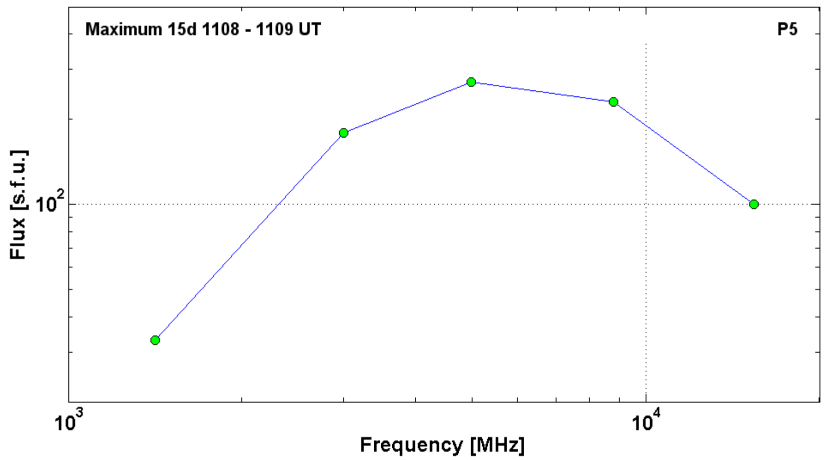
S/c, instruments	ΔE, MeV	To	Tmax	Jmax. /cm^2.s.sr.MeV	Dura-tion	Comments
IMP-8						
CPME	1-2	15^h	18^h	42	3d	
CPME	2-4.6	14^h	18^h	16	3d	
CPME	4.6-15	13^h	18^h	1.4	3d	
CPME	15-25	13^h	16^h	0.19	2d	
CPME	25-48	12^h	15^h	0.02	1,5d	
CPME	48-96	12^h	15^h	0.002	1d	
CPME	96-145	-	-	-	-	
CPME	145-440	-	-	-	-	
SOHO						
LION	0.75-2	16^h	18^h	4.3	3d	
LION	2-6	14^h	17^h	1	3d	
EPHIN	4-8	13^h	16^h	5.3	3d	
EPHIN	8-25	13^h	15^h	0.51	3d	
EPHIN	25-41	12^h	14^h	0.03	2d	

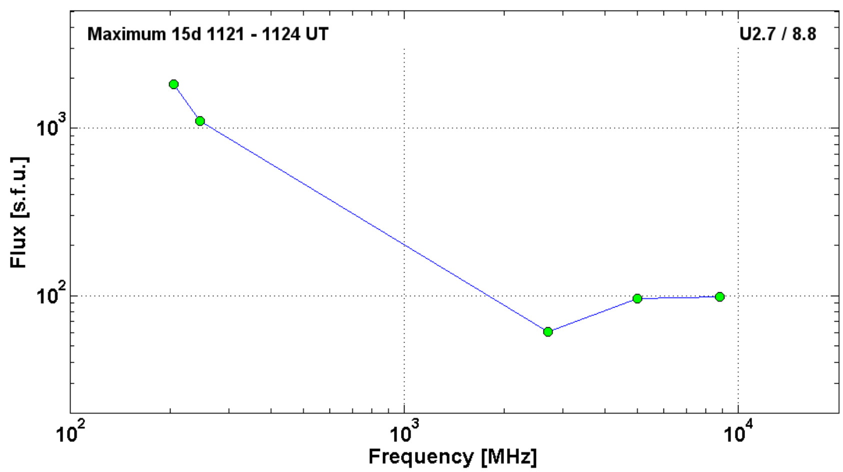
Electromagnetic and other phenomena that are sources and/or accompanying for the event of 2001 September 15

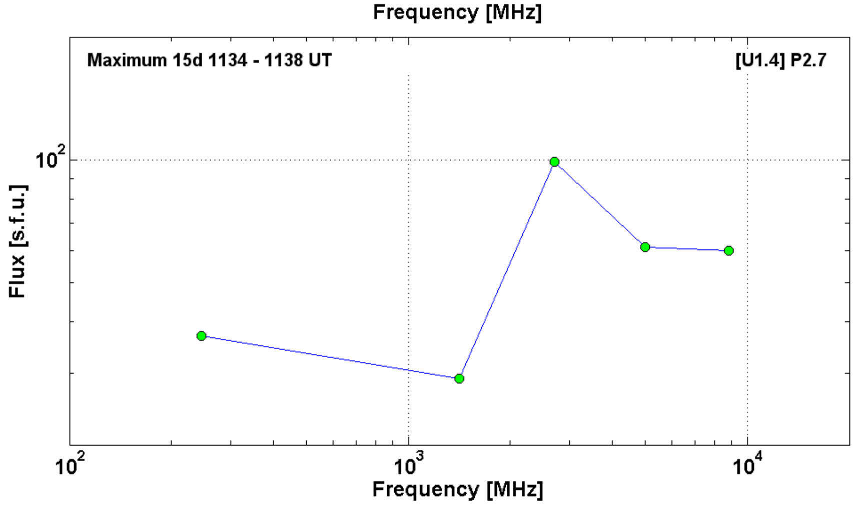
2001 September 15 ● AR9608 To event 401

Hα		1103	1109	1237	S21W49	1N	
Hα		<1124	~1139	1230	S27W53	SF	
1 – 12	keV	1004	1128	1154		M1.5	3.7E-2
53 – 93	keV	<113224	113332	114002		8	HXT Y
15.4	GHz	1107.0	1108.0	1109.0	P5	2.00	
8.8	GHz	1106.0	1108.0	1119.0		2.36	
5	GHz	1107.0	1108.0	1111.0		2.43	
3	GHz	1106.6	1108.9	1154.1		2.25	
1.4	GHz	1109.0	1109.0	1110.0		1.52	
DS DCIM	2000-4500	1106		1143	G	2	
DS DCIM	800-2000	1107		1141	G	1	
8.8	GHz	1119.0	1121.0	1132.0	U2.7 / 8.8	2.00	
5	GHz	1120.0	1122.0	1128.0		1.98	
2.7	GHz	1120.0	1122.0	1129.0		1.79	
245	MHz	1121.0	1124.0	1131.0		3.04	
204	MHz	1124.5	1124.9	1126.2		3.26	
DS II	30-220	1121		1128	GG,FS	2	
DS III	30-270	1123		1126	GG	2	
DS CONT	25-180	1124		1459		1	

8.8	GHz	1132.0	1134.0	1139.0		1.78	
5	GHz	1132.0	1134.0	1137.0		1.79	
2.7	GHz	1132.0	1134.0	1139.0	[U1.4] P2.7	2.00	
1.4	GHz	1134.0	1136.0	1137.0		1.46	
245	MHz	1138.0	1138.0	~1138.0		1.57	
DS III	25-90	1142		>1200	N	2	
CME	WL	1154	0478 km/s	-4.0 km/s^2	130˚	248˚	







Event 2001.09.24 – (2001-267) **№ 402**

Particle event: To(Ep>10 MeV) – 24d11^h

Tmax$_1$(Ep>10 MeV) – 24d18^h, Jmax$_1$(Ep>10 MeV) – 390 /cm^2.s.sr

Tmax$_2$(Ep>10 MeV) – 25d07^h, Jmax$_2$(Ep>10 MeV) – $1.1\cdot10^3$ /cm^2.s.sr

Tmax$_3$(Ep>10 MeV) – 25d22^h, Jmax$_3$(Ep>10 MeV) – $9.5\cdot10^3$ /cm^2.s.sr

Duration of the event – 5 days

Quasimaximal energy of protons in the event – Eqm$_1$ = 470 MeV

– Eqm$_2$ = 580 MeV

– Eqm$_3$ = 580 MeV

Sources: ● solar flare 24d09^{h}32^m, X2.6/2B, S17E26, AR9632;

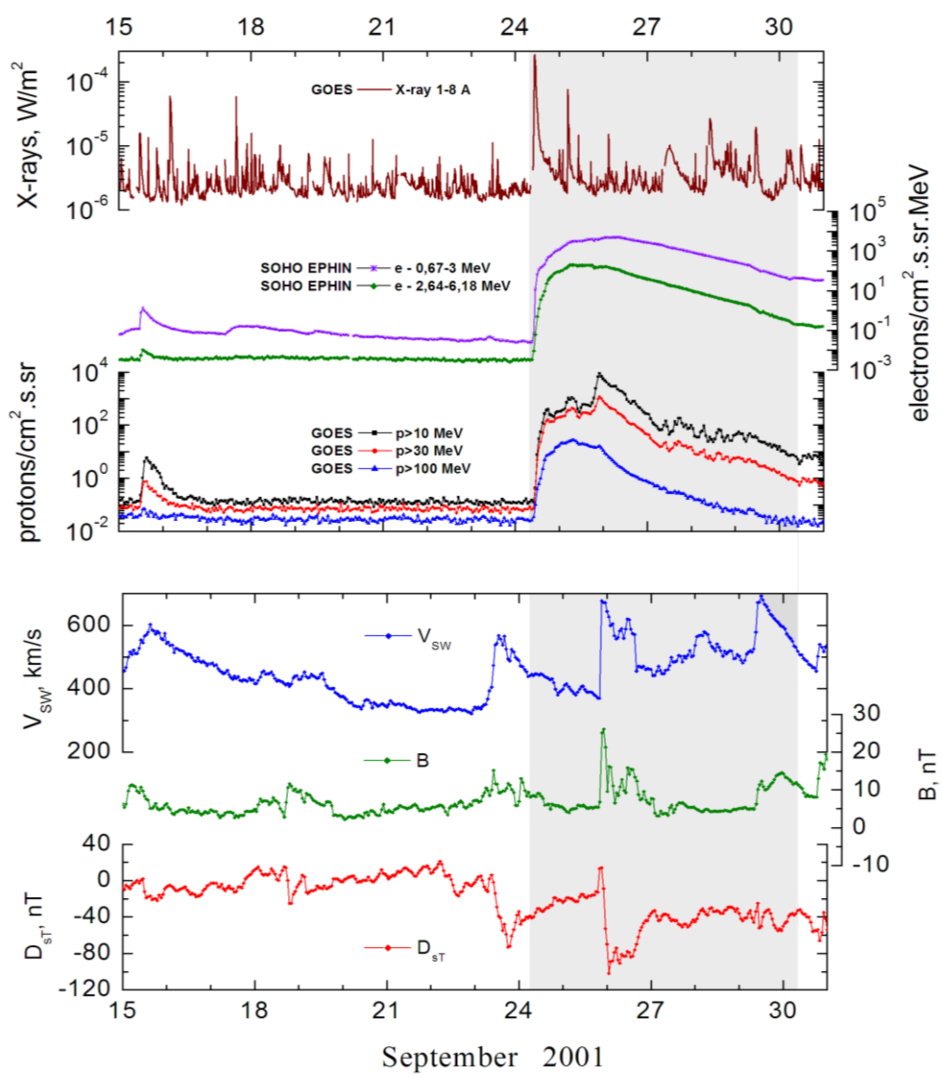
Ø solar flare 25d04^{h}24^m, M7.6/1N, S18W01, AR9628

Main X-ray burst 1-8 Å: onset – 24d09^{h}32^m, max – 24d10^h 38^m, Φ = 0.63 J/m^2

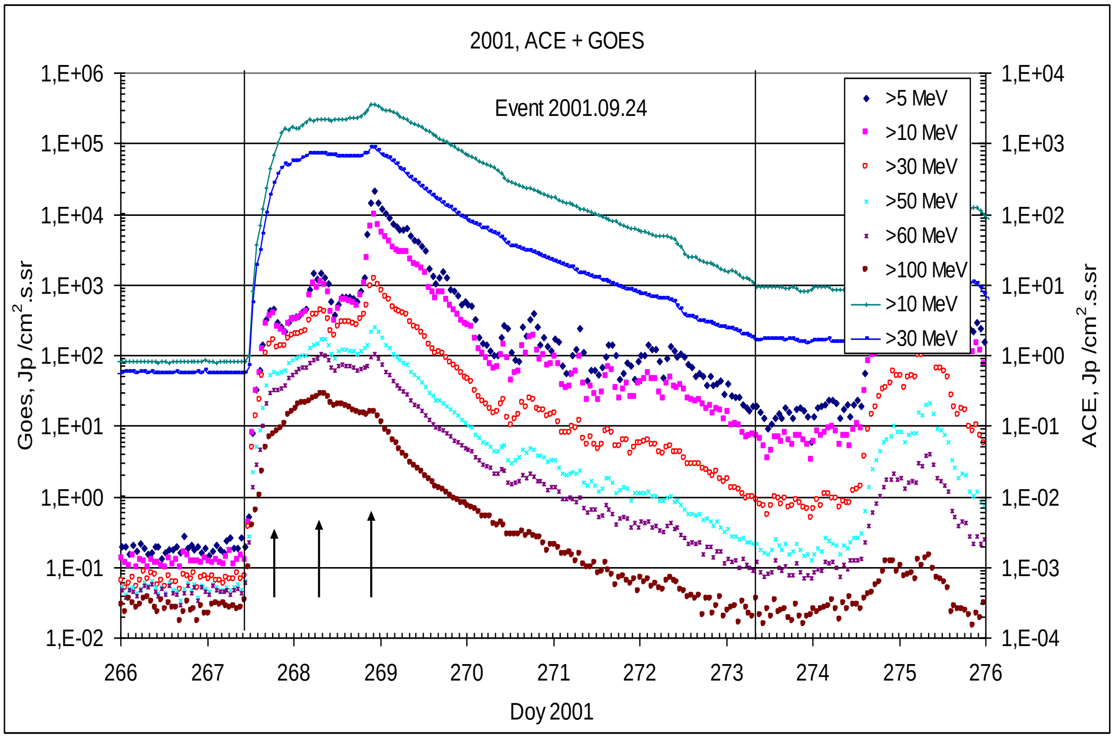
CME: 24d10^{h}31^m, V= 2402km/s, Δφ = 360º, dA = 142º

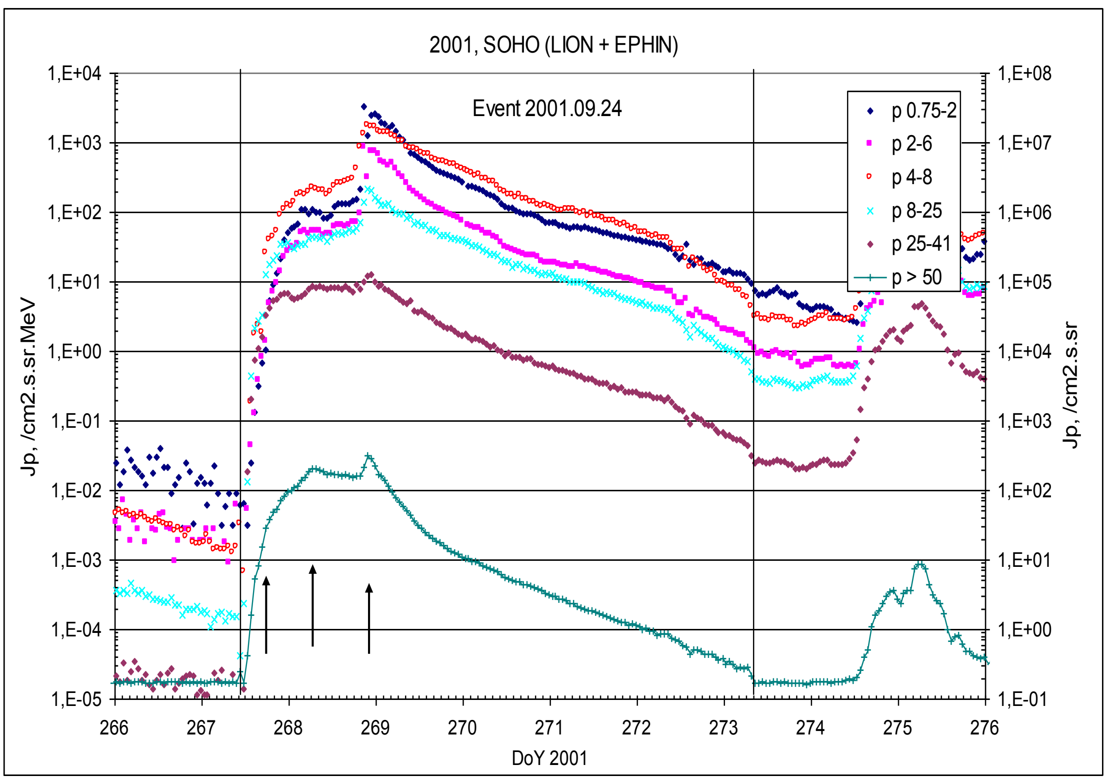
▲SC 25d20^{h}25^m, Δ SC 29d09^{h}40^m,

Particle fluxes and associated phenomena



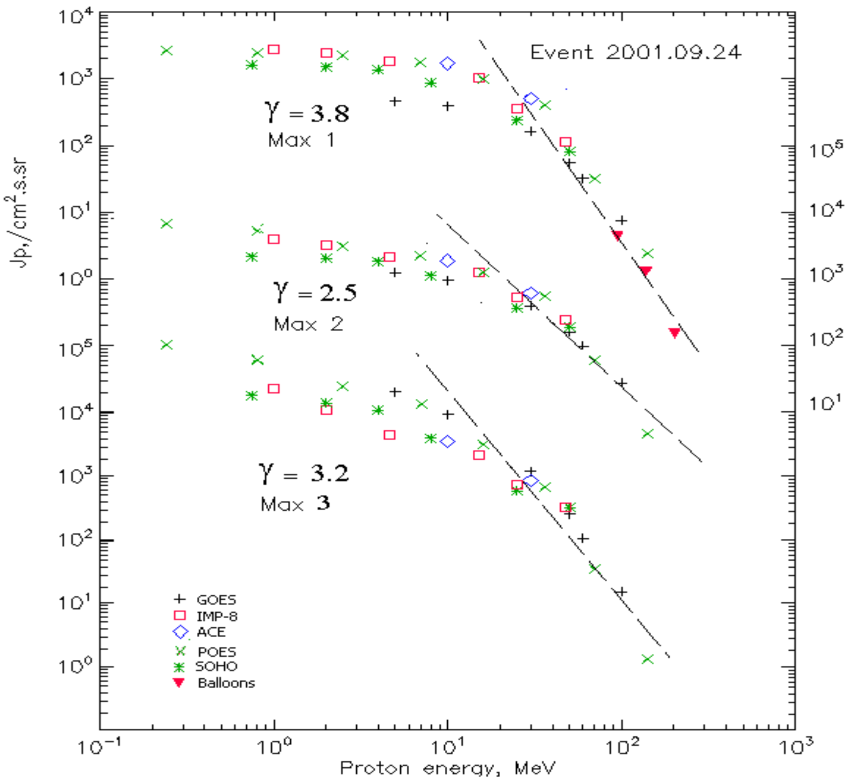
Time profiles of the proton fluxes for the event of 2001 September 24





Arrows on the profiles of the events indicate the time of the proton flux maxima, taken to build the proton spectra (see below)

Integral time-of-maximum proton spectrum



Integral fluxes of protons for the event of 2001 September 24

S/c, instruments	Ep, MeV	To	Tmax	Jmax, $/cm^2.s.sr$	Dura-tion	Comments
GOES -10						
EPS	>5	11^h	18^h/25d07^h/25d22^h	458/1430/21530	5d	
EPS	>10	11^h	18^h/25d07^h/25d22^h	390/1100/9500	5d	
EPS	>30	11^h	18^h/25d07^h/25d22^h	161/437/1190	5d	
EPS	>50	11^h	18^h/25d08^h/25d22^h	55/173/250	5d	
EPS	>60	11^h	18^h/25d08^h/25d22^h	32.4/103/105	5d	
EPS	>100	11^h	18^h/25d08^h/25d22^h	7.5/27.7/15	5d	
POES-16						
MEPED	>0.24	11^h	18^h/25d08^h/25d22^h	2694/6424/115014	5d	
MEPED	>0.8	11^h	18^h/25d08^h/25d22^h	2444/5464/65054	5d	
MEPED	>2.5	11^h	18^h/25d08^h/25d22^h	2227/3937 /29387	5d	
MEPED	>6.9	11^h	18^h/25d08^h/25d22^h	1770/2060/9920	5d	
MEPED	>16	11^h	18^h/25d08^h/25d22^h	990/1480/3130	5d	
MEPED	>36	11^h	18^h/25d08^h/25d22^h	402.5/620/680	5d	
MEPED	>70	11^h	18^h/25d08^h/25d22^h	31.5/62.8/33.8	5d	
MEPED	>140	11^h	18^h/25d08^h/25d22^h	2.43/4.63/1.33	5d	
ACE						
SIS	>10	11^h	23^h/25d08^h/25d22^h	1700/2200/3540	5d	
SIS	>30	11^h	23^h/25d08^h/25d22^h	500/700/860	5d	
SOHO						
EPHIN (INT)	>50	12^h	23^h/25d07^h/25d21^h	81/203/322	6d	

BALLOONS						
Mu	>95		18^h/ - / -	4.3/ - / -		
Mu	>138		18^h / - / -	1.27/ - / -		
Mu	>202		18^h / - / -	0.15/ - / -		

Differential fluxes of protons for the event of 2001 September 24

S/c, instruments	ΔE, MeV	To	Tmax	Jmax, /cm^2.s.sr.MeV	Dura-tion	Comments
IMP-8						
CPME	1-2	13^h	22^h/25d04^h/25d22^h	329/890/13200	6.5d	
CPME	2-4.6	11^h	22^h/25d04^h/25d21^h	238/560/2800	6.5d	
CPME	4.6-15	11^h	22^h/25d05^h/25d21^h	75.6/107/220	6.5d	
CPME	15-25	11^h	22^h/25d08^h/25d21^h	55.5/68.3/106	6.5d	
CPME	25-48	11^h	22^h/25d08^h/25d21^h	11.6/15.2/16.8	6.5d	
CPME	48-96	11^h	22^h/25d08^h/25d21^h	2.4/3.6/6.7	6.5d	
CPME	96-145	11^h	-	-	-	
CPME	145-440	11^h	-	-	-	
SOHO						
LION	0.75-2	13^h	24^h/25d07^h/25d23^h	60/108/2610	6d	
LION	2-6	12^h	24^h/25d07^h/25d23^h	31/53/767	6d	
EPHIN	4-8	12^h	23^h/25d07^h/25d22^h	127/216/1760	6d	
EPHIN	8-25	12^h	23^h/25d07^h/25d22^h	36.7/53/201	6d	
EPHIN	25-41	12^h	23^h/25d07^h/25d22^h	6.8/8.8/11,8	6d	
EPHIN	41-53	- “ -	- “ -	- “ -	- “ -	

References:

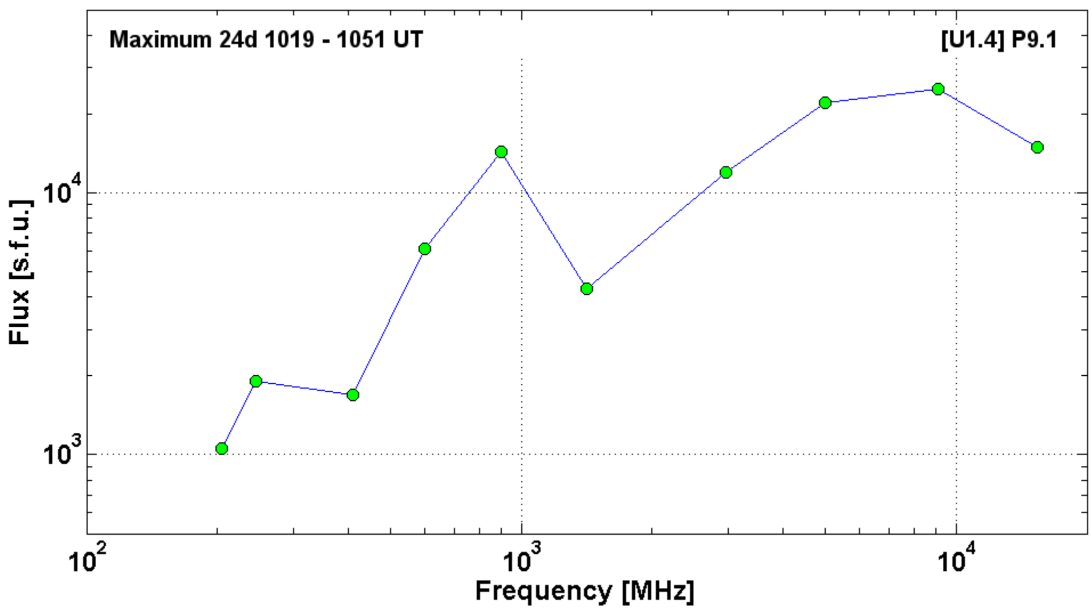
Kuwabara T., J.W. Bieber, J. Clem et al., 2006.
Veselovskij I.S., I.N. Myagkova, O.S. Yakovchuk, 2012.

Electromagnetic and other phenomena that are sources and/or accompanying for the event of 2001 September 24

2001 September 24 ● AR9632 To event 402

Hα		<0936	1019	1217	S16E23	2B	F
1 – 12	keV	0932	1038	1109		X2.6	6.3E-1
53 – 93	keV	094456	~101350	>101350		8	HXT Y
53 – 93	keV	<105750	~105750	113236		8	HXT Y

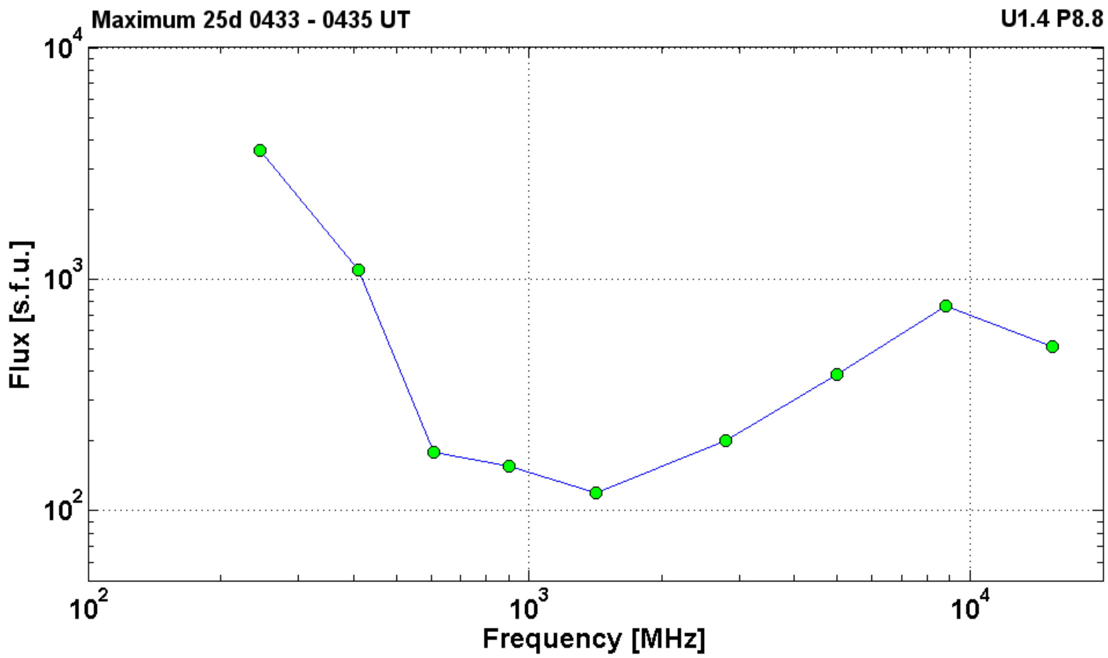
15.4	GHz	0933.0	1029.0	1203.0		4.18	
9.1	GHz	0932.0	1029.9	>1230.0	[U1.4] P9.1	4.40	
5	GHz	0933.0	1030.0	1324.0		4.34	
3	GHz	~0900.0	1031.1	>1209.0		4.08	
1.4	GHz	0957.0	1019.0	1142.0		3.63	
900	MHz	0830.0	1025.0	>1230.0		4.16	
600	MHz	0854.7	1024.7	1200.0		3.79	
410	MHz	0930.0	1024.0	1235.0		3.23	
245	MHz	0930.0	1048.0	1150.0		3.28	
204	MHz	0931.0	1051.7	1152.0		3.02	
DS IV	1200-3800	0959		1150	P,S	3	
DS IV	25-180	1018		1624		2	
DS III	1200-1700	0935		1123	GG,RS	2	
DS III	25-270	0937		~1017	S	2	
DS III	25-270	1017		~1110	S,C	3	
DS CONT	25-180	0938		1018		2	
DS CONT	40-270	~1019		~1116		3	
DS DCIM	2000-4500	0943		1126	GG	3	
DS DCIM	800-2000	0956		1149	GG	3	
CME	WL	1031	2402 km/s	54.1 km/s^2	360°	142°	



2001 September 25 Ø AR9628 To event 402

Hα	6563 Å	0426	0440	0506	S18W01	1N	FZ
1 – 12	keV	0424	0440	0452		M7.6	7.2E-2
53 – 93	keV	<043302	043556	051234		19	HXT Y
15.4	GHz	0434.0	0434.0	0503.0		2.71	
8.8	GHz	0425.0	0434.0	0522.0	U1.4 P8.8	2.89	
5	GHz	0429.0	0434.0	0522.0		2.59	
2.8	GHz	0433.0	0435.0	0516.0		2.8	
1.4	GHz	0433.0	0434.0	0450.0		1.4	

900	MHz	0432.7	0434.4	0501.9		900	
610	MHz	0433.0	0434.0	0443.0		610	
410	MHz	0433.0	0434.0	0444.0		410	
245	MHz	0432.0	0433.0	0437.0		245	
DS II	28-120	0440		0456		2	
DS III	80-1000	0432		0443	GG	2	
DS III	57-170	0442		0445	GG	1	
CME	WL	0604	0750km/s	–	062°	283°	



Event 2001.10.01 – (2001-274) **№ 403**

Particle event: To(Ep>10 MeV) – 01d14^h

$Tmax_1$(Ep>10 MeV) – 01d23^h, $Jmax_1$(Ep>10 MeV) – 370 /cm^2.s.sr

$Tmax_2$(Ep>10 MeV) – 02d07^h, $Jmax_2$(Ep> 10MeV) – $1.3\cdot10^3$ /cm^2.s.sr

Duration of the event – 3.5 days

Quasimaximal energy of protons in the event – Eqm_1 = 155 MeV

– Eqm_2 = 150 MeV

Sources: ■ solar flare 01d04^{h}41^m, M9.1/…, s18w80*, AR9628

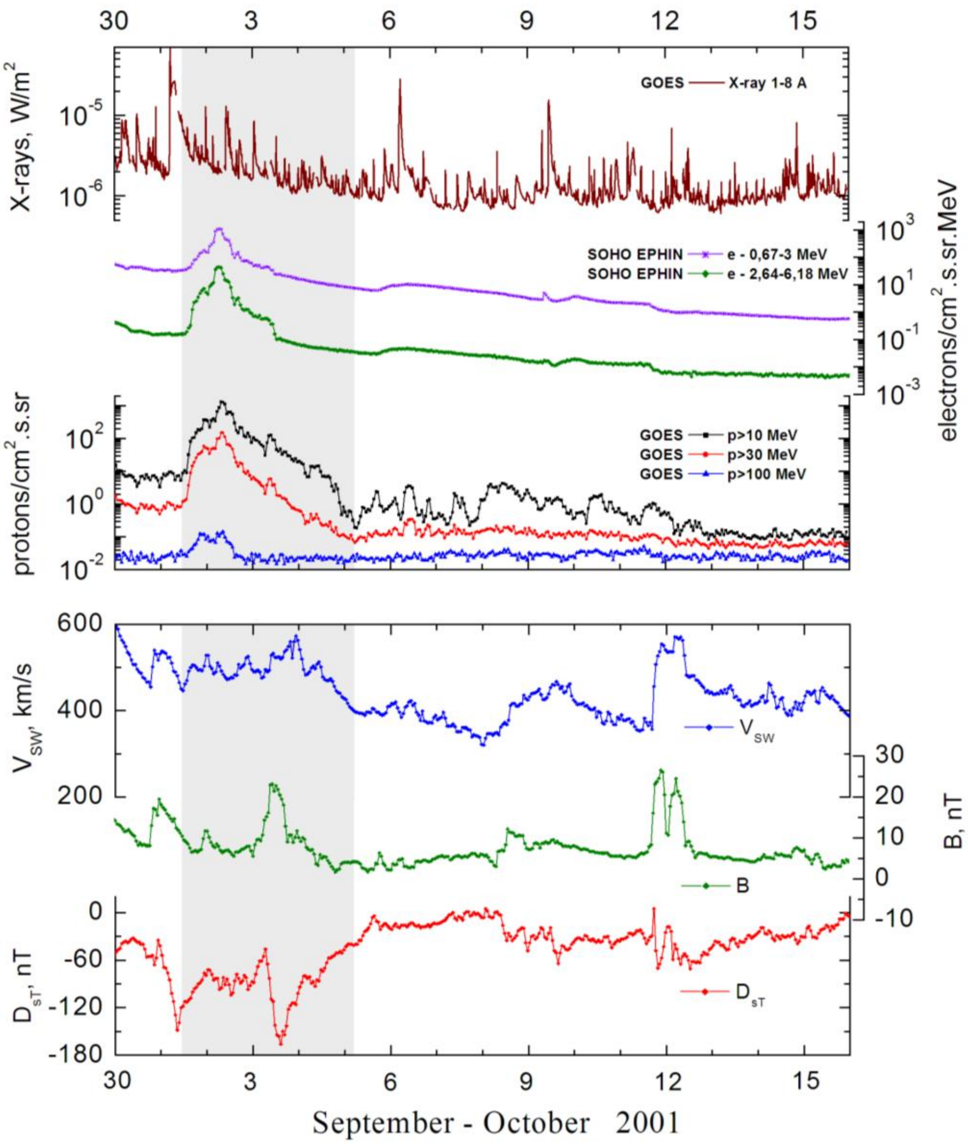
◊ flare activity AR9628 behind W–limb

Main X-ray burst 1-8 Å: onset – 01d04^{h}41^m, max – 01d05^{h}15^m, Φ = 0.086 J/m^2

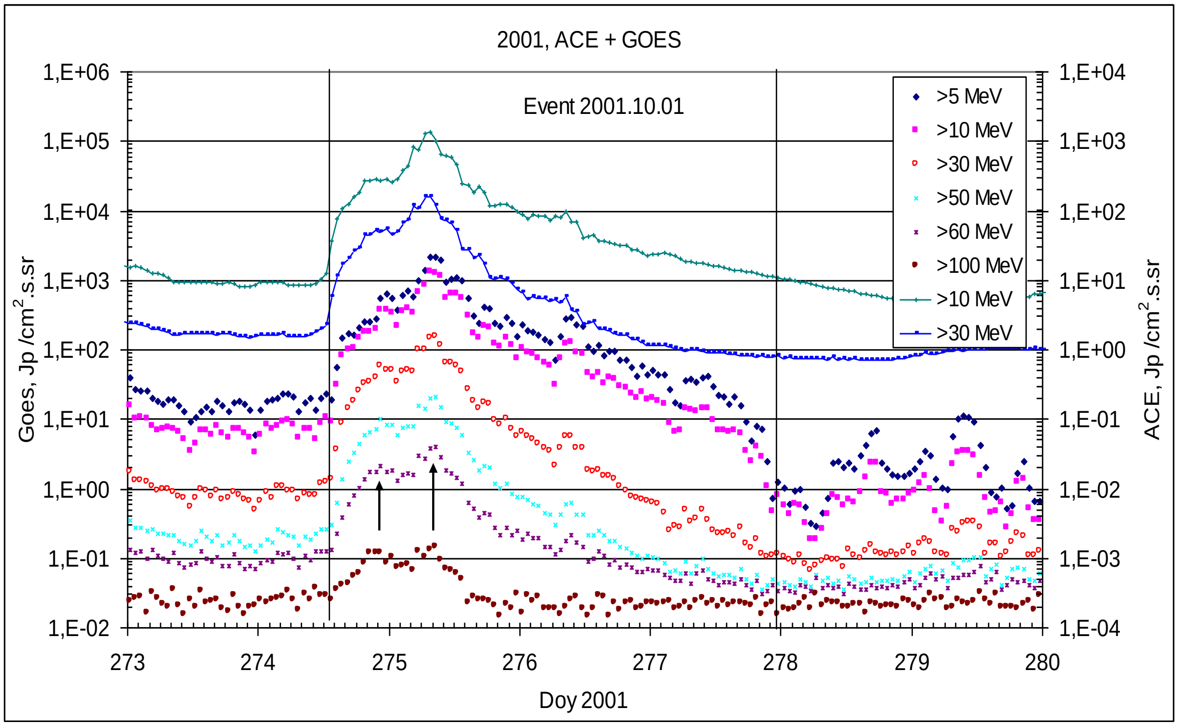
CME: 01d05^{h}30^m, V= 1405 km/s, $\Delta\varphi = 360^o$, dA = 225^o

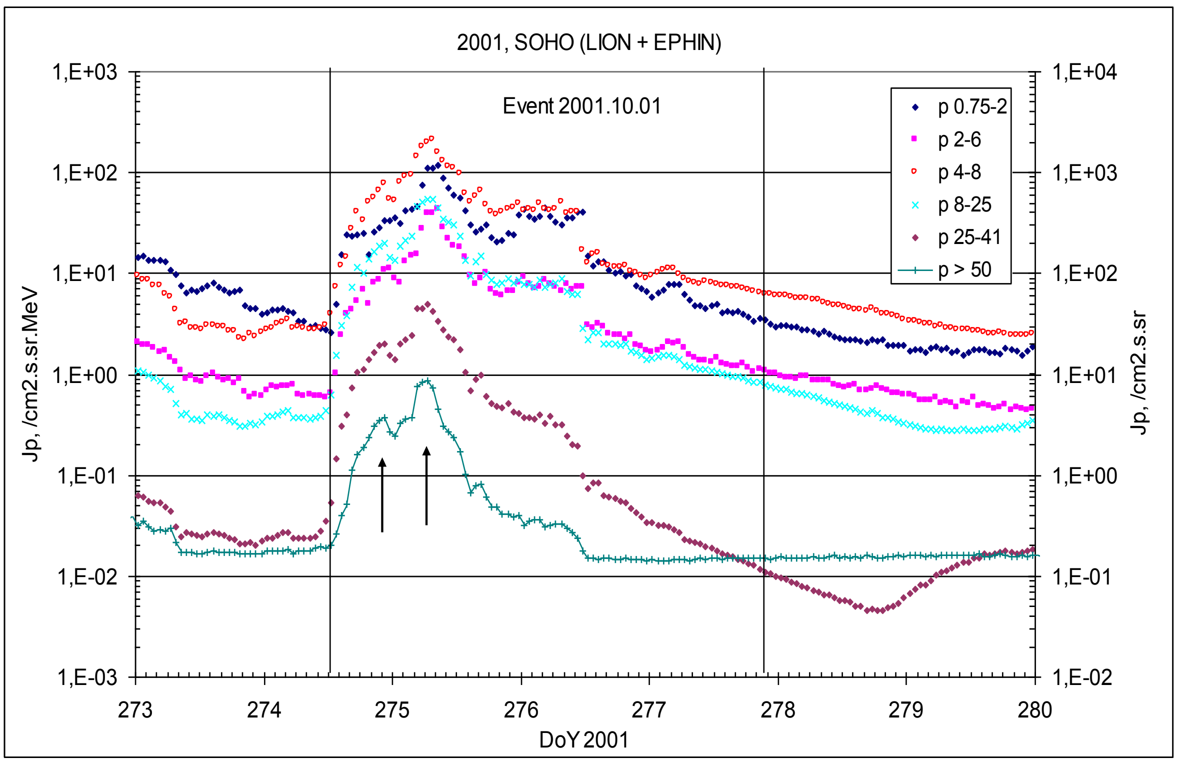
* − probable localization of the flare event

Particle fluxes and associated phenomena



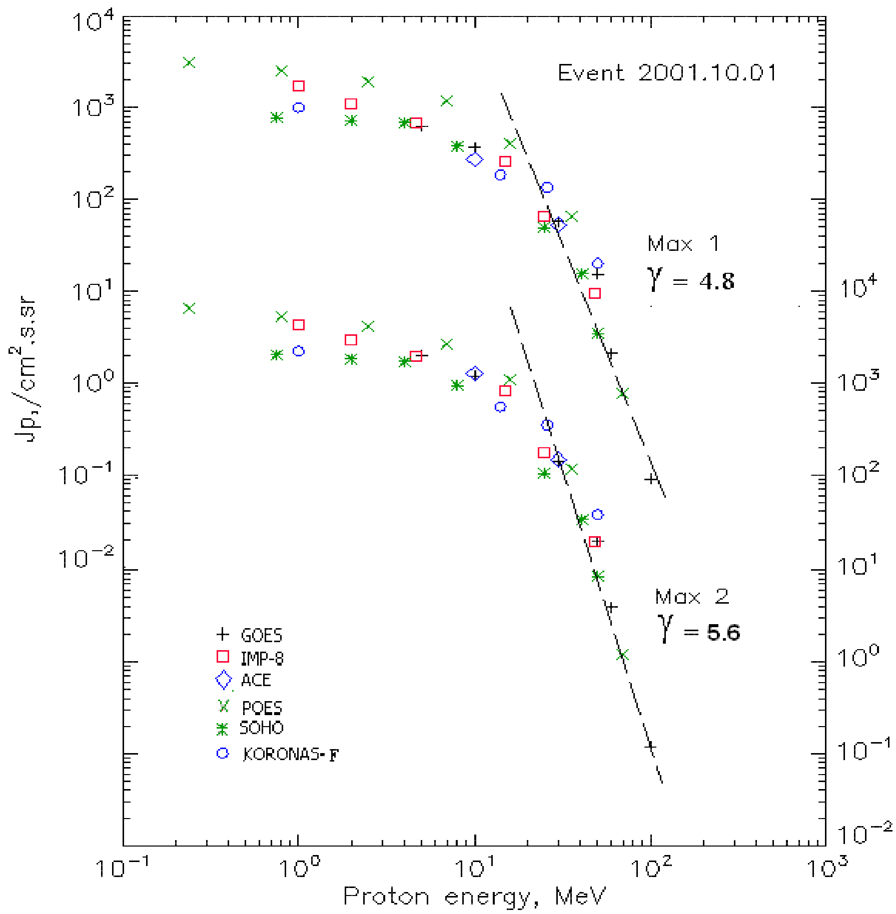
Time profiles of the proton fluxes for the event of 2001 October 01





Arrows on the profiles of the events indicate the time of the proton flux maxima, taken to build the proton spectra (see below)

Integral time-of-maximum proton spectrum



Integral fluxes of protons for the event of 2001 October 01

S/c, instruments	Ep, MeV	To	Tmax	Jmax, /cm^2.s.sr	Duration	Comments
GOES-10						
EPS	>5	14^h	23^h/02d07^h	633/2186	3.5d	
EPS	>10	14^h	23^h/02d07^h	370/1300	3.5d	
EPS	>30	14^h	23^h/02d08^h	57.2/151	3d	
EPS	>50	14^h	22^h /02d08^h	15.4/20.6	2d	
EPS	>60	14^h	22^h /02d08^h	2.1/3.9	1.5d	
EPS	>100	14^h	21^h /02d08^h	0.09/0.12	1d	
POES-16						
MEPED	>0.24	13^h	21^h/2d08^h	3090/7190	6d	
MEPED	>0.8	13^h	21^h/2d08^h	2520/5840	6d	
MEPED	>2.5	13^h	21^h/2d08^h	1920/4460	6d	
MEPED	>6.9	13^h	21^h/2d08^h	1195/2920	6d	
MEPED	>16	13^h	21^h/2d08^h	414/1200	6d	
MEPED	>36	13^h	21^h/2d08^h	65.1/128	6d	
MEPED	>70	13^h	21^h/2d08^h	0.76/1.2	6d	
MEPED	>140	13^h	-	-	-	

CORONAS-F						
MKL	>1	14^h	$21^h/2d08^h$	1020/2400	6d	
MKL	>14	14^h	$21^h/2d08^h$	185/610	6d	
MKL	>26	14^h	$21^h/2d08^h$	136/380	6d	
MKL	>50	14^h	$21^h/2d10^h$	53/113	6d	
ACE						
SIS	>10	13^h	$23^h/02d07^h$	273/1380	3d	
SIS	>30	13^h	$23^h/02d07^h$	53/160	3d	
SOHO						
EPHIN (INT)	>50	12^h	$23^h/02d06^h$	3.5/8.6	2d	

Differential fluxes of protons for the event of 2001 October 01

S/c, instruments	ΔE, MeV	To	Tmax	Jmax. /cm^2.s.sr.MeV	Dura-tion	Comments
IMP-8						
CPME	1-2	14^h	$23^h/02d08^h$	620/1350	6d	
CPME	2-4.6	14^h	$22^h/02d08^h$	178/490	6d	
CPME	4.6-15	14^h	$21^h/02d08^h$	41/115	6d	
CPME	15-25	14^h	$21^h/02d08^h$	19.3/70	6d	
CPME	25-48	14^h	$21^h/02d08^h$	2.33/7.3	4d	
CPME	48-96	14^h	$21^h/02d08^h$	0.2/0.45	4d	
CPME	96-145	-	-	-	-	
CPME	145-440	-	-	-	-	
SOHO						
LION	0.75-2	13^h	$23^h/02d07^h$	31.5/110	6d	
LION	2-6	13^h	$23^h/02d07^h$	10.8/38.8	6d	
EPHIN	4-8	12^h	$23^h/02d07^h$	74/210	6d	
EPHIN	8-25	12^h	$23^h/02d07^h$	19.8/53.2	6d	
EPHIN	25-41	12^h	$23^h/02d06^h$	2.1/4.9	4d	
EPHIN	41-53	- “ -	- “ -	- “ -	- “ -	

References:

Kuwabara T., J.W. Bieber, J. Clem et al., 2006

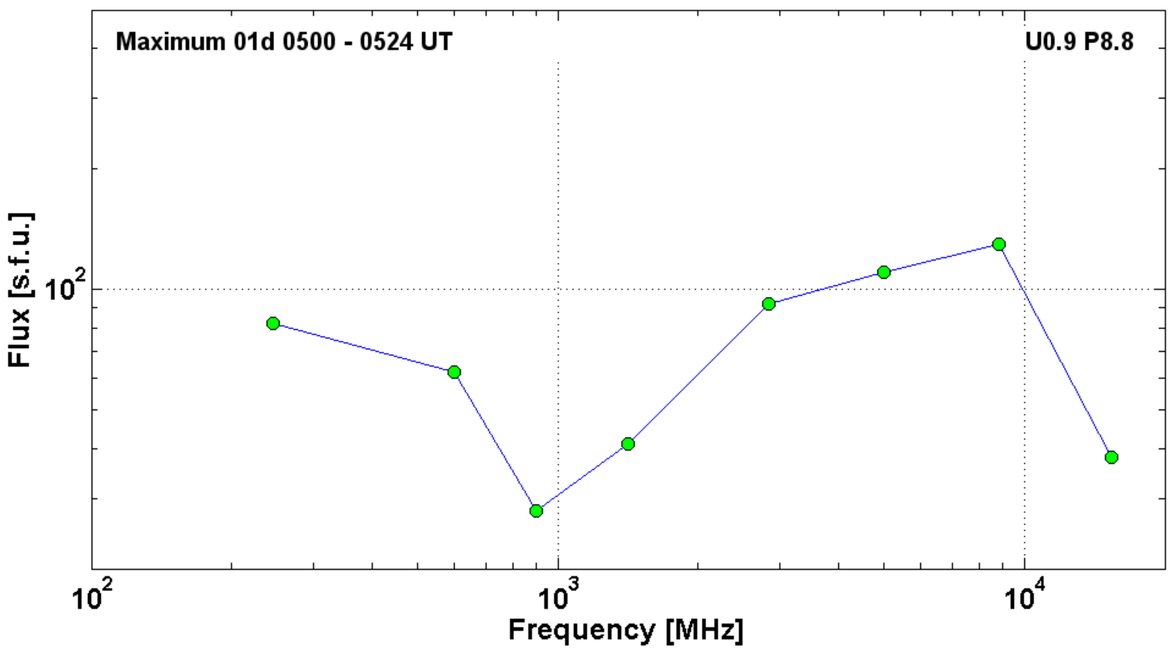
Electromagnetic and other phenomena that are sources and/or accompanying for the event of 2001 October 01

2001 October 01 ■ AR9628 To event 403

Hα	6563 Å	No Flare Patrol			s18w80*		
1 – 12	keV	0441	0515	0523		M9.1	8.6E-2
53 – 93	keV	045617	051221	052017		8	HXT Y

15.4	GHz	0500.0	0500.0	~0500.0		1.58	
8.8	GHz	<0509.0	~0511.0	>0515.0	U0.9 P8.8	2.11	
5	GHz	0459.0	0500.0	0501.0		2.04	
2.8	GHz	0449.0	0511.9	0533.0		1.96	
1.4	GHz	<0511.0	~0513.0	>0514.0		1.61	
900	MHz	0511.7	0511.9	0534.6		1.45	
600	MHz	~0511.6	0515.2	>0533.0		1.79	
245	MHz	0524.0	0524.0	~0524.0		1.91	
DS III	57-160	0451		0529	N	1	
DS III	57-220	0522		0525	G	2	
DS III	57-750	0529		>0755	S,C	3	
CME	WL	0530	1405 km/s	97.8 km/s^2	360˚	225˚	

* − probable localization of the flare event



Event 2001.10.19 – (2001-292) **№ 404**

Particle event: To(Ep>10 MeV) – 19d02^h

Tmax$_1$(Ep>10 MeV) – 19d08^h, Jmax$_1$(Ep>10 MeV) – 3.6 /cm^2.s.sr

Tmax$_2$(Ep>10 MeV) – 19d21^h, Jmax$_2$(Ep>10 MeV) – 8 /cm^2.s.sr

Duration of the event – 3 days

Quasimaximal energy of protons in the event – Eqm$_1$ = 300 MeV

– Eqm$_2$ = 310 MeV

Sources: ● solar flare 19d00^{h}47^m, X1.6/2B, N16W18, AR9661*

M1.2/2B, N16W18, AR9661*

Ø solar flare 19d16^{h}13^m, X1.6/2B, N15W30, AR9661

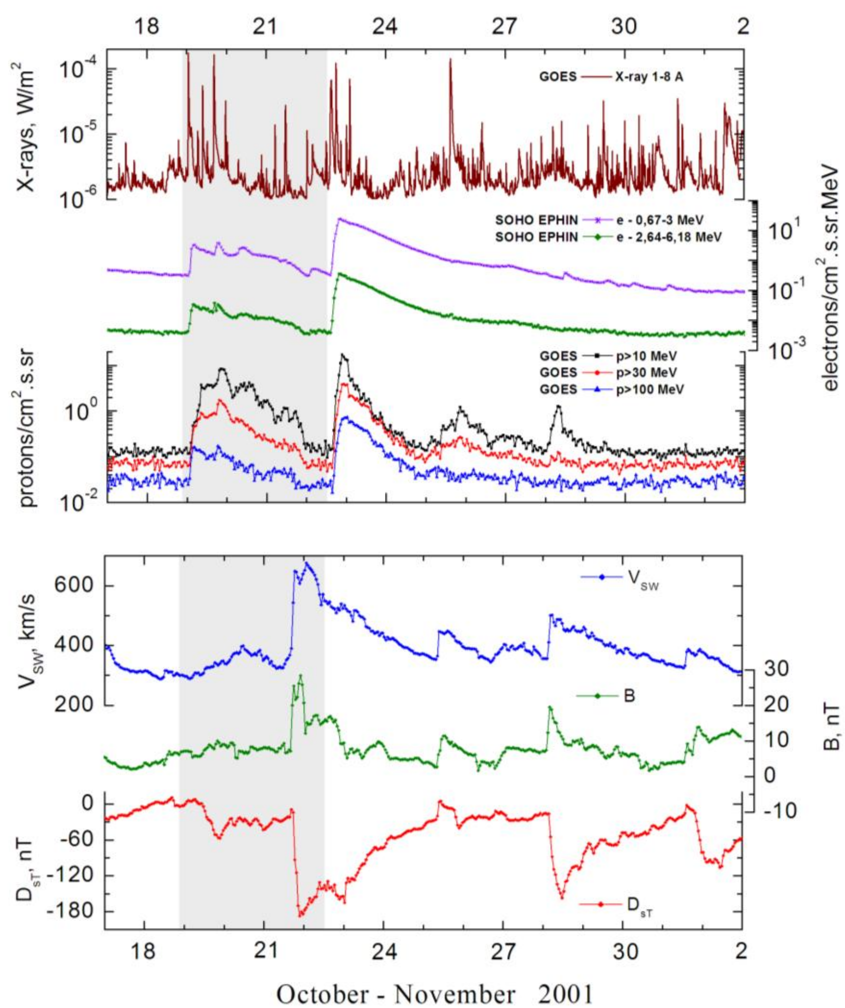
Main X-ray burst 1–8 Ǻ: onset – 19d00^h 47^m, max – 19d01^h 05^m, Φ = 0.12 J/m^2

CME: 19d01^{h}27^m, V = 0558 km/s, Δφ = 360^o, dA = 284^o

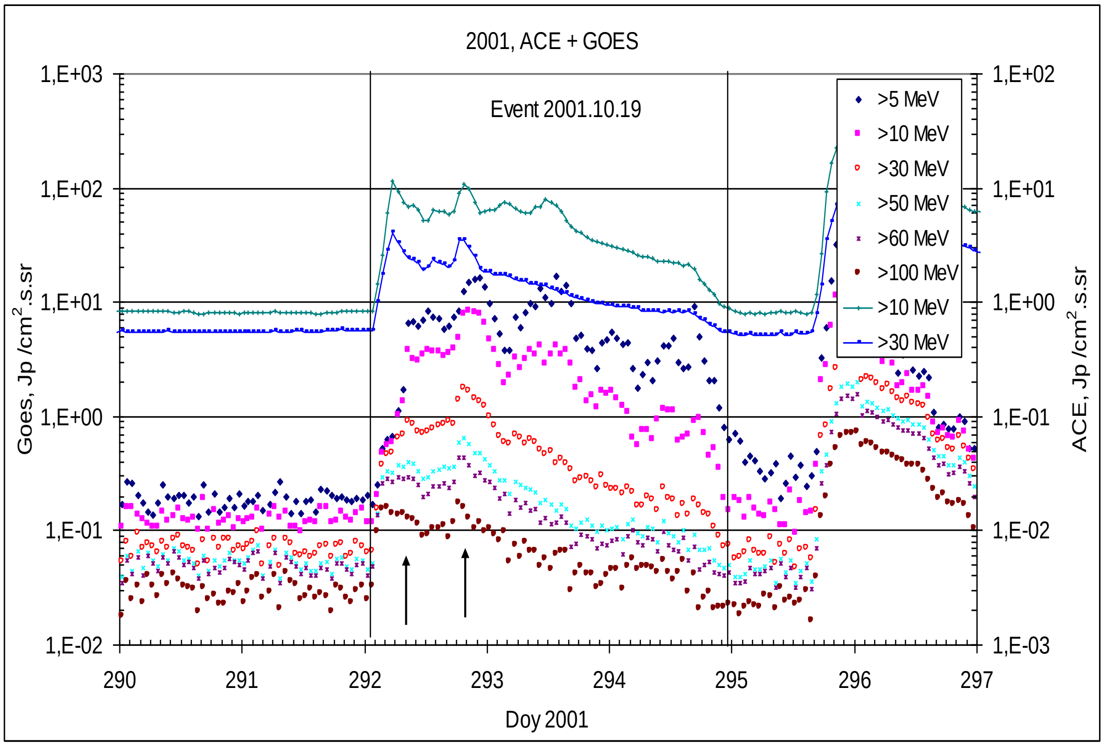
Δ SC 21d16^{h}48^m

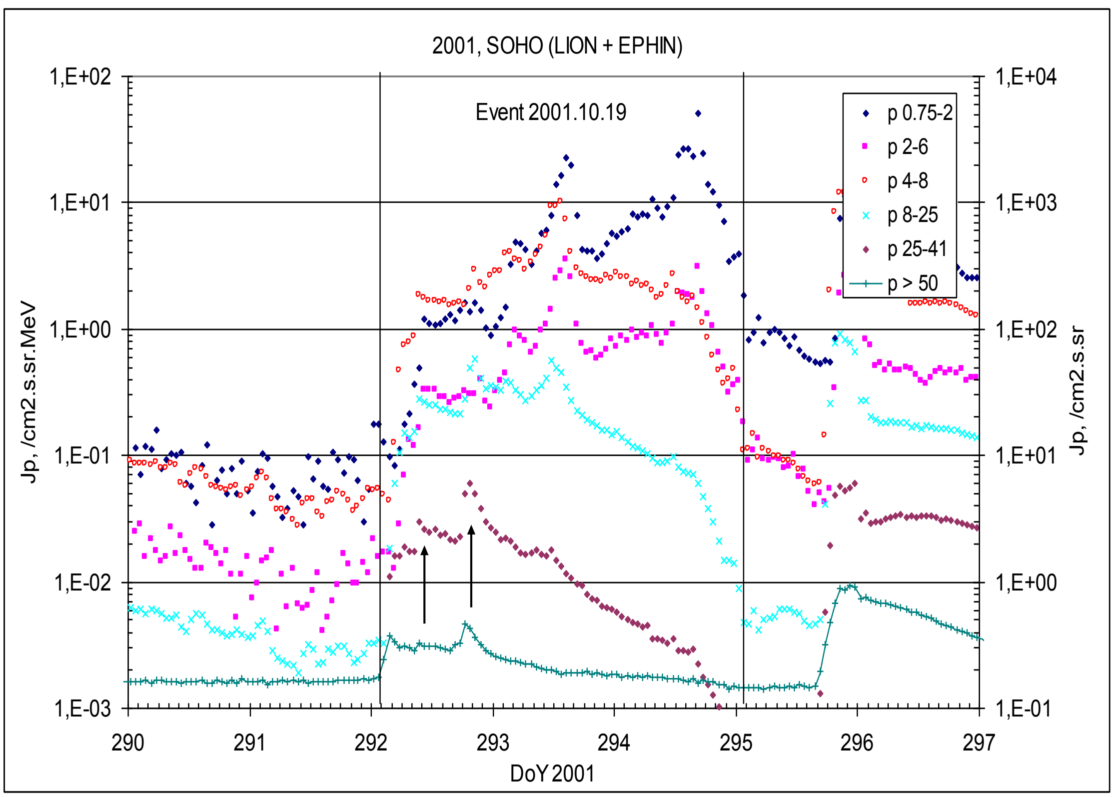
* One flare event with two X-ray bursts

Particle fluxes and associated phenomena



Time profiles of the proton fluxes for the event of 2001 October 19

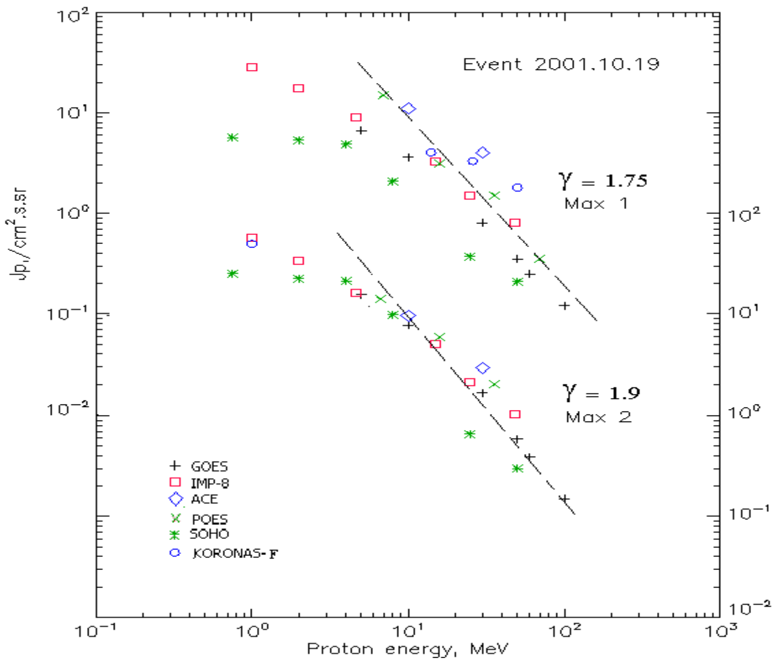




Arrows on the profiles of the events indicate the time of the proton flux maxima, taken to build the proton spectra (see below)

Список 2001 г.

Integral time-of-maximum proton spectrum



Integral fluxes of protons for the event of **2001 October 19**

S/c, instruments	Ep, MeV	To	Tmax	Jmax, /cm^2.s.sr	Duration	Comments
GOES-10						
EPS	>5	02^h	$09^h/22^h$	6.6/16.1	3d	
EPS	>10	02^h	$08^h/21^h$	3.6/8	3d	
EPS	>30	02^h	$08^h/20^h$	0.8/1.7	3d	
EPS	>50	02^h	$08^h/20^h$	0.35/0.59	3d	
EPS	>60	01^h	$07^h/19^h$	0.25/0.39	3d	
EPS	>100	01^h	$07^h/18^h$	0.12/0.15	3d	
POES-16						
MEPED	>0.24	-	-	-	-	
MEPED	>0.8	-	-	-	-	
MEPED	>2.5	-	-	-	-	
MEPED	>6.9	-	$05^h/19^h$	15/15	3d	
MEPED	>16	-	$05^h/19^h$	3.1/6.1	3d	
MEPED	>36	-	$05^h/19^h$	1.5./2.05	3d	
MEPED	>70	-	05^h/ -	0.35/ -	3d	
CORONAS-F						
MKL	>1	14^h	- /18^h	- /51	3d	
MKL	>14	14^h	08^h/ -	4/ -	3d	
MKL	>26	14^h	08^h/ -	3.3/ -	3d	
MKL	>50	14^h	08^h/ -	1.8/ -	3d	
ACE						
SIS	>10	02^h	$05^h/19^h$	11/9.9	3d	
SIS	>30	02^h	$05^h/19^h$	4/3	3d	
SOHO						
EPHIN (INT)	>50	02^h	$03^h/19^h$	0.21/0.3	1,5d	

Differential fluxes of protons for the event of 2001 October 19

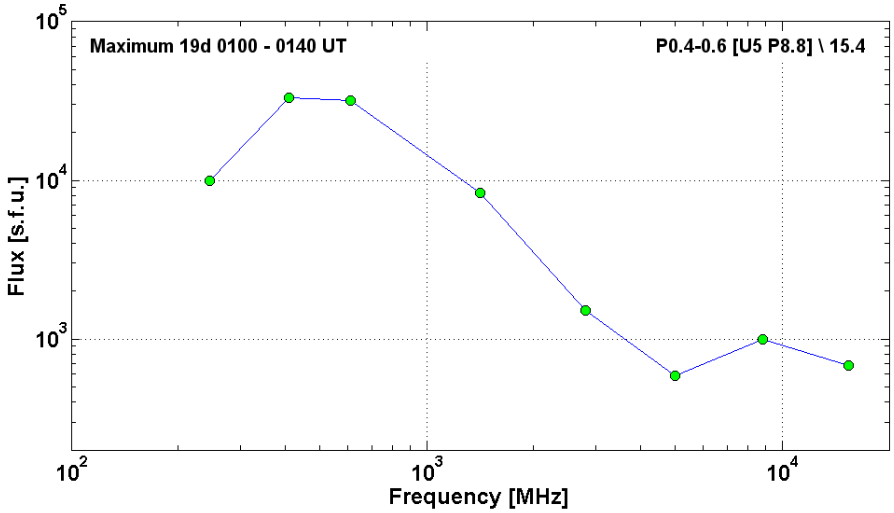
S/c, instruments	ΔE, MeV	To	Tmax	Jmax. /cm^2.s.sr.MeV	Dura- tion	Comments
IMP-8						
CPME	1-2	07^h	$11^h/20^h$	11/24.8	3,5d	
CPME	2-4.6	06^h	$07^h/20^h$	3.5/7.5	3,5d	
CPME	4.6-15	04^h	$07^h/20^h$	0.55/1.1	3d	
CPME	15-25	03^h	$06^h/20^h$	0.18/0.3	3d	
CPME	25-48	03^h	$06^h/20^h$	0.03/0.05	3d	
CPME	48-96	03^h	$06^h/19^h$	0.0085/0.01	3d	
CPME	96-145	03^h	-	-	-	
CPME	145-440	-	-	-	-	
SOHO						
LION	0.75-2	04^h	$07^h/20^h$	0.15/1.6	3d	
LION	2-6	04^h	$07^h/20^h$	0.12/0.3	3d	
EPHIN	4-8	04^h	$06^h/20^h$	0.7/2.94	3d	
EPHIN	8-25	03^h	$05^h/20^h$	0.1/0.57	3d	
EPHIN	25-41	02^h	$04^h/19^h$	0.016/0.06	3d	

Electromagnetic and other phenomena that are sources and/or accompanying for the event of 2001 October 19

2001 October 19 ● AR9691 To event 404

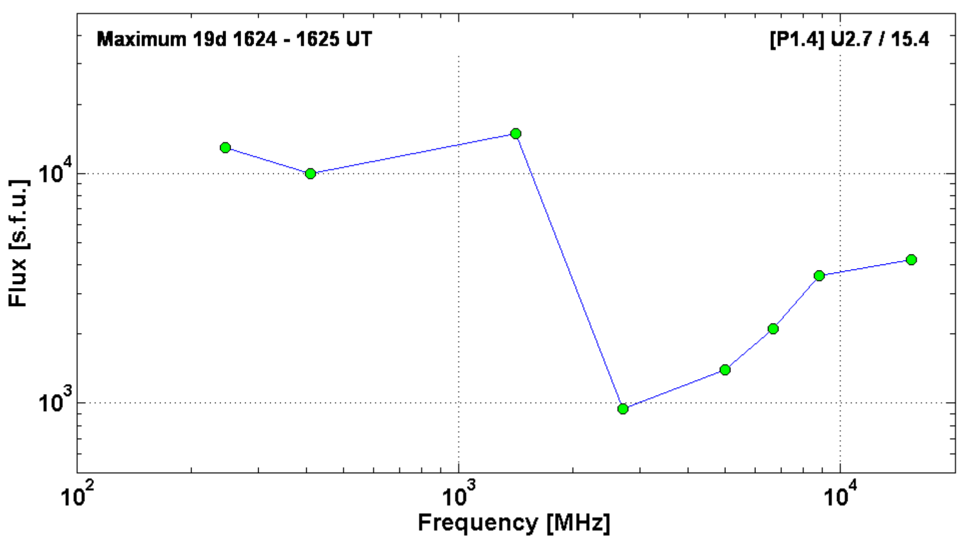
Hα	6563 Å	0049	0059	0355	N16W18	2B	EZ
1 – 12	keV	0047	0105	0113		X1.6	1.2E-1
1 – 12	keV	0220	0232	0246		M1.2	1.8E-2
15.4	GHz	0053.0	0100.0	0237.0		2.83	
8.8	GHz	0049.0	0100.0	0237.0	P0.4-0.6 [U5 P8.8]\15.4	3.00	
5	GHz	0050.0	0100.0	0239.0		2.77	
2.8	GHz	0050.0	0126.0	0152.0		3.18	
1.4	GHz	0054.0	0124.0	0201.0		3.92	
610	MHz	0056.0	0124.0	0237.0		4.51	
410	MHz	0056.0	0140.0	0206.0		4.52	
245	MHz	0059.0	0140.0	0206.0		4.00	
DS II	25-220	0101		0119		3	
DS IV	57-1600	0058		>0200	FS	3	
DS III	57-180	~0120		0331	S,C	2	
CME	WL	0127	0558 km/s	-25.6 km/s^2	360˚	284˚	

* One flare event with two X-ray bursts



2001 October 19 Ø AR9661 To event 404

Hα		1616	1636	1820	N15W30	2N	FUY
1 – 12	keV	1613	1630	1643		X1.6	1.6E-1
1,3-4,0	MeV						SONG-F
15.4	GHz	1614.0	1624.0	1705.0	[P1.4] U2.7 / 15.4	3.62	
8.8	GHz	1615.0	1625.0	1705.0		3.56	
6.7	GHz	1614.0	1625.0	1648.5		3.32	
5	GHz	1618.0	1625.0	1705.0		3.15	
2.7	GHz	1622.0	1625.0	1705.0		2.98	
1.4	GHz	1622.0	1624.0	1705.0		4.18	
410	MHz	1624.0	1624.0	1705.0		4.00	
245	MHz	1624.0	1624.0	1705.0		4.11	
DS II	25-180	1624		1642		2	
DS IV	25-180	1640		1704		2	
CME	WL	1650	0901 km/s	–0.7 km/s^2	360˚	273˚	

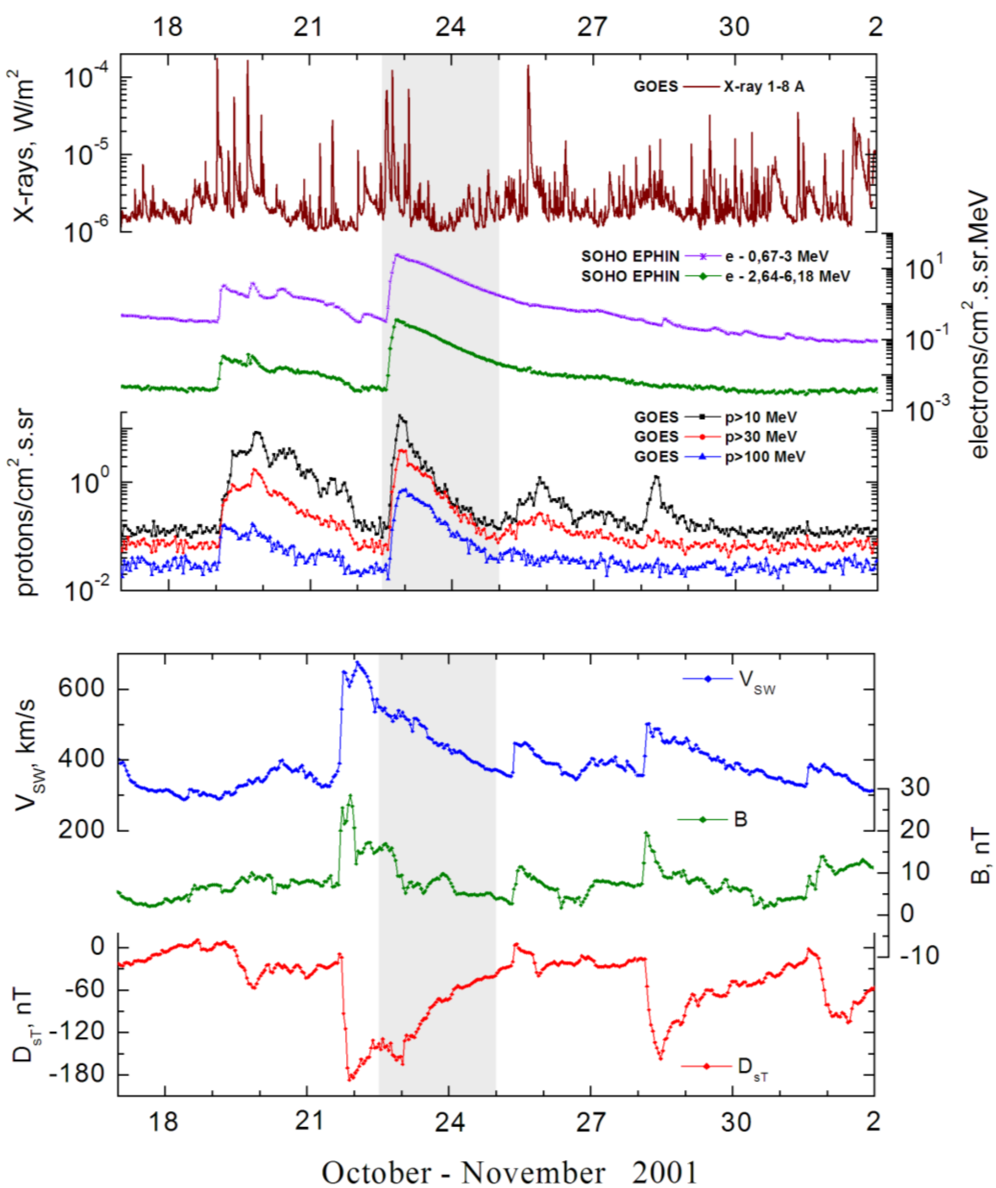


Event 2001.10.22 – (2001-295) **№ 405**

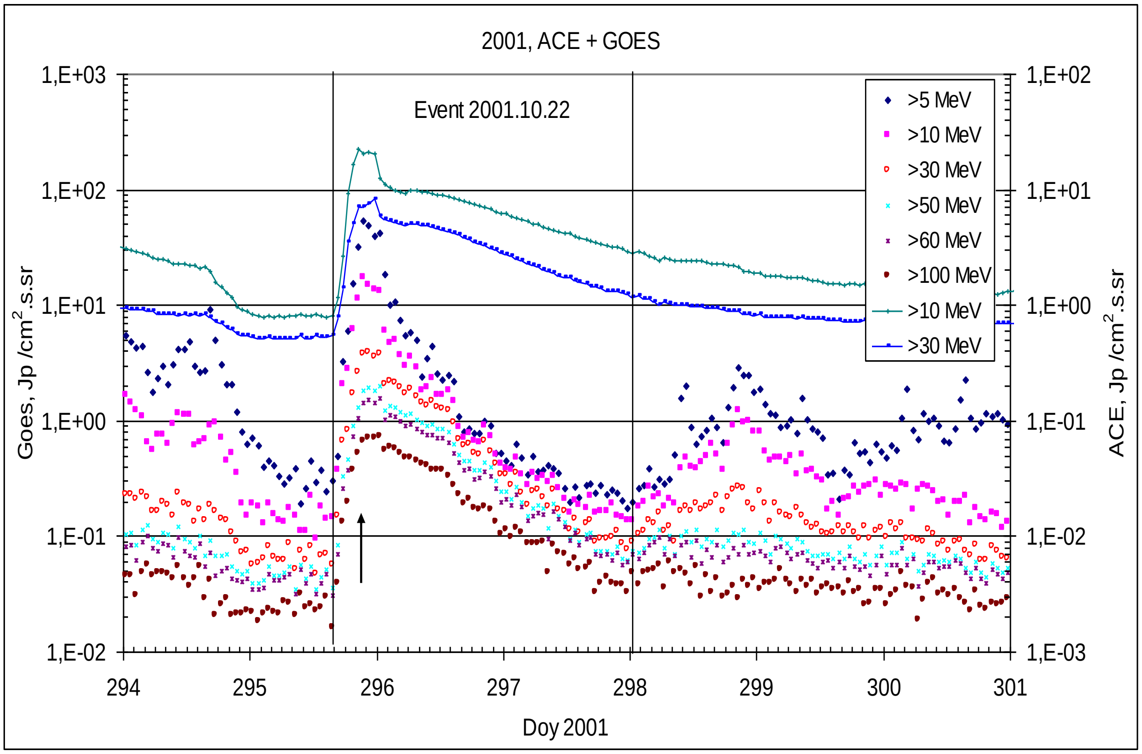
Particle event: To(Ep>10 MeV) – 22d16^h
Tmax(Ep>10 MeV) – 22d21^h, Jmax (Ep>10 MeV) – 17 /cm^2.s.sr
Duration of the event – 2.5 days
Quasimaximal energy of protons in the event – Eqm = 425 MeV

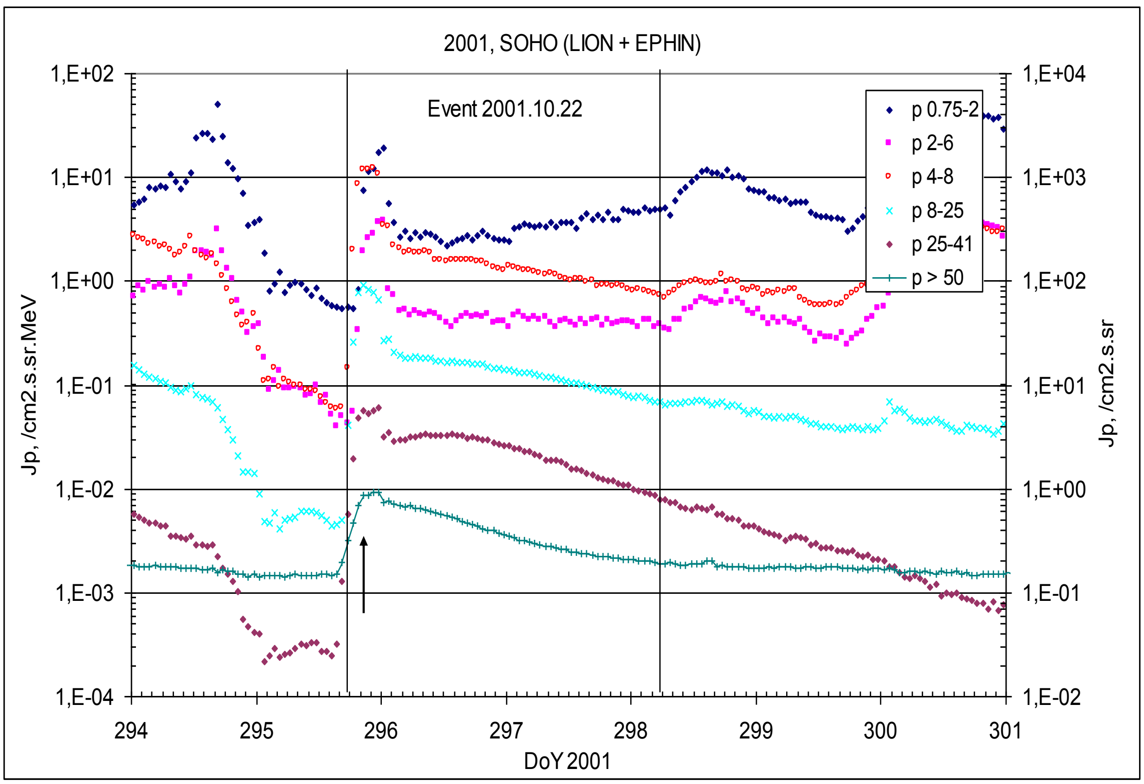
Sources: ● solar 22d17^{h}44^m, X1.2/2B, S18E16, AR9672
Ø solar 22d14^{h}16^m, 2N/M6.7, S17E20, AR9672
Main X-ray burst 1-8 Å: onset – 22d17^{h}44^m, max – 22d17^{h}59^m, Φ = 0.12 J/m^2
CME: 22d18^{h}26^m, V = 0618 km/s, 106^o , dA = 126^o
▲SC 25d08^{h}50^m

Particle fluxes and associated phenomena



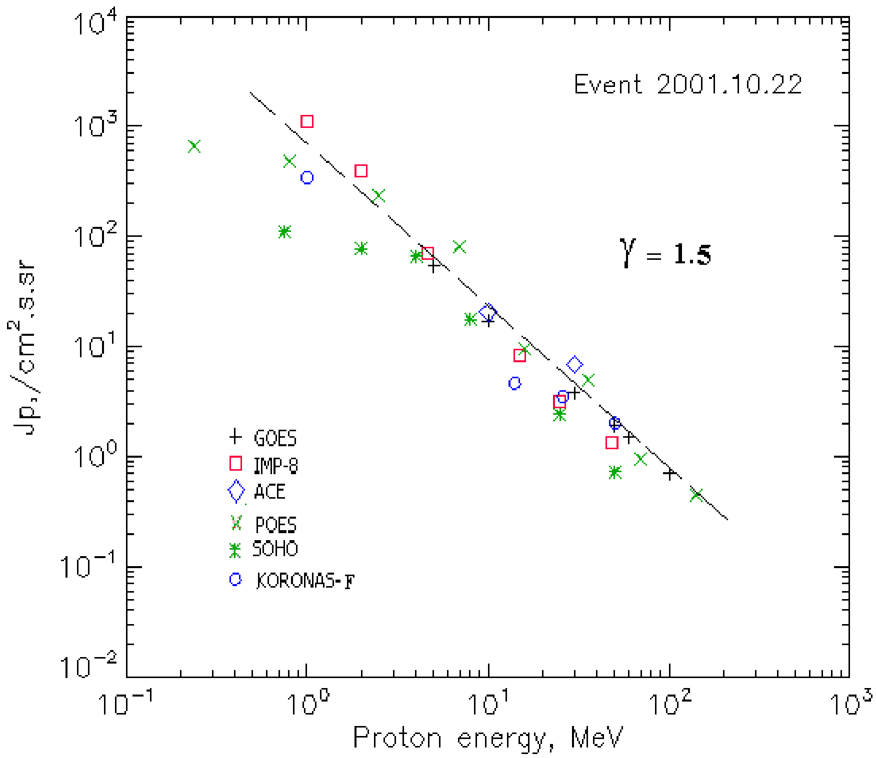
Time profiles of the proton fluxes for the event of 2001 October 22





Arrows on the profiles of the events indicate the time of the proton flux maxima, taken to build the proton spectra (see below)

Integral time-of-maximum proton spectrum



Integral fluxes of protons for the event of 2001 October 22

S/c, instruments	Ep, MeV	To	Tmax	Jmax, $/cm^2.s.sr$	Duration	Comments
GOES-10						
EPS	>5	16^h	22^h	53.6	2.5d	
EPS	>10	16^h	21^h	17.0	2.5d	
EPS	>30	16^h	22^h	3.8	2.5d	
EPS	>50	16^h	22^h	1.9	2.5d	
EPS	>60	16^h	22^h	1.5	2.5d	
EPS	>100	16^h	22^h	0.7	2.5d	
POES-16						
MEPED	>0.24	18^h	20^h	663	2.5d	
MEPED	>0.8	18^h	20^h	478	2.5d	
MEPED	>2.5	18^h	20^h	236	2.5d	
MEPED	>6.9	18^h	20^h	81	2.5d	
MEPED	>16	18^h	20^h	9.5	2.5d	
MEPED	>36	18^h	20^h	5	2.5d	
MEPED	>70	18^h	20^h	0.95	2.5d	
MEPED	>140	18^h	20^h	0.45	2.5d	
CORONAS-F						
MKL	>1	18^h	$23d02^h$	342	2.5d	
MKL	>14	18^h	$23d00^h$	4.6	2.5d	
MKL	>26	18^h	$23d00^h$	3.5	2.5d	
MKL	>50	18^h	$23d00^h$	2.0	2.5d	

ACE						
SIS	>10	16^h	21^h	20.4	3d	
SIS	>30	16^h	22^h	6.9	3d	
SOHO						
EPHIN (INT)	>50	16^h	21^h	0.73	3d	

Differential fluxes of protons for the event of 2001 October 22

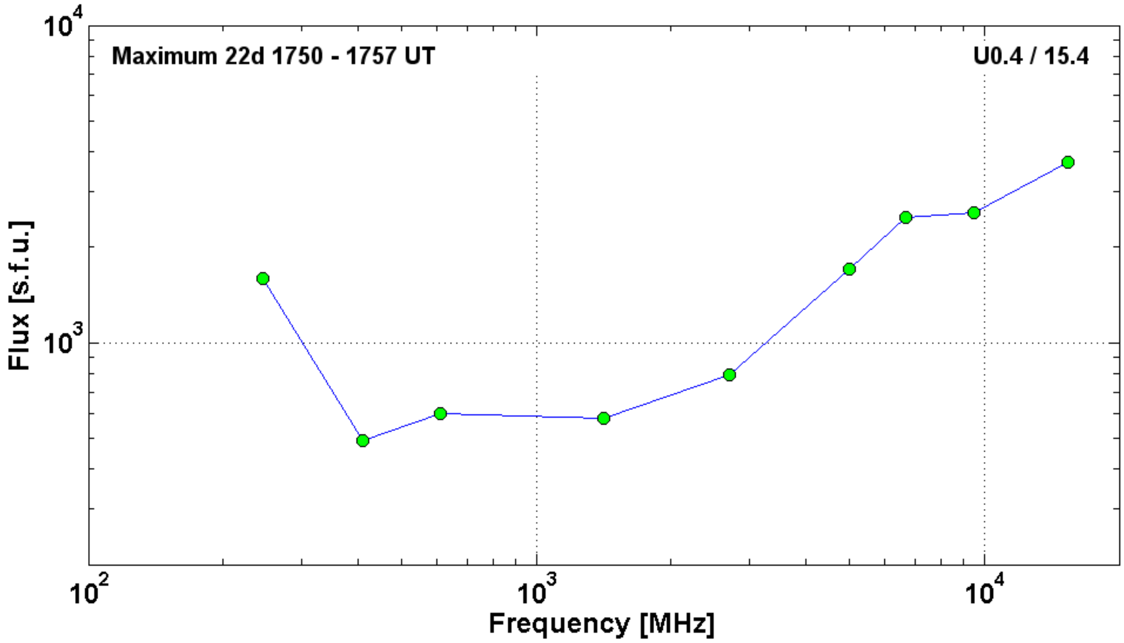
S/c, instruments	ΔE, MeV	To	Tmax	Jmax. /cm^2.s.sr.MeV	Dura-tion	Comments
IMP-8						
CPME	1-2	18^h	23^h	690	>1.5d	
CPME	2-4.6	18^h	23^h	136	>1.5d	
CPME	4.6-15	17^h	23^h	6	>1.5d	
CPME	15-25	16^h	22^h	0.5	>1.5d	
CPME	25-48	17^h	23^h	0.08	>1.5d	
CPME	48-96	17^h	23^h	0.028	>1.5d	
CPME	96-145	-	-	-	-	
CPME	145-440	-	-	-	-	
SOHO						
LION	0.75-2	18^h	$23d01^h$	18.5	7d	
LION	2-6	18^h	$23d01^h$	3.7	7d	
EPHIN	4-8	17^h	21^h	12.2	7d	
EPHIN	8-25	17^h	21^h	0.9	7d	
EPHIN	25-41	16^h	21^h	0.06	7d	
EPHIN	41-53	- “ -	- “ -	- “ -	- “ -	

Electromagnetic and other phenomena that are sources and/or accompanying for the event of 2001 October 22

2001 October 22 ● AR9672 To event 405

Hα		1744	1758	1911	S18E16	2B	UZ
1 – 12	keV	1744	1759	1814		X1.2	1.2E-1
53 – 93	keV	<174951	175509	>180251		108	HXT Y

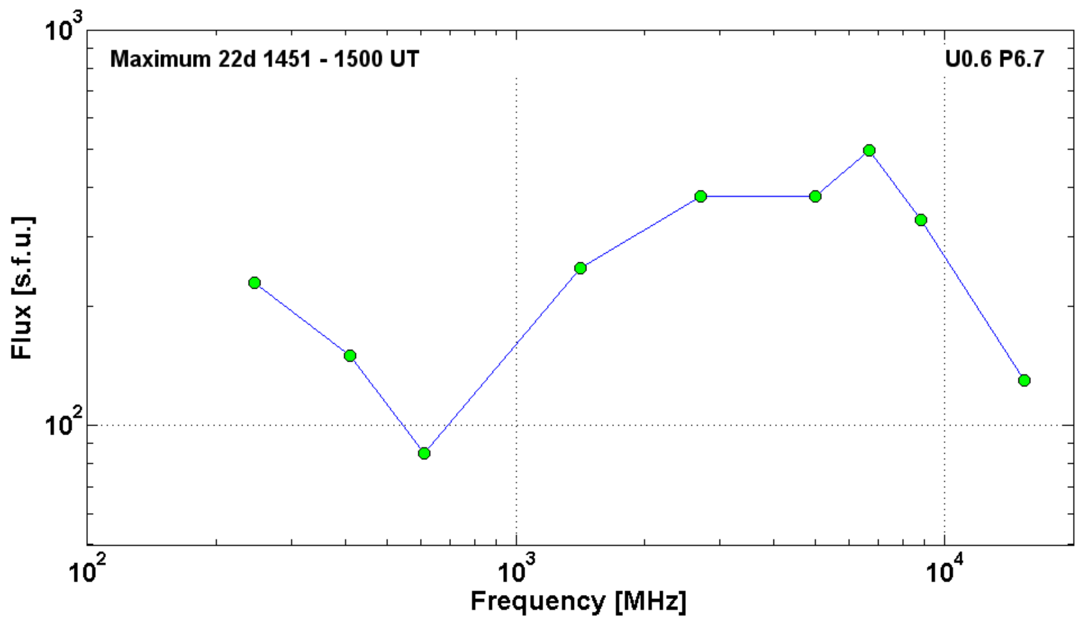
15.4	GHz	1747.0	1751.0	1809.0	U0.4 / 15.4	3.57	
9.5	GHz	1740.2	1750.8	1757.5		3.41	
6.7	GHz	1739.3	1751.0	1758.8		3.39	
5	GHz	1746.0	1751.0	1809.0		3.23	
2.7	GHz	1747.0	1751.0	1808.0		2.90	
1.4	GHz	1747.0	1751.0	1808.0		2.76	
610	MHz	1751.0	1757.0	1808.0		2.78	
410	MHz	1754.0	1757.0	1801.0		2.69	
245	MHz	1755.0	1755.0	1808.0		3.20	
DS II	25-180	1759		1810		1	
DS III	25-180	1754		1856	N	1	
DSF		~1648	1930	1930		14˚	
CME	WL	1826	0618 km/s	-7.6 km/s^2	106˚	126˚	



2001 October 22 Ø AR9661 To event 405

Hα		1416	1455	1552	S17E20	2N	F
1 – 12	keV	1427	1508	1531		M6.7	1.5E-1
53 – 93	keV	<143823	~144811	>144931		10	HXT Y

15.4	GHz	1444.0	1500.0	1519.0		15.4	
8.8	GHz	1444.0	1457.0	1526.0		8.8	
6.7	GHz	1450.0	1457.4	1511.2	U0.6 P6.7	6.7	
5	GHz	1444.0	1457.0	1526.0		5	
2.7	GHz	1445.0	1457.0	1522.0		2.7	
1.4	GHz	1445.0	1500.0	1522.0		1.4	
610	MHz	1446.0	1451.0	1522.0		610	
410	MHz	1445.0	1452.0	1513.0		410	
245	MHz	1444.0	1452.0	1522.0		245	
DS II	110-150	1452		1457	SH	DS II	
DS II	25-142	1453		1513		DS II	
DS II	30-80	1456		1520		DS II	
DS IV	40-400	1445		1521		DS IV	
DS III	40-250	1445		1452	GG	DS III	
DS DCIM	100-4000	1446		1509	CS	DS DCIM	
CME	WL	1506	1336 km/s	-8.0 km/s^2	360°	122	

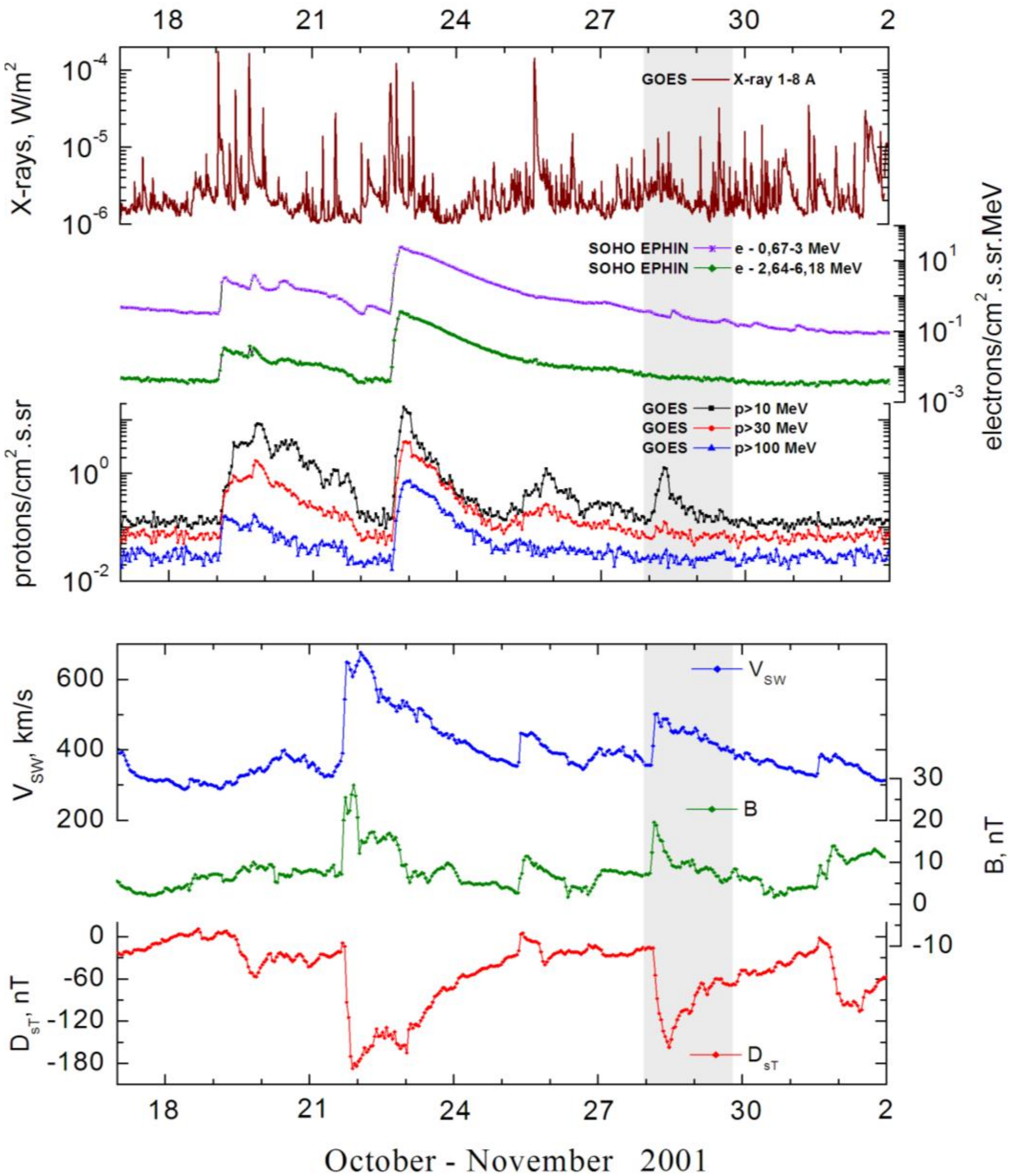


Event 2001.10.28 – (2001-301) **№ 406**

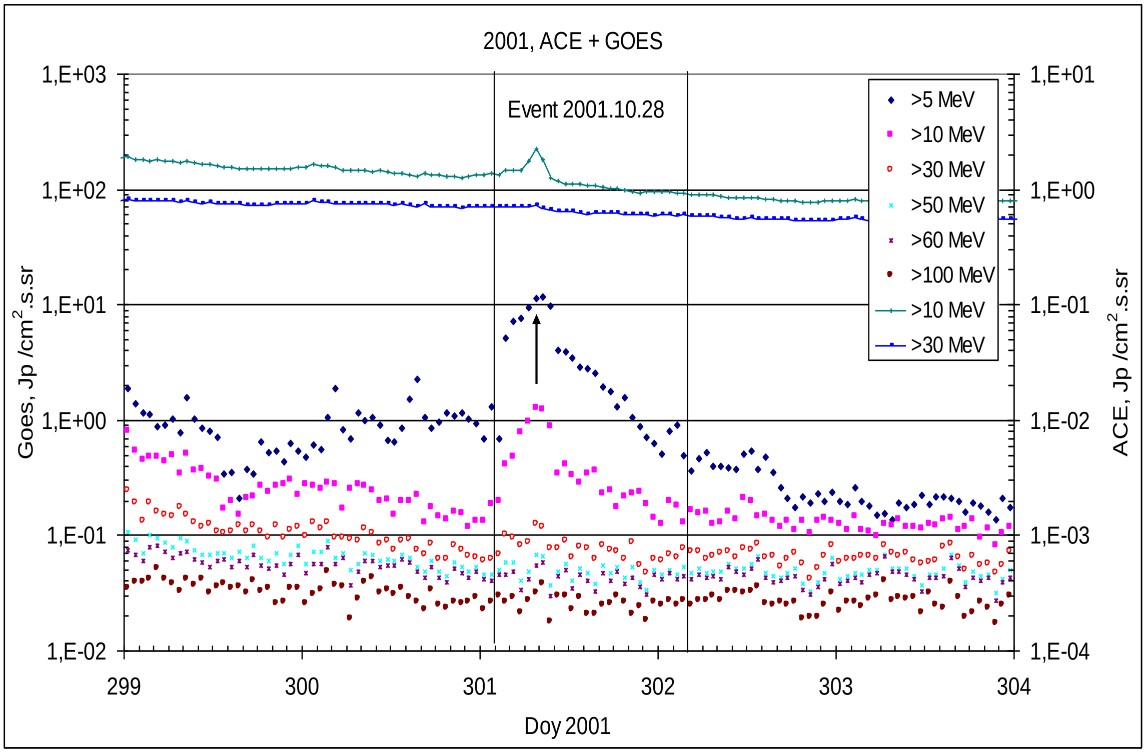
Particle event: To(Ep>10 MeV) – 28d02^h
Tmax(Ep>10 MeV) – 28d07^h, Jmax (Ep>10 MeV) – 1.1 /cm^2.s.sr
Duration of the event – 1day
Quasimaximal energy of protons in the event – Eqm = 60 MeV

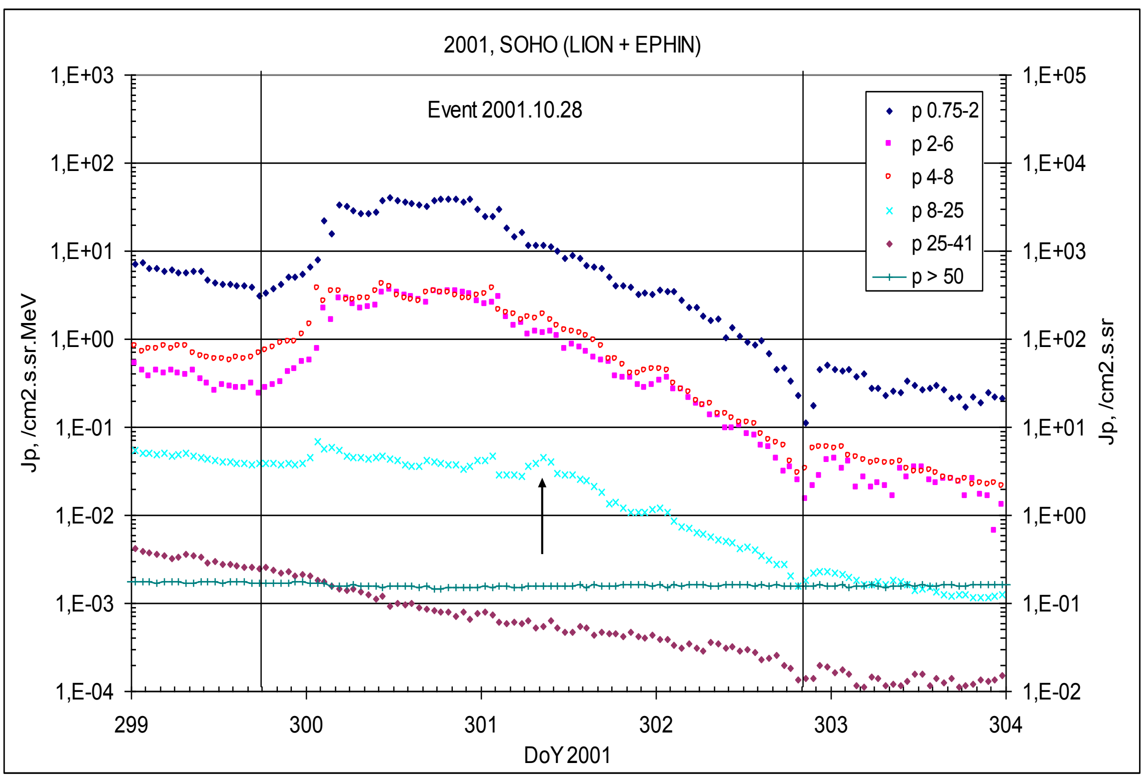
Sources: unknown
○ solar flare 28d04^{h}36^m, M1.3/1F, N12E40, AR9682
Main X-ray burst 1-8 Å: onset – 28d04^{h}36^m, max – 28d04^{h}50^m, Φ = 0.013 J/m^2
ΔSC 28d13^{h}19^m

Particle fluxes and associated phenomena



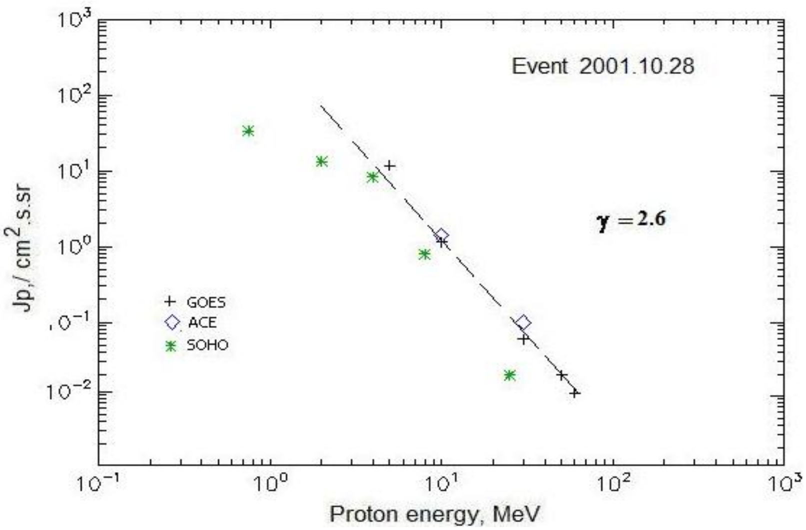
Time profiles of the proton fluxes for the event of 2001 October 28





Arrows on the profiles of the events indicate the time of the proton flux maxima, taken to build the proton spectra (see below)

Integral time-of-maximum proton spectrum



Integral fluxes of protons for the event of 2001 October 28

S/c, instruments	Ep, MeV	To	Tmax	Jmax, $/cm^2.s.sr$	Dura-tion	Comments
GOES-10						
EPS	>5	02^h	08^h	11.6	1.5d	
EPS	>10	02^h	07^h	1.14	1d	
EPS	>30	02^h	07^h	0.06	0.5d	
EPS	>50	02^h	07^h	0.02	-	
EPS	>60	02^h	07^h	0.01	-	
EPS	>100	-	-	-	-	
ACE						
SIS	>10	06^h	07^h	1.4	0.5d	
SIS	>30	-	08^h	0.1	-	
SOHO						
EPHIN (INT)	>50	-	-	-	-	

Differential fluxes of protons for the event of 2001 October 28

S/c, instruments	ΔE, MeV	To	Tmax	Jmax. $/cm^2.s.sr.MeV$	Dura-tion	Comments
SOHO						
LION	0.75-2	$26d18^h$	$28d09^h$	11.4	3d	
LION	2-6	$26d18^h$	$28d08^h$	1.2	3d	
EPHIN	4-8	$26d18^h$	$28d08^h$	1.9	3d	
EPHIN	8-25	-	$28d09^h$	0.045	3d	
EPHIN	25-41	-	$28d08^h$	0.0006	-	
EPHIN	41-53	- “ -	- “ -	- “ -	- “ -	

Electromagnetic and other phenomena that are sources and/or accompanying for the event of 2001 October 28

2001 October 28 ○ AR9682 To event 406

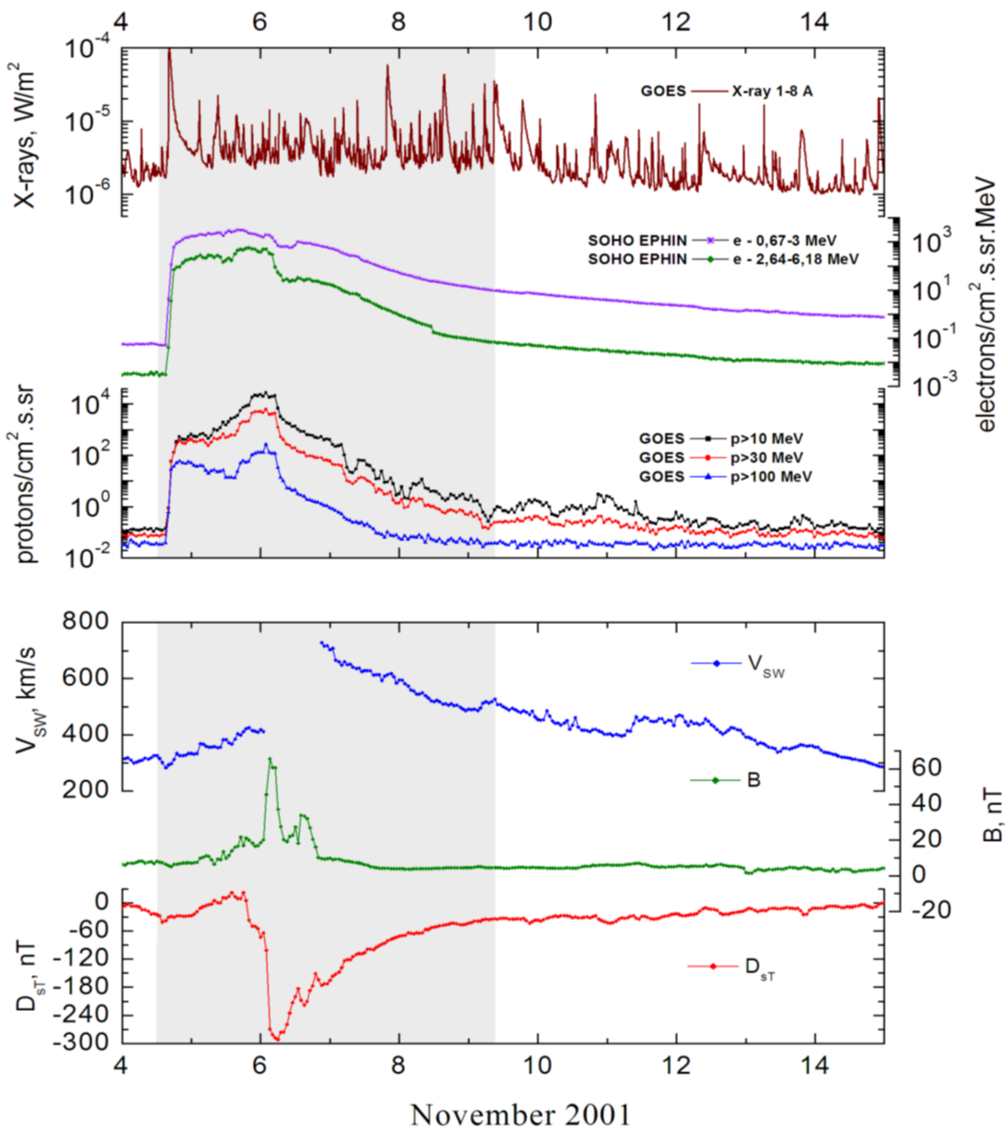
Hα		0443	0448	0531	N12E40	1F	F
1 – 12	keV	0436	0450	0458		M1.3	1.3E-2
8.8	GHz	0442.0	0444.0	0502.0		1.75	

Event 2001.11.04 – (2001-308) – GLE-62 **№ 407**

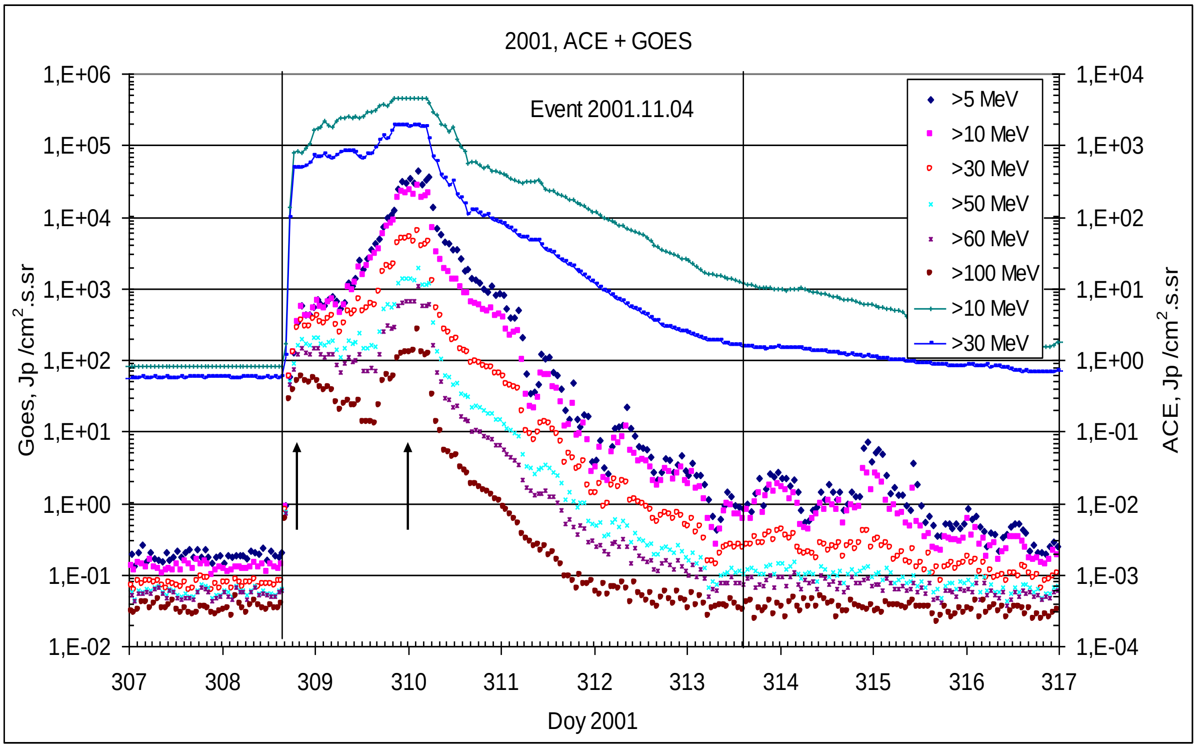
Particle event: To(Ep>10 MeV) – 04d16^h
Tmax$_1$(Ep>10 MeV) – 04d20^h, Jmax$_1$(Ep>10 MeV) – 540 /cm^2.s.sr
Tmax$_2$(Ep>10 MeV) – 06d00^h, Jmax$_2$(Ep>10 MeV) – 2.4·10^4 /cm^2.s.sr
Duration of the event – 5 days
Quasimaximal energy of protons in the event – Eqm$_1$ = 750 MeV
– Eqm$_2$ = 685 MeV

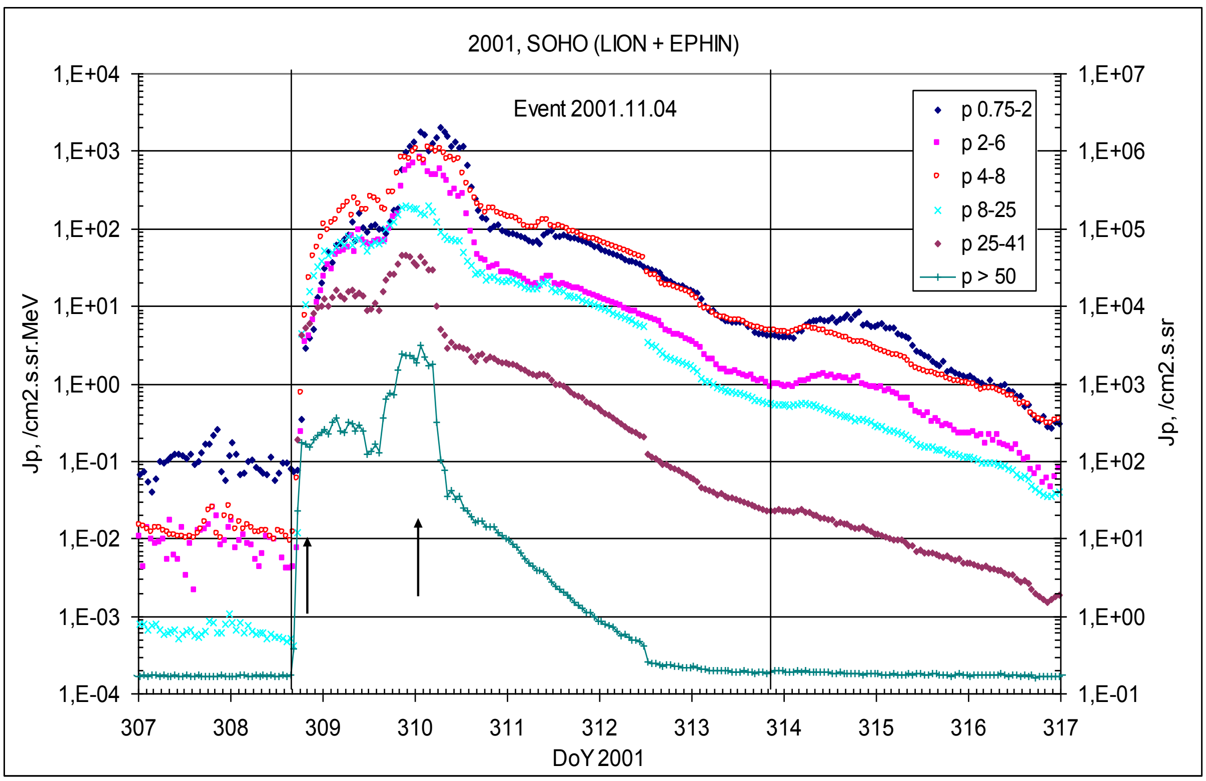
Sources: ● solar flare 04d16^{h}03^m, X1.0/3B, N07W19, AR9684
Ø solar flare 04d06^{h}38^m, C8.4/1N, N14W57, AR9682
Ø solar flare 05d09^{h}07^m, M2.1/1N, N03W37, AR9684
Main X-ray burst 1-8 Å: onset – 04d16^{h}03^m, max – 04d16^{h}20^m, Φ = 0.22 J/m^2
CME 04d16^{h}35^m, V = 1810 km/s, Δφ = 360^o, dA = 239^o,
▲SC 06d01^{h}52^m

Particle fluxes and associated phenomena



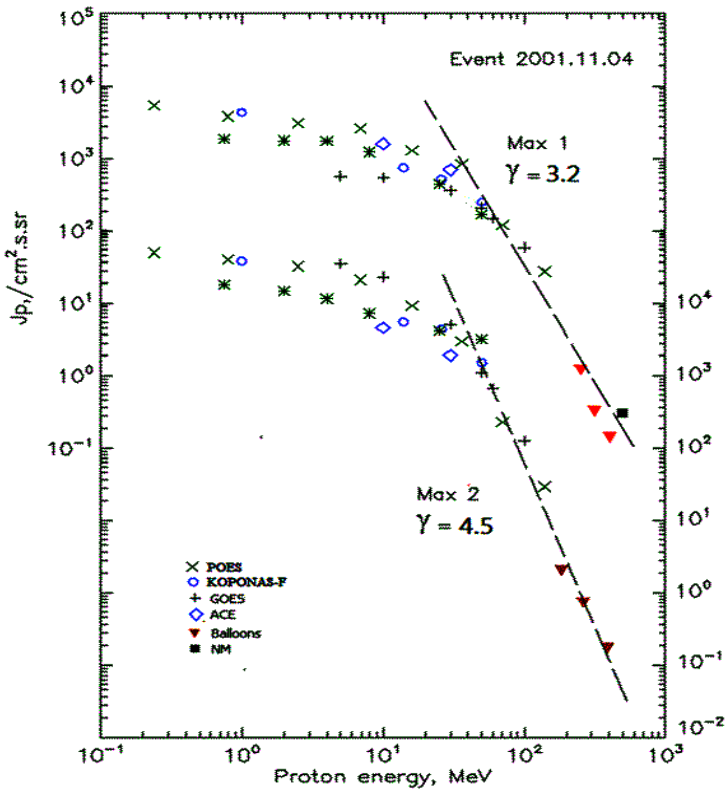
Time profiles of the proton fluxes for the event of 2001 November 04





Arrows on the profiles of the events indicate the time of the proton flux maxima, taken to build the proton spectra (see below)

Integral time-of-maximum proton spectrum



Integral fluxes of protons for the event of 2001 November 04

S/c, instruments	Ep, MeV	To	Tmax	Jmax, /cm^2.s.sr	Dura -tion	Comments
GOES-10						
EPS	>5	16^h	20^h/06d00^h	570/3.5·10^4	5d	
EPS	>10	16^h	20^h/06d00^h	540/2.3·10^4	5d	
EPS	>30	16^h	20^h/06d00^h	360/5.1·10^3	5d	
EPS	>50	16^h	20^h/06d00^h	210/1.1·10^3	5d	
EPS	>60	16^h	20^h/06d00^h	148/670	5d	
EPS	>100	16^h	20^h/06d00^h	59/126	5d	
POES-16						
MEPED	>0.24	16^h	22^h/06d03^h	5.4·10^3/5·10^4	5d	
MEPED	>0.8	16^h	22^h/06d03^h	3.8·10^3/4·10^4	5d	
MEPED	>2.5	16^h	22^h/06d03^h	3.1·10^3/3.2·10^4	5d	
MEPED	>6.9	16^h	22^h/06d03^h	2.6·10^3/2.1·10^4	5d	
MEPED	>16	16^h	22^h/06d03^h	1.3·10^3/9.3·10^3	5d	
MEPED	>36	16^h	22^h/06d03^h	840/3·10^3	5d	
MEPED	>70	16^h	22^h/06d03^h	121/230	5d	
MEPED	>140	16^h	22^h/06d03^h	27.6/29.4	5d	
CORONAS-F						
MKL	>1.	16^h	22^h/06d02^h	4.3·10^3/3.8·10^4	5d	
MKL	>14	16^h	22^h/06d02^h	750/5.5·10^3	5d	
MKL	>26	16^h	22^h/06d02^h	515/4.4·10^3	5d	
MKL	>50	16^h	22^h /06d02^h	252/1.5·10^3	5d	

ACE						
SIS	>10	16^h	$23^h/6d00^h$	$1.6\cdot10^3/4.6\cdot10^3$	5d	
SIS	>30	16^h	$23^h/6d00^h$	$700/1.9\cdot10^3$	5d	
SOHO						
EPHIN (INT)	>50	16^h	$20^h/06d02^h$	$170/3.2\cdot10^3$	4d	
BALLOONS						
Mu	>254		$05d(08^h08^m\text{-}08^h37^m)$	1.2/ -		
Mu	>317		$05d(08^h08^m\text{-}08^h37^m)$	0.32/ -		
Mu	>409		$05d(08^h08^m\text{-}08^h37^m)$	0.14/ -		
Mu	>184		$06d(02^h16^m\text{-}02^h57^m)$	- /2.0		
Mu	>265		$06d(02^h16^m\text{-}02^h57^m)$	- /0.73		
Mu	>390		$06d(02^h16^m\text{-}02^h57^m)$	- /0.17		
NM						
Network	>500		$20^h/-$	0.3/ -		

Differential fluxes of protons for the event of 2001 November 04

S/c, instru-ments	ΔE, MeV	To	Tmax	Jmax. /cm^2.s.sr.MeV	Dura -tion	Comments
SOHO						
LION	0.75-2	17^h	$05d02^h/06d02^h$	49.4/1800	8d	
LION	2-6	17^h	$05d02^h/06d02^h$	3.4/810	8d	
EPHIN	4-8	17^h	$06d03^h/06d01^h$	130/1080	8d	
EPHIN	8-25	17^h	$06d03^h/06d01^h$	46.3/180	8d	
EPHIN	25-41	17^h	$05d20^h/06d02^h$	12.4/44.1	8d	
EPHIN	41-53	- “ -	- “ -	- “ -	- “ -	

References:

Struminsky A.B., 2003.

Kuwabara T., J.W. Bieber, J. Clem, et.al., 2006.

Rawat R., S. Alex, and G.S. Lakhina, 2006.

Miroshnichenko L.I. and J. Perez-Peraza, 2008.

Lario D., A. Aran, R.B. Decker, 2009.

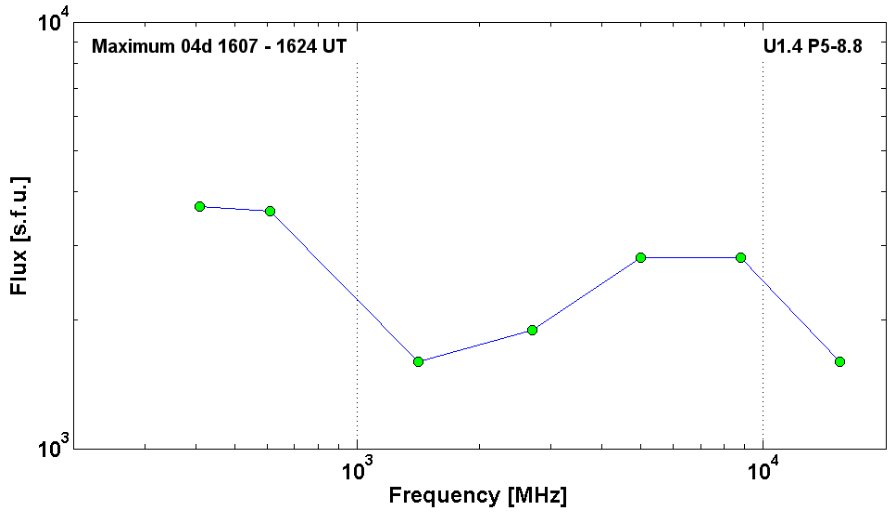
Tylka A.J., O.E. Malandraki, G. Dorrian et al., 2013.

Electromagnetic and other phenomena that are sources and/or accompanying for the event of 2001 November 04

2001 November 04 ● AR9684 To event 407

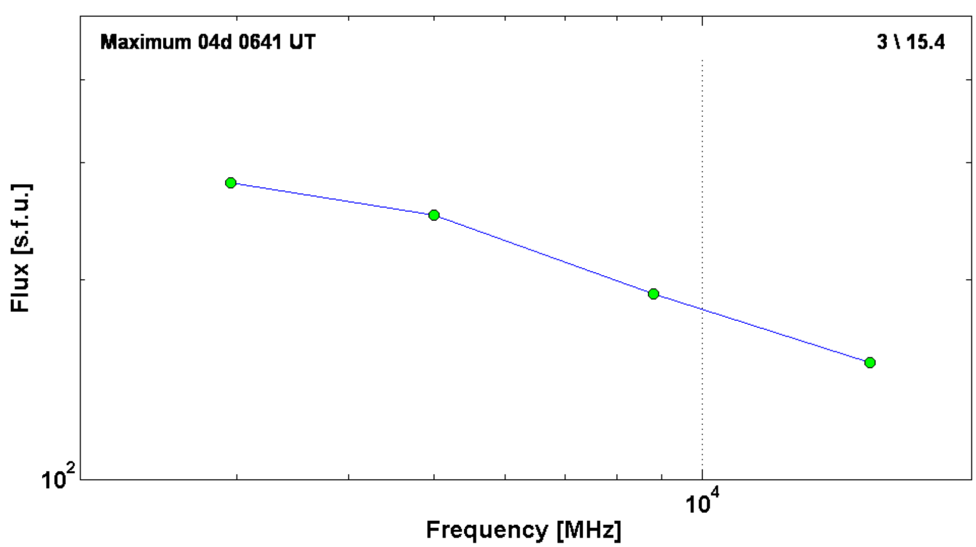
Hα		1603	1614	>2340	N07W19	3B	FUZ
1 – 12	keV	1603	1620	1657		X1.0	2.2E-1
53 – 93	keV	160256	161254	>171336		38	HXT Y
15.4	GHz	1605.0	1617.0	1725.0		3.20	
8.8	GHz	1604.0	1616.0	0000.0	U1.4 P5-8.8	3.45	
5	GHz	1604.0	1617.0	0000.0		3.45	
2.7	GHz	1602.0	1624.0	0000.0		3.28	
1.4	GHz	1602.0	1607.0	1727.0		3.20	
610	MHz	1604.0	1609.0	1709.0		3.56	
410	MHz	1605.0	1617.0	1714.0		3.57	

DS II	29-180	1610		1621		2	
DS IV	36-180	1612		1850		1	
DS III	25-180	1611		1715	N	2	
CME	WL	1635	1810 km/s	-63.4 km/s^2	360°	239°	



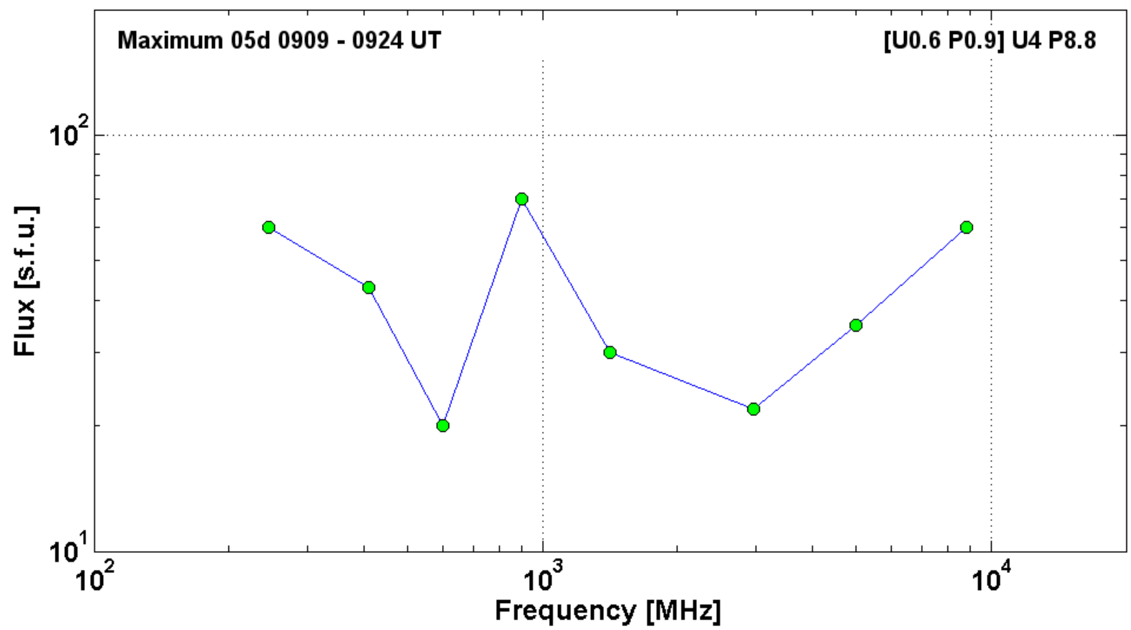
2001 November 04 Ø AR9682 To event 407

Hα		0641	0643	0700	N14W57	1N	C
1 – 12	keV	0638	0643	0646		C8.4	2.3E-3
53 – 93	keV	064056	064306	065144		13	HXT Y
15.4	GHz	0640.0	0641.0	0641.0	3 \ 15.4	2.18	
8.8	GHz	0640.0	0641.0	0643.0		2.28	
5	GHz	0640.0	0641.0	0643.0		2.40	
3	GHz	0640.7	0641.3	0644.1		2.45	
DS I	110-270	0650		>1200	N	1	
DS III	25-132	0639		0640		1	
CME	WL	0750	259 km/s	0.1 km/s^2	136°	011°	



2001 November 05 Ø AR9684 To event 407

Hα		0908	0911	0947	N03W37	1N	EFU
1 – 12	keV	0907	0915	0922		M2.1	1.6E-2
53 – 93	keV	092530	092548	092602		8	HXT Y
8.8	GHz	0907.0	0909.0	0915.0	[U0.6 P0.9] U4 P8.8	1.78	
5	GHz	0912.0	0912.0	~0912.0		1.54	
3	GHz	0912.4	0915.0			1.34	
1.4	GHz	0908.0	0909.0	0909.0		1.48	
900	MHz	0909.0	0909.9			1.85	
600	MHz	0909.0	0909.4	0912.4		1.30	
410	MHz	0922.0	0922.0	0924.0		1.63	
245	MHz	0922.0	0924.0	0926.0		1.78	
DS II	190-2200	0907		0928		2	
DS I	90-180	~0906		~0955	N	1	
DS III	45-150	~0910		~0957	N	1	
DS III	30-220	0933		0937	GG	2	
DS DCIM	800-2000	0907		0910	GG	2	
DS UNCLF	200-380	0910		0936		1	
CME	WL	0943	0997km/s	-8.1km/s^2	040°	259°	



Event 2001.11.17 – (2001-321) **№ 408**

Particle event To(Ep>10 MeV) – 17d10^h

Tmax(Ep>10 MeV) – 19d22^h, Jmax (Ep>10 MeV) – 13 /cm^2.s.sr

Duration of the event – 5 days

Quasimaximal energy of protons in the event – Eqm = 45 MeV

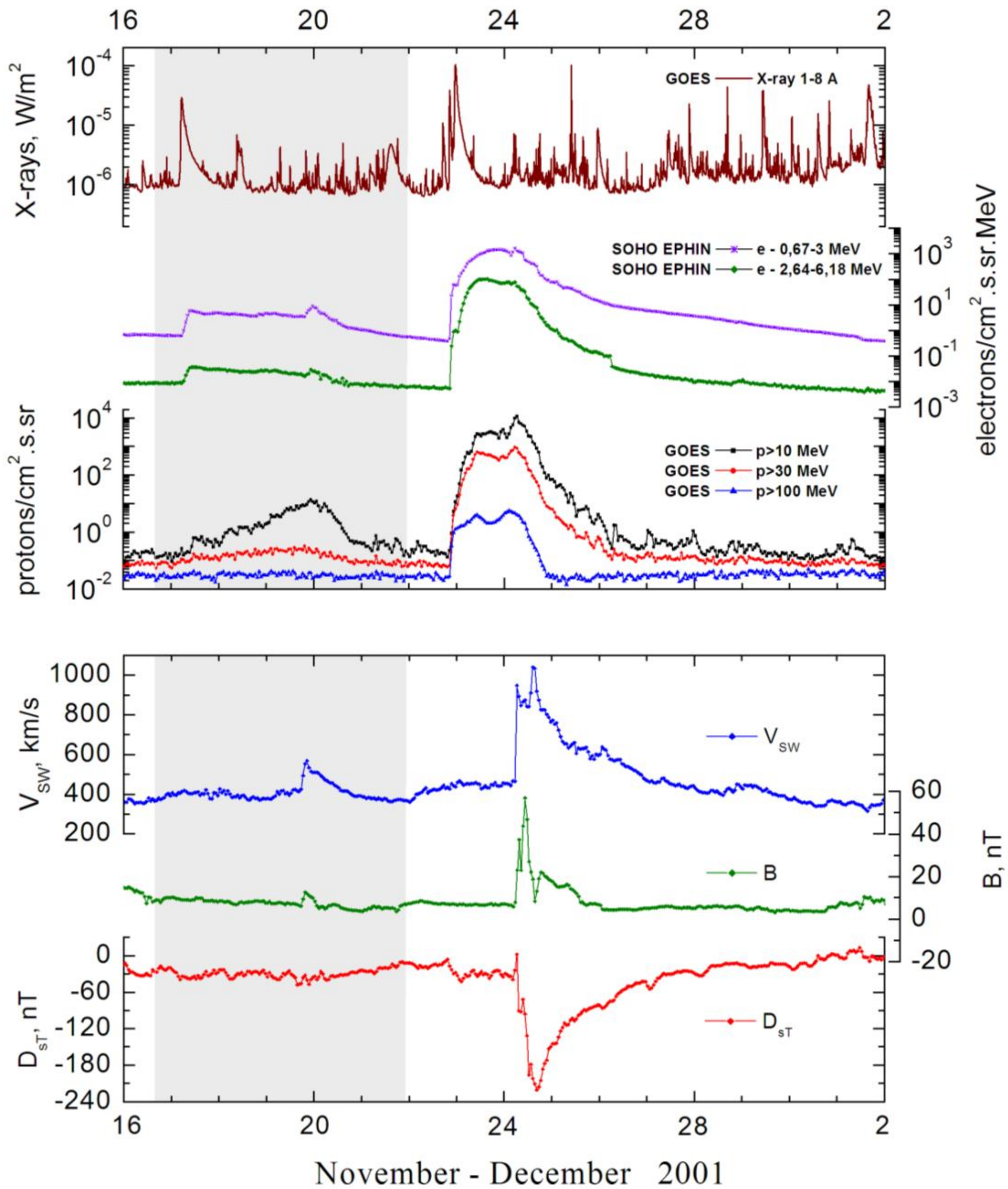
Sources: ● solar flare 17d04^{h}48^m, M2.8/2N, S13E42, AR9704

Main X-ray burst 1–8 Å: onset – 17d04^{h}49^m, max – 17d05^{h}25^m, Φ = 0.1 J/m^2

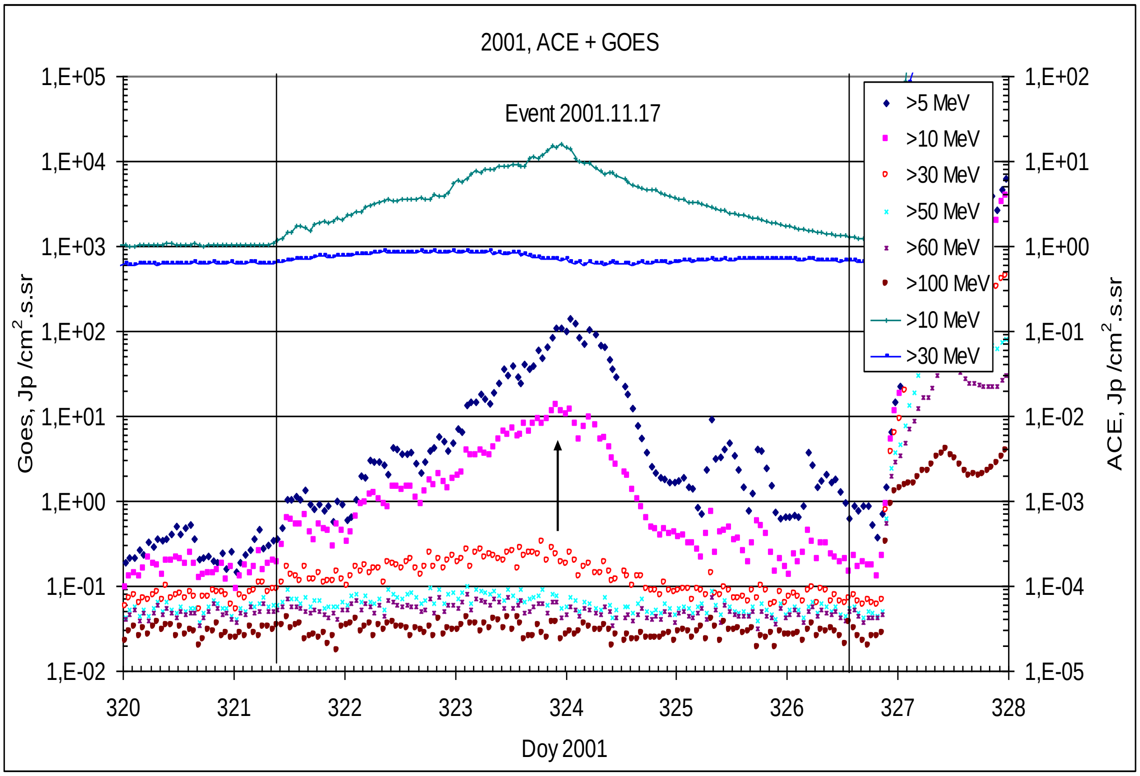
CME: 05^{h}30^m, V = 1379 km/s, Δφ = 360^o , dA = 058^o

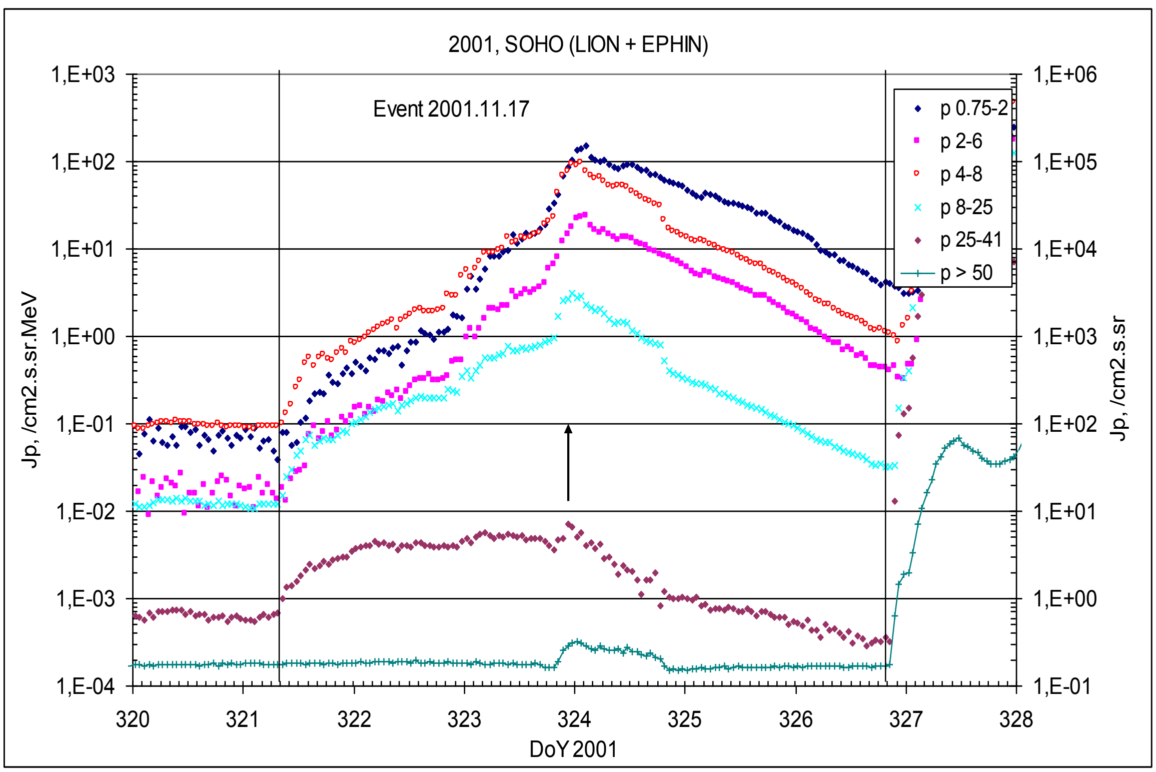
▲SC19d18^{h}15^m

Particle fluxes and associated phenomena



Time profiles of the proton fluxes for the event of 2001 November 17

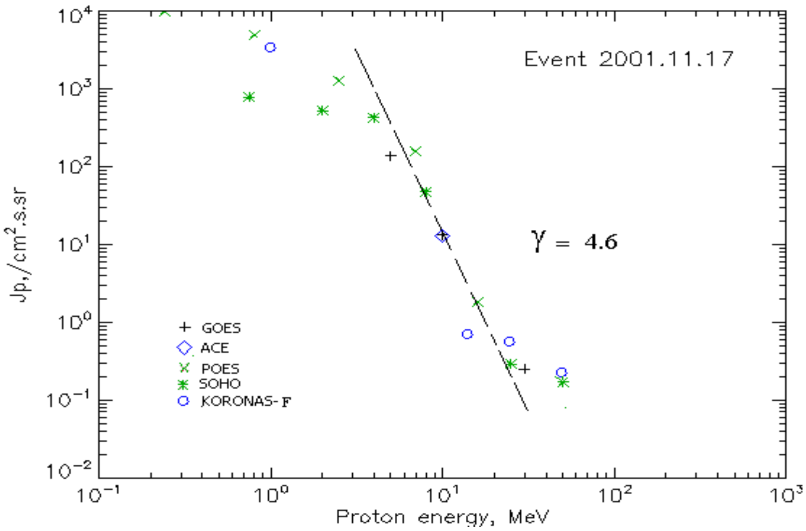




Arrows on the profiles of the events indicate the time of the proton flux maxima, taken to build the proton spectra (see below)

Список 2001 г.

Integral time-of-maximum proton spectrum



Integral fluxes of protons for the event of 2001 November 17

S/c, instruments	Ep, MeV	To	Tmax	Jmax, $/cm^2.s.sr^{-1}$	Dura-tion	Comments
GOES-10						
EPS	>5	10^h	$20d01^h$	139	5d	
EPS	>10	10^h	$19d22^h$	13	5d	
EPS	>30	10^h	$19d19^h$	0.25	4d	
EPS	>50	-	-	-	-	
EPS	>60	-	-	-	-	
EPS	>100	-	-	-	-	
POES-16						
MEPED	>0.24	10^h	$19d20^h$	9932	6d	
MEPED	>0.8	10^h	$19d20^h$	4978	6d	
MEPED	>2.5	10^h	$19d20^h$	1299	5d	
MEPED	>6.9	10^h	$19d20^h$	156	5d	
MEPED	>16	10^h	$19d20^h$	1.85	4d	
MEPED	>36	-	-	-	-	
MEPED	>70	-	-	-	-	
MEPED	>140	-	-	-	-	
CORONAS F						
MKL	>1.	10^h	$20d01^h$	3440	5d	
MKL	>14	10^h	$20d01^h$	0.72	4d	
MKL	>26	10^h	$20d01^h$	0.57	4d	
MKL	>50	10^h	$20d01^h$	0.21	4d	
ACE						
SIS	>10	-	$20d01^h$	13	5d	
SIS	>30	-	-	-	-	
SOHO						
EPHIN (INT)	>50	$19d20^h$	$20d00^h$	0.17	1d	

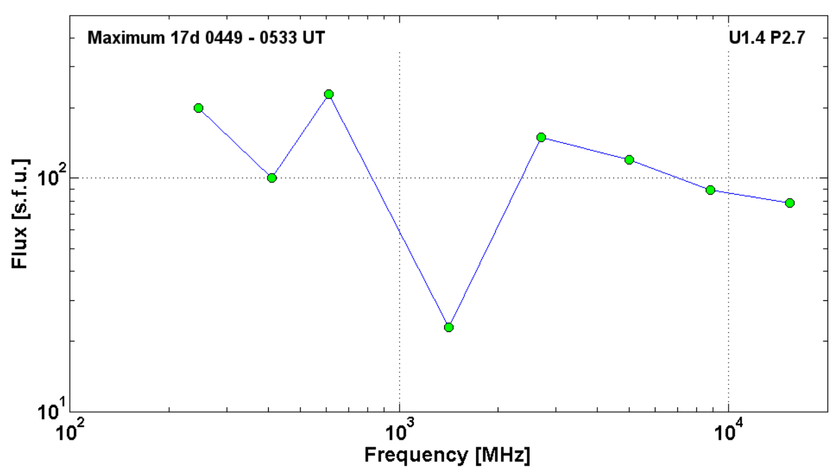
Differential fluxes of protons for the event of 2001 November 17

S/c, instruments	ΔE, MeV	To	Tmax	Jmax. /cm^2.s.sr.MeV	Dura-tion	Comments
SOHO						
LION	0.75-2	12^h	$19d21^h$	150	5d	
LION	2-6	11^h	$19d21^h$	23.6	5d	
EPHIN	4-8	09^h	$20d01^h$	95.4	5d	
EPHIN	8-25	09^h	$20d01^h$	2.8	5d	
EPHIN	25-41	09^h	$20d00^h$	0.006	5d	
EPHIN	41-53	- " -	- " -	- " -	- " -	

Electromagnetic and other phenomena that are sources and/or accompanying for the event of 2001 November 17

2001 November 17 ● AR9704 To event 408

Hα	6563 Å	0448	0505	0938	S13E42	2N	FZE
DSF	6563 Å	0404		0435	S10E47	13°	
1 – 12	keV	0449	0525	0611		M2.8	1.0E-1
53 – 93	keV	<050656	~050706	053910		8	HXT Y
15.4	GHz	0447.0	0533.0	0630.0		1.89	
8.8	GHz	0446.0	0459.0	0614.0		1.95	
5	GHz	0446.0	0459.0	0651.0		2.08	
2.7	GHz	0449.0	0459.0	0653.0	U1.4 P2.7	2.18	
1.4	GHz	0447.0	0449.0	0449.0		1.36	
610	MHz	0512.0	0533.0	0547.0		2.36	
410	MHz	0447.0	0450.0	0454.0		2.00	
245	MHz	0451.0	0455.0	0458.0		2.30	
DS II	45-145	0450		0455		1	
DS II	25-55	0500		0507		3	
DS IV	57-500	0444		0555		1	
DS IV	25-180	0455		1025		2	
DS III	57-800	0448		0553	S	2	
CME	WL	0530	1379 km/s	-22.5 km/s^2	360°	058°	



Event 2001.11.22 – (2001-326) **№ 409**

Particle event: To(Ep>10 MeV) – 22d21^h

Tmax$_1$(Ep>10 MeV) – 23d10^h, Jmax$_1$(Ep>10 MeV) – $2.7\cdot10^3$ /cm^2.s.sr

Tmax$_2$(Ep>10 MeV) – 24d06^h, Jmax$_2$(Ep>10 MeV) – $1.1\cdot10^4$ /cm^2.s.sr

Duration of the event – 4 days

Quasimaximal energy of protons in the event – Eqm$_1$ = 390 MeV

– Eqm$_2$ = 350 MeV

Sources: ● solar flare 22d<22^{h}09^m, M9.9/3B, S13W38, AR9704

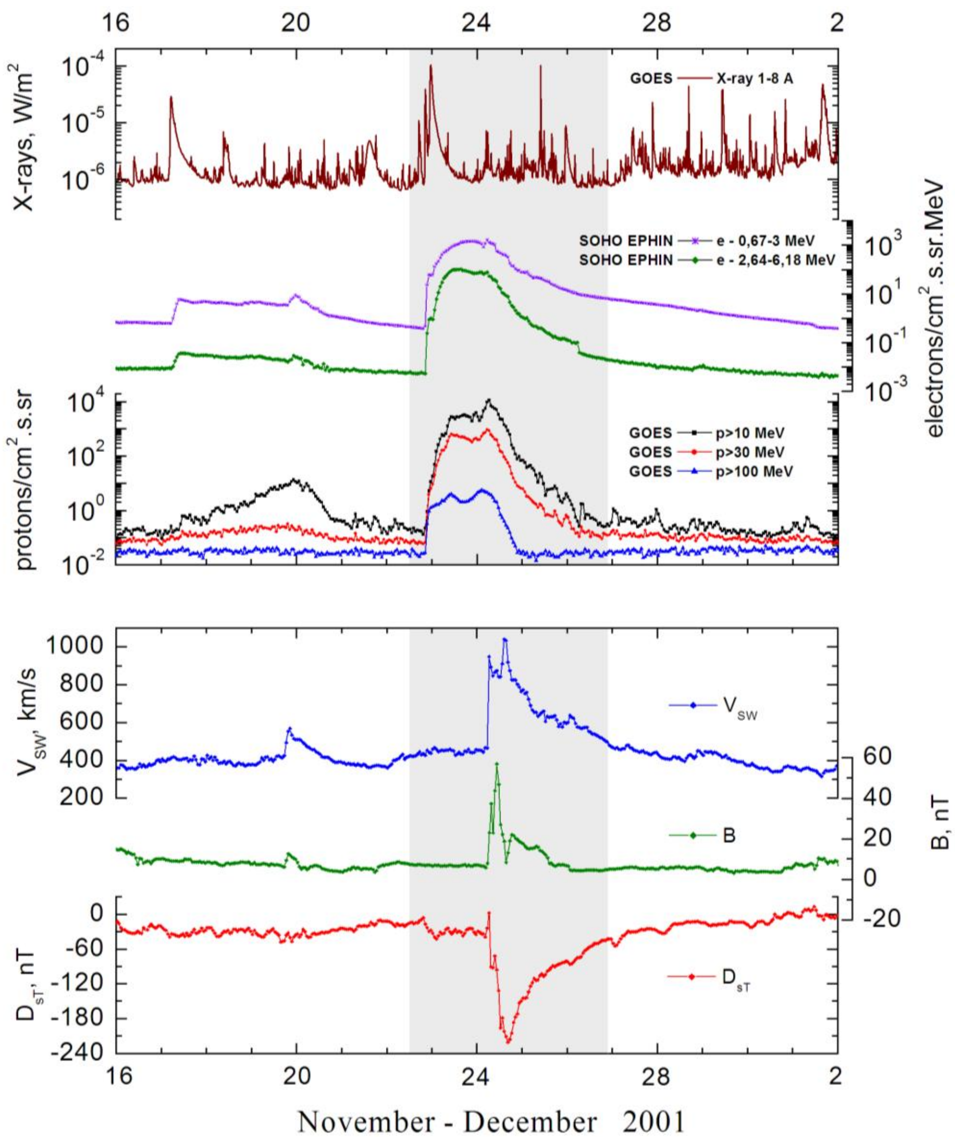
Ø solar flare 22d20^{h}18^m, M3.8/2B, S26W68, AR9704

Main X-ray burst 1-8 Å: onset – 22d22^{h}32^m, max – 22d23^{h}30^m, Φ = 0.31 J/m^2

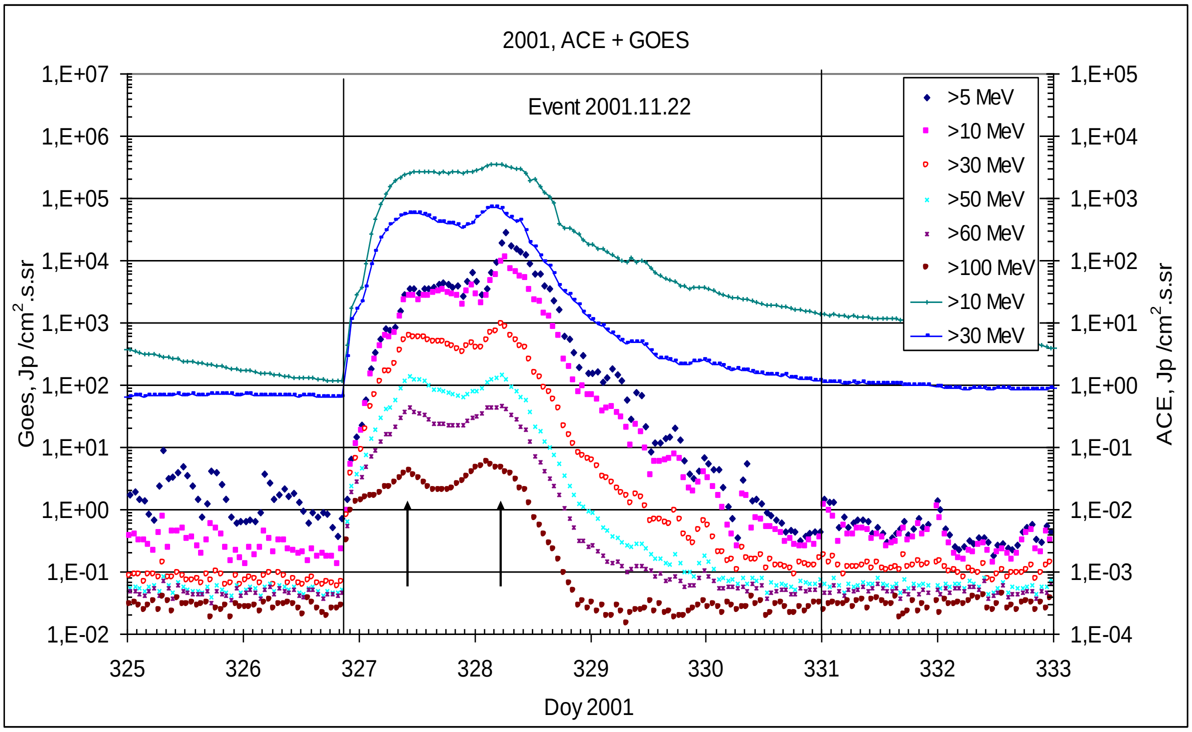
CME:22d23^{h}30^m, V = 1437 km/s, Δφ = 360^o, dA = 341^o

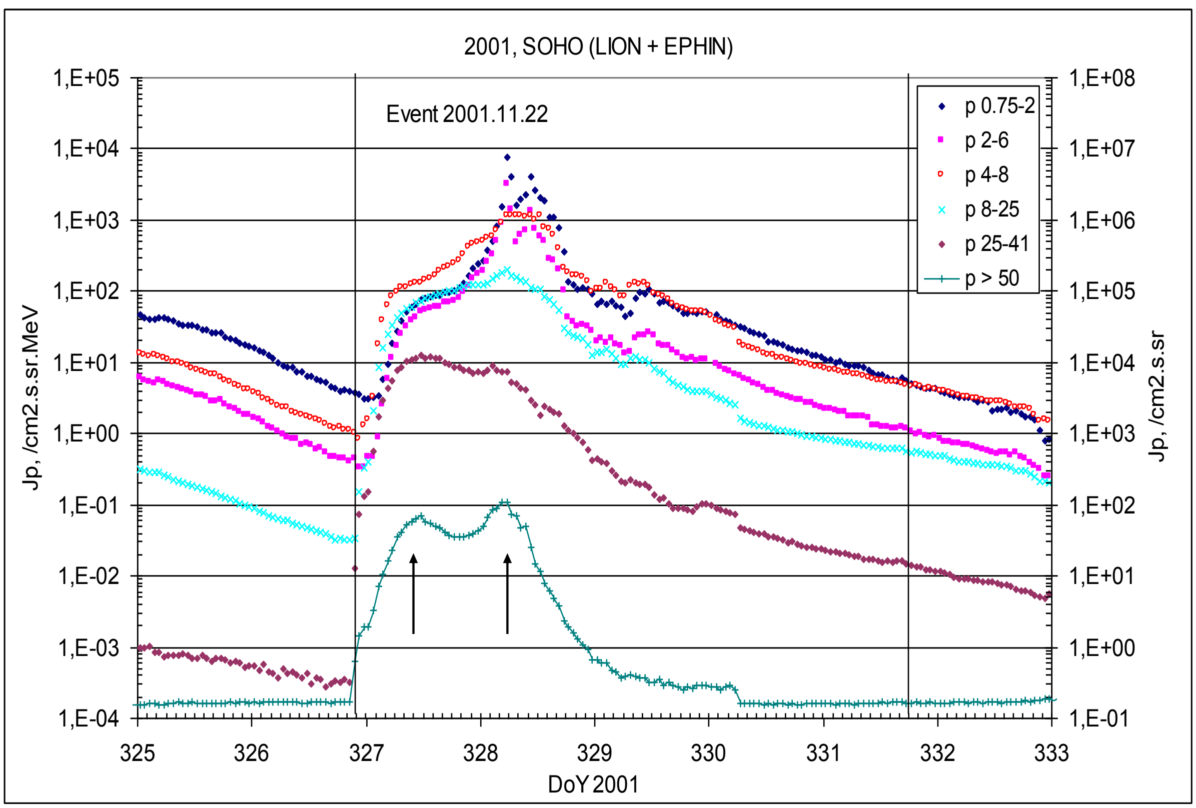
▲SC 24d05^{h}56^m

Particle fluxes and associated phenomena



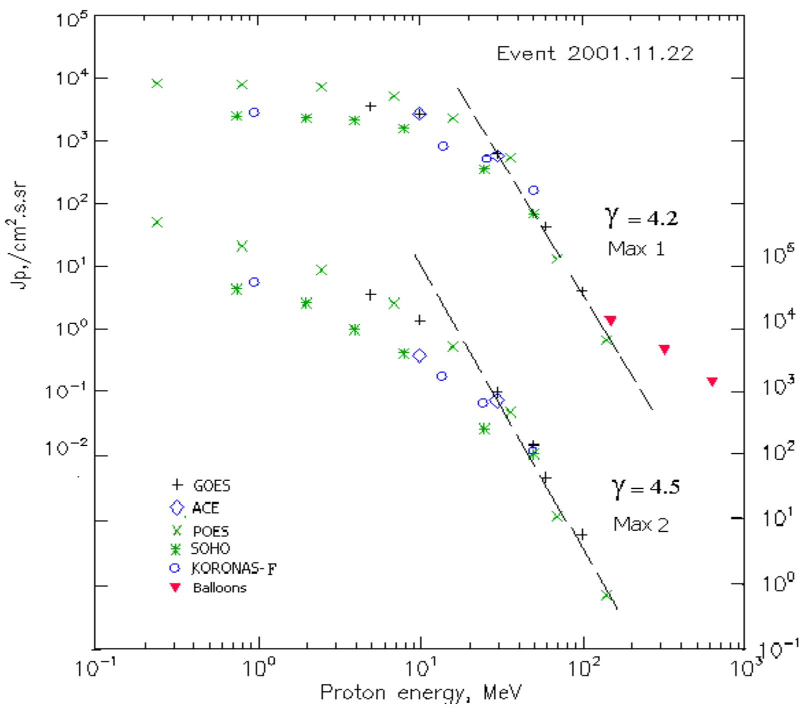
Time profiles of the proton fluxes for the event of 2001 November 22





Arrows on the profiles of the events indicate the time of the proton flux maxima, taken to build the proton spectra (see below)

Integral time-of-maximum proton spectrum



Integral fluxes of protons for the event of 2001 November 22

S/c, instruments	Ep, MeV	To	Tmax	Jmax, /cm^2.s.sr	Dura-tion	Comments
GOES-10						
EPS	>5	21^h	23d11^h/24d06^h	$3.6\cdot10^3/2.8\cdot10^4$	4d	
EPS	>10	21^h	23d10 ^{h}/24d06^h	$2.7\cdot10^3/1.1\cdot10^4$	4d	
EPS	>30	21^h	23d10^h/24d05^h	624/923	3d	
EPS	>50	21^h	23d10^h/24d05^h	137/145	3d	
EPS	>60	21^h	23d10^h/24d05^h	43/46	2.5d	
EPS	>100	21^h	23d10^h/24d02^h	4/5.6	2d	
POES-16						
MEPED	>0.24	21^h	23d07^h/24d07^h	$8.3\cdot10^3/3.6\cdot10^5$	4d	
MEPED	>0.8	21^h	23d07^h/24d07^h	$8\cdot10^3/1.5\cdot10^5$	4d	
MEPED	>2.5	21^h	23d07^h/24d07^h	$7.3\cdot10^3/6.7\cdot10^4$	4d	
MEPED	>6.9	21^h	23d07^h/24d07^h	$5.3\cdot10^3/2.1\cdot10^4$	4d	
MEPED	>16	21^h	23d07^h/24d07^h	$2.3\cdot10^3/4.7\cdot10^3$	3d	
MEPED	>36	21^h	23d07^h/24d07^h	550/458	3d	
MEPED	>70	21^h	23d07^h/24d07^h	13.1/12	2d	
MEPED	>140	21^h	23d07^h/24d07^h	0.67/0.67	2d	
CORONAS-F						
MKL	> 1	21^h	23d11^h/24d06^h	$2.9\cdot10^3/4.3\cdot10^4$	4d	
MKL	>14	21^h	23d11^h/24d06^h	$920/1.6\cdot10^3$	4d	
MKL	>26	21^h	23d11^h/24d06^h	520/595	4d	
MKL	>50	21^h	23d11^h/24d06^h	150/121	4d	
ACE						
SIS	>10	21^h	23d11^h/24d06^h	$2.7\cdot10^3/3.3\cdot10^3$	4d	
SIS	>30	21^h	23d11^h/24d06^h	575/688	3d	

SOHO						
EPHIN (INT)	>50	21^{h}	$23d11^{h}/24d05^{h}$	68.7/108	3.2d	
BALLOONS						
Mu	>150		$23d(10^{h}-11^{h})$/ -	1.3/ -		
Mu	>323		$23d(10^{h}-11^{h})$/ -	0.45/ -		
Mu	>633		$23d(10^{h}-11^{h})$/ -	0.14/ -		

Differential fluxes of protons for the event of 2001 November 22

S/c, instruments	ΔE, MeV	To	Tmax	Jmax. /cm^2.s.sr.MeV	Dura-tion	Comments
SOHO						
LION	0.75-2	$23d01^{h}$	$23d11^{h}/24d05^{h}$	73.5/7560	8d	
LION	2-6	$23d01^{h}$	$23d11^{h}/24d05^{h}$	50.4/3210	8d	
EPHIN	4-8	23^{h}	$23d11^{h}/24d05^{h}$	132/1170	8d	
EPHIN	8-25	22^{h}	$23d11^{h}/24d05^{h}$	73.5/200	8d	
EPHIN	25-41	21^{h}	$23d11^{h}/24d05^{h}$	12.7/7.4	8d	
EPHIN	41-53	- " -	- " -	- " -	- " -	

References:

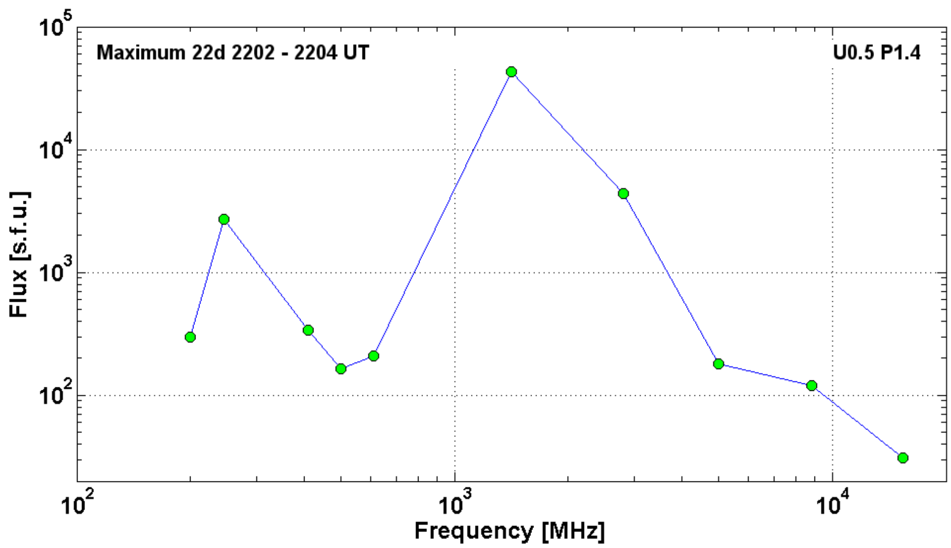
Kuwabara T., J.W. Bieber, J. Clem et al., 2006.
Lario D, A. Aran, R.B. Decker, 2009
Veselovskij I.S., I.N. Myagkova, O.S. Yakovchuk, 2012.

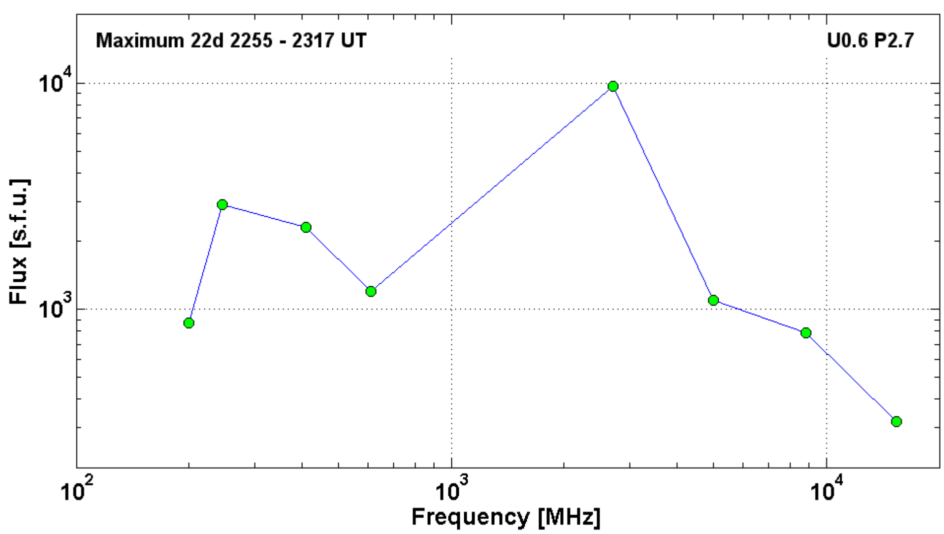
Electromagnetic and other phenomena that are sources and/or accompanying for the event of 2001 November 22

2001 November 22 ● AR9704 To event 409

Hα	6563Å	<2209	2345	0401	S13W38	3B	FHZE
DSF	6563Å	~2048		~1135	S18W36	17°	
1 – 12	keV	2232	2330	2406		M9.9	3.1E-1
53 – 93	keV	222939	225749	>000351		14	HXT Y
15.4	GHz	2204.0	2204.0	2205.0		1.49	
8.8	GHz	2203.0	2203.0	0000.0		2.08	
5	GHz	2201.0	2203.0	0000.0		2.26	
2.8	GHz	2200.0	2204.0	2209.0		3.64	
1.4	GHz	2158.0	2204.0	0024.0	U0.5 P1.4	4.63	
610	MHz	2201.0	2202.0	2204.0		2.32	
500	MHz	2201.0	2202.0	2203.0		2.22	
410	MHz	2202.0	2202.0	2203.0		2.53	
245	MHz	2201.0	2202.0	2202.0		3.43	
200	MHz	2202.0	2202.0	2203.0		2.48	
DS II	25-116	2231		2241		1	
DS IV	25-180	2235		0012		2	
DS IV	57-1300	2245		>2400	FS	2	
DS III	140-700	2201		2202	B	2	
DS III	57-1300	2253		2346	N	2	
DS CONT	74-180	2235		2320		1	

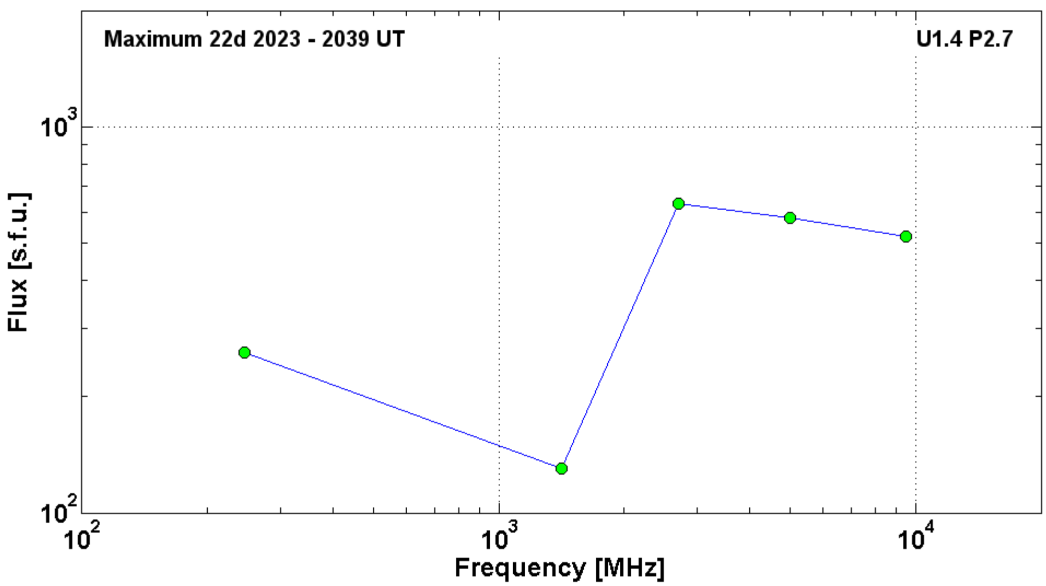
15.4	GHz	2203.0	2300.0	0024.0		2.51	
8.8	GHz	2202.0	2305.0	0055.0		2.90	
5	GHz	2202.0	2305.0	0055.0		3.04	
2.7	GHz	2159.0	2257.0	0024.0	U0.6 P2.7	3.99	
610	MHz	2201.0	~2255.0	0021.0		3.08	
410	MHz	2201.0	~2257.0	0024.0		3.36	
245	MHz	2201.0	~2315.0	0024.0		3.46	
200	MHz	2232.0	2317.0	2340.0		2.94	
610	MHz	2201.0	2357.0	2358.0		3.54	
410	MHz	2202.0	2355.0	2357.0		3.49	
DS IV	57-300	<0000		0010	FS	1	
DS I	60-170	0010		0202	S	1	
CME	WL	2330	1437 km/s	-12.9 km/s^2	360˚	349˚	





2001 November 22 Ø AR9698 To event 409

Hα	6563 Å	2022	2026	>2126	S26W68	2B	FHZ
1 – 12	keV	2018	2036	2052		M3.8	5.1E-2
53 – 93	keV	<204429	204433	204639		8	HXT Y
9.5	GHz	2022.0	2027.4	2037.5		2.72	
5	GHz	2023.0	2027.0	0000.0		2.76	
2.7	GHz	2023.0	2027.0	2039.0	U1.4 P2.7	2.80	
1.4	GHz	2023.0	2023.0	2037.0		2.11	
245	MHz	2038.0	2039.0	2039.0		2.41	
DS II	25-180	2022		2047		3	
DS III	25-180	2021		2056	N	1	
DS III	57-200	2023		2026	G	3	
DS UNCLF	57-100	2038		2044		3	
CME	WL	2030	1443 km/s	-43.3 km/s^2	360°	221°	

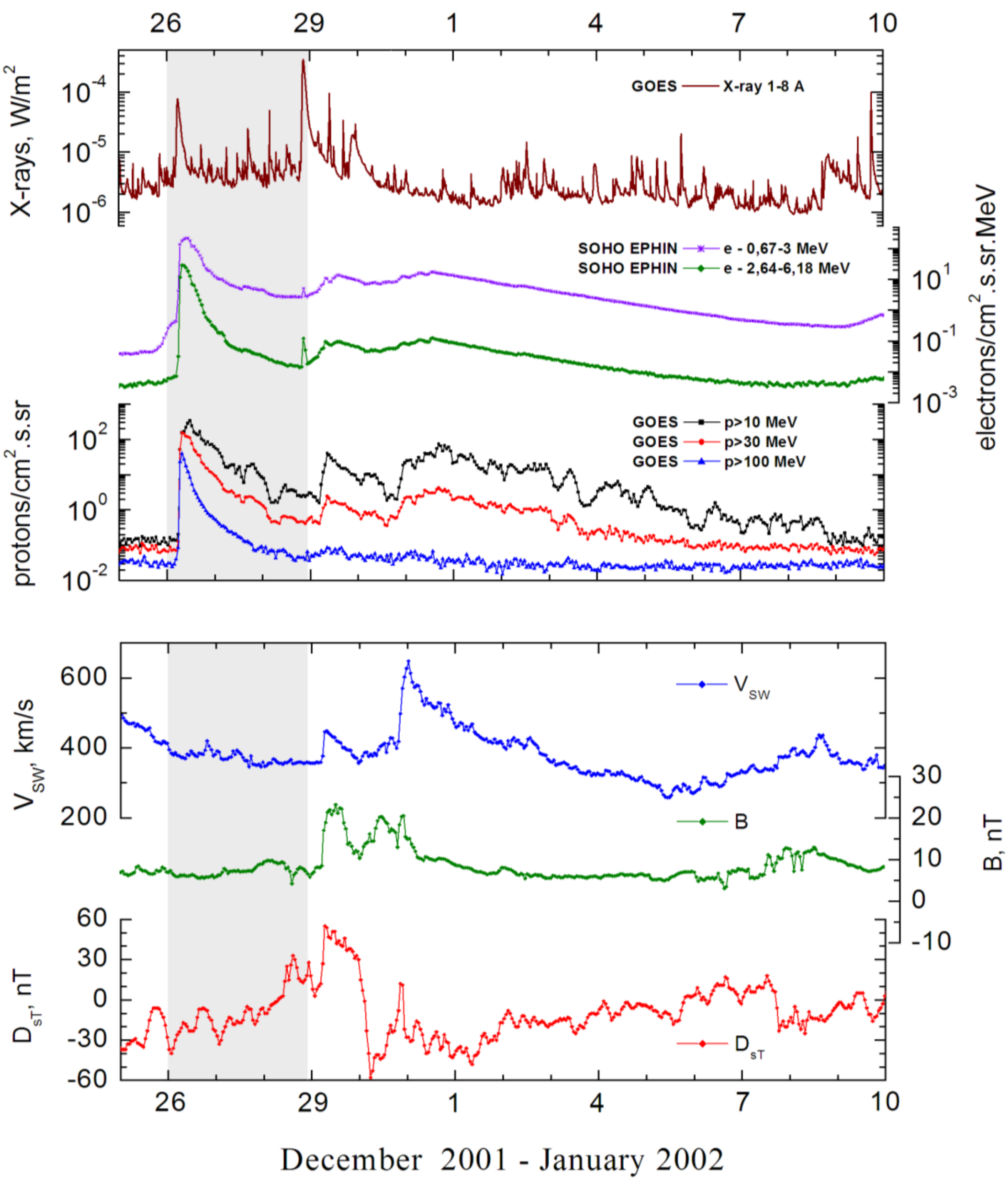


Event 2001.12.26 – (2001-360) – GLE-63 **№ 410**

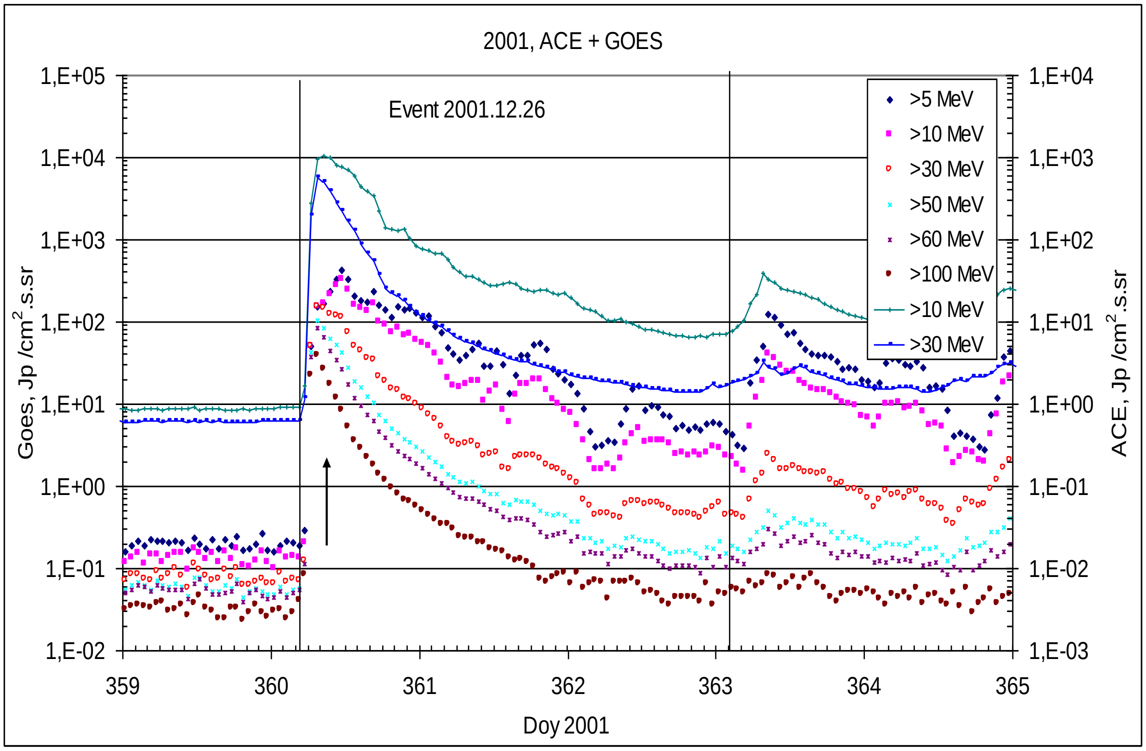
Particle event: To(Ep>10 MeV) – 26d05^h
Tmax(Ep>10 MeV) – 26d11^h, Jmax (Ep>10 MeV) – 336 /cm^2.s.sr
Duration of the event – 3 days
Quasimaximal energy of protons in the event – Eqm = 800 MeV

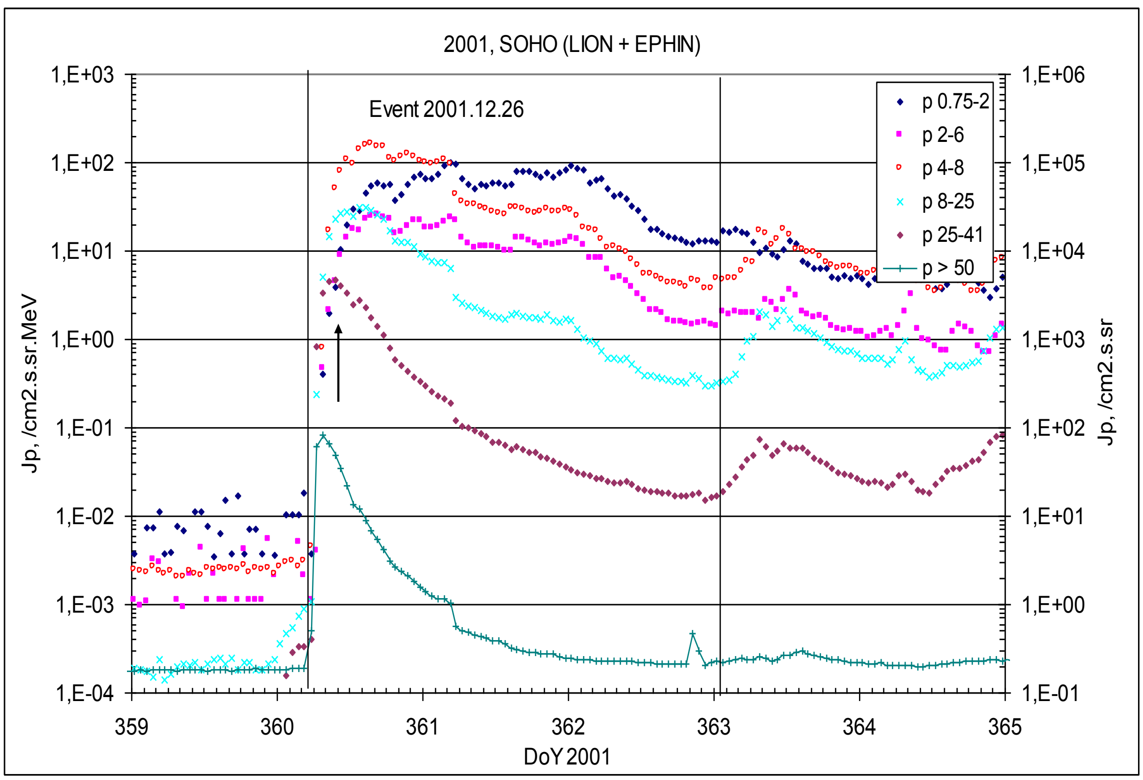
Sources: ● solar flare 26d04^{h}32^m, M7.1/1B, N08W54, AR9742
Main X-ray burst 1-8 Å: onset – 26d04^{h}32^m, max – 26d05^{h}40^m, Φ = 0.34 J/m^2
CME: 26d05^{h}30^m, V = 1446 km/s, Δφ = 212^o, dA = 266^o

Particle fluxes and associated phenomena



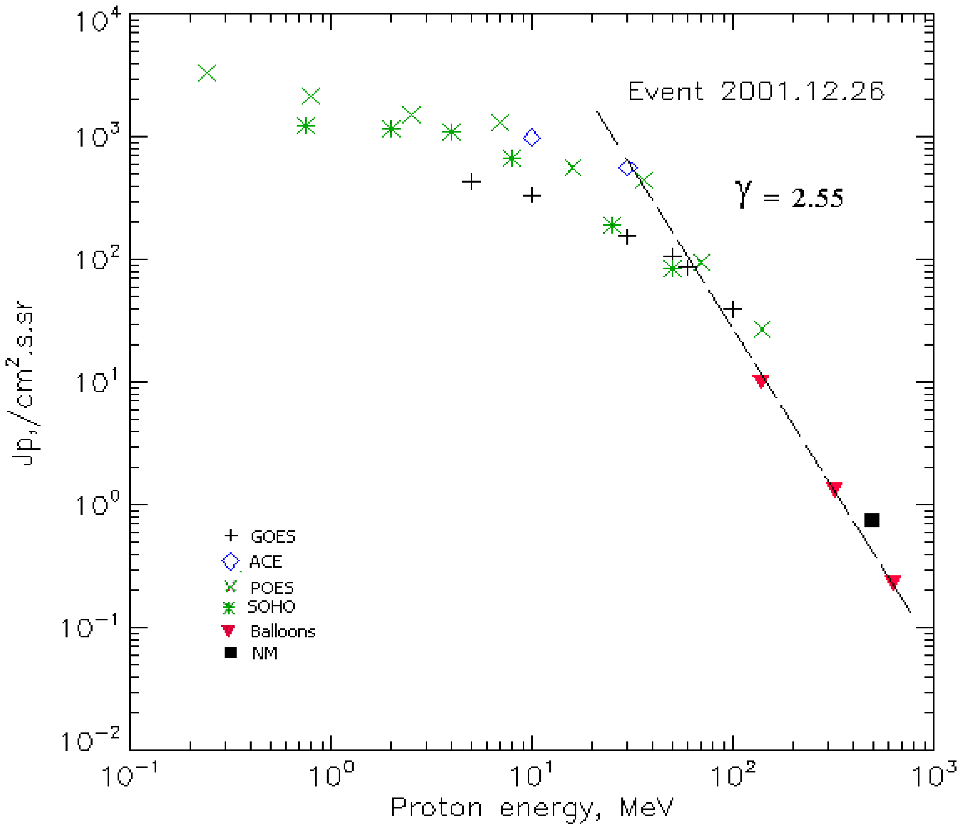
Time profiles of the proton fluxes for the event of 2001 December 26





Arrows on the profiles of the events indicate the time of the proton flux maxima, taken to build the proton spectra (see below)

Integral time-of-maximum proton spectrum



Integral fluxes of protons for the event of 2001 December 26

S/c, Instruments	Ep, MeV	To	Tmax	Jmax, /cm^2.s.sr	Dura-tion	Comments
GOES-10						
EPS	>5	05^h	11^h	432	3d	
EPS	>10	05^h	11^h	340	3d	
EPS	>30	05^h	07^h	154	3d	
EPS	>50	05^h	07^h	106	3d	
EPS	>60	05^h	07^h	86	2.5d	
EPS	>100	05^h	07^h	40	2d	
POES 16						
MEPED	>0.24	05^h	07^h	3350	3d	
MEPED	>0.8	05^h	07^h	2150	3d	
MEPED	>2.5	05^h	07^h	1500	3d	
MEPED	>6.9	05^h	07^h	1300	3d	
MEPED	>16	05^h	07^h	563	3d	
MEPED	>36	05^h	07^h	448	3d	
MEPED	>70	05^h	07^h	94	2d	
MEPED	>140	05^h	07^h	27	2d	
ACE						
SIS	>10	05^h	09^h	987	2.5d	
SIS	>30	05^h	07^h	565	2d	
SOHO						
EPHIN (INT)	>50	05^h	07^h	84	2d	

BALLOONS						
Mu	>139		07^h07^m -08^h44^m	9.9		
Mu	>323		07^h07^m -08^h44^m	1.31		
Mu	>633		07^h07^m -08^h44^m	0.23		
NM						
Network	>500		07^h	0.74		

Differential fluxes of protons for the event of 2001 December 26

S/c, instruments	ΔE, MeV	To	Tmax	Jmax. /cm^2.s.sr.MeV	Dura-tion	Comments
SOHO						
LION	0.75-2	05^h	12^h	29.4	3d	
LION	2-6	05^h	12^h	17.3	3d	
EPHIN	4-8	05^h	11^h	107	3d	
EPHIN	8-25	05^h	11^h	28.2	3d	
EPHIN	25-41	05^h	09^h	4.7	2.5d	
EPHIN	41-53	- " -	- " -	- " -	- " -	

References:

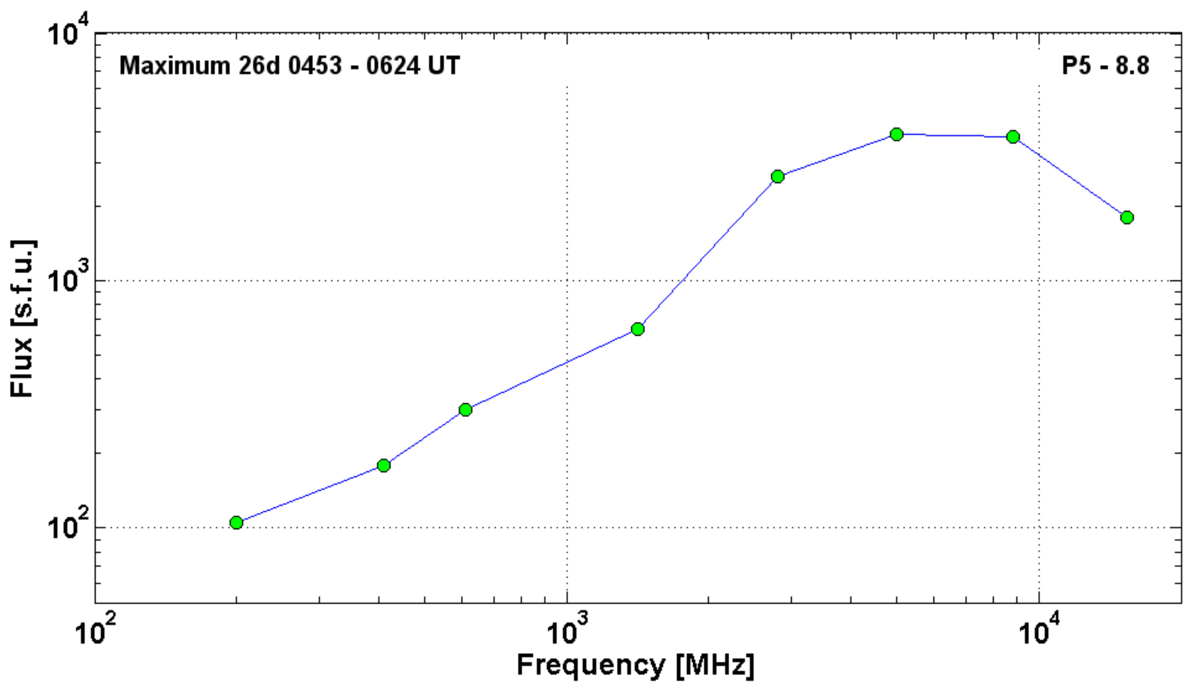
Struminsky A.B, 2003.
Kuwabara T., J.W. Bieber, J. Clem et al., 2006.
Miroshnichenko L.I. and J. Perez-Peraza, 2008.

Electromagnetic and other phenomena that are sources and/or accompanying for the event of 2001 December 26

2001 December 26 • AR9742 To event 410

Hα		0432	0514	0823	N08W54	1B	EPT
1 – 12	keV	0432	0540	0647		M7.1	3.4E-01
15.4	GHz	0453.0	0507.0	0642.0		3.26	
8.8	GHz	0439.0	0512.0	0706.0		3.58	
5	GHz	0435.0	0512.0	0700.0	P5 - 8.8	3.59	
2.8	GHz	0430.0	0514.0	0644.0		3.42	
1.4	GHz	0447.0	0514.0	0648.0		2.81	

610	MHz	0501.0	0624.0	0644.0		2.48	
410	MHz	0455.0	0557.0	0643.0		2.26	
200	MHz	0446.0	0453.0	0659.0		2.02	
DS II	25-180	0502		0519		3	
DS IV	57-1000	0501		>0810		2	
DS IV	25-180	0520		1049		3	
DS I	60-270	<0652		~1200	N	2	
DS III	57-250	0455		0511	G	2	
DS III	25-72	0557		0557		3	
CME	WL	0530	1446 km/s	-39.9 km/s^2	212˚	266˚	

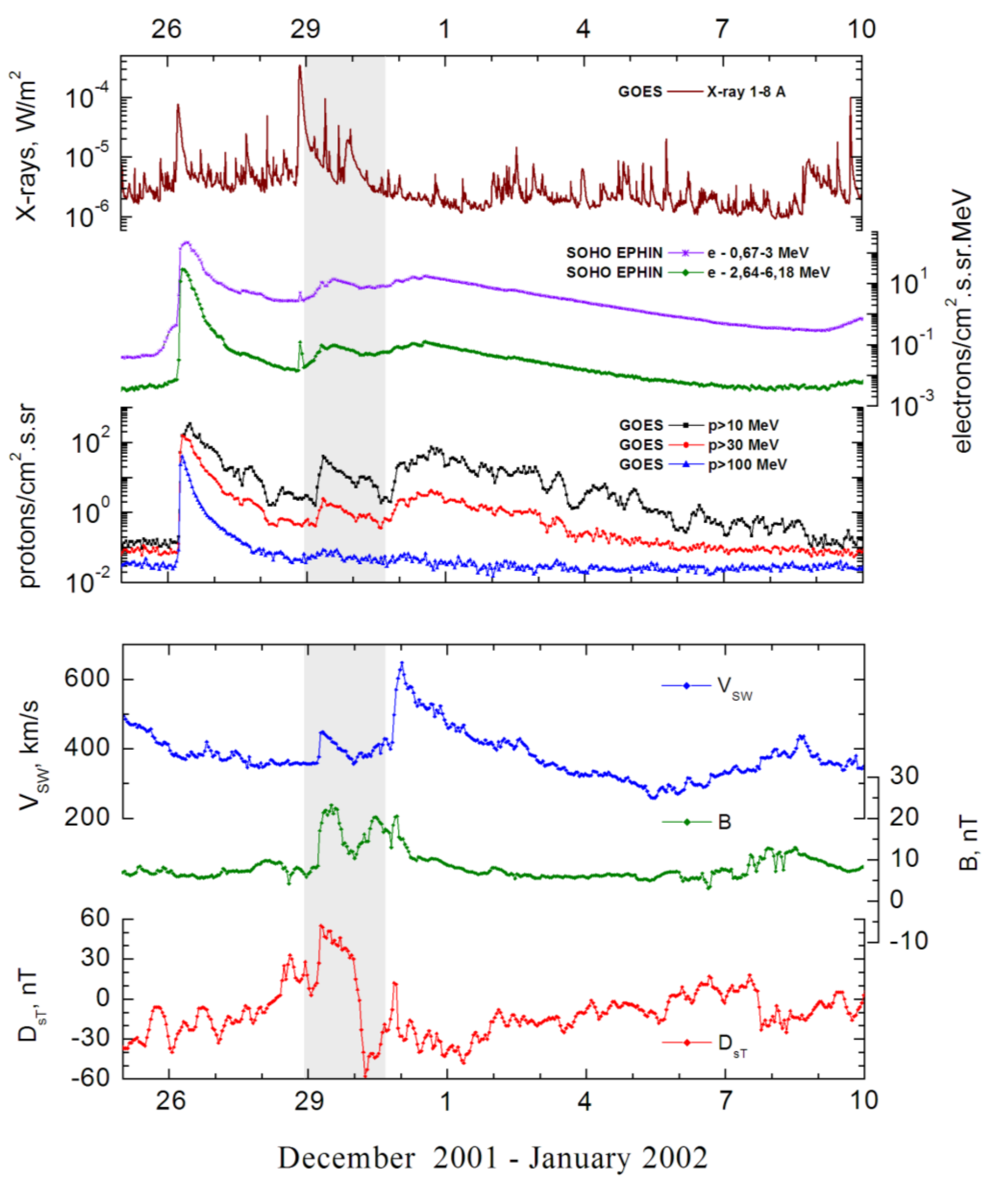


Event 2001.12.29 – (2001-363) **№ 411**

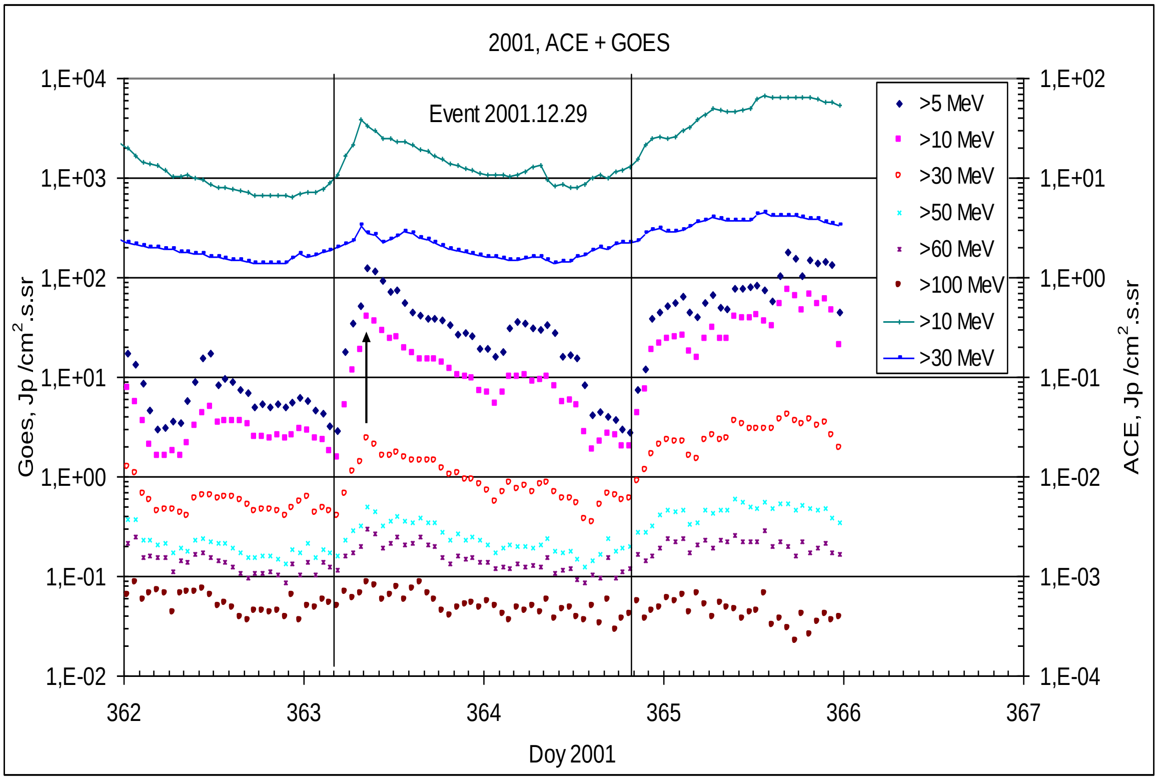
Particle event: To(Ep>10 MeV) – 29d05^h
Tmax(Ep>10 MeV) – 29d08^h, Jmax (Ep>10 MeV) – 40 /cm^2.s.sr
Duration of the event – 1.5 days
Quasimaximal energy of protons in the event – Eqm = 195 MeV

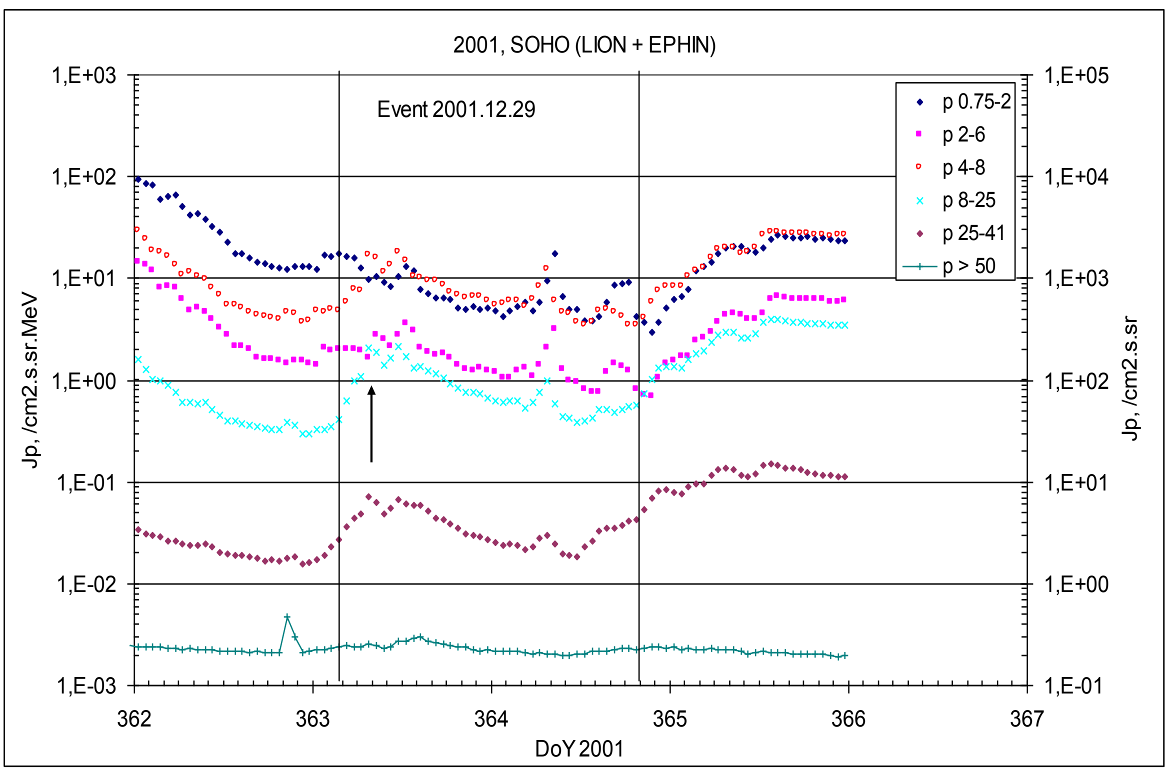
Sources: ■ solar flare 28d20^{h}02^m, X3.4/…, s26e90, AR9767*
Ø solar flare 28d09^{h}38^m, M9.3/…, S08W88, AR9748
Main X-ray burst 1-8 Å: onset – 28d20^{h}02^m, max – 28d20^{h}45^m, Φ = 1.3 J/m^2
CME: 28d20^{h}30^m, V=2216 km/s, Δφ = 360^o, dA = 115^o;
▲SC 29d05^{h}38^m
* − probable localization of the flare event

Particle fluxes and associated phenomena



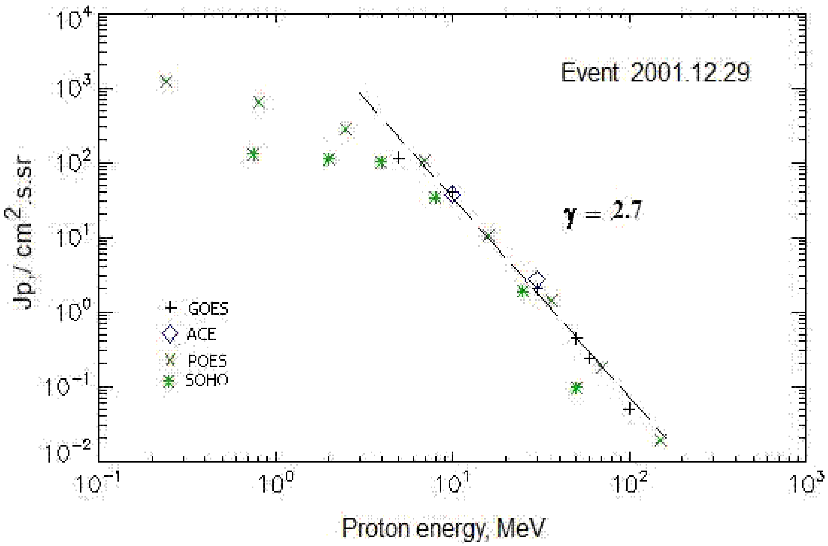
Time profiles of the proton fluxes for the event of 2001 December 29





Arrows on the profiles of the events indicate the time of the proton flux maxima, taken to build the proton spectra (see below)

Integral time-of-maximum proton spectrum



Integral fluxes of protons for the event of 2001 December 29

S/c, instruments	Ep, MeV	To	Tmax	Jmax, /cm^2.s.sr	Dura-tion	Comments
GOES-10						
EPS	>5	05^h	08^h	115	1.5d	
EPS	>10	05^h	08^h	40	1.5d	
EPS	>30	05^h	08^h	2	1.5d	
EPS	>50	05^h	08^h	0.44	1d	
EPS	>60	05^h	08^h	0.24	1d	
EPS	>100	05^h	08^h	0.05	1d	
POES-16						
MEPED	>0.24	04^h	09^h	1200	1.5d	
MEPED	>0.8	04^h	09^h	640	1.5d	
MEPED	>2.5	04^h	09^h	274	1.5d	
MEPED	>6.9	04^h	09^h	106	1.5d	
MEPED	>16	04^h	09^h	10.7	1.5d	
MEPED	>36	04^h	09^h	1.4	1d	
MEPED	>70	04^h	09^h	0.18	1d	
MEPED	>140	04^h	09^h	0.018	1d	
ACE						
SIS	>10	03^h	08^h	37.7	1.5d	
SIS	>30	04^h	08^h	2.7	1d	
SOHO						
EPHIN (INT)	>50	01^h	07^h	0.08	1d	

Differential fluxes of protons for the event of 2001 December 29

S/c, instruments	ΔE, MeV	To	Tmax	Jmax. /cm^2.s.sr.MeV	Dura-tion	Comments
SOHO						
LION	0.75-2	02^h	08^h	10.6	1.5d	
LION	2-6	02^h	08^h	2.7	1.5d	

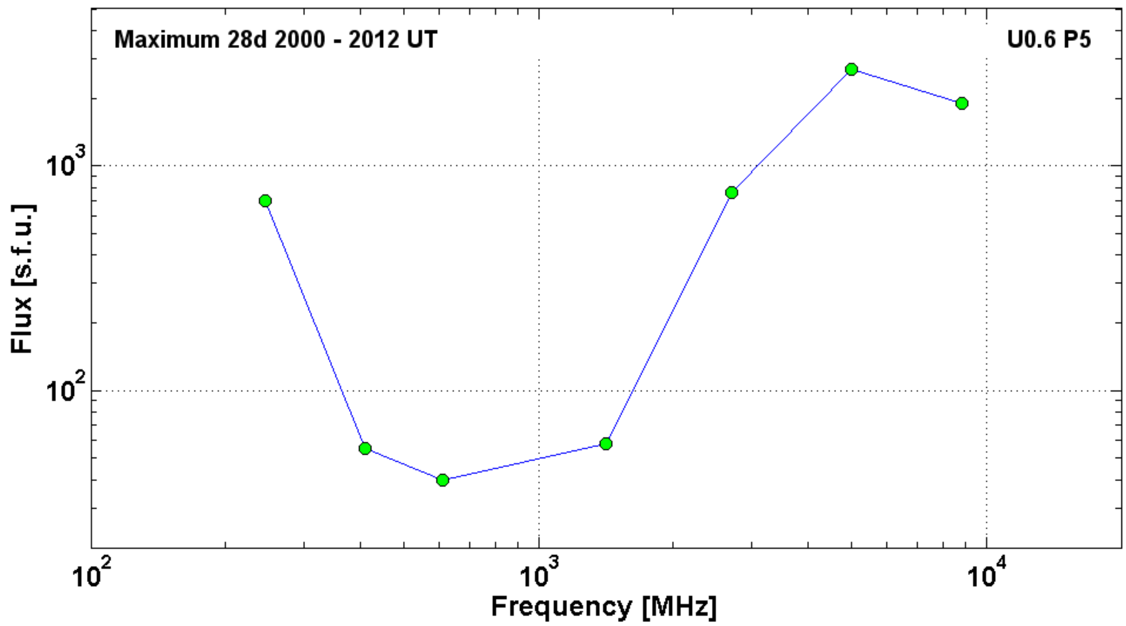
EPHIN	4-8	02^h	08^h	16.8	1d	
EPHIN	8-25	01^h	07^h	1.9	1d	
EPHIN	25-41	01^h	07^h	0.07	1d	
EPHIN	41-53	- “ -	- “ -	- “ -	- “ -	

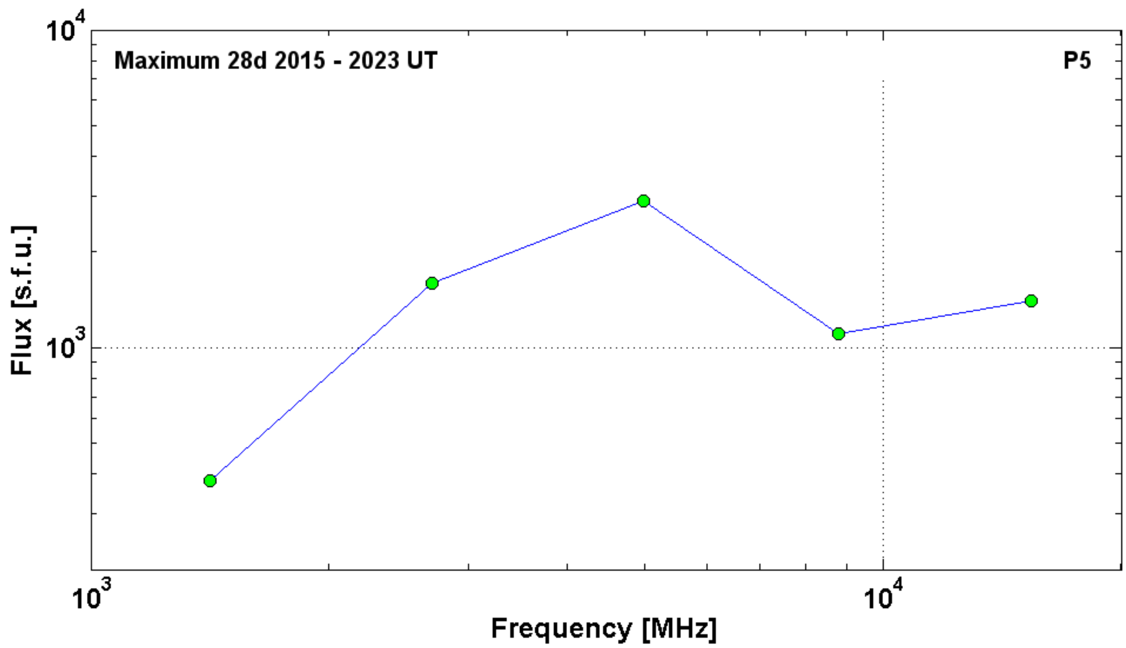
Electromagnetic and other phenomena that are sources and/or accompanying for the event of 2001 December 29

2001 December 28 ■ AR9767 To event 411

Hα	6563 Å	No Flare			s26e90*		
1 – 12	keV	2002	2045	2132		X3.4	1.3E00
8.8	GHz	1950.0	2004.0	2021.0		3.28	
5	GHz	1946.0	2004.0	2024.0	U0.6 P5	3.43	
2.7	GHz	1942.0	2005.0	2024.0		2.88	
1.4	GHz	2011.0	2012.0	2015.0		1.76	
610	MHz	2004.0	2006.0	2007.0		1.60	
410	MHz	2003.0	2003.0	~2003.0		1.74	
245	MHz	1959.0	2000.0	2000.0		2.85	
DS II	25-180	2003		2006		2	
DS III	57-130	2005		2014	GG	3	
DS III	25-180	2007		2040	N	2	
15.4	GHz	1944.0	2017.0	2105.0		3.15	
8.8	GHz	1957.0	2015.0	2033.0		3.04	
5	GHz	1949.0	2015.0	2105.0	P5	3.46	
2.7	GHz	1946.0	2015.0	2054.0		3.20	
1.4	GHz	1949.0	2023.0	2045.0		2.58	
DS II	57-130	2018		2037	SH	3	
DS III	57-110	2015		2019	GG	3	
CME	WL	2030	2216 km/s	6.9 km/s^2	360˚	115˚	

* − probable localization of the flare event

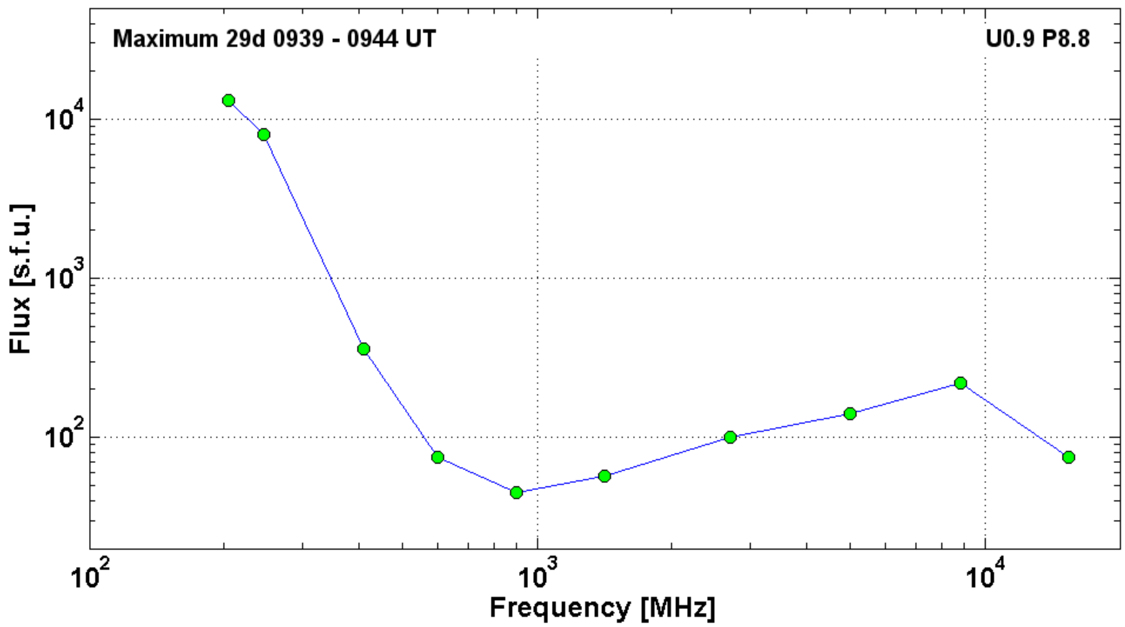




2001 December 29 Ø AR9748 To event 411

Hα	6563 Å	0941	0942	0952	S08W88	SF	
1 – 12	keV	0938	0945	1006		M9.3	1.1E-1
15.4	GHz	0939.0	0939.0	0945.0		1.88	
8.8	GHz	0939.0	0943.0	0951.0	U0.9 P8.8	2.34	
5	GHz	0939.0	0941.0	0951.0		2.15	
2.7	GHz	0939.0	0939.0	0943.0		2.00	
1.4	GHz	0939.0	0940.0	0943.0		1.76	

900	MHz	0939.3	0942.3			1.65	
600	MHz	0939.2	0942.0			1.88	
410	MHz	0940.0	0942.0	0948.0		2.56	
245	MHz	0939.0	0944.0	0946.0		3.90	
204	MHz	0943.2	0944.2	0947.5		4.11	
DS II	40-280	0943		1015		3	
DS IV	40-450	0939		1020		2	
DS III	25-180	0939		0943		3	
DS III	40-270	0943		0949	GG	2	
DS III	30-155	0950		0957	N	2	
DS V	45-165	0939		0940	G	2	
DS DCIM	2000-4500	0939		0944	G	1	
DS DCIM	800-2000	0939		0945	GG	1	
DS III/V	40-700	0939		0942	G,U	3	
CME	WL	0954	0634 km/s	-10.8 km/s^2	150˚	271˚	



Event 2001.12.30 – (2001-364) **№ 412**

Particle event: To(Ep>10 MeV) – 30d20^h

Tmax$_1$(Ep>10 MeV) – 31d02^h, Jmax$_1$(Ep>10 MeV) – 25.5 /cm^2.s.sr

Tmax$_2$(Ep>10 MeV) – 31d16^h, Jmax$_2$(Ep>10 MeV) – 75 /cm^2.s.sr

Duration of the event – 3 days

Quasimaximal energy of protons in the event – Eqm$_1$= 190 MeV

– Eqm$_2$ = 170 MeV

Sources: ⊡ solar flare 29d19^{h}50^m, M1.8/, s08w90, AR9748

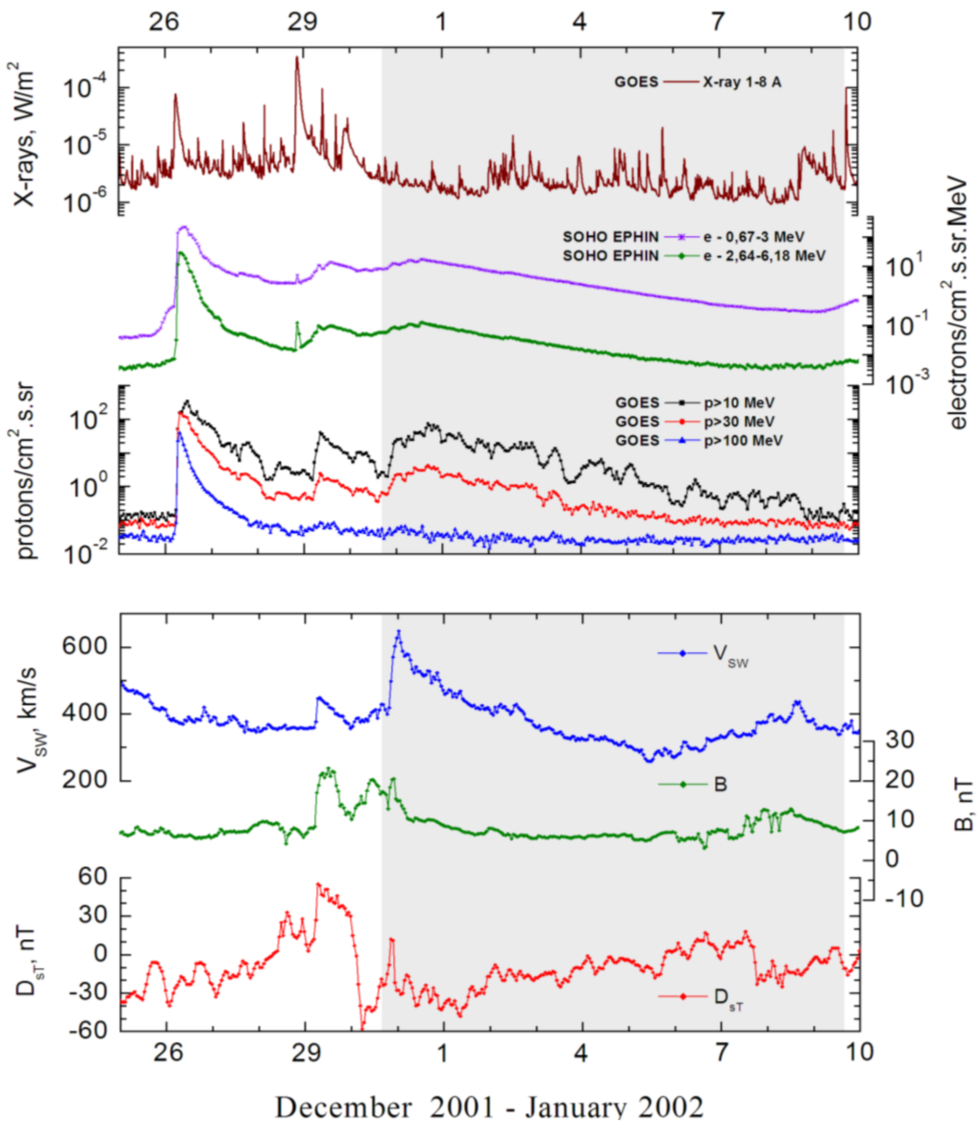
Main X-ray burst 1-8 Å: onset – 29d19^{h}50^m, max – 29d21^{h}27^m, Φ = 0.19 J/m^2

CME: 29d20^{h}30^m, V=0819 km/s, Δφ = 211^o; dA = 281^o;

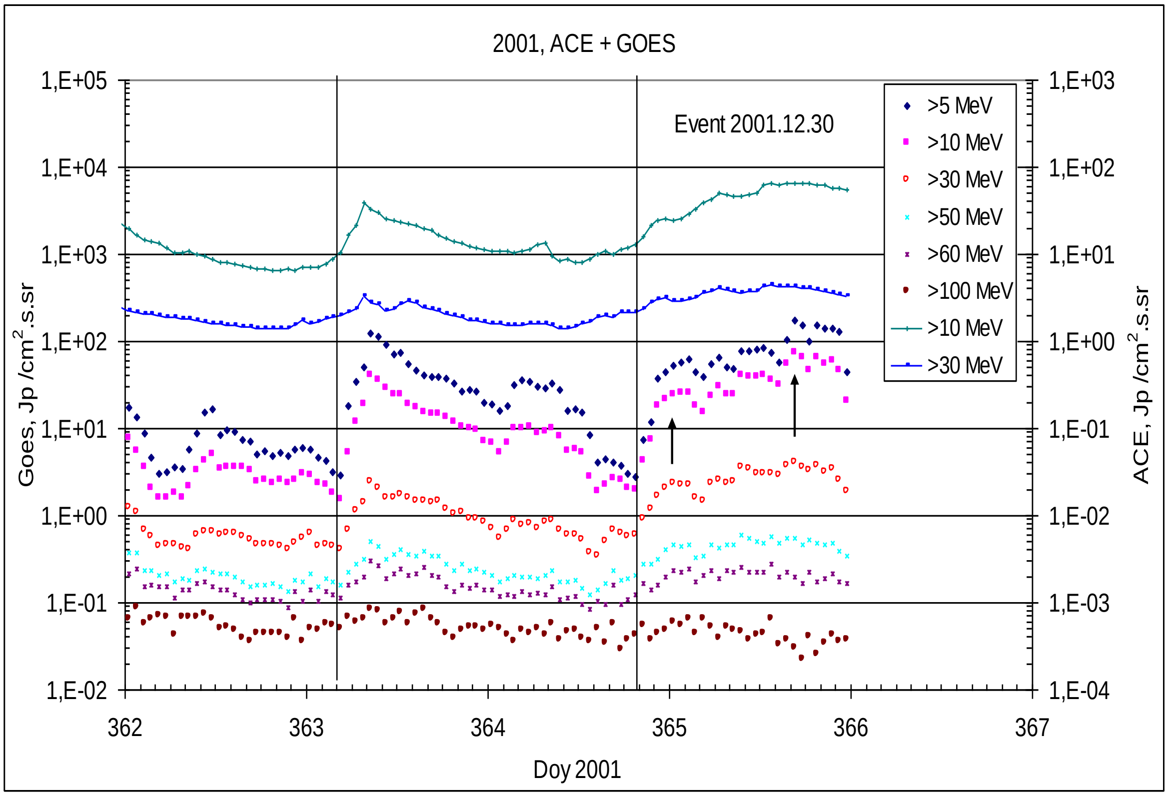
ΔSC 30d20^{h}29^m

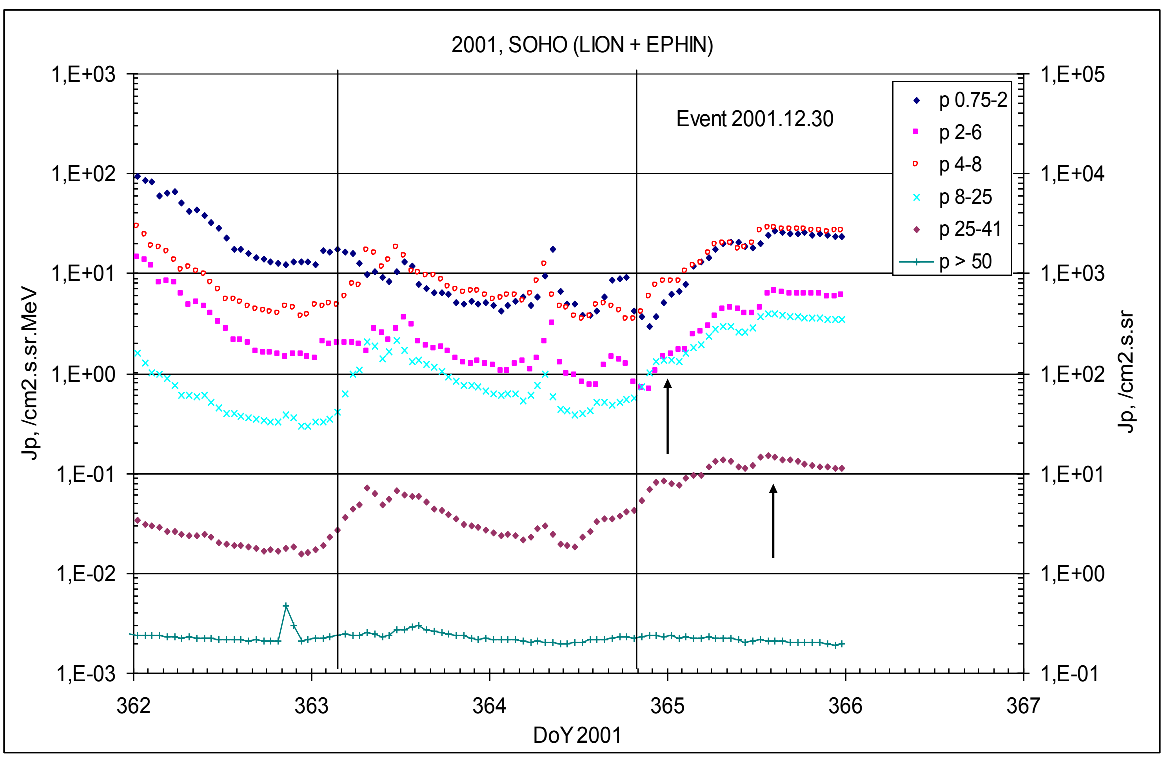
* − probable localization of the flare event

Particle fluxes and associated phenomena



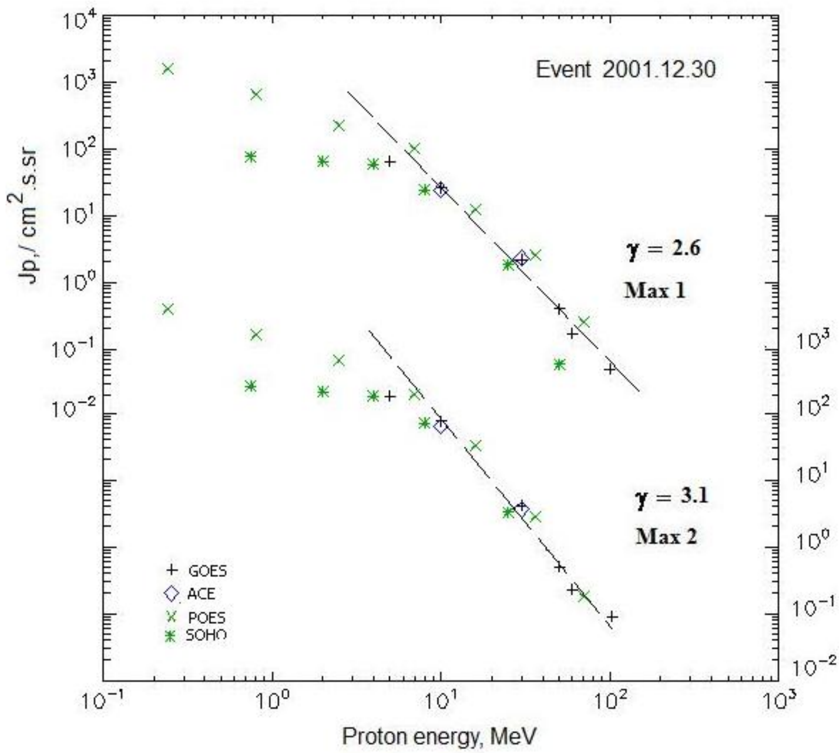
Time profiles of the proton fluxes for the event of 2001 December 30





Arrows on the profiles of the events indicate the time of the proton flux maxima, taken to build the proton spectra (see below)

Integral time-of-maximum proton spectrum



Integral fluxes of protons for the event of 2001 December 30

S/c, instruments	Ep, MeV	To	Tmax	Jmax, /cm^2.s.sr	Dura-tion	Comments
GOES-10						
EPS	>5	20^h	31d02^h/31d16^h	63.2/177	3d	
EPS	>10	20^h	31d02^h/31d16^h	25.5/75	3d	
EPS	>30	20^h	31d02^h/31d16^h	2.2/4.1	3d	
EPS	>50	20^h	31d02^h/31d16^h	0.4/0.5	3d	
EPS	>60	20^h	31d02^h/31d16^h	0.17/0.23	3d	
EPS	>100	20^h	31d02^h/31d16^h	0.05 /0.1	3d	
POES-16						
MEPED	>0.24	20^h	31d02^h/31d16^h	1830/3.6·10^3	3d	
MEPED	>0.8	20^h	31d02^h/31d16^h	625/1.5·10^3	3d	
MEPED	>2.5	20^h	31d02^h/31d16^h	220/610	3d	
MEPED	>6.9	20^h	31d02^h/31d16^h	110/194	3d	
MEPED	>16	20^h	31d02^h/31d16^h	13/32.6	3d	
MEPED	>36	20^h	31d02^h/31d16^h	2.5/2.8	3d	
MEPED	>70	20^h	31d02^h/31d16^h	0.25 /0.18	3d	
MEPED	>140	-	-	-	-	
ACE						
SIS	>10	20^h	31d00^h/31d16^h	24/63.4	3d	
SIS	>30	20^h	31d00^h/31d16^h	2.3 /3.6	3d	
SOHO						
EPHIN (INT)	>50	-	31d00^h/ -	0.06/ -	-	

Differential fluxes of protons for the event of 2001 December 30

S/c, instruments	ΔE, MeV	To	Tmax	Jmax. /cm^2.s.sr.MeV	Dura-tion	Comments
SOHO						
LION	0.75-2	22^h	31d02^h/31d15^h	6.7/25.7	3d	
LION	2-6	20^h	31d02^h/31d15^h	1.7/6.4	3d	
EPHIN	4-8	21^h	31d02^h/31d15^h	8.4/27.6	3d	
EPHIN	8-25	20^h	31d02^h/31d14^h	1.3/3.9	3d	
EPHIN	25-41	20^h	31d02^h/31d14^h	0.08/0.15	3d	
EPHIN	41-53	- " -	- " -	- " -	- " -	

References:

Kuwabara T., J.W. Bieber, J. Clem et al., 2006.

Electromagnetic and other phenomena that are sources and/or accompanying for the event of 2001 December 30

2001 December 29 ⊡ AR9767 To event 412

Hα	6563 Å	No	Flare	Patrol	s08w90*		
1 – 12	keV	1950	2127	2355		M1.8	1.9E-01
410	MHz	2007.0	2009.0	2010.0		2.30	
DS I	70-170	2013		2228	S	1	
DS III	57-180	2140		2148	G	1	
DS CONT	78-180	2158		0538		1	
CME	WL	2030	0819 km/s	9.3 km/s^2	211°	281°	

* − probable localization of the flare event

События 2002 г.

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1. Event 2002.01.10 – (2002-010) № 413 415
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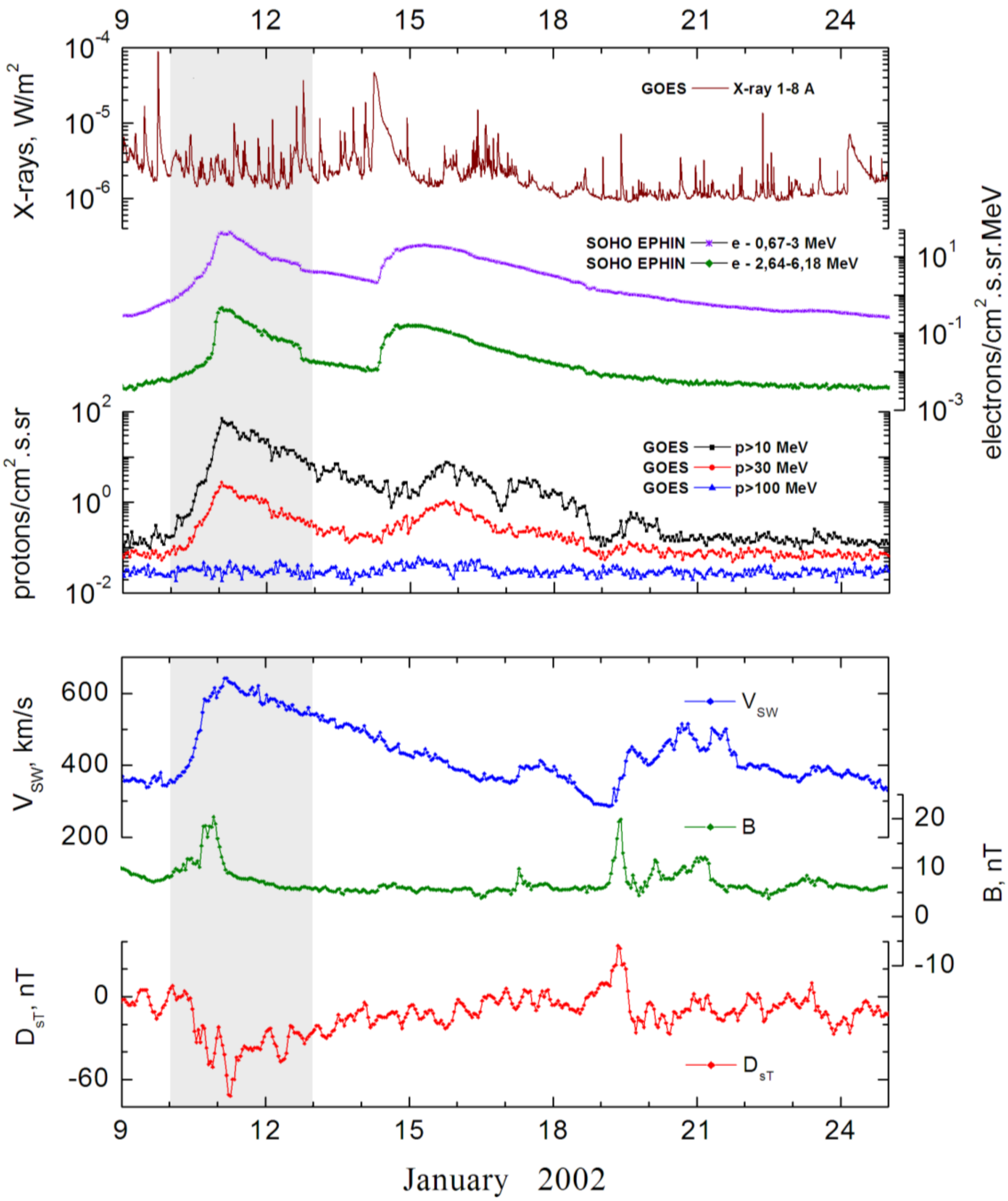
23. Event 2002.11.09 – (2002-313) № 435 522

Event 2002.01.10 – (2002-010) **№ 413**

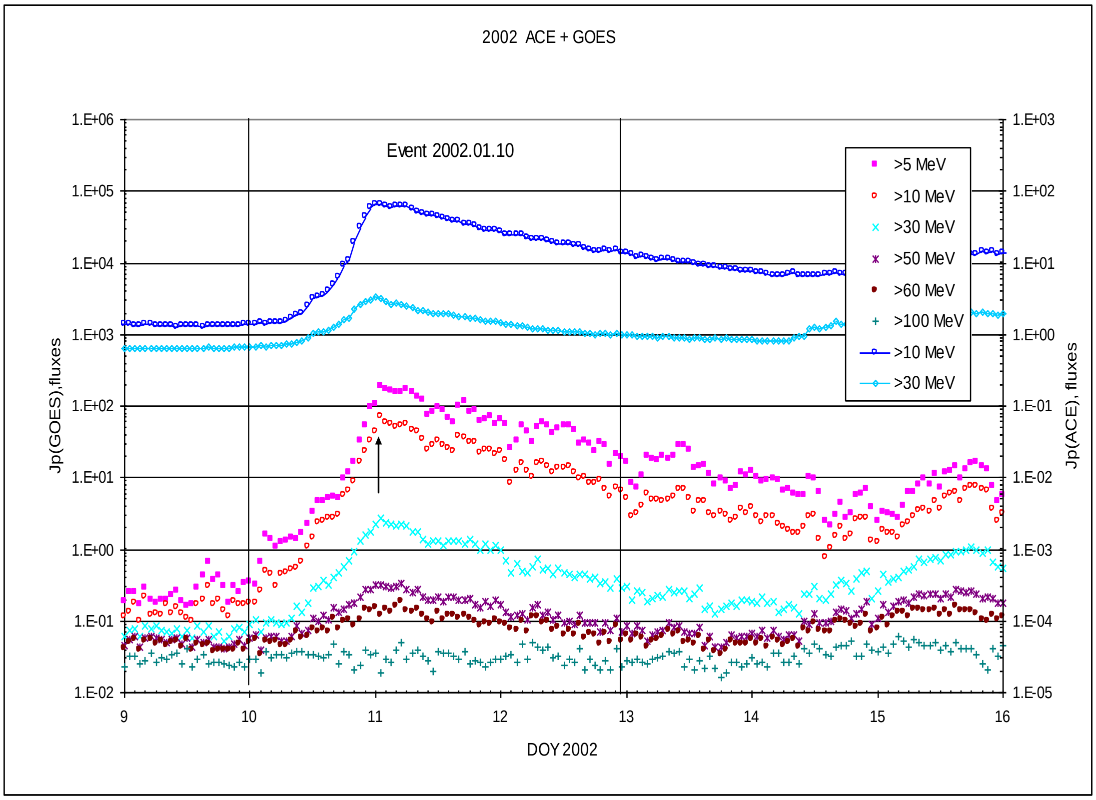
Particle event: To(Ep>10MeV) – 10d02^h
Tmax(Ep>10MeV) – 11d01^h, Jmax(Ep>10MeV) – 70 /cm^2.s.sr
Duration of the event – 3 days
Quasimaximal energy of protons in the event – Eqm = 85 MeV

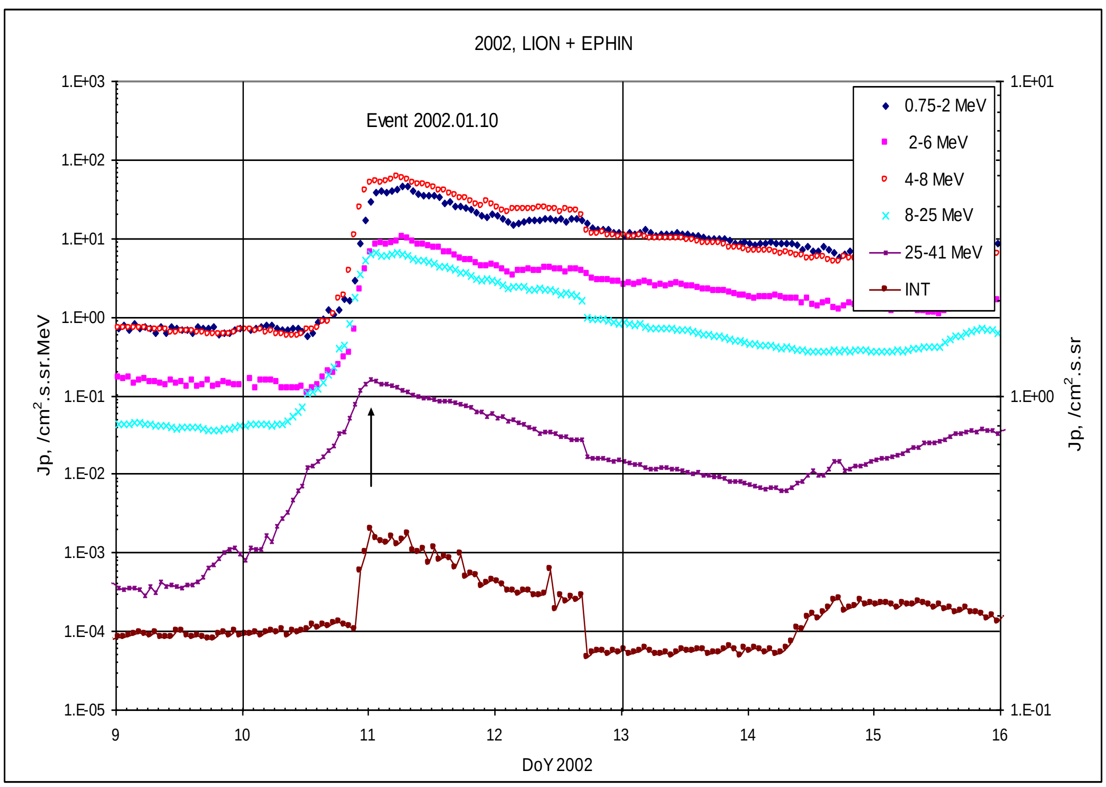
Sources: ☉ solar flare 09d17^{h}42^m, M9.5/2B, N13W02, AR9773
Main X-ray burst 1-8 Å: onset – 09d17^{h}42^m, max – 09d18^{h}01^m, Φ = 0.091 J/m^2
CME: 09d18^{h}54^m, V = 0113 km/s, Δφ = 026^o, dA = 353^o

Particle fluxes and associated phenomena



Time profiles of the proton fluxes for the event of 2002 January 10





Arrows on the profiles of the events indicate the time of the proton flux maxima, taken to build the proton spectra (see below)

Integral time-of-maximum proton spectrum

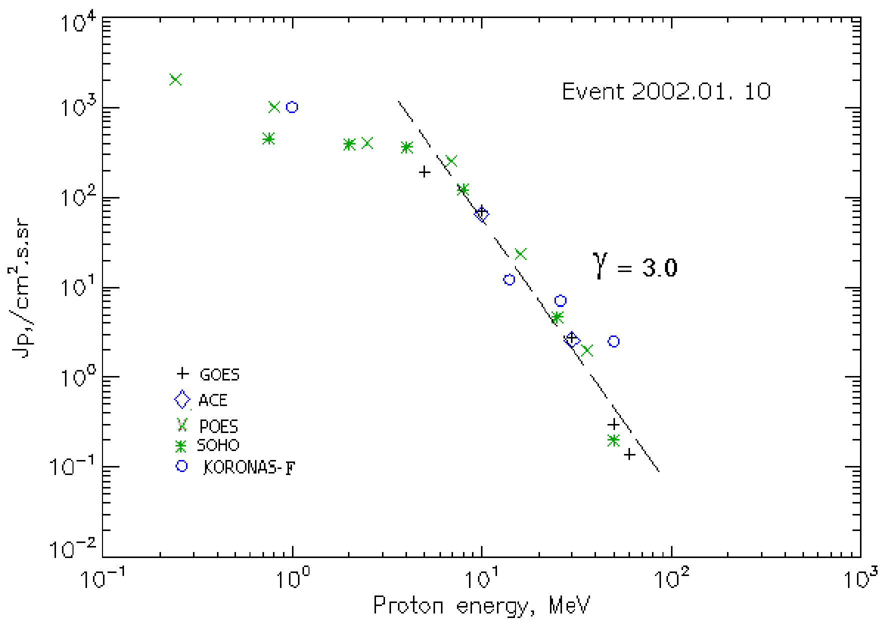


Table of the fluxes integral of proton for the event 2002 January 10

S/c, instru-ments	Ep, MeV	To	Tmax	Jmax, $(cm^2.s.sr)^{-1}$	Dura-tion	Comments
GOES 10						
EPS	>5	02^h	$11d01^h$	190	3d	
EPS	>10	02^h	$11d01^h$	70	3d	
EPS	>30	02^h	$11d01^h$	2.8	3d	
EPS	>50	-	$11d00^h$	0.27	3d	
EPS	>60	-	$11d00^h$	0.14	3d	
POES 16						
MEPED	>0.24	-	$11d05^h$	2080	3d	
MEPED	>0.8	-	$11d05^h$	970	3d	
MEPED	>2.5	-	$11d04^h$	410	3d	
MEPED	>6.9	-	$11d03^h$	250	3d	
MEPED	>16	-	$11d02^h$	23	3d	
MEPED	>36	-	$11d02^h$	2	3d	
MEPED	>70	-	-	-	-	
MEPED	>140	-	-	-	-	
CORONAS F						
MKL	>1	-	$11d02^h$	1020	3d	
MKL	>14	-	$11d01^h$	12	3d	
MKL	>26	-	$11d01^h$	7	3d	
MKL	>50	-	$11d01^h$	2.5	3d	
ACE						
SIS	>10	08^h	$11d00^h$	63	3d	
SIS	>30	08^h	$11d00^h$	2.6	3d	
SOHO						
EPHIN (INT)	>50	22^h	$11d\ 04^h$	0.2	1d	

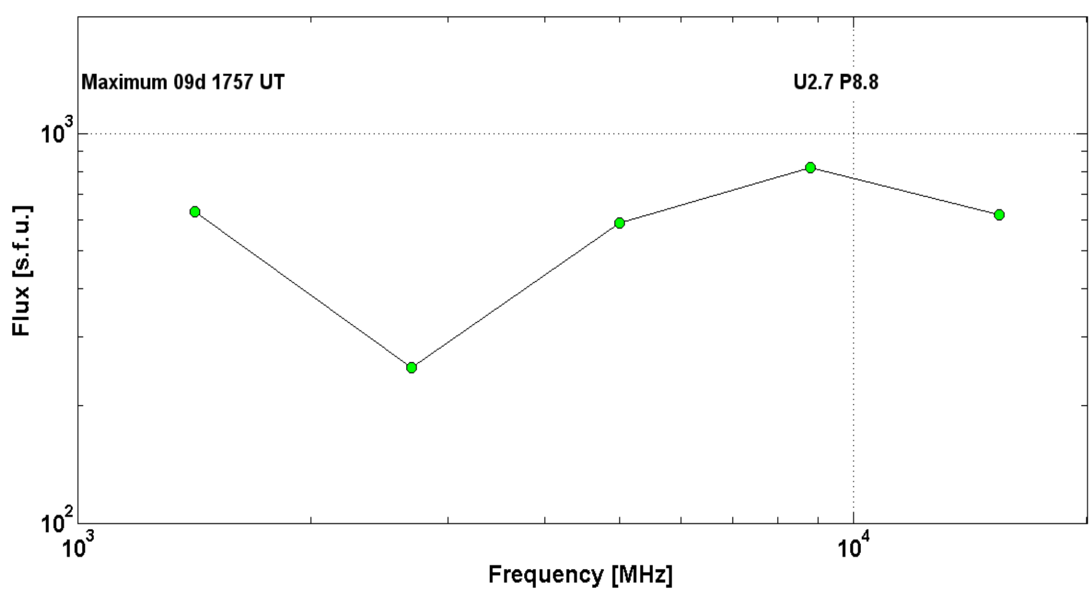
Fluxes differential of proton for the event 2002 January 10

S/c, instruments	ΔE, MeV	To	Tmax	Jmax, $(cm^2.s.sr.MeV)^{-1}$	Dura-tion	Comments
SOHO						
LION	0.75-2	14^h	$11d06^h$	46.2	3d	
LION	2-6	14^h	$11d06^h$	10.4	3d	
EPHIN	4-8	14^h	$11d05^h$	60.6	3d	
EPHIN	8-25	14^h	$11d05^h$	6.7	2d	
EPHIN	25-41	09^h	$11d00^h$	0.16	2d	
ERHIN	41-53	- " -	- " -	- " -	- " -	

Electromagnetic and other phenomena that are sources and/or accompanying for the event of 2002 January 10

2002 January 09 ☉ AR9773 To event 413

Hα		1744	1800	1900	N13W02	2B	FU
1 – 12	keV	1742	1801	1812		M9.5	9.1E-02
15.4	GHz	1757.0	1757.0	1758.0		2.79	
8.8	GHz	1751.0	1757.0	0000.0	U2.7 P8.8	2.91	
5	GHz	1751.0	1757.0	0000.0		2.77	
2.7	GHz	1753.0	1757.0	0000.0		2.40	
1.4	GHz	1751.0	1757.0	1759.0		2.80	
DS III	25-90	1805		1806		1	
CME	WL	1854	0113 km/s	2.3 km/s^2	026°	353°	

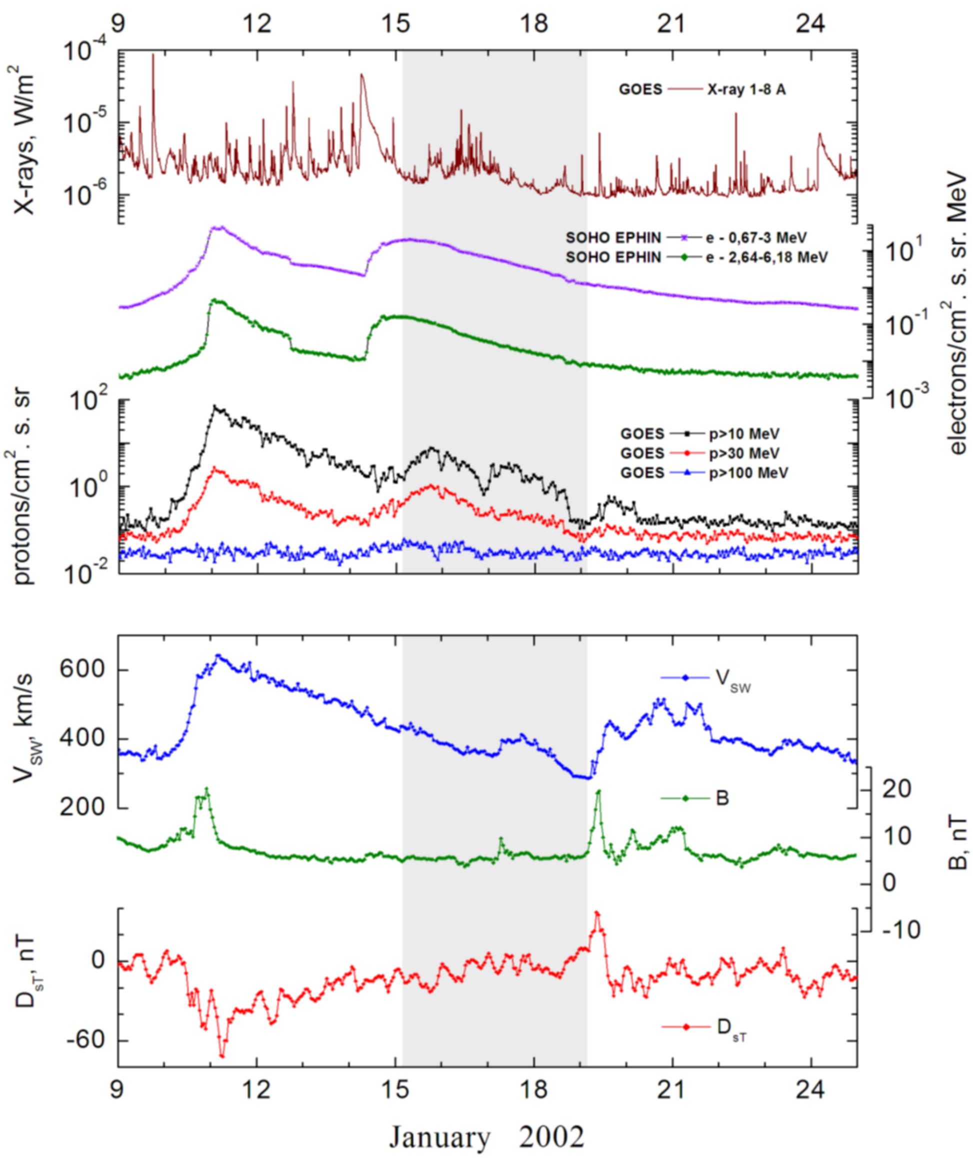


Event 2002.01.15 – (2002-015) **№ 414**

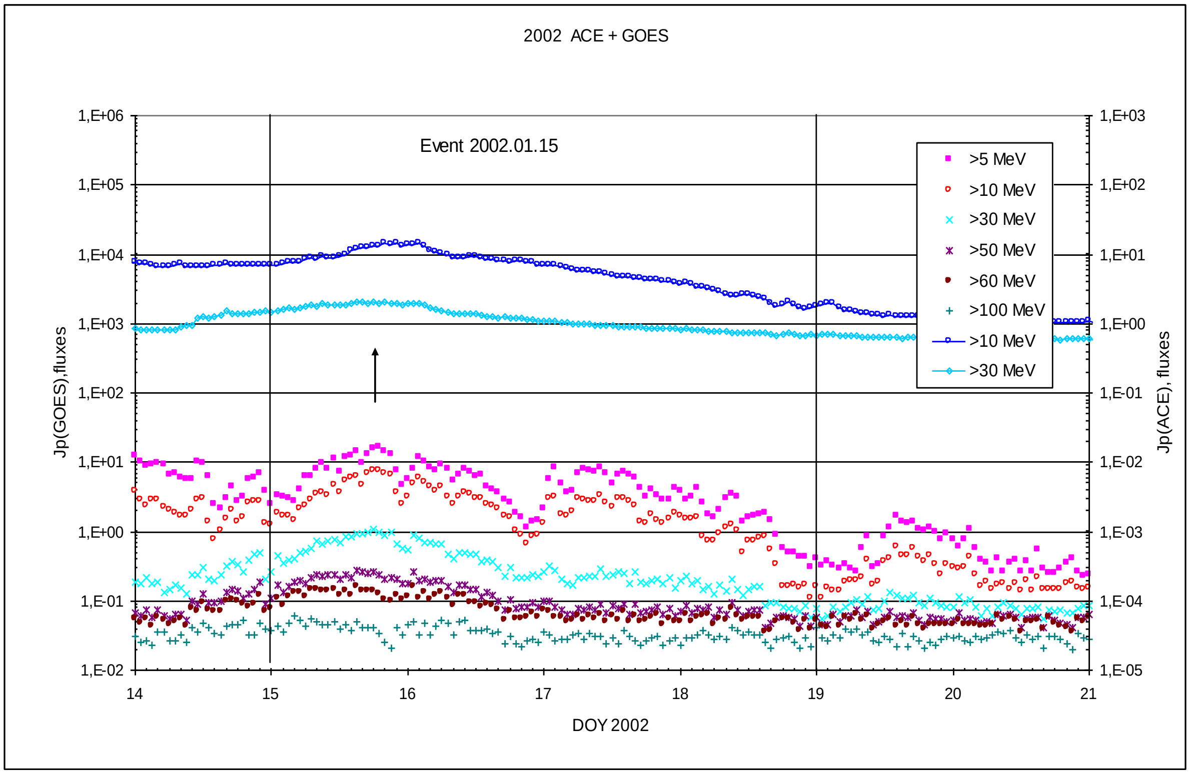
Particle event: To(Ep>10 MeV) – 15d07^{h}
Tmax(Ep>10 MeV) – 15d18^{h}, Jmax(Ep>10 MeV) – 7.5 /cm^{2}.s.sr
Duration of the event – 4 days
Quasimaximal energy of protons in the event – Eqm = 80 MeV

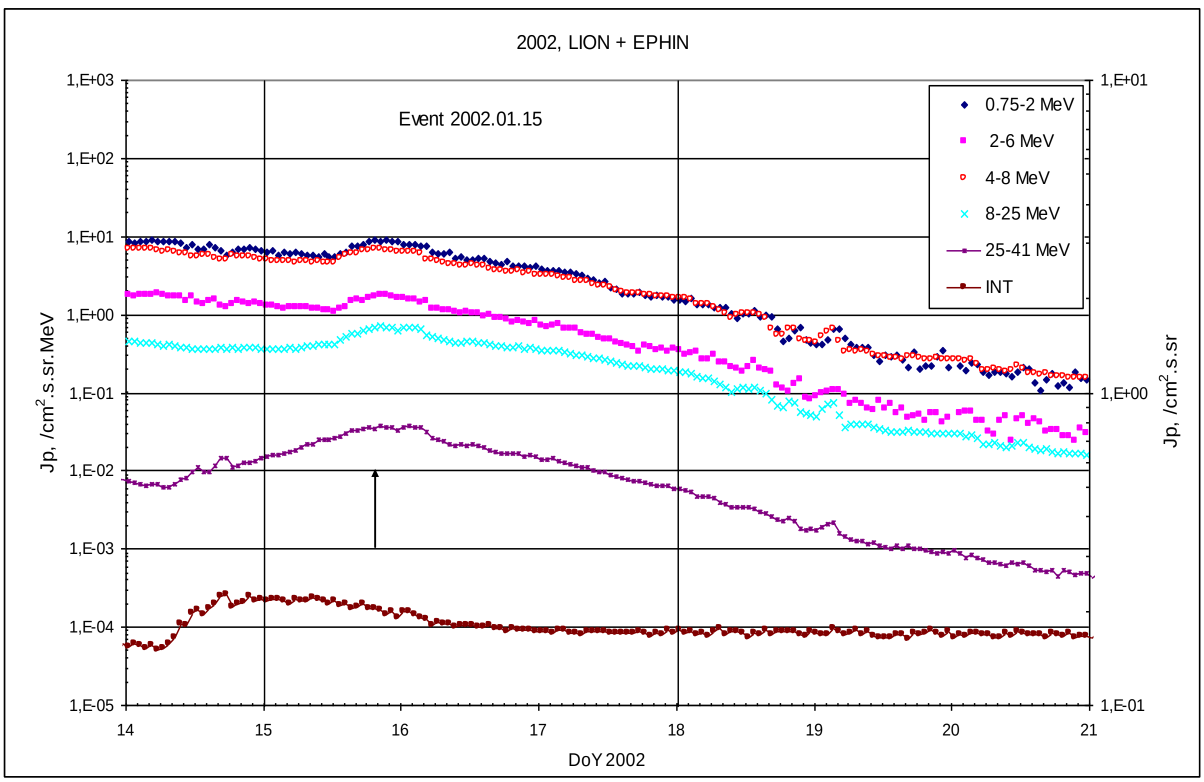
Sources: ⊡ solar flare 14d05^{h}29^{m}, M4.4/…, s23w90*, AR9767, 1.5d behind W-limb
Ø solar flare 14d01^{h}48^{m}, 2N/M1.7, N05E44, AR9782
Main X-ray burst 1-8 Å: onset – 14d05^{h}29^{m}, max – 14d06^{h}27^{m}, Φ = 0.34 J/m^{2}
CME: 14d05^{h}35^{m}; V = 1492 km/s; Δφ = 360^{o}; dA = 246^{o}
* − probable localization of the flare event

Particle fluxes and associated phenomena



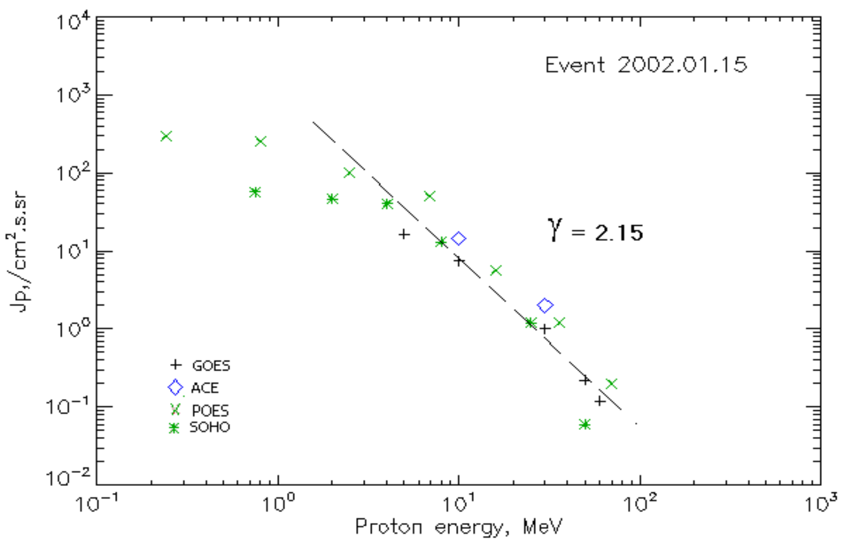
Time profiles of the proton fluxes for the event of 2002 January 15





Arrows on the profiles of the events indicate the time of the proton flux maxima, taken to build the proton spectra (see below)

Integral time-of-maximum proton spectrum



Integral fluxes of protons for the event of 2002 January 15

S/c, instruments	Ep, MeV	To	Tmax	Jmax, $(cm^2.s.sr)^{-1}$	Duration	Comments
GOES-10						
EPS	>5	07^h	19^h	16.2	4d	
EPS	>10	07^h	18^h	7.5	4d	
EPS	>30	07^h	18^h	1.0	3d	
EPS	>50	07^h	15^h	0.22	2d	
EPS	>60	-	15^h	0.12	2d	
POES-16						
MEPED	>0.24	-	22^h	310	4d	
MEPED	>0.8	-	22^h	250	4d	
MEPED	>2.5	-	22^h	105	4d	
MEPED	>6.9	-	22^h	52	3d	
MEPED	>16	-	22^h	5.7	2d	
MEPED	>36	-	21^h	1.2	2d	
MEPED	>70	-	20^h	0.2	4d	
ACE						
SIS	>10	$14d23^h$	22^h	14.5	5d	
SIS	>30	$14d11^h$	18^h	2	5d	
SOHO						
EPHIN (INT)	>50	$14d08^h$	16^h	0.06	2d	

Differential fluxes of protons for the event of 2002 January 15

S/c, instruments	ΔE, MeV	To	Tmax	Jmax, $(cm^2.s.sr.MeV)^{-1}$	Duration	Comments
SOHO						
LION	0.75-2	14^h	21^h	9.1	5d	
LION	2-6	11^h	21^h	1.8	5d	
EPHIN	4-8	13^h	20^h	6.8	5d	
EPHIN	8-25	13^h	20^h	0.7	5d	
EPHIN	25-41	$14d09^h$	20^h	0.04	5d	

Electromagnetic and other phenomena that are sources and/or accompanying for the event of 2002 January 15

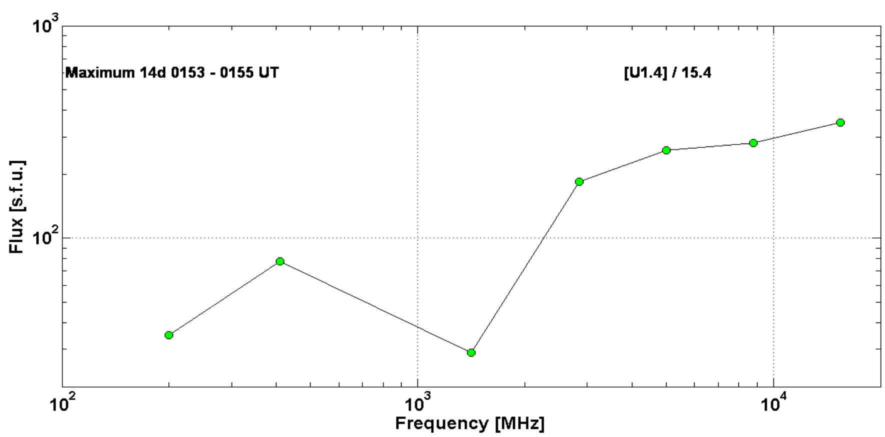
2002 January 14 ⊡ AR9767 To event 414

Hα	6563 Å	No Flare			s23w90*		
1 – 12	keV	0529	0627	0825		M4.4	3.4E-01
610	MHz	0555.0	0555.0	~0555.0		1.82	
500	MHz	0518.0	0521.0	0532.0		1.70	
245	MHz	0537.0	0540.0	0540.0		1.85	
200	MHz	0524.0	0535.0	0548.0		1.90	
DS II	85-180	0608		0611	SH	1	
DS III	30-170	0536		0643	N	1	
CME	WL	0535	1492km/s	52.3km/s^2	360˚	246˚	

* − probable localization of the flare event

2002 January 14 Ø AR9782 To event 414

Hα		0148	0155	0320	N05E44	2N	FH
1 – 12	keV	0152	0156	0203		M1.7	8.4E-03
15.4	GHz	0154.0	0155.0	0158.0	[U1.4] / 15.4	2.54	
8.8	GHz	0153.0	0155.0	0158.0		2.45	
5	GHz	0153.0	0155.0	0159.0		2.41	
2.8	GHz	0151.0	0155.4	0210.0		2.27	
1.4	GHz	0155.0	0155.0	~0155.0		1.46	
410	MHz	0153.0	0153.0	~0153.0		1.89	
200	MHz	0153.0	0153.0	0154.0		1.54	
CME	WL						gap

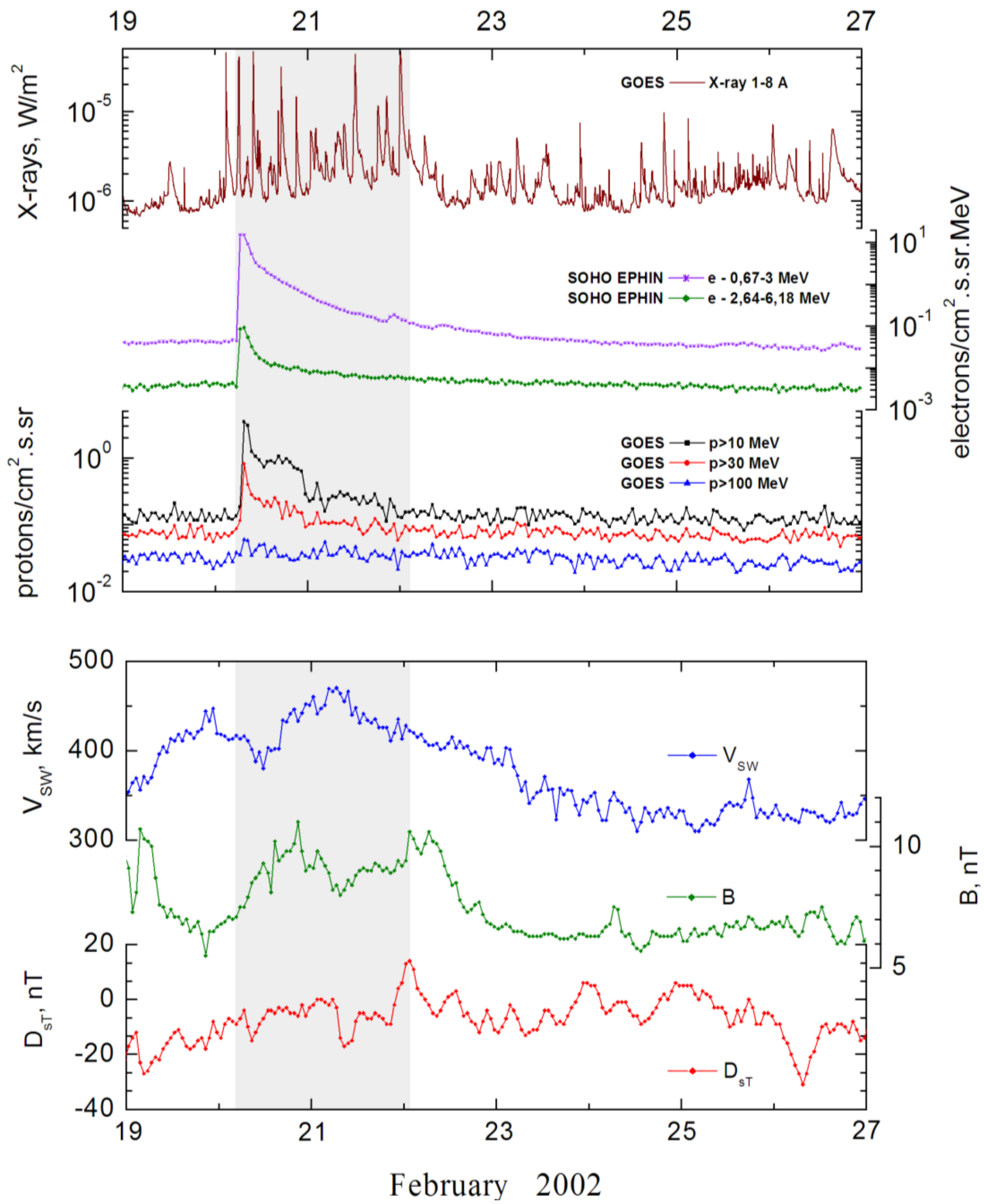


Event 2002.02.20 – (2002-051) **№ 415**

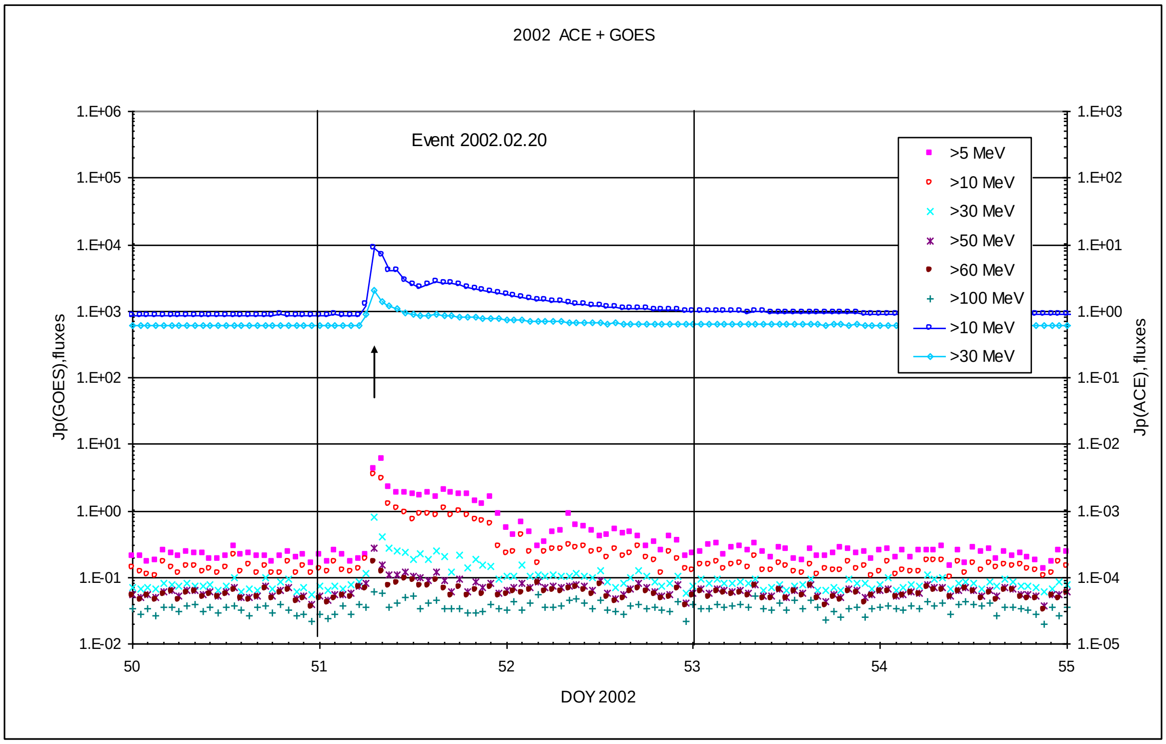
Particle event: To(Ep>10 MeV) – 20d07^h
Tmax(Ep>10 MeV) – 20d08^h, Jmax (Ep>10 MeV) – 3.3 /cm^2.s.sr
Duration of the event – 2 days
Quasimaximal energy of protons in the event – Eqm = 145 MeV

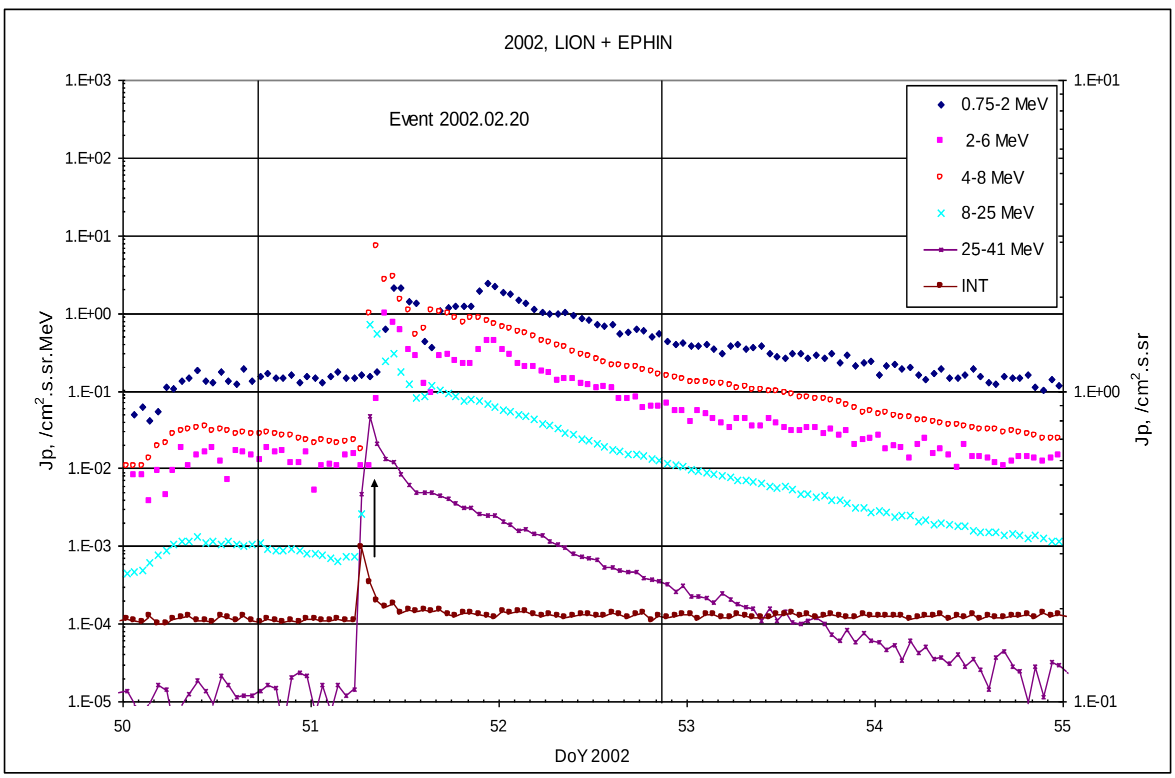
Sources: ● solar flare 20d05^{h}52^m, M5.1/1N, N12W72, AR9825
Main X-ray burst 1-8 Å: onset – 20d05^{h}52^m, max – 20d06^{h}12^m, Φ = 0.022 J/m^2
CME: 20d06^{h}30^m, V=952 km/s, Δφ = 360^o, dA = 263^o

Particle fluxes and associated phenomena



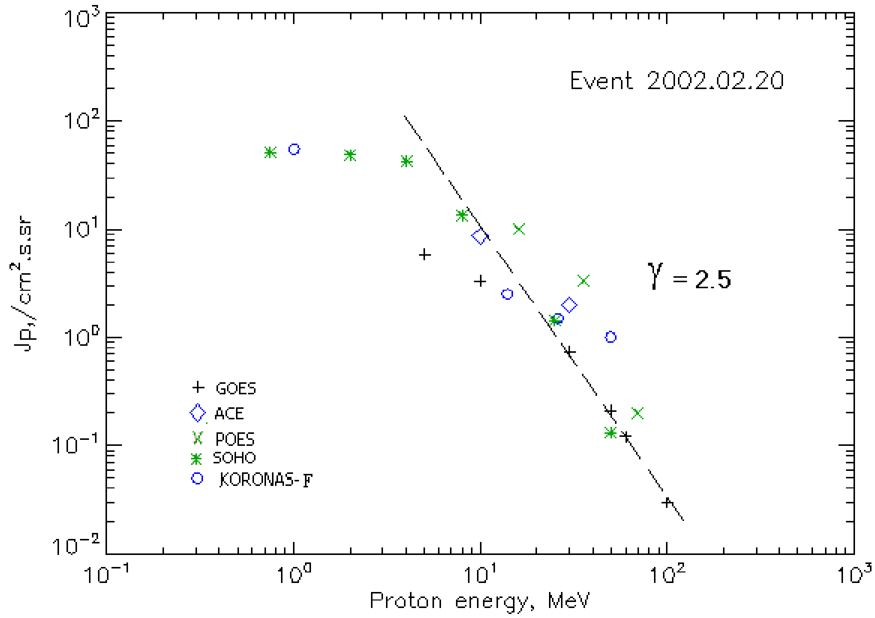
Time profiles of the proton fluxes for the event of 2002 February 20





Arrows on the profiles of the events indicate the time of the proton flux maxima, taken to build the proton spectra (see below)

Integral time-of-maximum proton spectrum



Integral fluxes of protons for the event of 2002 February 20

S/c, instruments	Ep, MeV	To	Tmax	Jmax, $(cm^2.s.sr)^{-1}$	Dura-tion	Comments
GOES-10						
EPS	>5	07^h	08^h	5.8	2d	
EPS	>10	07^h	08^h	3.3	2d	
EPS	>30	04^h	07^h	0.74	1d	
EPS	>50	02^h	07^h	0.21	1d	
EPS	>60	02^h	07^h	0.12	1d	
EPS	>100	02^h	07^h	0.03	1d	
POES-16						
MEPED	>0.24	-	-	-	-	
MEPED	>0.8	-	-	-	-	
MEPED	>2.5	-	-	-	-	
MEPED	>6.9	-	-	-	-	
MEPED	>16	-	07^h	10	1d	
MEPED	>36	-	07^h	3,3	1d	
MEPED	>70	-	07^h	0.2	1d	
MEPED	>140	-	-	-	-	
CORONAS F						
MKL	>1.	-	07^h	55	1d	
MKL	>14	-	07^h	2.5	1d	
MKL	>26	-	07^h	1.5	1d	
MKL	>50	-	07^h	1	1d	
ACE						
SIS	>10	06^h	07^h	8.6	3d	
SIS	>30	06^h	07^h	2.0	2d	
SOHO						
EPHIN (INT)	>50	02^h	06^h	0.13	0.5d	

Differential fluxes of protons for the event of 2002 February 20

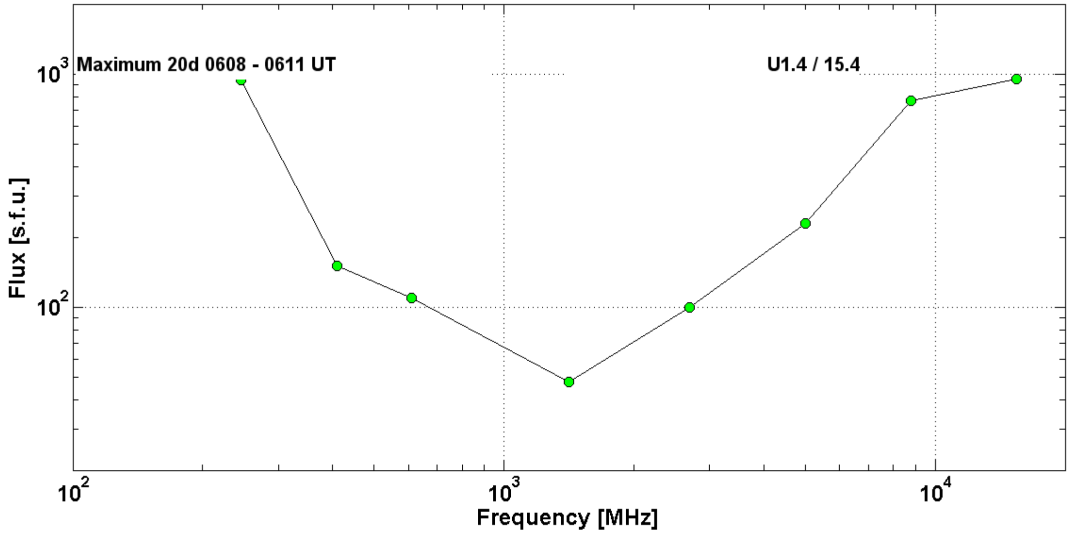
S/c, instruments	ΔE, MeV	To	Tmax	Jmax, $(cm^2.s.sr.MeV)^{-1}$	Dura-tion	Comments
SOHO						
LION	0.75-2	08^h	11^h	2.1	9d	
LION	2-6	08^h	10^h	1	9d	
EPHIN	4-8	07^h	08^h	7.1	9d	
EPHIN	8-25	06^h	07^h	0.7	9d	
EPHIN	25-41	06^h	07^h	0.046	5d	
EPHIN	41-53	- “ -	- “ -	- “ -	- “ -	

Electromagnetic and other phenomena that are sources and/or accompanying for the event of 2002 February 20

2002 February 20 ● AR9825 To event 415

Hα	6563 Å	0555	0611	0628	N12W72	1N	EF
1 – 12	keV	0552	0612	0616		M5.1	2.2E-2
12 – 25	keV	061624	061630	062912		984336	RHESSI
4–7	MeV						SONG F
15.4	GHz	0608.0	0611.0	0613.0	U1.4/15.4	2.98	
8.8	GHz	0608.0	0609.0	0612.0		2.89	
5	GHz	0608.0	0609.0	0611.0		2.36	
2.7	GHz	0606.0	0610.0	0611.0		2.00	
1.4	GHz	0608.0	0611.0	0613.0		1.68	
610	MHz	0609.0	0610.0	0611.0		2.04	
410	MHz	0608.0	0610.0	0611.0		2.18	
245	MHz	0608.0	0608.0	0610.0		2.97	
DS II	57-190	0615		0630	SH	2	
DS II	25-57	0620		0625		1	
DS IV	25-71	0621		0637		1	
DS III	25-800	0555		0558	G	3	
DS III	25-1000	0608		0615	G	3	
DS V	25-180	0555		0558		3	
DS V	25-180	0608		0610		1	

nº							Armenia(S)
CME	WL	0630	0952 km/s	–17.1 km/s^2	360˚	263˚	



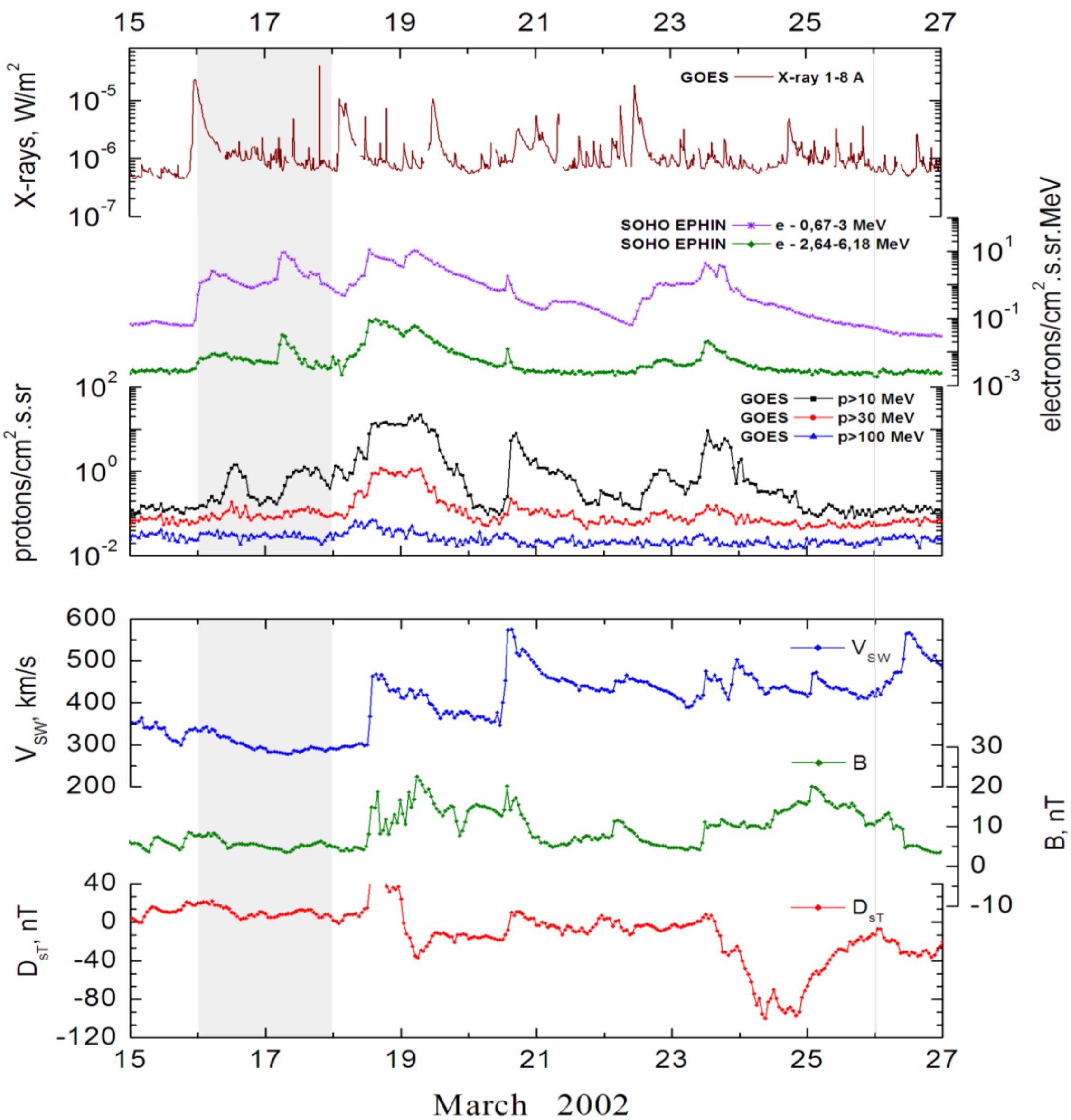
Список 2002 г.

Event 2002.03.16 – (2002-075) **№ 416**

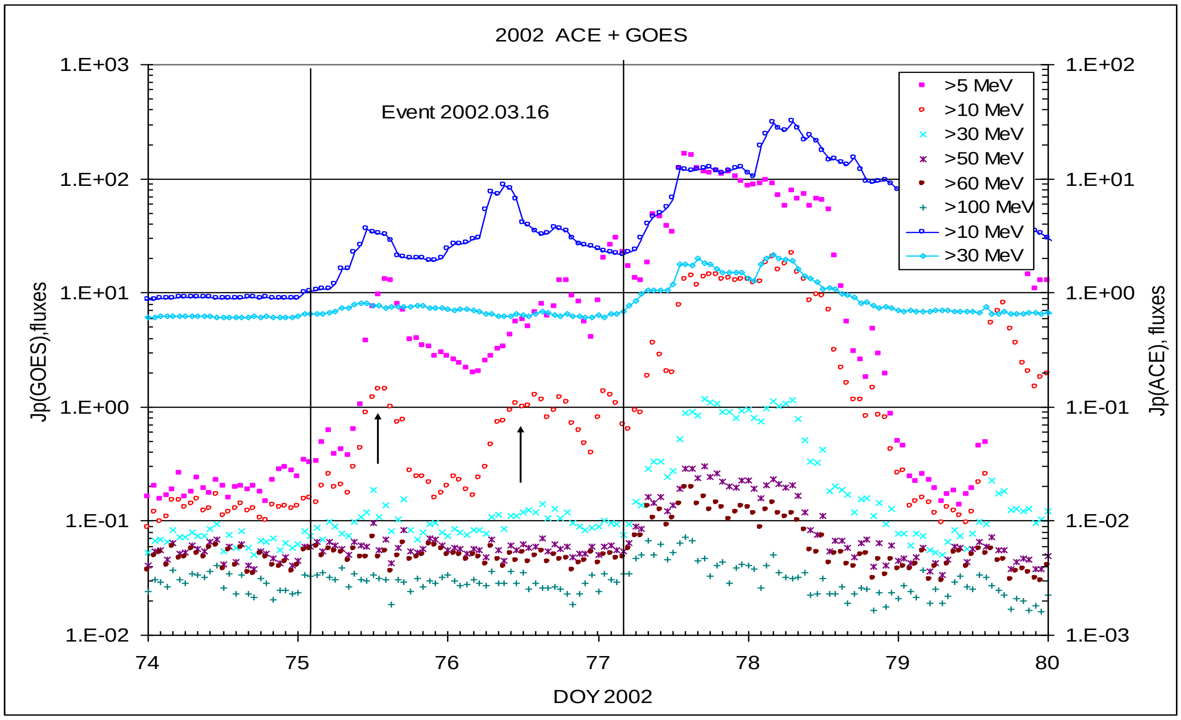
Particle event: To(Ep>10 MeV) – 16d02^h
Tmax$_1$(Ep>10 MeV) – 16d13^h, Jmax$_1$(Ep>10 MeV) –1.3 /cm^2.s.sr
Tmax$_2$(Ep>10 MeV) – 17d11^h, Jmax$_2$(Ep>10 MeV) – 1.1 /cm^2.s.sr
Duration of the event – 2 days
Quasimaximal energy of protons in the event – Eqm$_1$ = 70 MeV
– Eqm$_2$ = 65 MeV

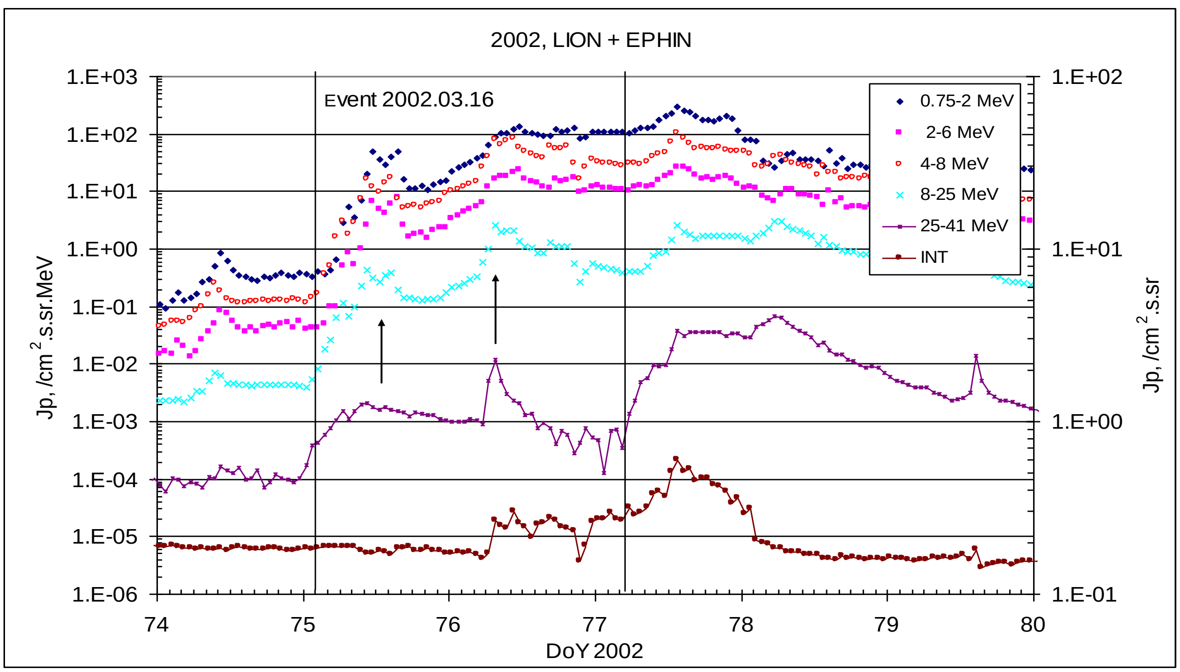
Sources: ● solar flare 15d22^{h}09^m, M2.2/1F, S08W03, AR9866
Ø solar flare 17d10^{h}11^m, M1.3/…, S22E14, AR9871
Main X-ray burst 1-8 Å: onset – 15d22^{h}09^m, max – 15d23^{h}10^m, Φ = 0.13 J/m^2
CME: 15d23^{h}06^m, V=957 km/s, Δφ = 360^o; dA = 309^o

Particle fluxes and associated phenomena



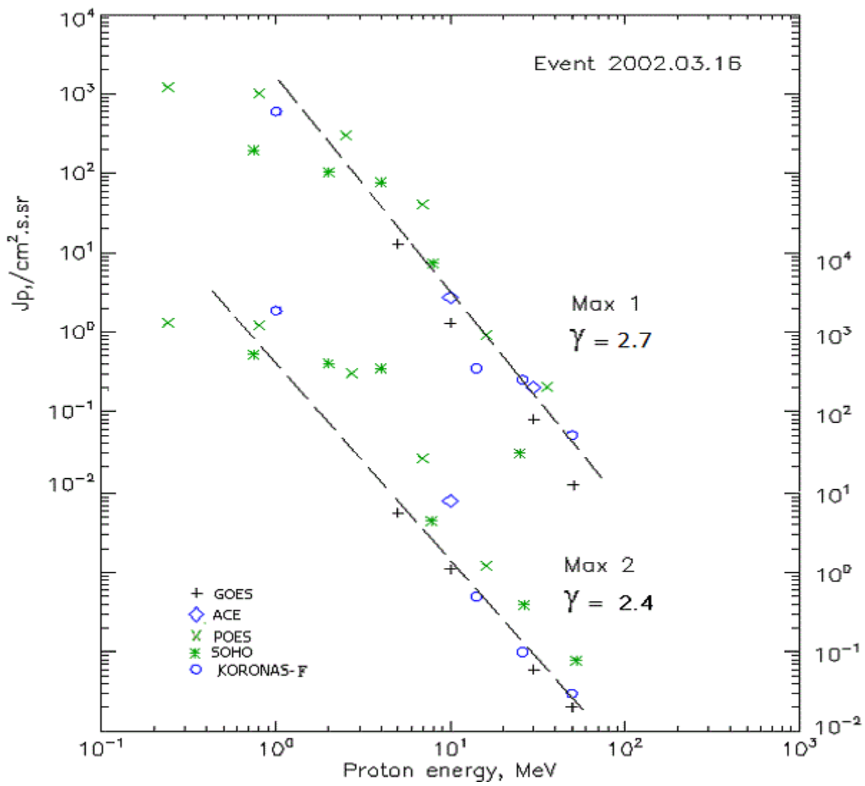
Time profiles of the proton fluxes for the event of 2002 March 16





Arrows on the profiles of the events indicate the time of the proton flux maxima, taken to build the proton spectra (see below)

Integral time-of-maximum proton spectrum



Integral fluxes of protons for the event of 2002 March 16

S/c, instruments	Ep, MeV	To	Tmax	Jmax, $(cm^2.s.sr)^{-1}$	Dura-tion	Comments
GOES-10						
EPS	>5	01^h	$14^h/17d12^h$	12.7/5.6	2d	
EPS	>10	02^h	$13^h/17d11^h$	1.3/1.1	2d	
EPS	>30	03^h	$12^h/17d11^h$	0.08/0.06	2d	
EPS	>50	-	$12^h/17d11^h$	0.01/ 0.02	2d	
EPS	>60	-	-	-	-	
EPS	>100	-	-	-	-	
POES-16						
MEPED	>0.24	-	$14^h/17d10^h$	1220/1430	2d	
MEPED	>0.8	-	$14^h/17d10^h$	1010/1360	2d	
MEPED	>2.5	-	$14^h/17d10^h$	320/630	2d	
MEPED	>6.9	-	$14^h/17d10^h$	42/54	2d	
MEPED	>16	-	$14^h/17d09^h$	0.9/1.2	2d	
MEPED	>36	-	$14^h/-$	0.2/-	2d	
MEPED	>70	-	-	-	-	
MEPED	>140	-	-	-	-	
CORONAS F						
MKL	>1.	-	$14^h/17d12^h$	600/1980	2d	
MKL	>14	-	$13^h/17d11^h$	0.35/0.5	2d	
MKL	>26	-	$12^h/17d11^h$	0.25/0.1	2d	
MKL	>50	-	$12^h/17d11^h$	0.05/0.03	2d	

ACE						
SIS	>10	01^h	$11^h/17d09^h$	2.7/8	2d	
SIS	>30	01^h	11^h/ -	0.2/ -	2d	
SOHO						
EPHIN (INT)	>50	-	- /$17d08^h$	- /0.08	2d	

Differential fluxes of protons for the event of 2002 March 16

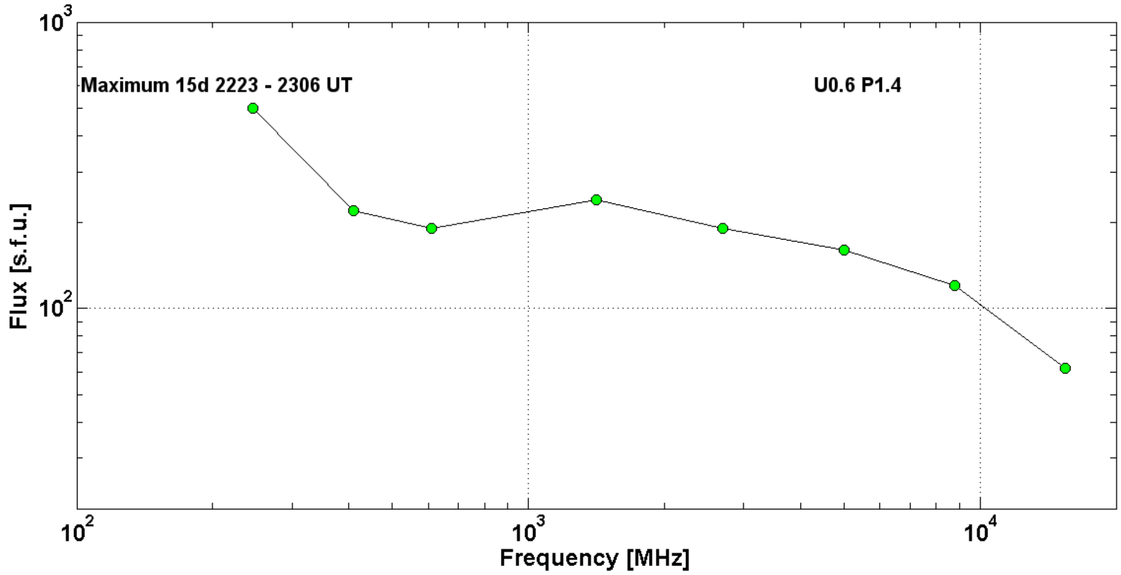
S/c, instruments	ΔE, MeV	To	Tmax	Jmax, $(cm^2.s.sr.MeV)^{-1}$	Dura-tion	Comments
SOHO						
LION	0.75-2	04^h	$11^h/17d09^h$	50.5/102	2d	
LION	2-6	04^h	$11^h/17d09^h$	6.7/18.3	2d	
EPHIN	4-8	03^h	$11^h/17d08^h$	17.4/81.5	2d	
EPHIN	8-25	01^h	$10^h/17d08^h$	0.43/2.6	2d	
EPHIN	25-41	00^h	$10^h/17d08^h$	0.002/0.012	2d	
EPHIN	41-53	- “ -	- “ -	- “ -	- “ -	

Electromagnetic and other phenomena that are sources and/or accompanying for the event of 2002 March 16

2002 March 15 ● AR9866 To event 416

Hα	6563 Å	2220	2238	0041	S08W03	1F	FZ
1 – 12	keV	2209	2310	0042		M2.2	1.3E-01
25-50	keV	221856	224614	224700		4869744	RHESSI
12-25	keV	23:31:20	23:32:42	23:51:00		2764632	RHESSI
12-25	keV	23:51:00	23:51:58	00:26:28		2748672	RHESSI
6-12	keV	00:26:28	00:26:30	00:34:00		346968	RHESSI
15.4	GHz	2223.0	2223.0	~2223.0		1.79	
8.8	GHz	2223.0	2234.0	2304.0		2.08	
5	GHz	2222.0	2234.0	2304.0		2.20	
2.7	GHz	2220.0	2234.0	2303.0		2.28	
1.4	GHz	2220.0	2234.0	2300.0	U0.6 P1.4	2.38	
610	MHz	2220.0	2236.0	2303.0		2.28	
410	MHz	2220.0	2236.0	2306.0		2.34	
245	MHz	2306.0	2306.0	~2306.0		2.70	

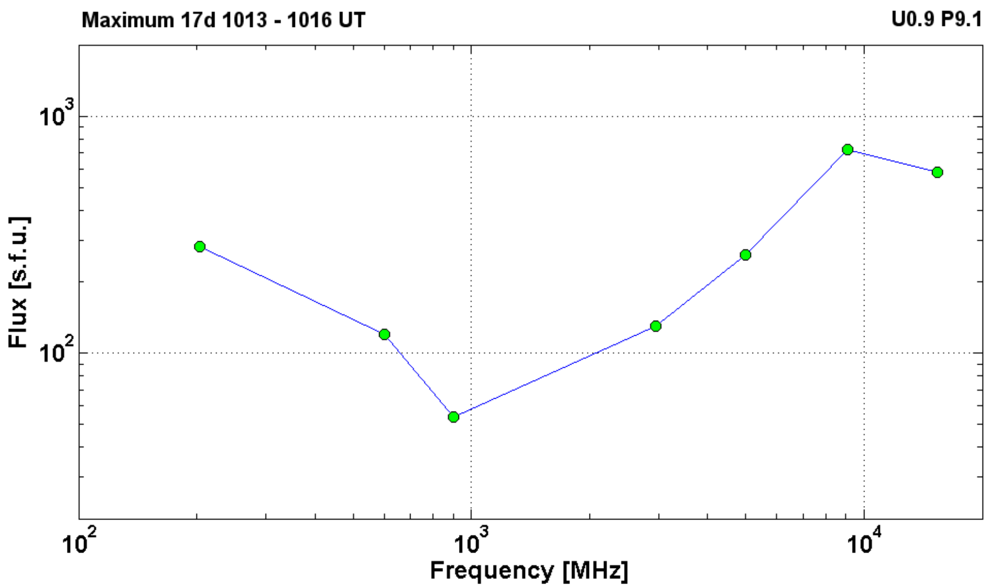
DS IV	25-180	2213		0045		1	
DS IV	57-750	2218		2312	FS	1	
DS III	25-138	2208		0005	N	1	
DS III	57-200	<0000		>0800	S,C	2	
DS CONT	25-180	2219		0026		1	
CME	WL	2306	0957 km/s	-17.4 km/s^2	360˚	309˚	



2002 March 17 Ø AR9871 To event 416

Hα	6563 Å	No Flare Patrol			s20e22		
1 – 12	keV	1011	1011	1024		M1.3	6.0E-03
50-100	keV	100840	101742	102112			RHESSI
15.4	GHz	1014.0	1015.0	1022.0		2.76	
9.1	GHz	1013.0	1015.9	1030.0		2.86	
5	GHz	1014.0	1015.0	1022.0		2.41	
3	GHz	1012.9	1016.3			2.11	
900	MHz	1008.4	1014.7			1.73	
600	MHz	1008.4	1013.7	1032.3	U0.9 P9.1	2.08	
204	MHz	1013.8	1015.9	1016.8		2.45	

DS I	200-300	~1023		~1050	S,N	2	
DS III	100-300	1008		1016	GG,C	3	
DS III	110-400	1008		1009	G	2	
DS III	40-350	1013		1023	GG	3	
DS III	40-250	1035		1036	G	2	
DS III	40-300	1039		1039	G	1	
DS DCIM	300-4000	1008		1036	P	3	
CME	WL	1034	0989 km/s	-6.2km/s^2	187°	165°	

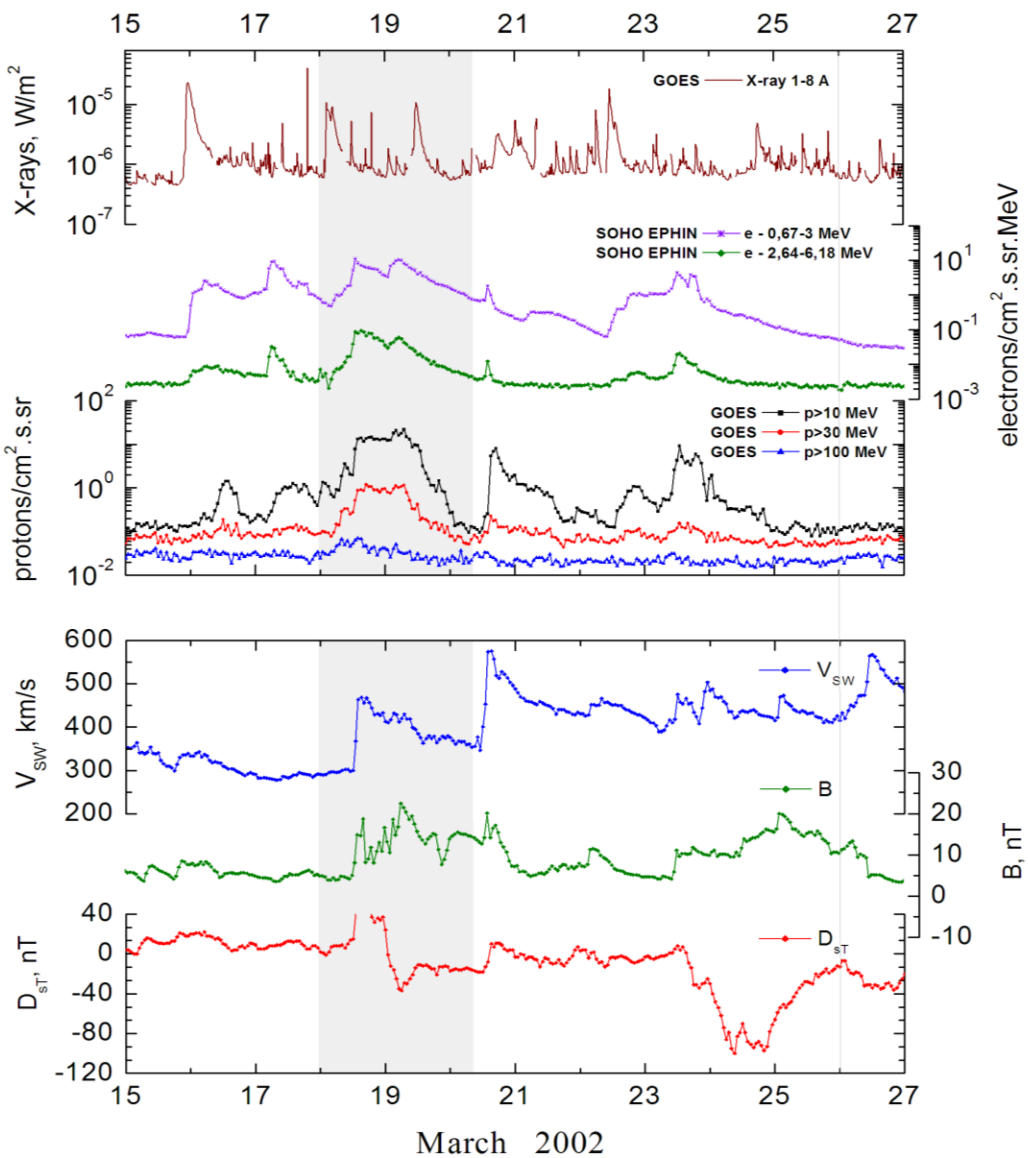


Event 2002.03.18 – (2002-077) **№ 417**

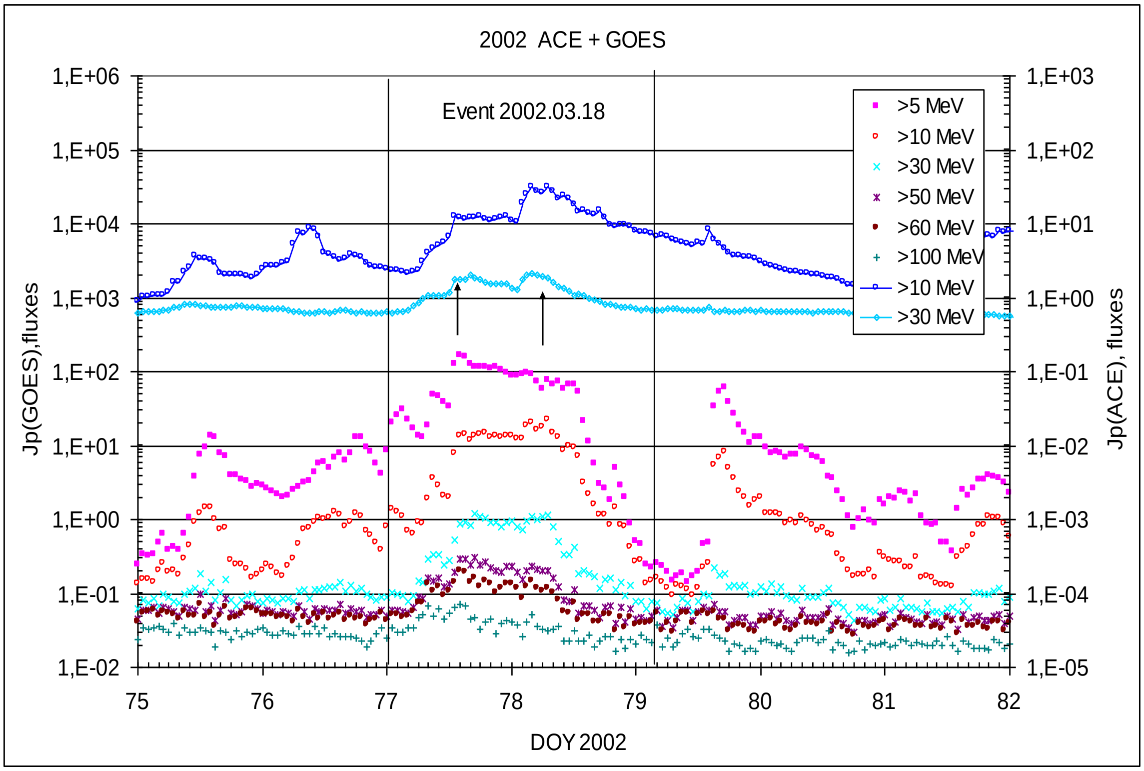
Particle event: To(Ep>10 MeV) – 18d00^h
Tmax$_1$(Ep>10 MeV) – 18d15^h, Jmax$_1$(Ep>10 MeV) – 14.5 /cm^2.s.sr
Tmax$_2$(Ep>10 MeV) – 19d06^h, Jmax$_2$(Ep>10 MeV) – 20 /cm^2.s.sr
Duration of the event – 2 days
Quasimaximal energy of protons in the event – Emax$_1$ = 155 MeV
– Emax$_2$ = 145 MeV

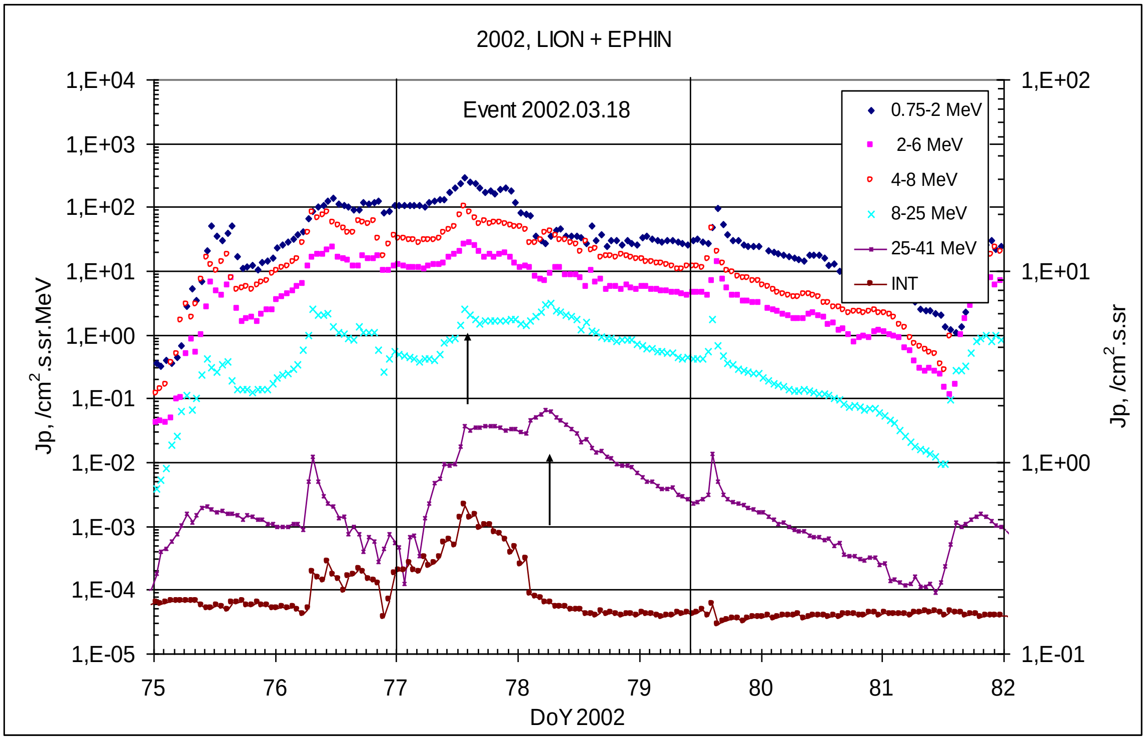
Sources: ⊙ solar flare 17d19^{h}24^m, M4.0/SF, S22E16, AR9871
Ø solar flare 18d02^{h}16^m, M1.0/SN, S16E27, AR9871
Main X-ray burst 1-8 Å: onset – 17d19^{h}24^m, max – 17d19^{h}31^m, Φ = 0.011 J/m^2
CME: 17d20^{h}06^m, V = 823 km/s, Δφ = 288^o, dA = 276^o
▲ SC 18d13^{h}23^m;

Particle fluxes and associated phenomena



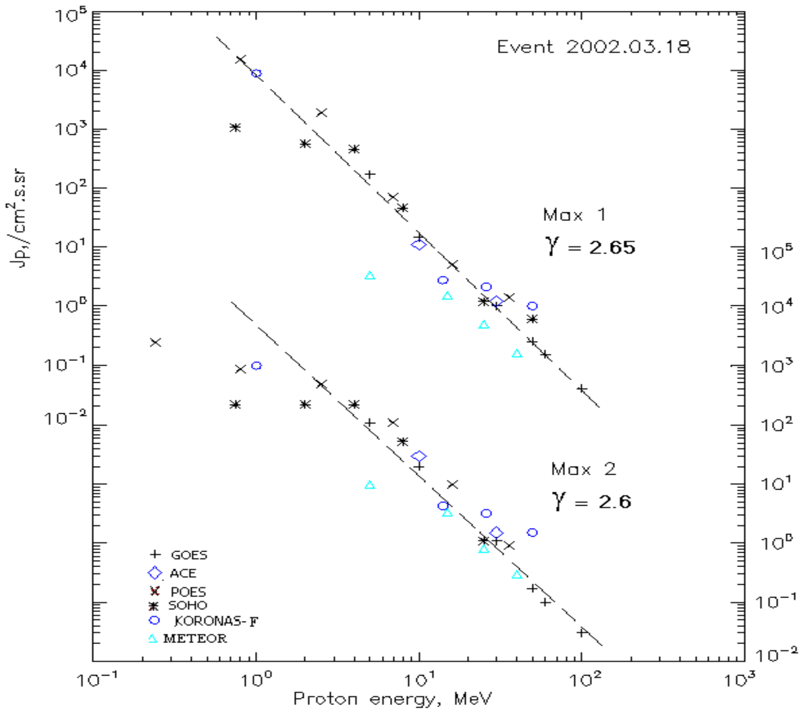
Time profiles of the proton fluxes for the event of 2002 March 18





Arrows on the profiles of the events indicate the time of the proton flux maxima, taken to build the proton spectra (see below)

Integral time-of-maximum proton spectrum



Integral fluxes of protons for the event of 2002 March 18

S/c, instru-ments	Ep, MeV	To	Tmax	Jmax, $(cm^2.s.sr)^{-1}$	Dura-tion	Comments
GOES 10						
EPS	>5	00^h	15^h/19d06^h	170/110	2d	
EPS	>10	00^h	15^h/19d06^h	14.5/20	2d	
EPS	>30	00^h	17^h/19d07^h	1/1.1	2d	
EPS	>50	06^h	15^h/19d06^h	0.25/0.17	2d	
EPS	>60	06^h	14^h/19d06^h	0.15/0.1	2d	
EPS	>100	06^h	15^h/19d06^h	0.04/0.03	2d	
METEOR						
CBM	>5	08^h	18^h/19d07^h	3.4/9.8	3d	
CBM	>15	07^h	17^h/19d03^h	1.5/3.3	2.5d	
CBM	>25	07^h	17^h/19d07^h	0.5/0.8	2d	
CBM	>40	06^h	17^h/19d01^h	0.16/0.3	1.5d	
BP	>90	-	-	-	-	
ChD	>600	-	-	-	-	
POES 16						
MEPED	>0.24	-	- /19d07^h	- /2530	2d	
MEPED	>0.8	-	16^h/19d07^h	15200 /910	2d	
MEPED	>2.5	-	16^h/19d07^h	1930 /490	2d	
MEPED	>6.9	-	16^h/19d07^h	70 /110	2d	
MEPED	>16	-	16^h/19d07^h	05./10/	2d	
MEPED	>36	-	16^h/19d06^h	1.4/0.9	2d	
MEPED	>70	-	-	-	-	
MEPED	>140	-	-	-	-	

CORONAS F						
MKL	>1.	-	15^h/19d09^h	8850/1030	2d	
MKL	>14	-	15^h/19d09^h	2.75/4.3	2d	
MKL	>26	-	15^h/19d09^h	2.1/3.2	2d	
MKL	>50	-	15^h/19d09^h	1.0/1.5	2d	
ACE						
SIS	>10	07^h	14^h/19d04^h	11/30	1.5d	
SIS	>30	05^h	14^h/19d04^h	1.2/1.5	1.5d	
SOHO						
EPHIN (INT)	>50	05^h	13^h/ -	0.6/ -	1.5d	

Fluxes differential of proton for the event 2002 March 18

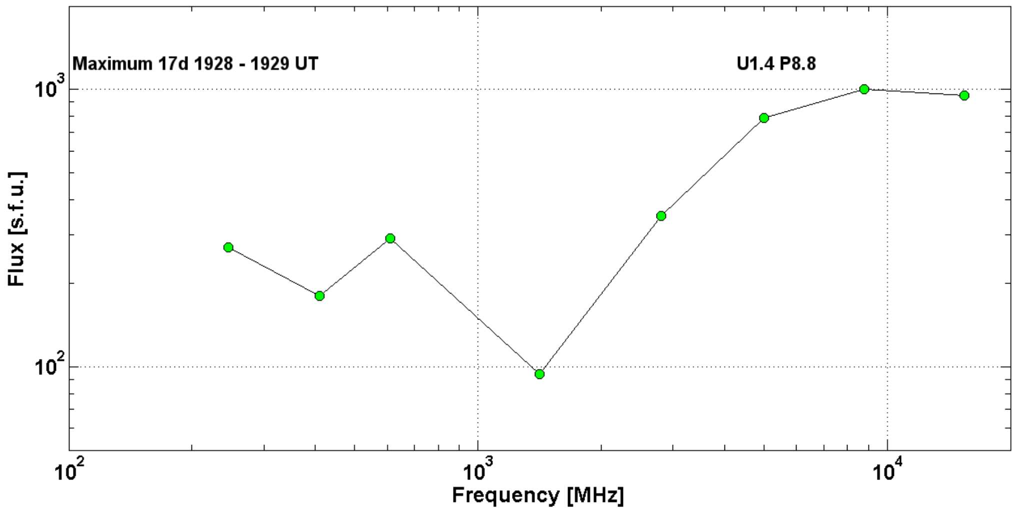
S/c, instru-ments	ΔE, MeV	To	Tmax	Jmax, $(cm^2.s.sr.MeV)^{-1}$	Dura-tion	Comments
SOHO						
LION	0.75-2	04^h	13^h/19d07^h	290/42	2d	
LION	2-6	03^h	13^h/19d07^h	26.5/11	2d	
EPHIN	4-8	05^h	13^h/19d06^h	101/42	2d	
EPHIN	8-25	08^h	13^h/19d06^h	2.6/3.1	2d	
EPHIN	25-41	05^h	13^h/19d05^h	0.04/0.07	2d	
ERHIN	41-53	- “ -	- “ -	- “ -	- “ -	

Electromagnetic and other phenomena that are sources and/or accompanying for the event of 2002 March 18

2002 March 17 ☉ AR9871 To event 417

Hα	6563 Å	<1938	~1938	1948	S22E16	SF	
1 – 12	keV	1924	1931	1934		M4.0	1.1E-2
50-100	keV	192616	193014	193628		6799464	HESSI
15.4	GHz	1927.0	1928.0	1934.0		2.98	
8.8	GHz	1926.0	1928.0	1934.0	U1.4 P8.8	3.00	
5	GHz	1927.0	1928.0	1935.0		2.90	
2.8	GHz	1923.0	1929.0	~1933.0		2.54	
1.4	GHz	1927.0	1928.0	1934.0		1.97	

610	MHz	1928.0	1928.0	1929.0		2.46	
410	MHz	1928.0	1929.0	1929.0		2.26	
245	MHz	1927.0	1928.0	1934.0		2.43	
DS III	N	1926		2112	25-180	3	
DS V		1926		1931	25-180	2	
n°							Armenia(S)
CME		2006	0823 km/s	-7.0 km/s^2	153˚	191˚	



2002 March 18 Ø AR9871 To event 417

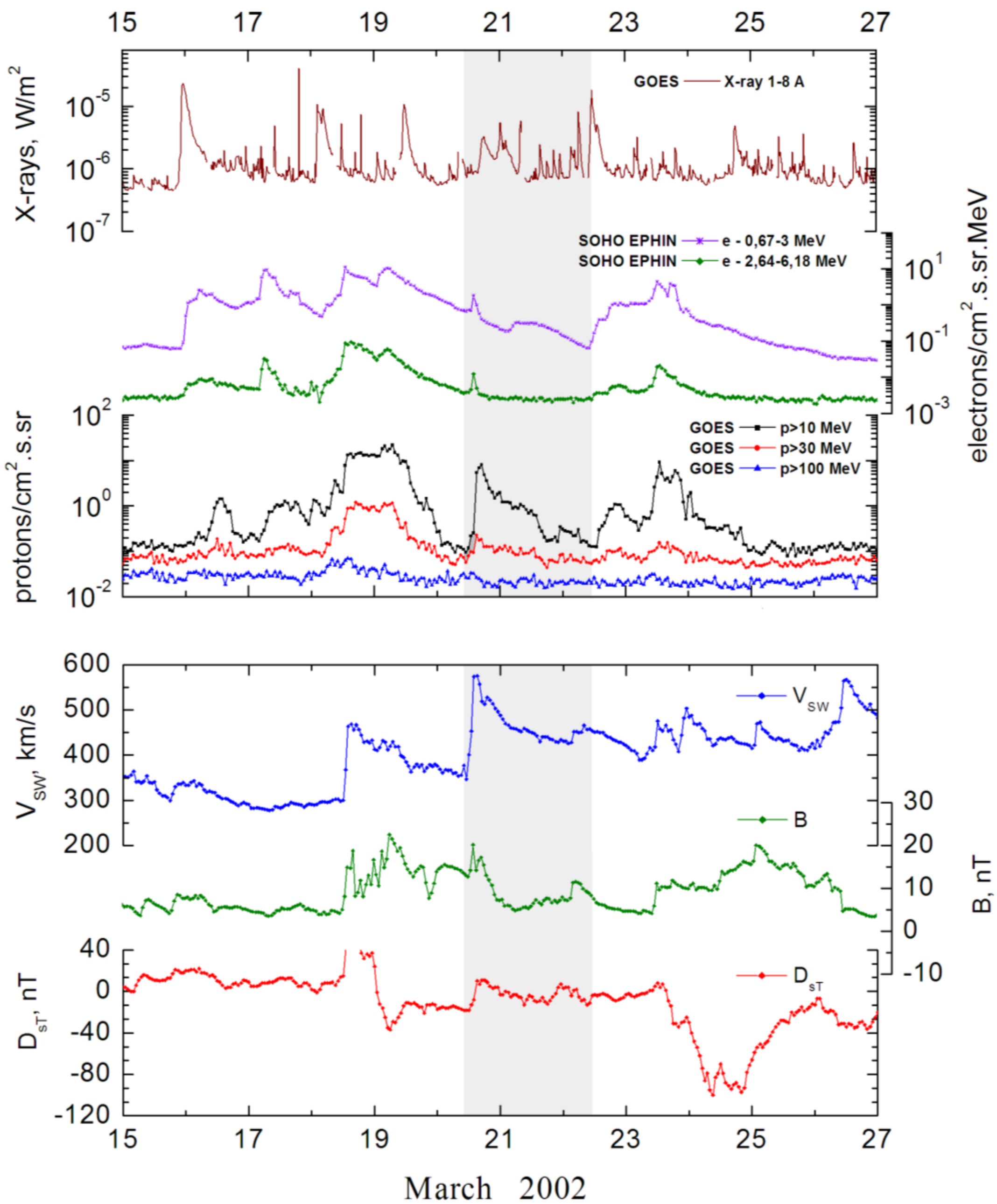
Hα	6563 Å	0222	0224	0233	S16E27	SN	E
1 – 12	keV	0216	0231	0400		M1.0	4.5E-02
6-12	keV	025912	030014	030436		60024	HESSI
6-12	keV	030436	030506	032248		166440	HESSI
CME		0254	0989 km/s	-2.9 km/s^2	360˚	311˚	

Event 2002.03.20 – (2002-079) **№ 418**

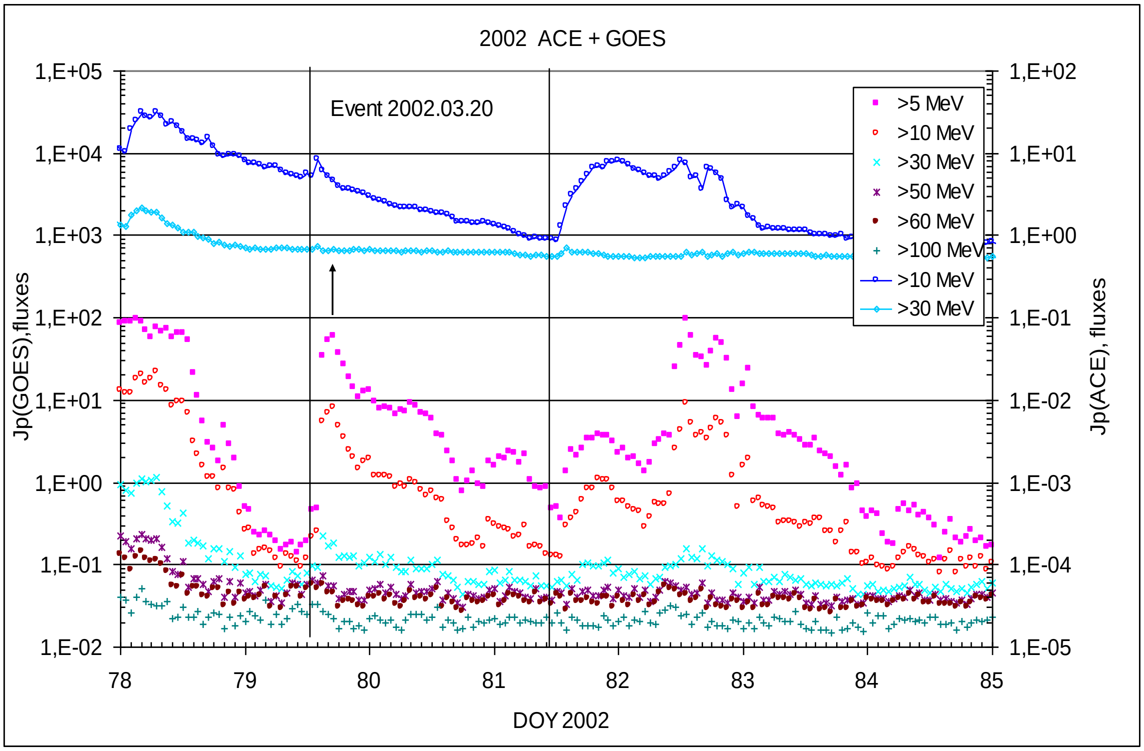
Particle event: To(Ep>10 MeV) – 20d13^h
Tmax(Ep>10 MeV) –20d17^h, Jmax (Ep>10 MeV) – 8 /cm^2.s.sr
Duration of the event – 2 days
Quasimaximal energy of protons in the event – Emax = 60 MeV

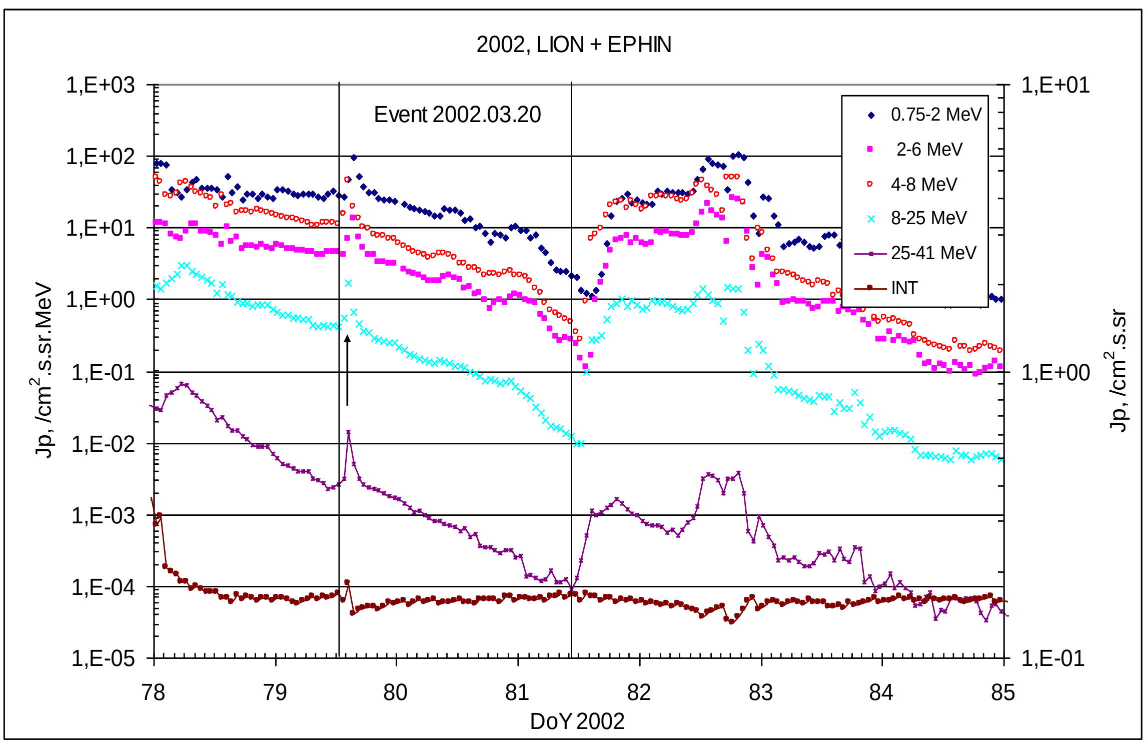
Sources: O solar flare 20d08^{h}08^m, C1.9/SF, S19W41, AR9873
Main X-ray burst 1-8 Å: onset – 20d08^{h}08^m, max – 20d08^{h}33^m, Φ = 0.0031 J/m^2
▲ SC 20d13^{h}29^m

Particle fluxes and associated phenomena



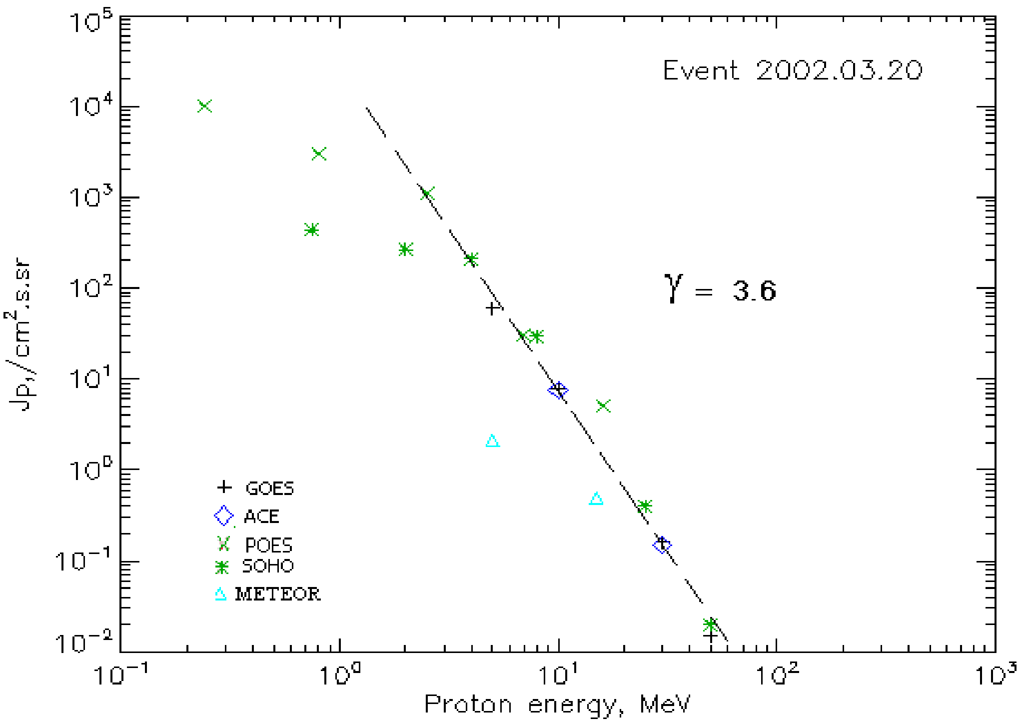
Time profiles of the proton fluxes for the event of 2002 March 20





Arrows on the profiles of the events indicate the time of the proton flux maxima, taken to build the proton spectra (see below)

Integral time-of-maximum proton spectrum



Fluxes integral of proton for the event 2002 March 20

S/c, instru-ments	Ep, MeV	To	Tmax	Jmax, $(cm^2.s.sr)^{-1}$	Dura-tion	Comments
GOES 10						
EPS	>5	13^h	17^h/	60	2d	
EPS	>10	13^h	17^h	8	2d	
EPS	>30	13^h	15^h	0.16	2d	
EPS	>50	13^h	15^h	0.02	-	
EPS	>60	-	-	-	-	
EPS	>100	-	-	-	-	
METEOR						
CBM	>5	-	16^h	2.15	2d	
CBM	>15	-	16^h	0.5	2d	
CBM	>25	-	-	-	-	
CBM	>40	-	-	-	-	
BP	>90	-	-	-	-	
ChD	>600	-	-	-	-	
POES 16						
MEPED	>0.24	-	16^h	10150	2d	
MEPED	>0.8	-	16^h	3070	2d	
MEPED	>2.5	-	16^h	1120	2d	
MEPED	>6.9	-	16^h	28	2d	
MEPED	>16	-	16^h	5	2d	
MEPED	>36	-	-	-	-	
MEPED	>70	-	-	-	-	
MEPED	>140	-	-	-	-	

ACE						
SIS	>10	10^h	14^h	7.5	2d	
SIS	>30	12^h	14^h	0.15	-	
SOHO						
EPHIN (INT)	>50	10^h	15^h	0.025	1d	

Fluxes differential of proton for the event 2002 March 20

S/c, instru-ments	ΔE, MeV	To	Tmax	Jmax, $(cm^2.s.sr.MeV)^{-1}$	Dura-tion	Comments
SOHO						
LION	0.75-2	11^h	15^h	98	2d	
LION	2-6	14^h	15^h	13.5	2d	
EPHIN	4-8	10^h	15^h	45.3	2d	
EPHIN	8-25	10^h	15^h	1.73	2d	
EPHIN	25-41	10^h	15^h	0.014	2d	
ERHIN	41-53	- “ -	- “ -	- “ -	- “ -	

Electromagnetic and other phenomena that are sources and/or accompanying for the event of 2002 March 20

2002 March 20 o **AR9873** **To event 418**

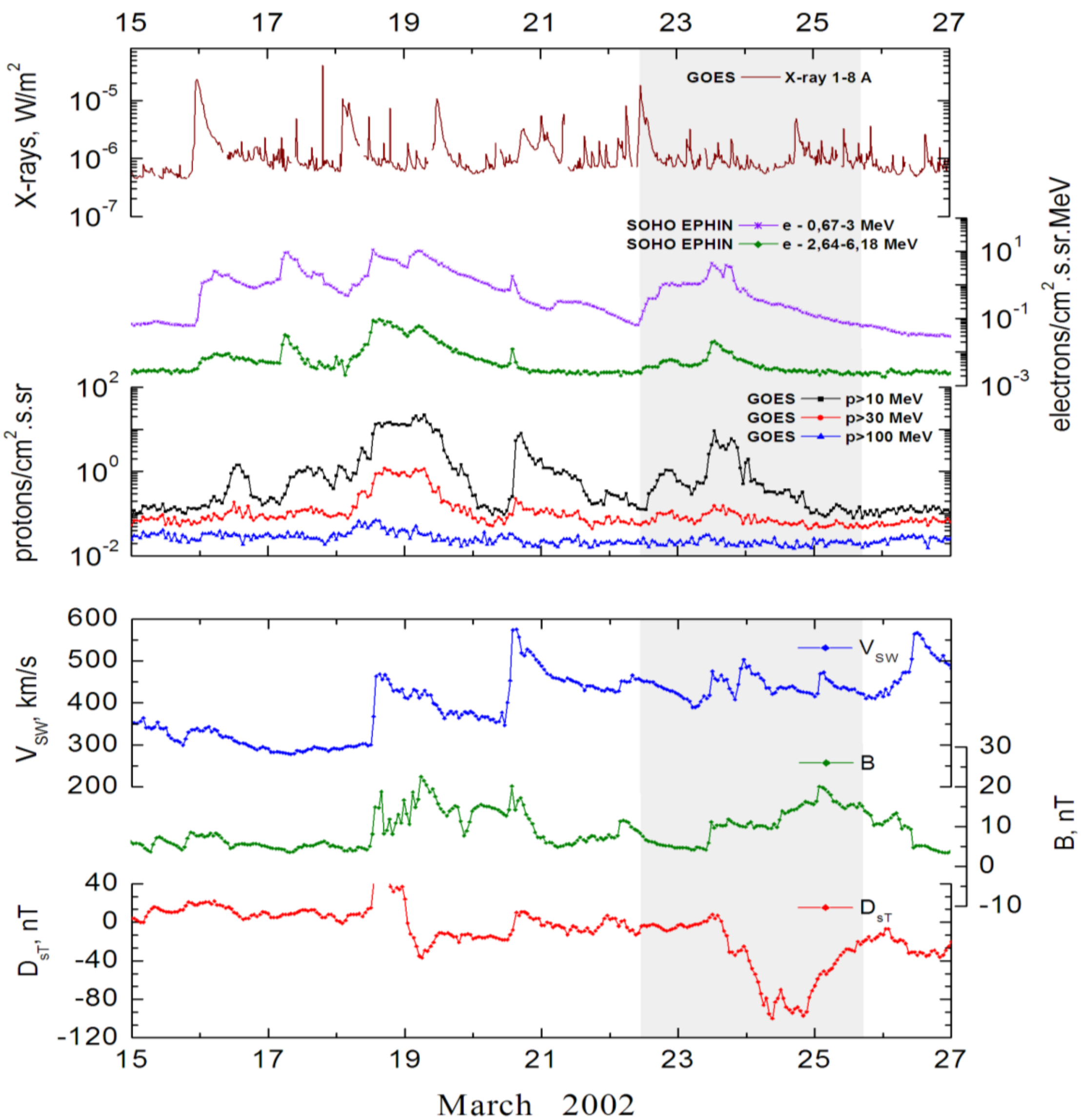
Hα	6563 Å	0823	0824	0827	S19W41	SF	
1 – 12	keV	0808	0833	0845		C1.9	3.1E-3
245	MHz	0808.0	0808.0	~0808.0		2.40	
DS III	GG	0808		0808	30-270	2	
245	MHz	0837.0	0838.0	0838.0		2.63	
DS III	G	0837		0838	30-270	2	

Event 2002.03.22 – (2002-081) **№ 419**

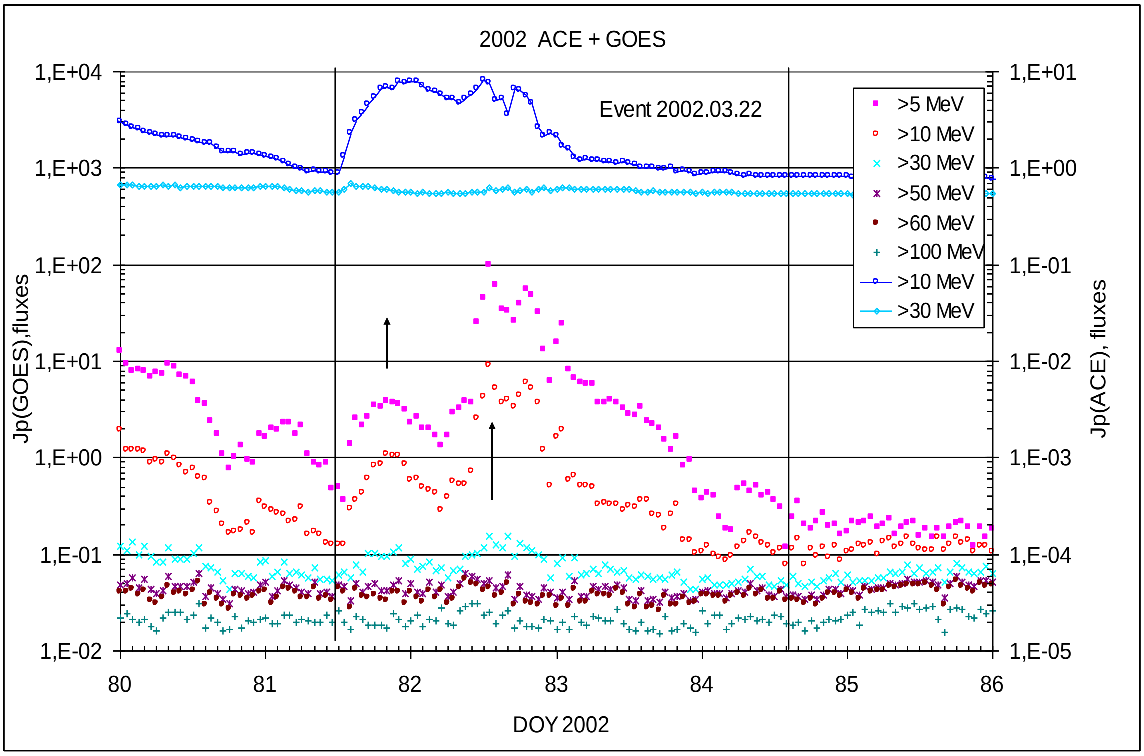
Particle event: To(Ep>10 MeV) – $22d12^h$
$Tmax_1$(Ep>10 MeV) – $22d20^h$, $Jmax_1$(Ep>10 MeV) – 1 /cm^2.s.sr
$Tmax_2$(Ep>10 MeV) – $23d13^h$, $Jmax_2$(Ep>10 MeV) – 9 /cm^2.s.sr
Duration of the event – 4 days
Quasimaximal energy of protons in the event – $Emax_1$ = 45 MeV
– $Emax_2$ = 50 MeV

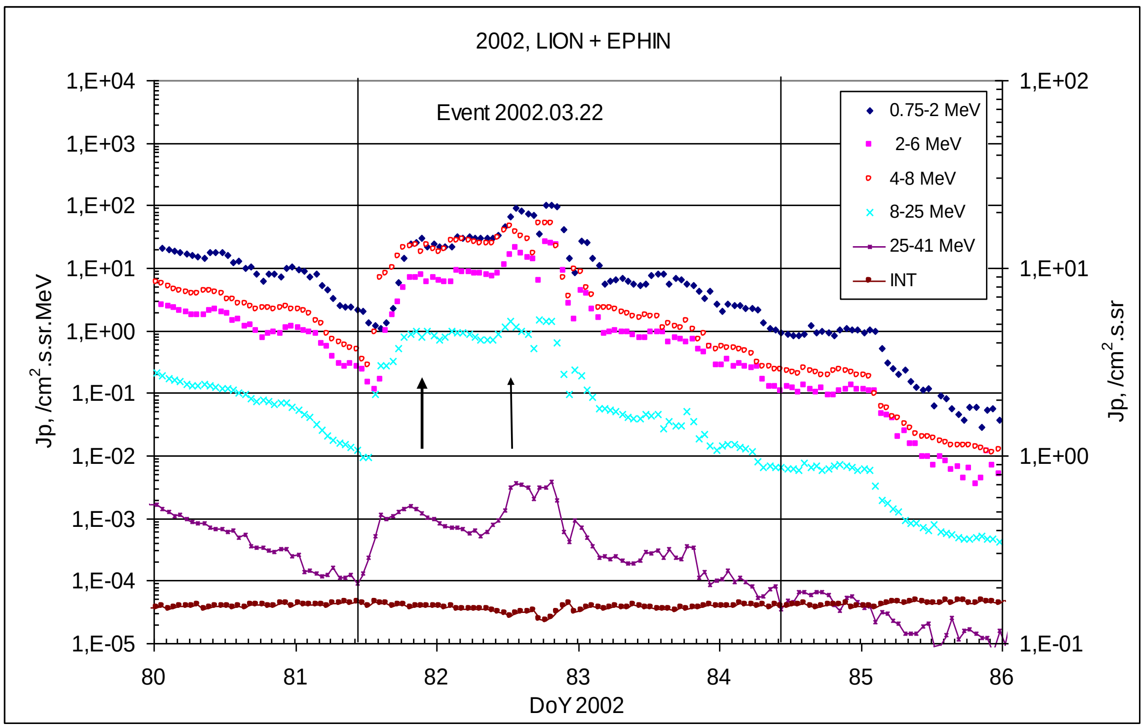
Sources: ■ solar flare $22d10^h12^m$, M1.6/…, s10w90, AR9866
Main X-ray burst 1-8 Å: onset – $22d10^h12^m$, max – $22d11^h14^m$, Φ = 0.049 J/m^2
CME: $22d11^h06^m$; V = 1750 km/s; Δφ = 360°; dA = 259°
▲ SC $23d11^h37^m$

Particle fluxes and associated phenomena



Time profiles of the proton fluxes for the event of 2002 March 22





Arrows on the profiles of the events indicate the time of the proton flux maxima, taken to build the proton spectra (see below)

Integral time-of-maximum proton spectrum

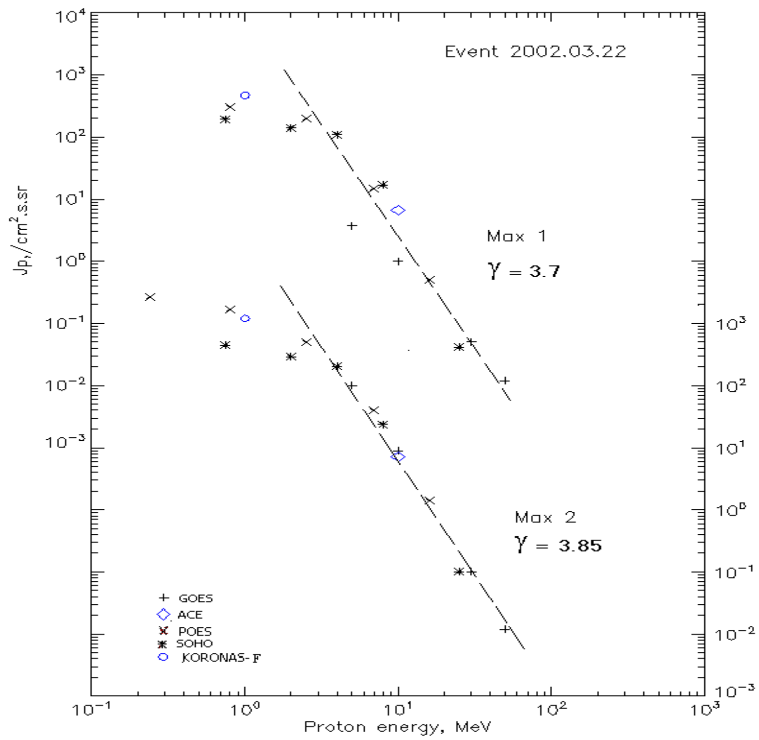


Table of the fluxes integral of proton for the event 2002 March 22

S/c, instru-ments	Ep, MeV	To	Tmax	Jmax, $(cm^2.s.sr)^{-1}$	Dura-tion	Comments
GOES 10						
EPS	>5	14^h	$20^h/23d13^h$	3.7/110	4d	
EPS	>10	14^h	$20^h/23d13^h$	1/9	4d	
EPS	>30	-	$22^h/23d16^h$	0.05/0.1	-	
EPS	>50	-	$22^h/23d16^h$	0.015/0.012	-	
EPS	>60	-	-	-	-	
EPS	>100	-	-	-	-	
POES 16						
MEPED	>0.24	-	$22^h/23d16^h$	- /2730	4d	
MEPED	>0.8	-	$22^h/23d16^h$	290 /1730	4d	
MEPED	>2.5	-	$22^h/23d16^h$	190/510	4d	
MEPED	>6.9	-	$22^h/23d16^h$	15/40	4d	
MEPED	>16	-	$22^h/23d16^h$	0.5/1.4	4d	
MEPED	>36	-	-	-	-	
MEPED	>70	-	-	-	-	
MEPED	>140	-	-	-	-	
CORONAS F						
MKL	>1.	-	$22^h/23d16^h$	470/1230	4d	
MKL	>14	-	-	-	-	
MKL	>26	-	-	-	-	
MKL	>50	-	-	-	-	
ACE						
SIS	>10	13^h	$22^h/23d12^h$	6.7/7.2	2d	
SIS	>30	10^h	-	-	-	

SOHO						
EPHIN (INT)	>50	-	-	-	-	

Fluxes differential of proton for the event 2002 March 22

S/c, instruments	ΔE, MeV	To	Tmax	Jmax, $(cm^2.s.sr.MeV)^{-1}$	Dura-tion	Comments
SOHO						
LION	0.75-2	15^h	$21^h/23d13^h$	29.5/80	4d	
LION	2-6	15^h	$21^h/23d13^h$	7.7/21	4d	
EPHIN	4-8	13^h	$20^h/23d12^h$	23/45.5	6d	
EPHIN	8-25	13^h	$20^h/23d12^h$	1/1.4	6d	
EPHIN	25-41	13^h	$19^h/23d13^h$	0.0016/0.0035	5d	
ERHIN	41-53	- “ -	- “ -	- “ -	- “ -	

Electromagnetic and other phenomena that are sources and/or accompanying for the event of 2002 March 22

2002 March 22 ■ AR9866 To event 419

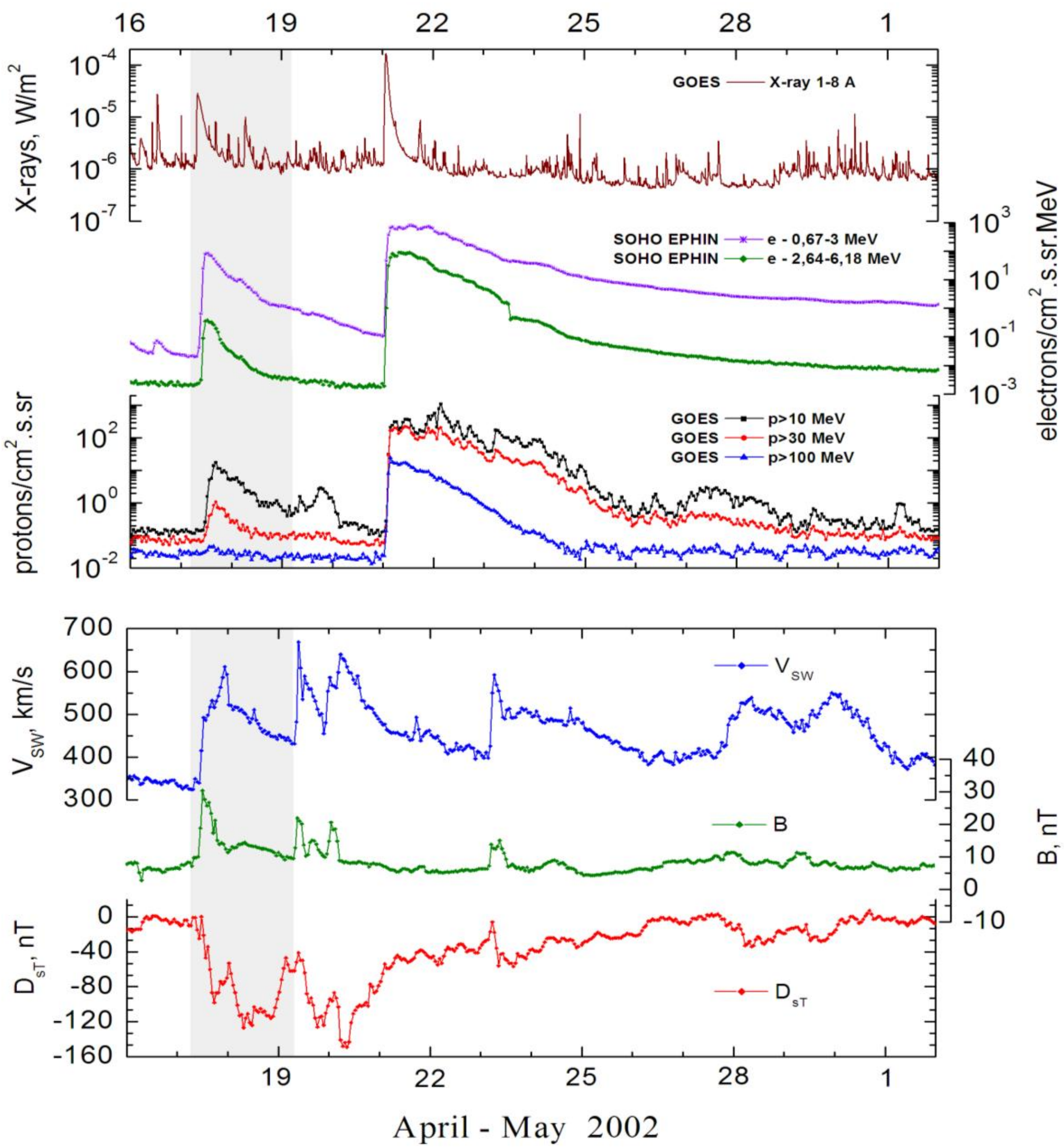
Hα	6563 Å	No Flare Patrol			s10w90		
1 – 12	keV	1012	1114	1152		M1.6	4.9E-2
6-12	keV	1037	103730	103828		9600	HESSI
25-50	keV	104536	105838	105940		663384	HESSI
6-12	keV	113208	113250	113912		99912	HESSI
3	GHz	1047.5	~1100.0	1152.5		1.77	
204	MHz	1010.7	1010.9	1013.2		1.86	
DS II		1047		1049	40-220	2	
DS IV		1052		~1154	40-200	2	
DS I	GG	1048		1049	130-160	2	
DS III	G	1047		1048	40-210	2	
DS DCIM	G	1047		1114	2000-4500	1	
CME	1106	1750 km/s	-22.5 km/s^2	360˚	259˚	1106	

Event 2002.04.17 – (2002-107) **№ 420**

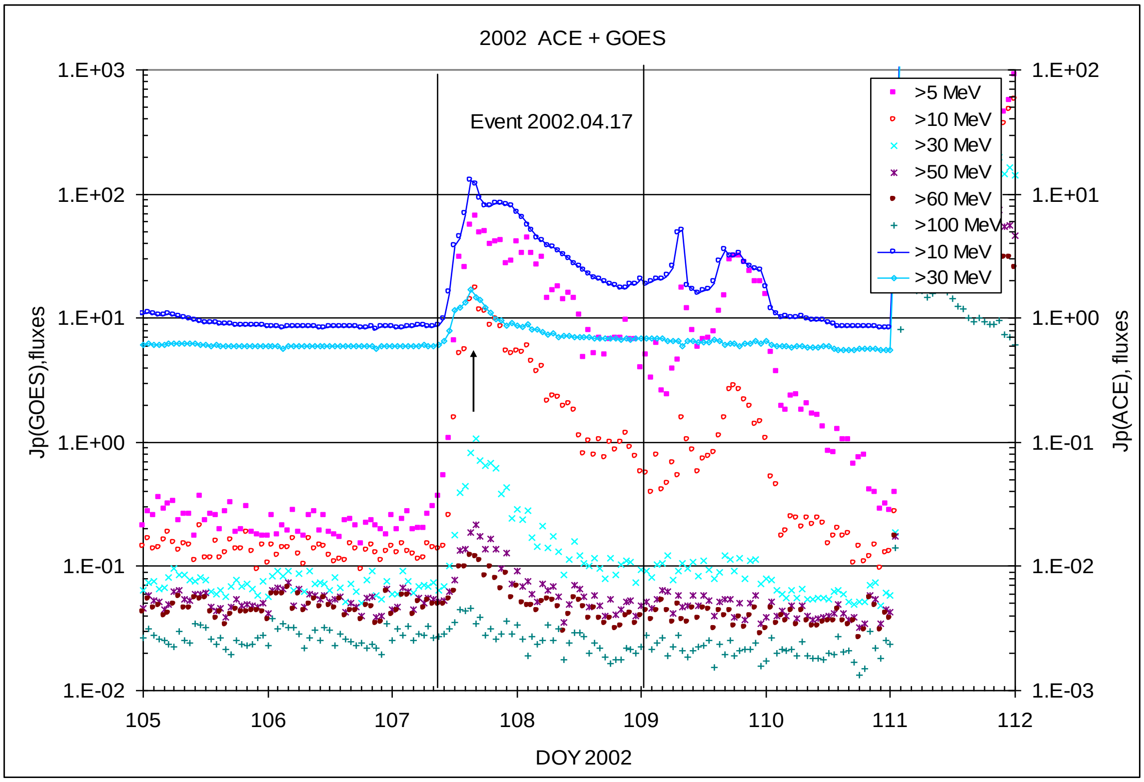
Particle event: To(Ep>10 MeV) – 17d10^h
Tmax(Ep>10 MeV) – 17d16^h, Jmax (Ep>10 MeV) – 21 /cm^2.s.sr
Duration of the event – 2 days
Quasimaximal energy of protons in the event – Emax = 120 MeV

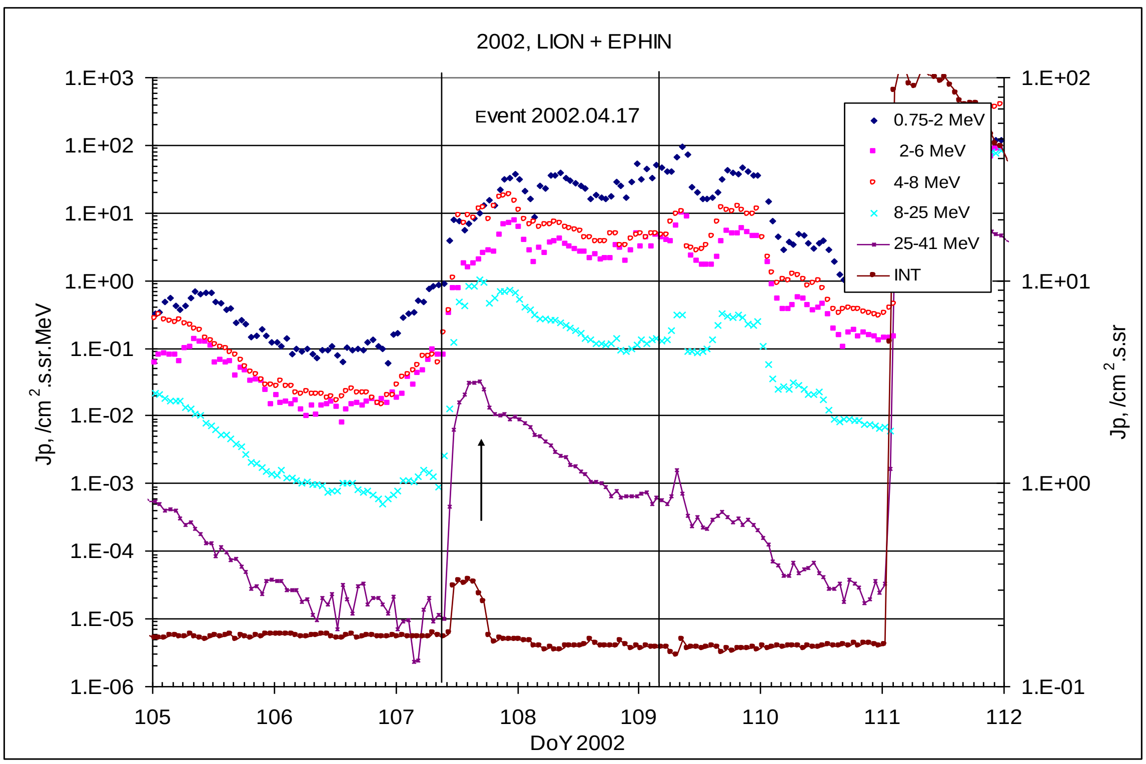
Sources: ● solar flare 17d07^{h}46^m, M2.6/2N, S14W36, AR9906
Main X-ray burst 1-8 Å: onset – 17d07^{h}46^m, max – 17d08^{h}24^m, Φ = 0.15 J/m^2
CME: 17d08^{h}26^m; V = 1240 km/s; Δφ = 360^o; dA = 292^o
▲ SC 17d11^{h}09^m; ▲ SC 19d08^{h}36^m;

Particle fluxes and associated phenomena



Time profiles of the proton fluxes for the event of 2002 April 17





Arrows on the profiles of the events indicate the time of the proton flux maxima, taken to build the proton spectra (see below)

Integral time-of-maximum proton spectrum

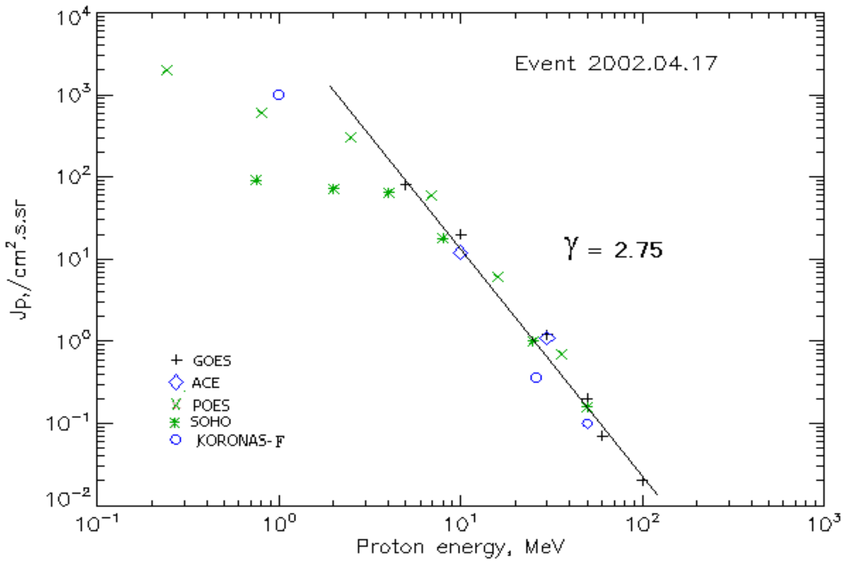


Table of the fluxes integral of proton for the event 2002 April 17

S/c, instru-ments	Ep, MeV	To	Tmax	Jmax, $(cm^2.s.sr)^{-1}$	Dura-tion	Comments
GOES 10						
EPS	>5	10^h	16^h	80	2d	
EPS	>10	10^h	16^h	21	2d	
EPS	>30	10^h	16^h	1.2	2d	
EPS	>50	10^h	16^h	0.2	2d	
EPS	>60	10^h	16^h	0.07	1d	
EPS	>100	-	16^h	0.02	1d	
POES 16						
MEPED	>0.24	-	16^h	2070	2d	
MEPED	>0.8	-	16^h	630	2d	
MEPED	>2.5	-	16^h	310	2d	
MEPED	>6.9	-	16^h	60	2d	
MEPED	>16	-	16^h	6	1d	
MEPED	>36	-	16^h	0.7	1d	
MEPED	>70	-	-	-	-	
MEPED	>140	-	-	-	-	
CORONAS F						
MKL	>1.	-	16^h	980	2d	
MKL	>14	-	-	-	2d	
MKL	>26	-	16^h	0.36	2d	
MKL	>50	-	16^h	0.1	2d	
ACE						
SIS	>10	10^h	15^h	12	2d	
SIS	>30	10^h	15^h	1.1	1d	
SOHO						
EPHIN (INT)	>50	11^h	15^h	0.16	0.5d	

Fluxes differential of proton for the event 2002 April 17

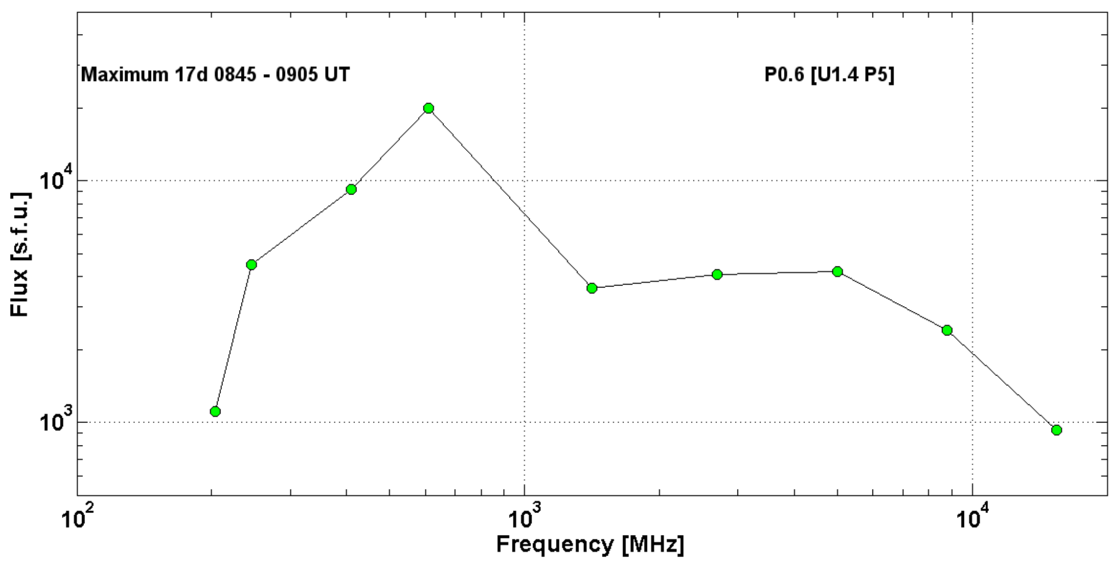
S/c, instru-ments	ΔE, MeV	To	Tmax	Jmax, $(cm^2.s.sr.MeV)^{-1}$	Dura-tion	Comments
SOHO						
LION	0.75-2	10^h	18^h	15.2	2d	
LION	2-6	10^h	18^h	2.8	2d	
EPHIN	4-8	10^h	16^h	11.5	2d	
EPHIN	8-25	10^h	16^h	1	2d	
EPHIN	25-41	10^h	16^h	0.03	2d	
ERHIN	41-53	- “ -	- “ -	- “ -	- “ -	

Electromagnetic and other phenomena that are sources and/or accompanying for the event of 2002 April 17

2002 April 17 ● AR9906 To event 420

Hα	6563 Å	0750	0815	>1141	S14W36	2N	FTZ
1 – 12	keV	0746	0824	0957		M2.6	1.5E-1
25-50	keV	081432	081438	081624		1125888	HESSI
15.4	GHz	0803.0	0857.0	1033.0		2.97	
8.8	GHz	0753.0	0857.0	1012.0		3.38	
5	GHz	0753.0	0857.0	1037.0	P0.6 [U1.4 P5]	3.62	
2.7	GHz	0746.0	0857.0	0000.0		3.61	
1.4	GHz	0751.0	0847.0	1045.0		3.56	
610	MHz	0753.0	0905.0	1041.0		4.30	
410	MHz	0757.0	0845.0	0953.0		3.96	
245	MHz	0801.0	0901.0	1041.0		3.65	
204	MHz	0832.0	0905.5	1056.1		3.05	

DS II		0754		0820	100-600	3	
DS II		0808		0823	25-79	2	
DS II		0845		0908	100-1400	3	
DS II		0945		1024	100-900	3	
DS IV		0756		~1100	40-800	3	
DS III	GG,RS	0749		0758	720-3300	3	
DS III	N	0826		1200	25-270	2	
DS CONT		0804		~0832	25-270	2	
DS CONT		~0840		~1032	25-270	2	
DS DCIM	P,C,S	0754		1052	150-4000	3	
DS UNCLF		0813		0816	25-70	2	
CME		0826	1240 km/s	-19.8 km/s^2	360°	292°	

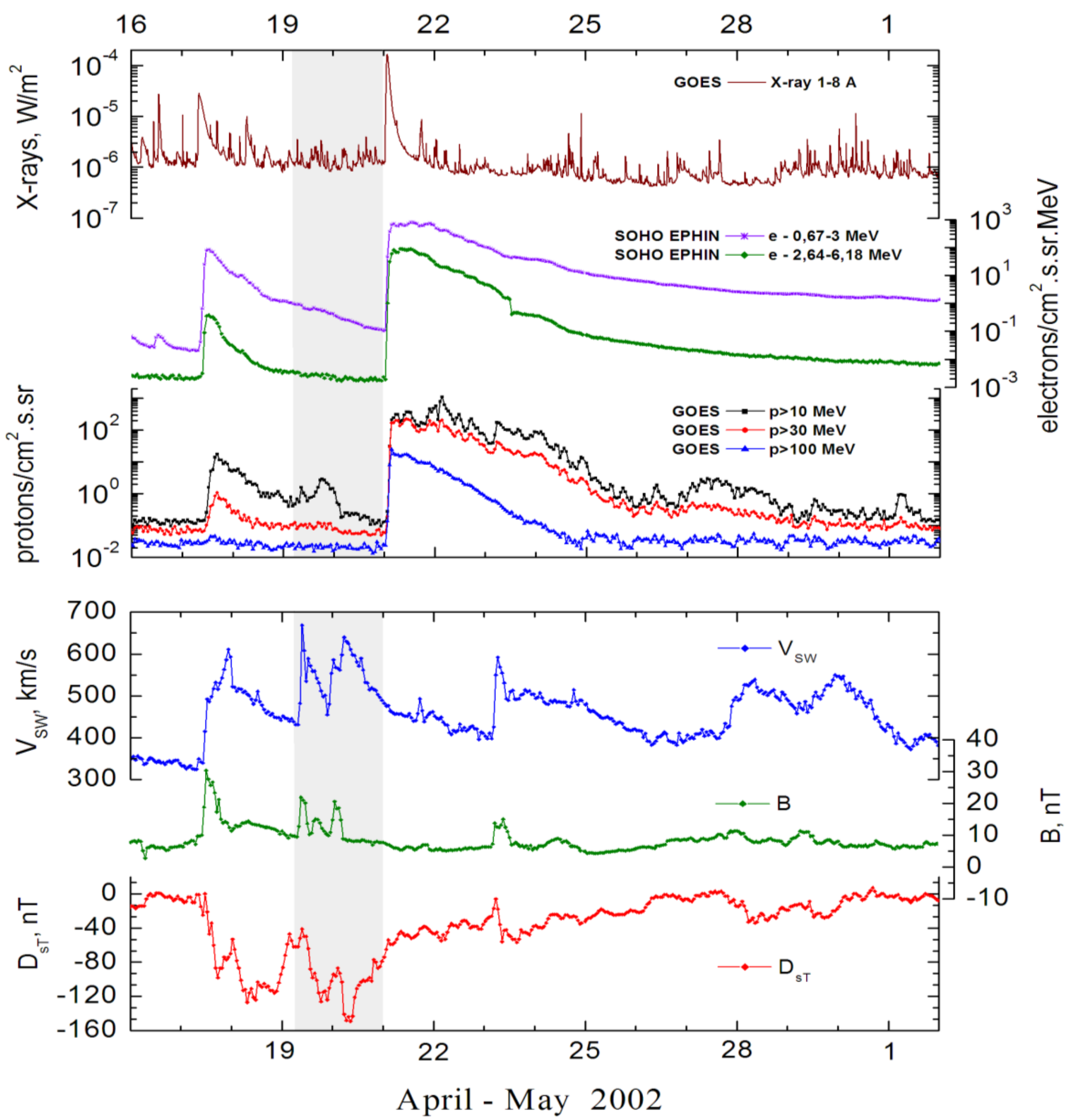


Event 2002.04.19 – (2002-109) **№ 421**

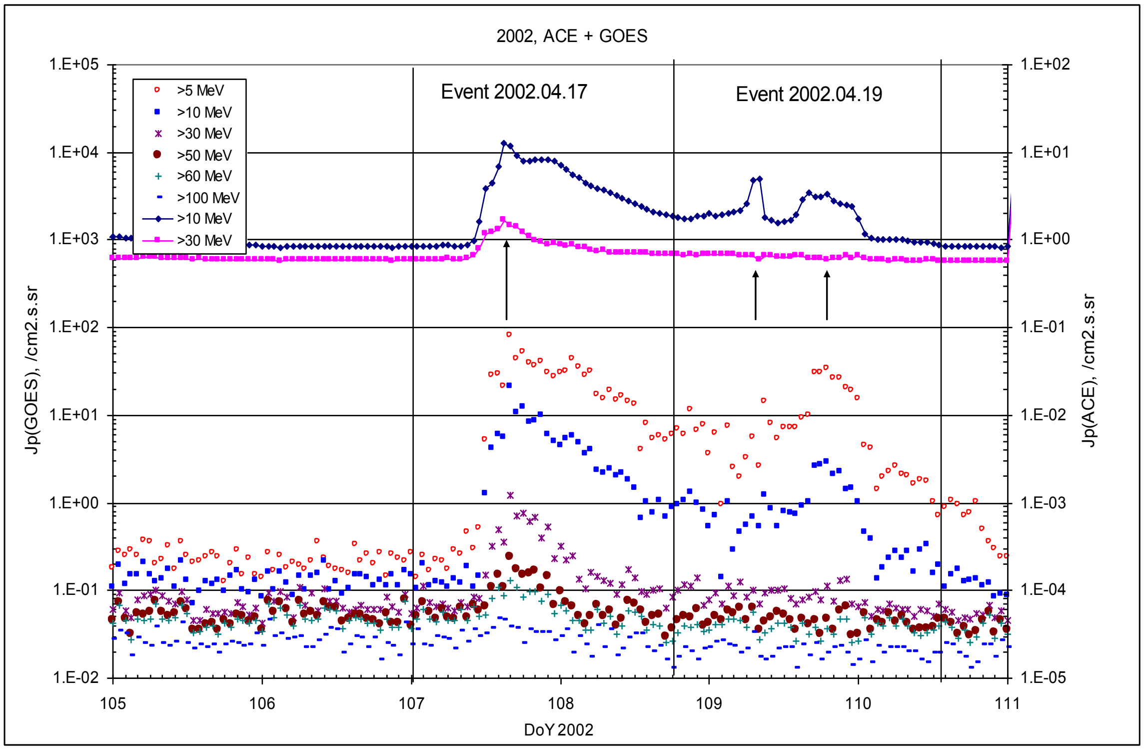
Particle event: To(Ep>10 MeV) – 19d05^h
Tmax$_1$(Ep>10 MeV) – 19d09^h, Jmax$_1$(Ep>10 MeV) – 1 /cm^2.s.sr
Tmax$_2$(Ep>10 MeV) – 19d19^h, Jmax$_2$(Ep>10 MeV) – 2.7 /cm^2.s.sr
Duration of the event – 2 days
Quasimaximal energy of protons in the event – Eqm$_1$ = 45 MeV
– Eqm$_2$ = 50 MeV

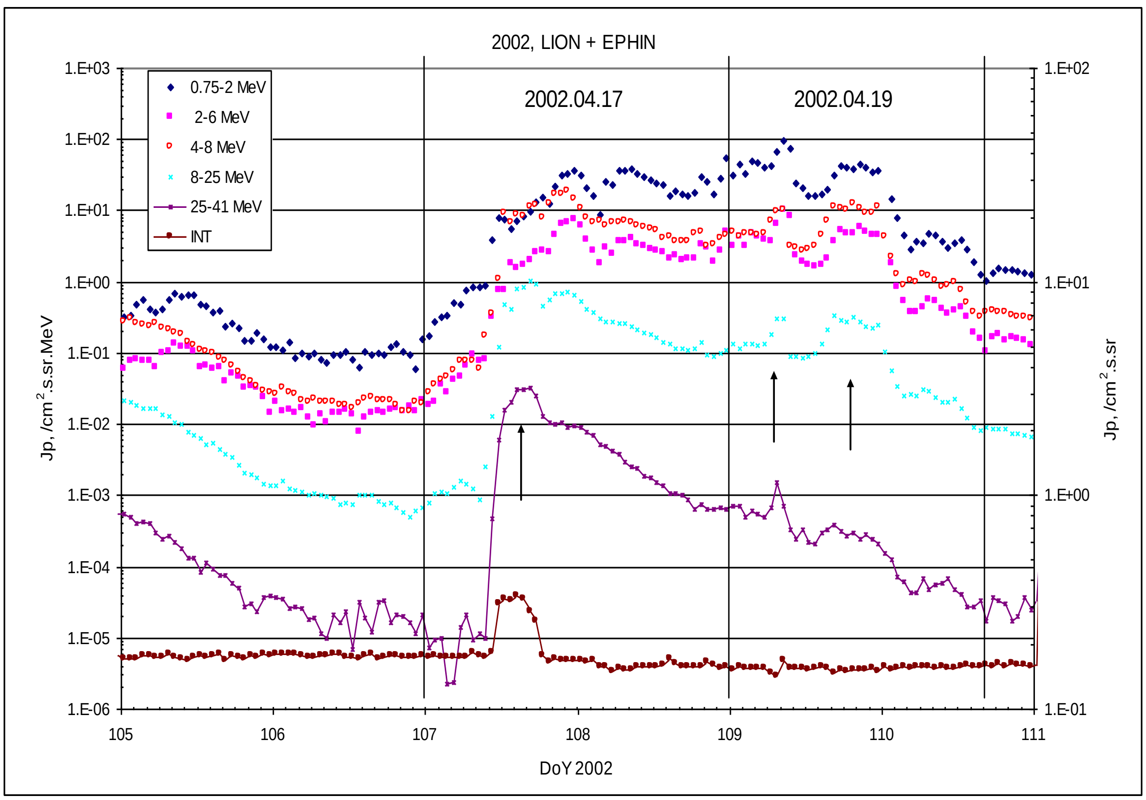
Sources: ◊ Flare activity AR9906
o solar flare 19d15^{h}16^m, C2.5/SF, S16W59, AR9906;
Main X-ray burst 1-8 Å: onset – 19d15^{h}16^m, max – 19d15^{h}21^m;
▲ SC 19d08^{h}36^m;

Particle fluxes and associated phenomena



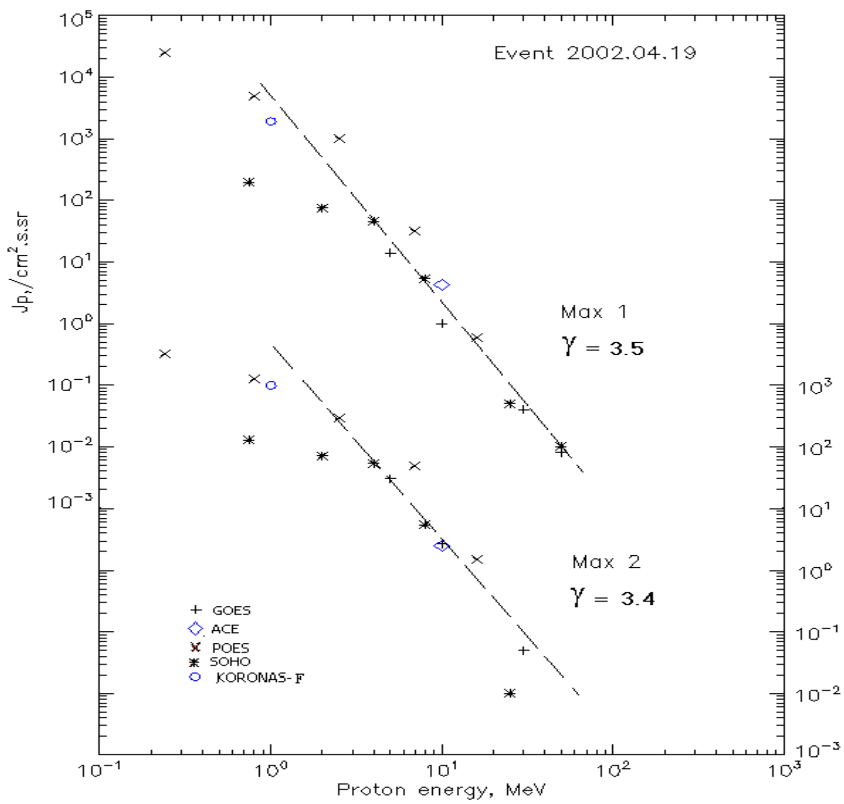
Time profiles of the proton fluxes for the event of 2002 April 19





Arrows on the profiles of the events indicate the time of the proton flux maxima, taken to build the proton spectra (see below)

Integral time-of-maximum proton spectrum



Integral fluxes of protons for the event of 2002 April 19

S/c, instruments	Ep, MeV	To	Tmax	Jmax, $(cm^2.s.sr)^{-1}$	Dura-tion	Comments
GOES-10						
EPS	>5	05^h	$09^h/19^h$	14/31	2d	
EPS	>10	05^h	$09^h/19^h$	1/2.7	2d	
EPS	>30	05^h	$10^h/19^h$	0.04/0.05	2d	
EPS	>50	05^h	$11^h/19^h$	0.01/ -	2d	
EPS	>60	-	-	-	-	
EPS	>100	-	-	-	-	
POES-16						
MEPED	>0.24	-	$10^h/19^h$	25070/3330	2d	
MEPED	>0.8	-	$10^h/19^h$	5040/1340	2d	
MEPED	>2.5	-	$10^h/19^h$	960/320	2d	
MEPED	>6.9	-	$10^h/19^h$	31.5/50	2d	
MEPED	>16	-	$10^h/19^h$	0.6/1.5	2d	
MEPED	>36	-	-	-	-	
MEPED	>70	-	-	-	-	
MEPED	>140	-	-	-	-	
CORONAS F						
MKL	>1.	-	$08^h/19^h$	1960/930	2d	
MKL	>14	-	-	-	-	
MKL	>26	-	-	-	-	
MKL	>50	-	-	-	-	

ACE						
SIS	>10	05^h	$08^h/19^h$	4.2/2.5	2d	
SIS	>30	-	-	-	-	
SOHO						
EPHIN (INT)	>50	05^h	08^h/ -	0.01/ -	-	

Differential fluxes of protons for the event of 2002 April 19

S/c, instruments	ΔE, MeV	To	Tmax	Jmax, $(cm^2.s.sr.MeV)^{-1}$	Dura-tion	Comments
SOHO						
LION	0.75-2	05^h	$08^h/20^h$	97/46	2d	
LION	2-6	05^h	$08^h/20^h$	10/5.8	2d	
EPHIN	4-8	05^h	$09^h/19^h$	10.1/12.3	2d	
EPHIN	8-25	05^h	$09^h/19^h$	0.31/0.32	2d	
EPHIN	25-41	05^h	$08^h/18^h$	0.0015/0.0003	2d	
EPHIN	41-53	- " -	- " -	- " -	- " -	

Electromagnetic and other phenomena that are sources and/or accompanying for the event of 2002 April 19

2002 **April 19** O **AR9906** **To event 421**

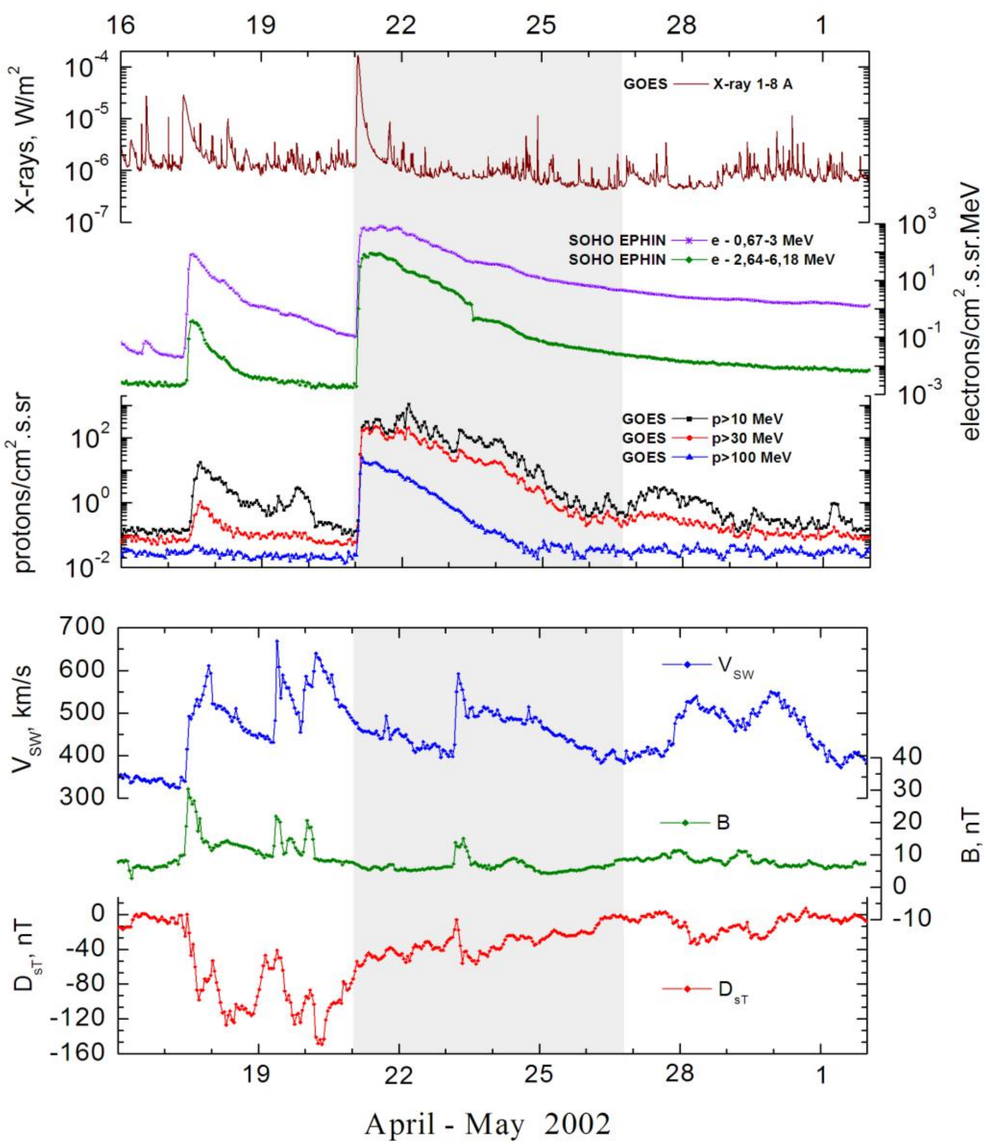
Hα	6563 Å	1513	1520	1528	S16W59	SF	F
1 – 12	keV	1516	1521	1527		C2.5	1.4E-3

Event 2002.04.21 – (2002-111) **№ 422**

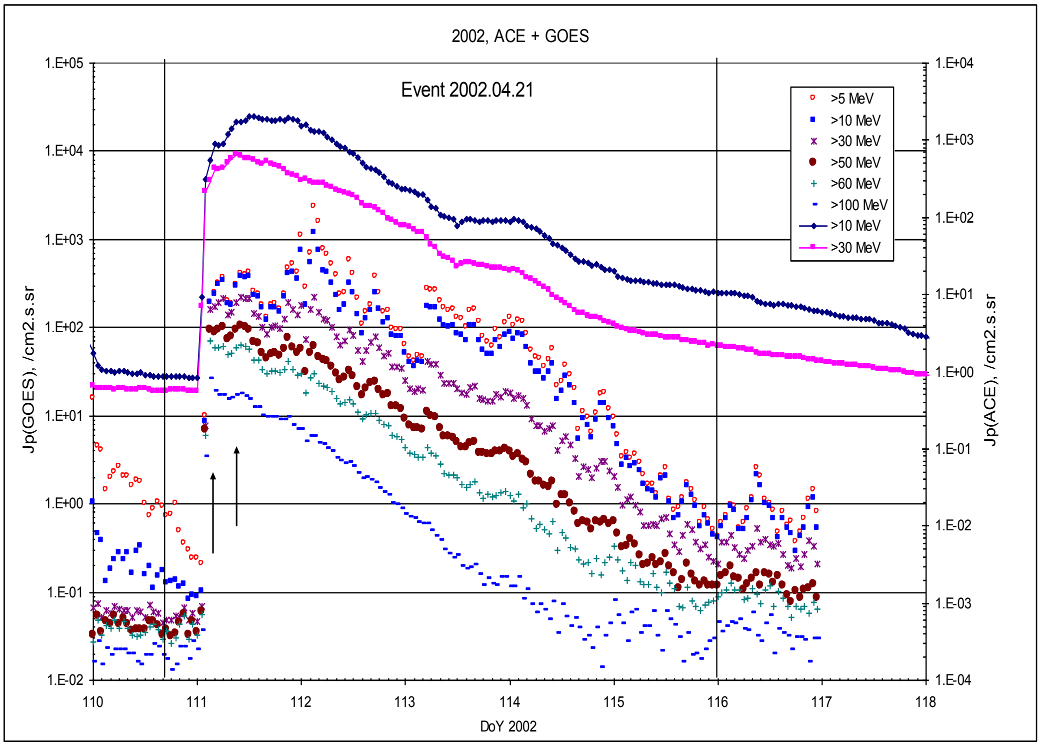
Particle event: To(Ep>10 MeV) – 21d01^h
Tmax$_1$(Ep>10 MeV) – 21d03^h, Jmax$_1$(Ep>10 MeV) – 915 /cm^2.s.sr *)
Tmax$_2$(Ep>10 MeV) – 21d09^h, Jmax$_2$(Ep>10 MeV) – 1730 /cm^2.s.sr *)
Duration of the event – 6 days
Quasimaximal energy of protons in the event – Eqm$_1$ = 575 MeV
– Eqm$_2$ = 570 MeV
*) Data from ACE (SIS)

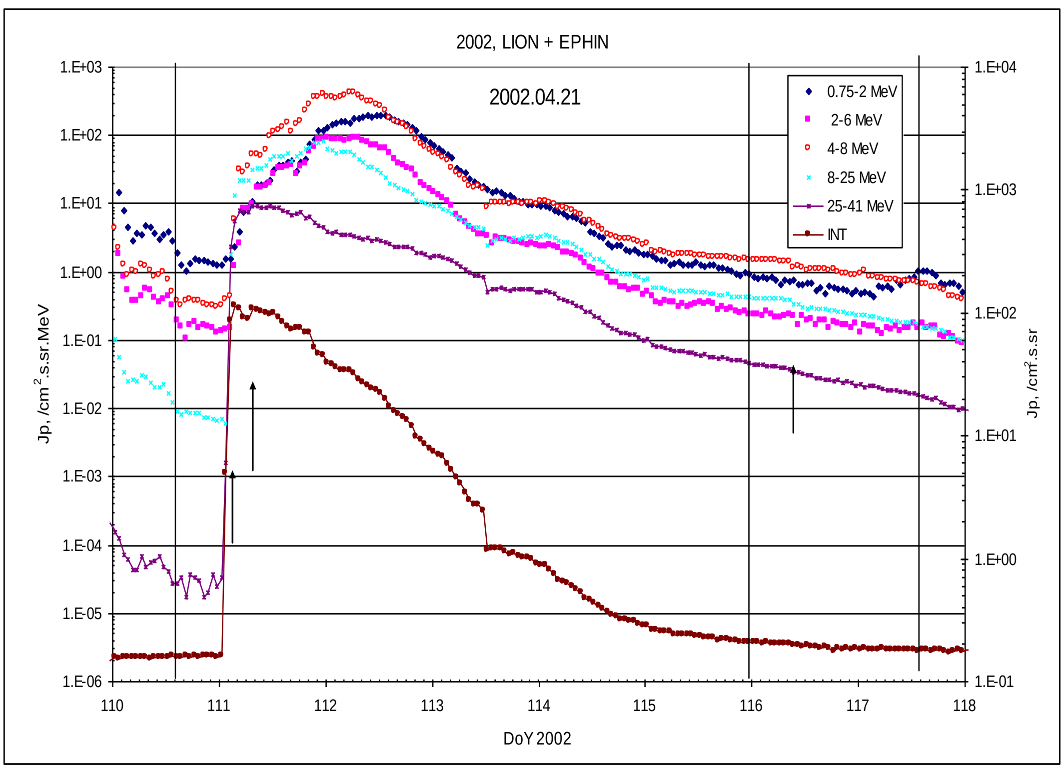
Sources: ■ solar flare 21d00^{h}43^m, X1.5/1F, S14W84, AR9906
Main X-ray burst 1-8 Å: onset – 21d00^{h}43^m, max – 21d01^{h}51^m, Φ = 0.6 J/m^2
CME: 21d01^{h}27^m, V = 2393 km/s, Δφ = 360^o, dA = 282^o
▲SC 23d04^{h}48^m

Particle fluxes and associated phenomena



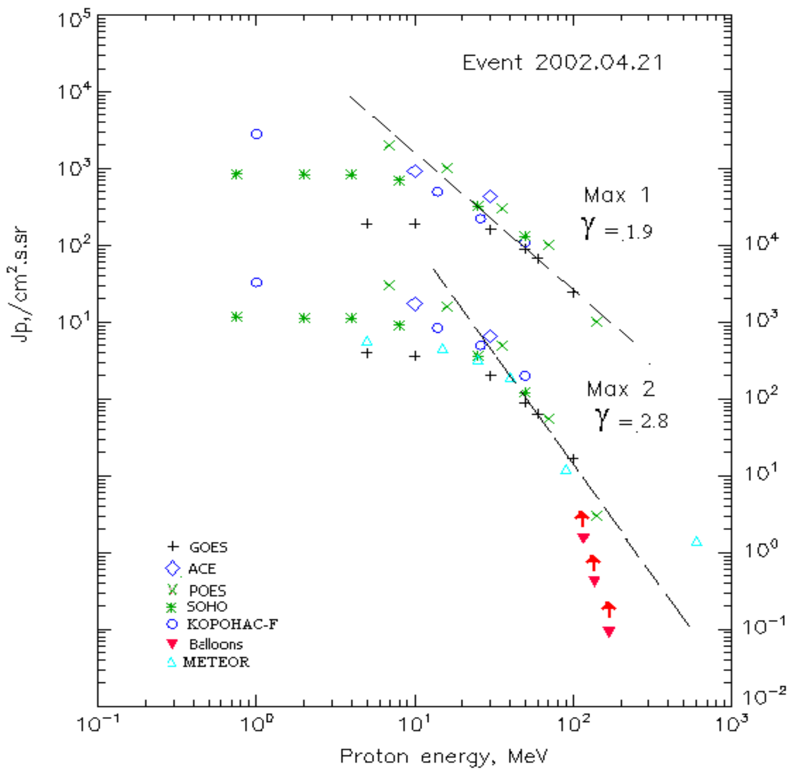
Time profiles of the proton fluxes for the event of 2002 April 21





Arrows on the profiles of the events indicate the time of the proton flux maxima, taken to build the proton spectra (see below)

Integral time-of-maximum proton spectrum



Integral fluxes of protons for the event of 2002 April 21

S/c, instruments	Ep, MeV	To	Tmax	Jmax, $(cm^2.s.sr)^{-1}$	Dura-tion	Comments
GOES-10						
EPS	>5	02^h	$03^h/09^h$	195/410	6d	
EPS	>10	01^h	$03^h/09^h$	190/365	6d	
EPS	>30	01^h	$03^h/10^h$	160/195	6d	
EPS	>50	01^h	$03^h/10^h$	95/103	5d	
EPS	>60	01^h	$03^h/10^h$	68/64	5d	
EPS	>100	01^h	$03^h/10^h$	24/16.5	5d	
METEOR						
CBM	>5	02^h	- /11^h	- /585	7d	
CBM	>15	02^h	- /11^h	- /454	6d	
CBM	>25	02^h	- /09^h	- /330	5d	
CBM	>40	02^h	- /09^h	- /190	4d	
BP	>90	02^h	- /09^h	- /12.3	3d	
ChD	>600	02^h	- /10^h	- /1.4	2d	
POES-16						
MEPED	>0.24	-	-	-	-	
MEPED	>0.8	-	-	-	-	
MEPED	>2.5	-	-	-	-	
MEPED	>6.9	-	$03^h/10^h$	2030/ 3110	6d	
MEPED	>16	-	$03^h/10^h$	970/ 1620	6d	
MEPED	>36	-	$03^h/10^h$	290/ 510	5d	
MEPED	>70	-	$03^h/10^h$	110/ 55	5d	
MEPED	>140	-	$03^h/10^h$	10/3	5d	

CORONAS F						
MKL	>1.	-	$03^h/12^h$	2830/3330	6d	
MKL	>14	-	$03^h/12^h$	490/840	5d	
MKL	>26	-	$03^h/12^h$	220/510	5d	
MKL	>50	-	$03^h/12^h$	110/210	5d	
ACE						
SIS	>10	01^h	$04^h/09^h$	915/1730	6d	
SIS	>30	01^h	$04^h/09^h$	430/650	6d	
SOHO						
EPHIN (INT)	>50	01^h	$04^h/08^h$	116/107	4d	
BALLOONS						
Mu	>117	-	- /22d(09^h42^m-10^h20^m)	- /1.5	-	After second
Mu	>137	-	- /22d(09^h42^m-10^h20^m)	- /0.41	-	maximum
Mu	>169	-	- /22d(09^h42^m-10^h20^m)	- /0.09	-	

Differential fluxes of protons for the event of 2002 April 21

S/c, instruments	ΔE, MeV	To	Tmax	Jmax, $(cm^2.s.sr.MeV)^{-1}$	Dura-tion	Comments
SOHO						
LION	0.75-2	02^h	$05^h/10^h$	7.5/19.3	5d	
LION	2-6	02^h	$05^h/10^h$	1.2/1.7	5d	
EPHIN	4-8	02^h	$05^h/08^h$	32/53.2	5d	
EPHIN	8-25	02^h	$05^h/08^h$	22.2/32.4	5d	
EPHIN	25-41	01^h	$05^h/08^h$	7.5/9.15	5d	
EPHIN	41-53	- “ -	- “ -	- “ -	- “ -	

References:

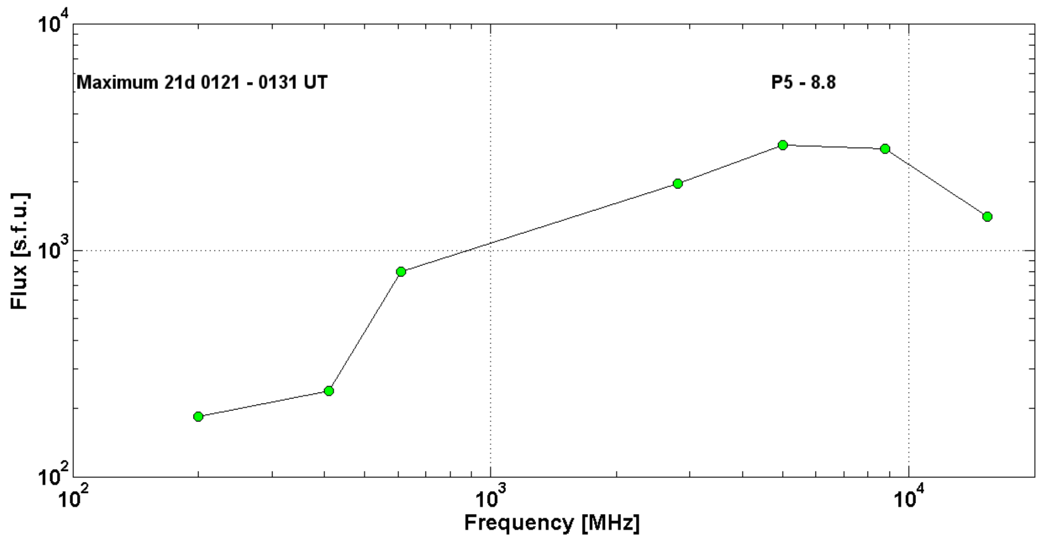
Kuwabara T., J.W. Bieber, J. Clem et al., 2006.
Veselovskij I.S., I.N. Myagkova, O.S. Yakovchuk, 2012.

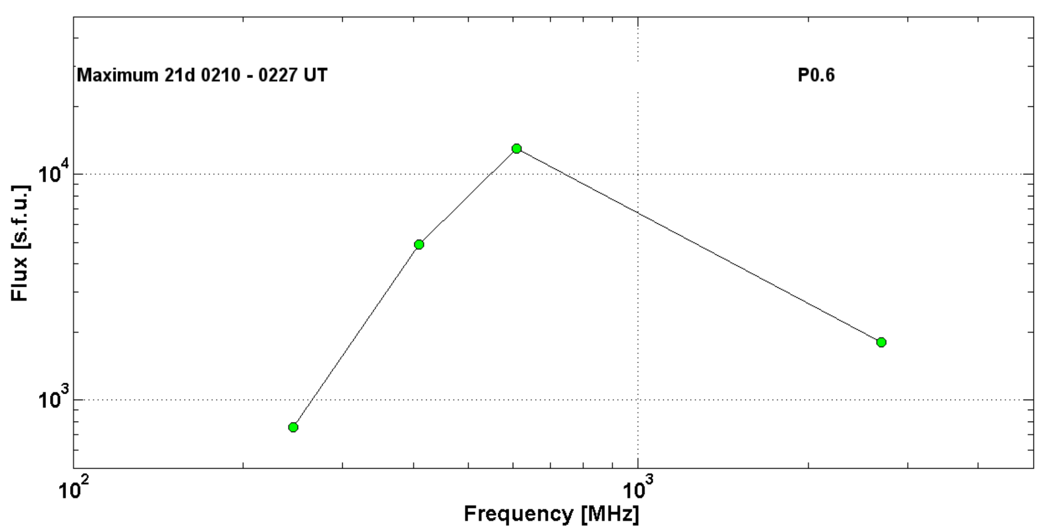
Electromagnetic and other phenomena that are sources and/or accompanying for the event of 2002 April 21

2002 April 21 ■ AR9906 To event 422

Hα	6563 Å	0059	0131	0251	S14W84	1F	FY
1 – 12	keV	0043	0151	0238		X1.5	6.0E-1
12-25	keV	004008	004914	005116		277345	RHESSI
100-300	keV	005116	013202	013324		59430512	RHESSI
15.4	GHz	0110.0	0123.0	0252.0		3.15	
8.8	GHz	0058.0	0123.0	0318.0	P5 - 8.8	3.45	
5	GHz	0057.0	0123.0	0321.0		3.46	
2.8	GHz	0044.0	0131.0	0342.0		3.29	
610	MHz	0111.0	0121.0	0000.0		2.90	
410	MHz	0111.0	0121.0	0000.0		2.38	
200	MHz	0102.0	0131.0	0305.0		2.27	

DS II	57-130	0119		0130	SH	3	
DS II	25-80	0119		0126		3	
DS IV	30-220	0117		0154		3	
DS I	57-120	0134		0238	S,C	1	
DS III	57-240	0120		0150	S,C	1	
DS III	57-210	0130		0132	G	2	
DS CONT	300-900	0120		0124		1	
2.7	GHz	0058.0	0227.0	0328.0		3.26	
610	MHz	0145.0	0210.0	0305.0	P0.6	4.11	
410	MHz	0146.0	0220.0	0252.0		3.69	
245	MHz	0143.0	0227.0	0306.0		2.88	
DS IV		0136		0238	25-124	1	
DS IV		0148		0245	130-1800	3	
DS III	G	0210		0222	25-210	2	
°n						Mauna Kea,Norikura	
CME	WL	0127	2393 km/s	-1.4 km/s^2	360˚	282˚	





Список 2002 г.

Event 2002.05.22 – (2002-142) **№ 423**

Particle event: To(Ep>10 MeV) – 22d07^h

Tmax$_1$(Ep>10 MeV) – 23d10^h, Jmax$_1$(Ep>10 MeV) – 260 /cm^2.s.sr

Tmax$_2$(Ep>10 MeV) – 23d16^h, Jmax$_2$(Ep>10 MeV) – 87 /cm^2.s.sr

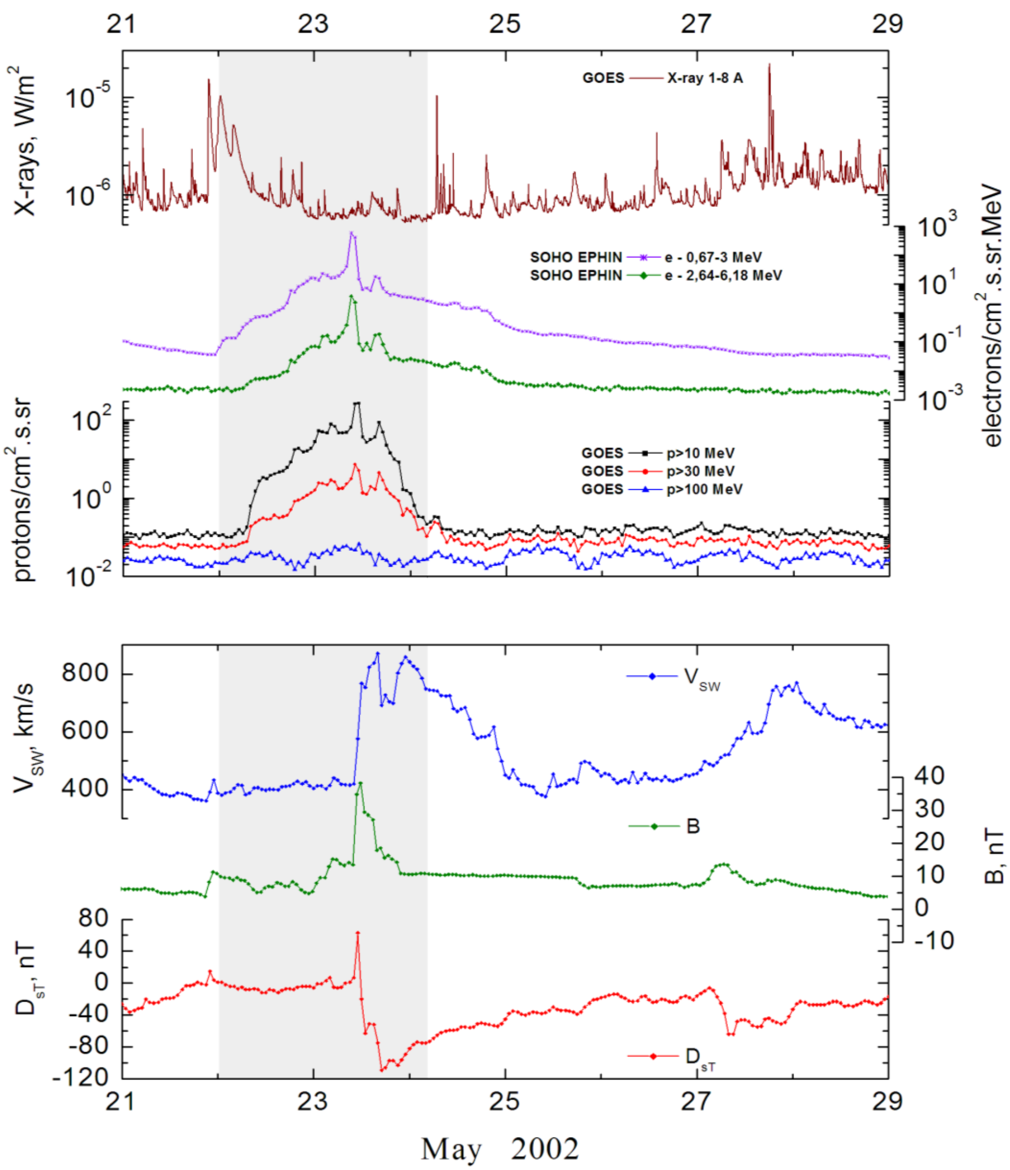
Duration of the event – 2 days

Quasimaximal energy of protons in the event – Eqm$_1$ = 125 MeV

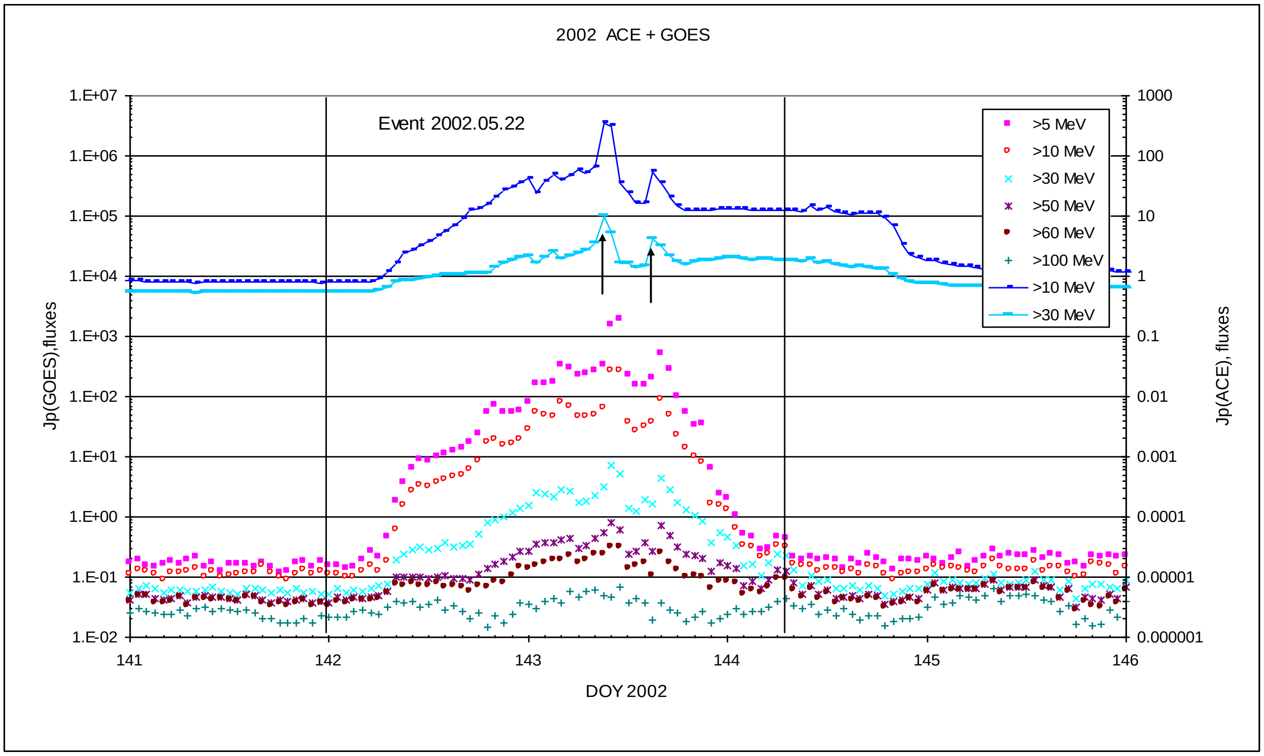
– Eqm$_2$ = 175 MeV

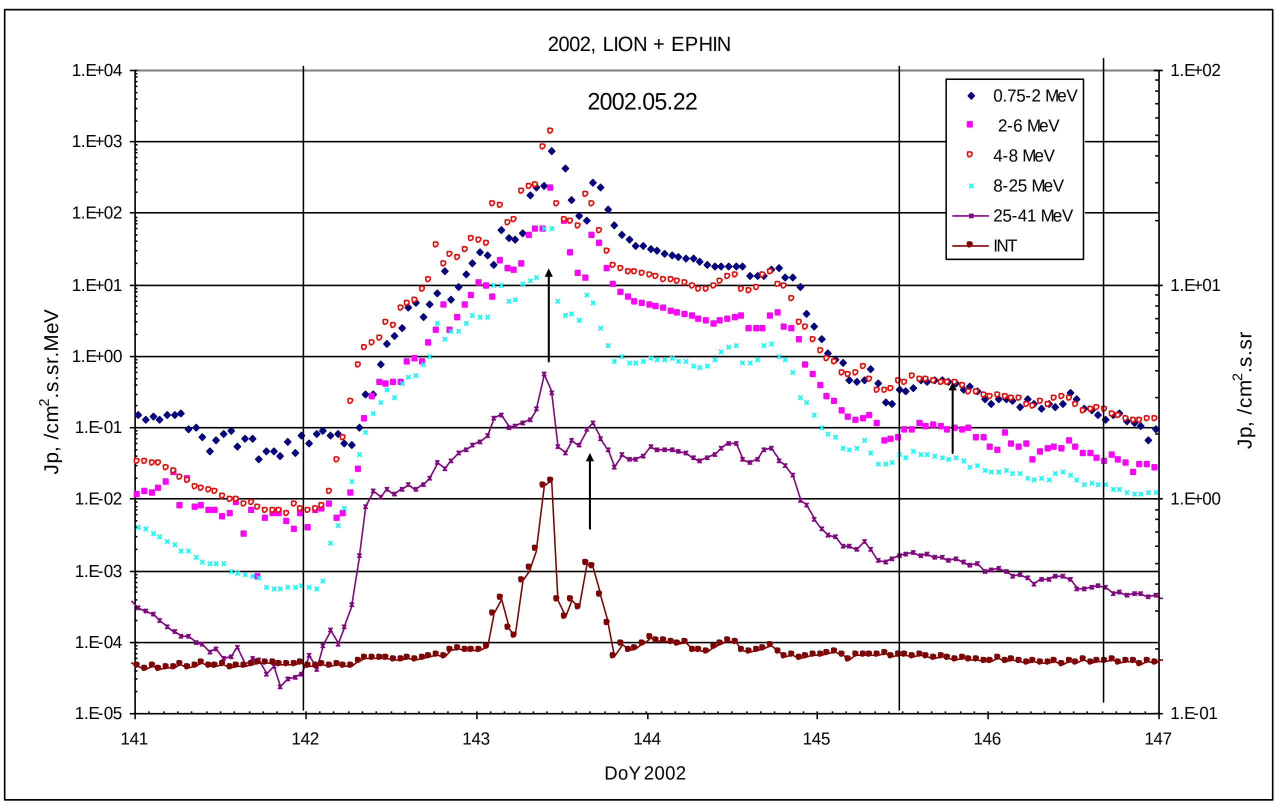
Sources: ☉ solar flare 22d03^{h}18^m, C5.0/SF, S22W53, DSF**;**
Main X-ray burst 1-8 Å: onset – 22d03^{h}18^m, max – 22d03^{h}54^m, Φ = 0.025 J/m^2**;**
CME: 22d03^{h}50^m, V = 1557 km/s, Δφ = 360^o, dA = 250^o**;**
▲SC 23d10^{h}51^m

Particle fluxes and associated phenomena



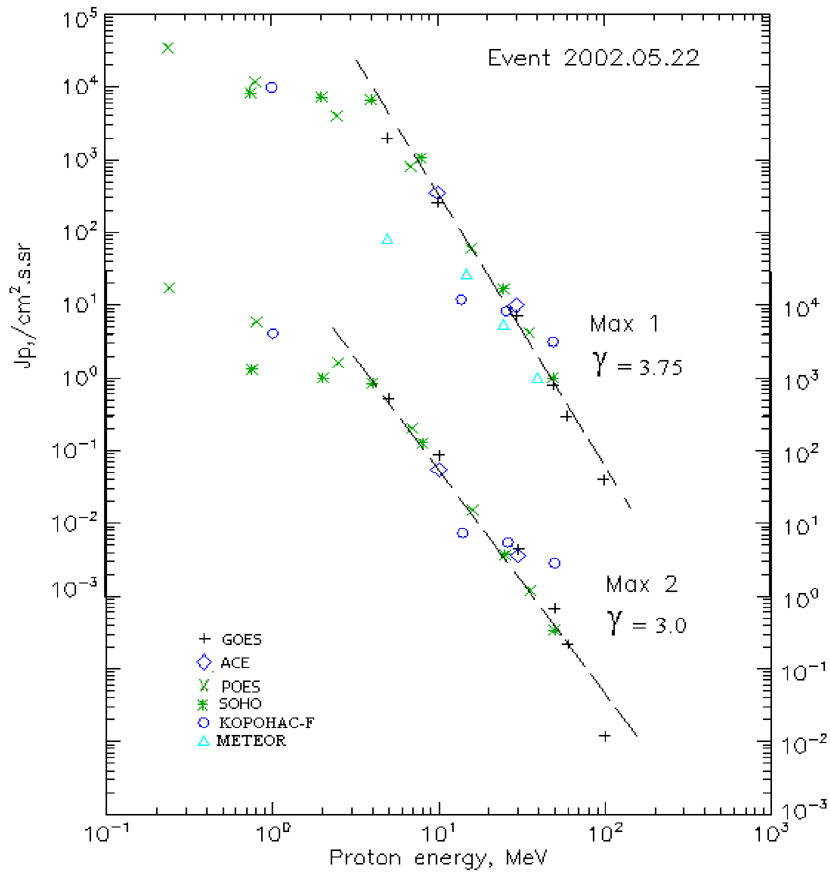
Time profiles of the proton fluxes for the event of 2002 May 22





Arrows on the profiles of the events indicate the time of the proton flux maxima, taken to build the proton spectra (see below)

Integral time-of-maximum proton spectrum



Integral fluxes of protons for the event of May 22

S/c, instruments	Ep, MeV	To	Tmax	Jmax, $(cm^2.s.sr)^{-1}$	Duration	Comments
GOES-10						
EPS	>5	07^h	$23d11^h/23d16^h$	2120/520	2d	
EPS	>10	07^h	$23d10^h/23d16^h$	260/87	2d	
EPS	>30	07^h	$23d10^h/23d16^h$	7.2/4.4	2d	
EPS	>50	07^h	$23d10^h/23d16^h$	0.8/0.67	2d	
EPS	>60	07^h	$23d10^h/23d16^h$	0.3/0.22	2d	
EPS	>100	07^h	$23d10^h/23d16^h$	0.04/0.012	2d	
METEOR						
CBM	>5	08^h	$23d11^h$/ -	83/ -	3d	
CBM	>15	08^h	$23d11^h$/ -	27/ -	3d	
CBM	>25	08^h	$23d11^h$/ -	5.3/ -	3d	
CBM	>40	08^h	$23d11^h$/ -	1/ -	2d	
BP	>90	-	-	-	-	
ChD	>600	-	-	-	-	

POES-16						
MEPED	>0.24	-	23d11^h/23d16^h	35280/ 17140	2d	
MEPED	>0.8	-	23d11^h/23d16^h	12310/ 6130	2d	
MEPED	>2.5	-	23d11^h/23d16^h	4240/1610	2d	
MEPED	>6.9	-	23d11^h/23d16^h	830/190	2d	
MEPED	>16	-	23d11^h/23d16^h	60/15	2d	
MEPED	>36	-	23d11^h/23d16^h	4.2/1.3	2d	
MEPED	>70	-	-	-	-	
MEPED	>140	-	-	-	-	
CORONAS F						
MKL	>1.	-	23d12^h/23d16^h	9970/4080	2d	
MKL	>14	-	23d12^h/23d16^h	12/7.4	2d	
MKL	>26	-	23d12^h/23d16^h	8.2/5.5	2d	
MKL	>50	-	23d12^h/23d16^h	3.14/2.85	2d	
ACE						
SIS	>10	06^h	23d10^h/23d15^h	320/55	3d	
SIS	>30	07^h	23d09^h/23d15^h	9.7/3.6	3d	
SOHO						
EPHIN (INT)	>50	07^h	23d09^h/23d15^h	1/0.34	1d	

Differential fluxes of protons for the event of 2002 May 22

S/c. instruments	ΔE. MeV	To	Tmax	Jmax. (cm^2.s.sr.MeV)$^{-1}$	Dura-tion	Comments
SOHO						
LION	0.75-2	07^h	23d10^h/23d16^h	730/270	3d	
LION	2-6	05^h	23d10^h/23d16^h	224/47	3d	
EPHIN	4-8	03^h	23d10^h/23d16^h	1390/179	3d	
EPHIN	8-25	02^h	23d09^h/23d15^h	61/7.3	3d	
EPHIN	25-41	02^h	23d09^h/23d16^h	0.56/0.12	3d	
EPHIN	41-53	- “ -	- “ -	- “ -	- “ -	

References:

Kuwabara T., J.W. Bieber, J. Clem et al., 2006.

Electromagnetic and other phenomena that are sources and/or accompanying for the event of 2002 May 22

2002 May 22 ☉ AR To event 423

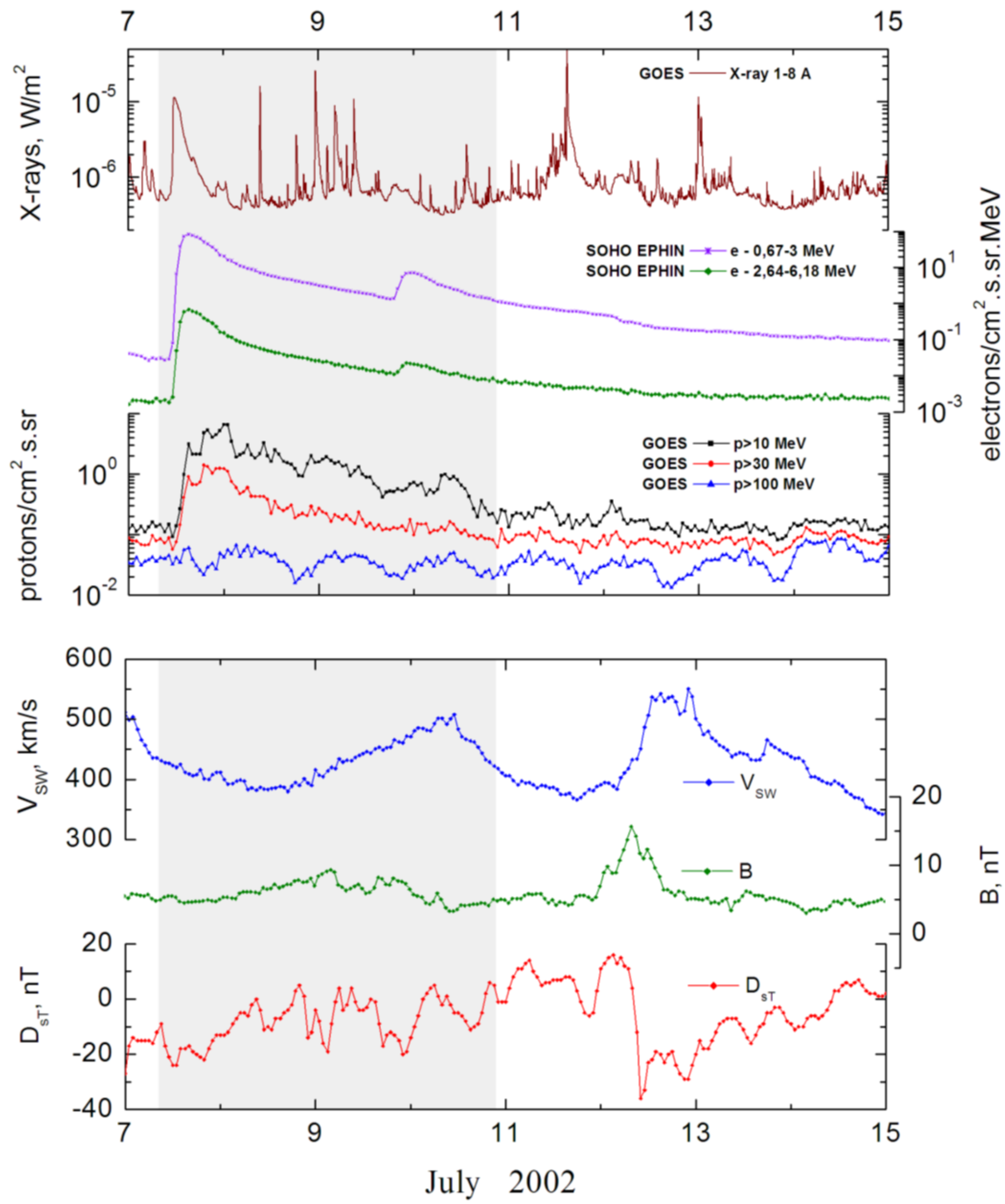
Hα	6563 Å	<0400	~0400l	0437	S22W53	SF	U
DSF	6563 Å	21^d >1929		22^d <1135	S30W34	43˚	
1 – 12	keV	0318	0354	0502		C5.0	2.5E-2
6-12	keV	04:00:44	04:00:54	04:16:32		74256	HESSI
2.8	GHz	0323.0	0337.6	0408.0		1.26	
200	MHz	0329.0	0329.0	0330.0		1.54	
DS III	57-180	0320		0353	GG	2	
DS III	25-180	0348		0352		2	
DS CONT	25-180	0321		0353		1	
CME	WL	0350	1557 km/s	-10.4 km/s^2	360˚	250˚	

Event 2002.07.07 – (2002-188) **№ 424**

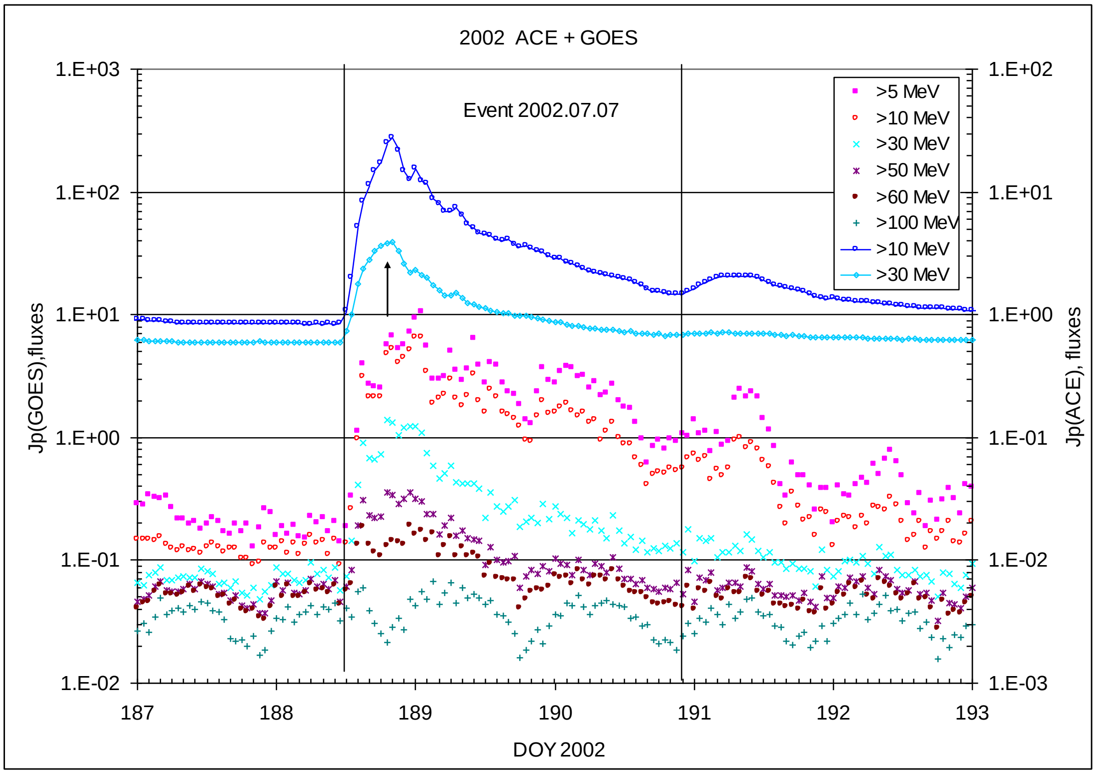
Particle event: To(Ep>10 MeV) – 07d13^h
Tmax(Ep>10 MeV) – 07d20^h, Jmax (Ep>10 MeV) –26 /cm^2.s.sr *)
Duration of the event – 3 days
Quasimaximal energy of protons in the event – Eqm = 85 MeV
*) Data from ACE (SIS)

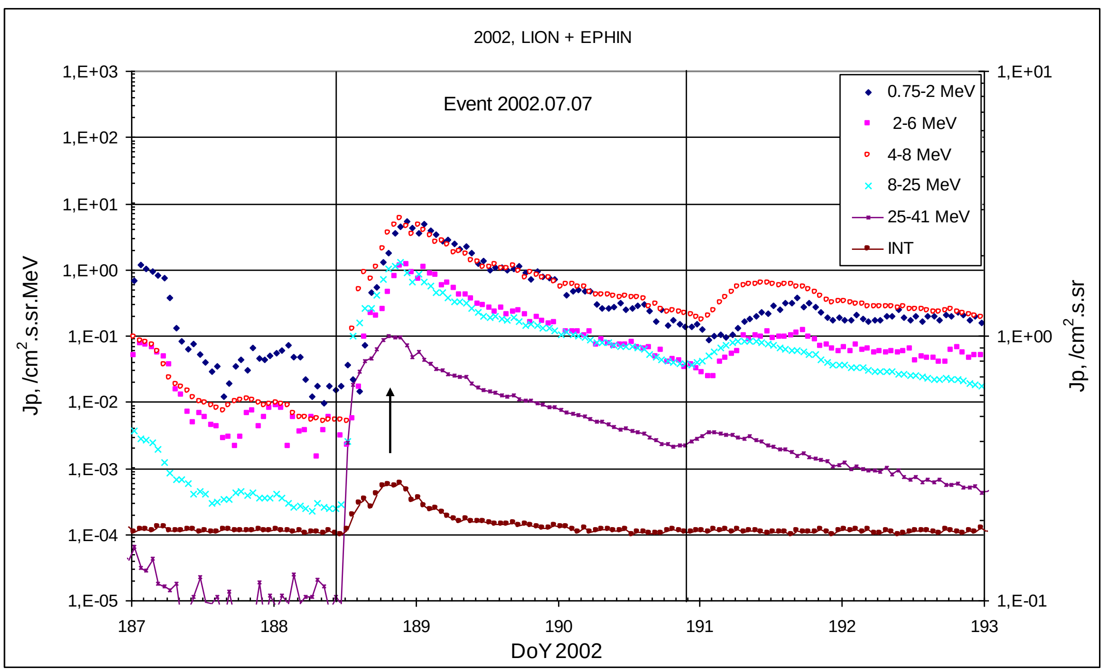
Sources: ■ solar flare 07d11^{h}15^m, M1.0/…, s19w90*, AR10017
Main X-ray burst 1-8 Å: onset – 07d11^{h}15^m, max – 07d11^{h}43^m, Φ = 0.062 J/m^2
CME: 07d11^{h}30^m; V = 1423 km/s; Δφ = 228^o; dA = 260 ^{o}
* Localization from EPL observtion

Particle fluxes and associated phenomena



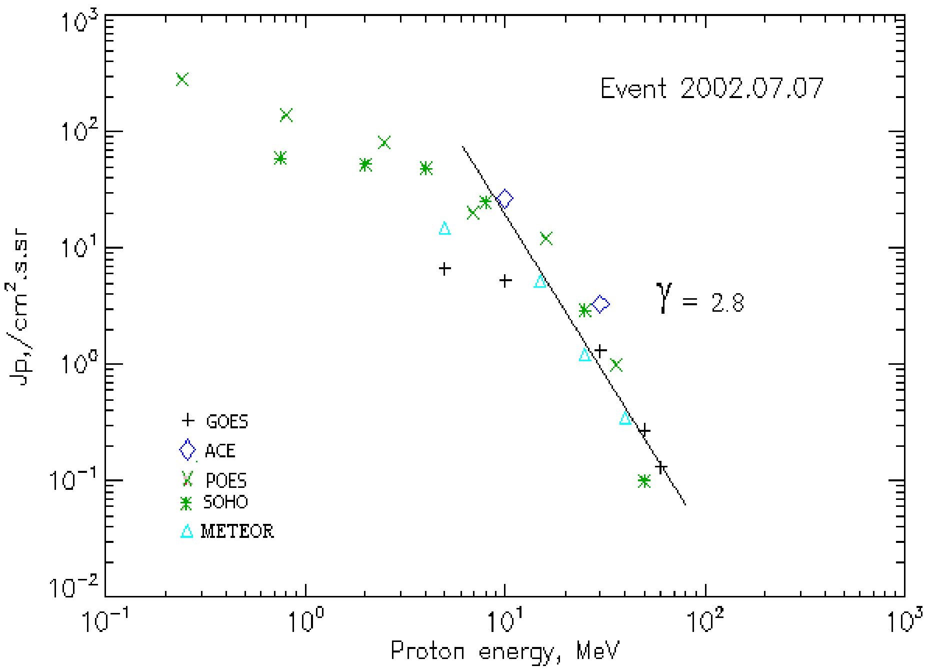
Time profiles of the proton fluxes for the event of 2002 July 07





Arrows on the profiles of the events indicate the time of the proton flux maxima, taken to build the proton spectra (see below)

Integral time-of-maximum proton spectrum



Integral fluxes of protons for the event of 2002 July 07

S/c, instruments	Ep, MeV	To	Tmax	Jmax, $(cm^2.s.sr)^{-1}$	Dura-tion	Comments
GOES-10						
EPS	>5	13^h	20^h	6.6	3d	
EPS	>10	13^h	20^h	5.2	3d	
EPS	>30	13^h	19^h	1.3	3d	
EPS	>50	13^h	21^h	0.27	3d	
EPS	>60	13^h	23^h	0.13	3d	
EPS	>100	-	-	-	-	
METEOR						
CBM	>5	12^h	19^h	14.7	3d	
CBM	>15	12^h	19^h	5.2	3d	
CBM	>25	12^h	21^h	1.2	2d	
CBM	>40	12^h	22^h	0.34	1d	
BP	>90	-	-	-	-	
ChD	>600	-	-	-	-	
POES-16						
MEPED	>0.24	-	22^h	280	3d	
MEPED	>0.8	-	22^h	140	3d	
MEPED	>2.5	-	22^h	80	3d	
MEPED	>6.9	-	22^h	20	3d	
MEPED	>16	-	22^h	12	3d	
MEPED	>36	-	22^h	1	3d	
MEPED	>70	-	-	-	-	
MEPED	>140	-	-	-	-	
ACE						
SIS	>10	12^h	20^h	26.6	3d	
SIS	>30	12^h	20^h	3.3	3d	

SOHO						
EPHIN (INT)	>50	12^h	19^h	0.1	1d	

Differential fluxes of protons for the event of 2002 July 07

S/c, instruments	ΔE, MeV	To	Tmax	Jmax, $(cm^2.s.sr.MeV)^{-1}$	Dura-tion	Comments
SOHO						
LION	0.75-2	12^h	22^h	5.3	3d	
LION	2-6	12^h	22^h	1.2	3d	
EPHIN	4-8	12^h	21^h	5.9	3d	
EPHIN	8-25	12^h	21^h	1.3	3d	
EPHIN	25-41	12^h	20^h	0.1	3d	
EPHIN	41-53	- “ -	- “ -	- “ -	- “ -	

Electromagnetic and other phenomena that are sources and/or accompanying for the event of 2002 July 07

2002 July 07 ⊡ AR10017 To event 424

Hα	6563 Å	No Flare			s13w90*		
EPL	6563 Å	1039		1059	S13W90		
1 – 12	keV	1115	1143	1317		M1.0	6.2E-2
12-25	keV	112956	113050	113908		339912	RHESSI
12-25	keV	113908	113910	114956		83664	RHESSI
12-25	keV	121304	121314	121624		56784	RHESSI
12-25	keV	121624	121842	123516		247872	RHESSI
6-12	keV	123516	123518	123852		35808	RHESSI
204	MHz	1112.6	1114.7	1115.1		1.85	
DS I	130-320	~1110		~1145	S,N	1	
DS I	45-90	1122		1137	S	2	
DS III	40-350	1111		1119	GG	2	
DS III	45-90	1152		1158	N	1	
DS III	40-65	1243		1243	B	2	
CME	WL	1130	1423 km/s	22.0 km/s^2	228˚	260˚	

* Localization from EPL observtion.

Event 2002.07.16 – (2002-197) **№ 425**

Particle event: To(Ep>10 MeV) – $16d12^h$

$Tmax_1$(Ep>10 MeV) – $16d22^h$, $Jmax_1$(Ep>10 MeV) – 27 /cm^2.s.sr

$Tmax_2$(Ep>10 MeV) – $17d14^h$, $Jmax_2$(Ep>10 MeV) – 85 /cm^2.s.sr

Duration of the event – 3 days

Quasimaximal energy of protons in the event – Eqm_1 = 125 MeV

– Eqm_2 = 135 MeV

Sources: ● solar flare $15d19^h50^m$, 3B/X3.0, N19W01, AR10030

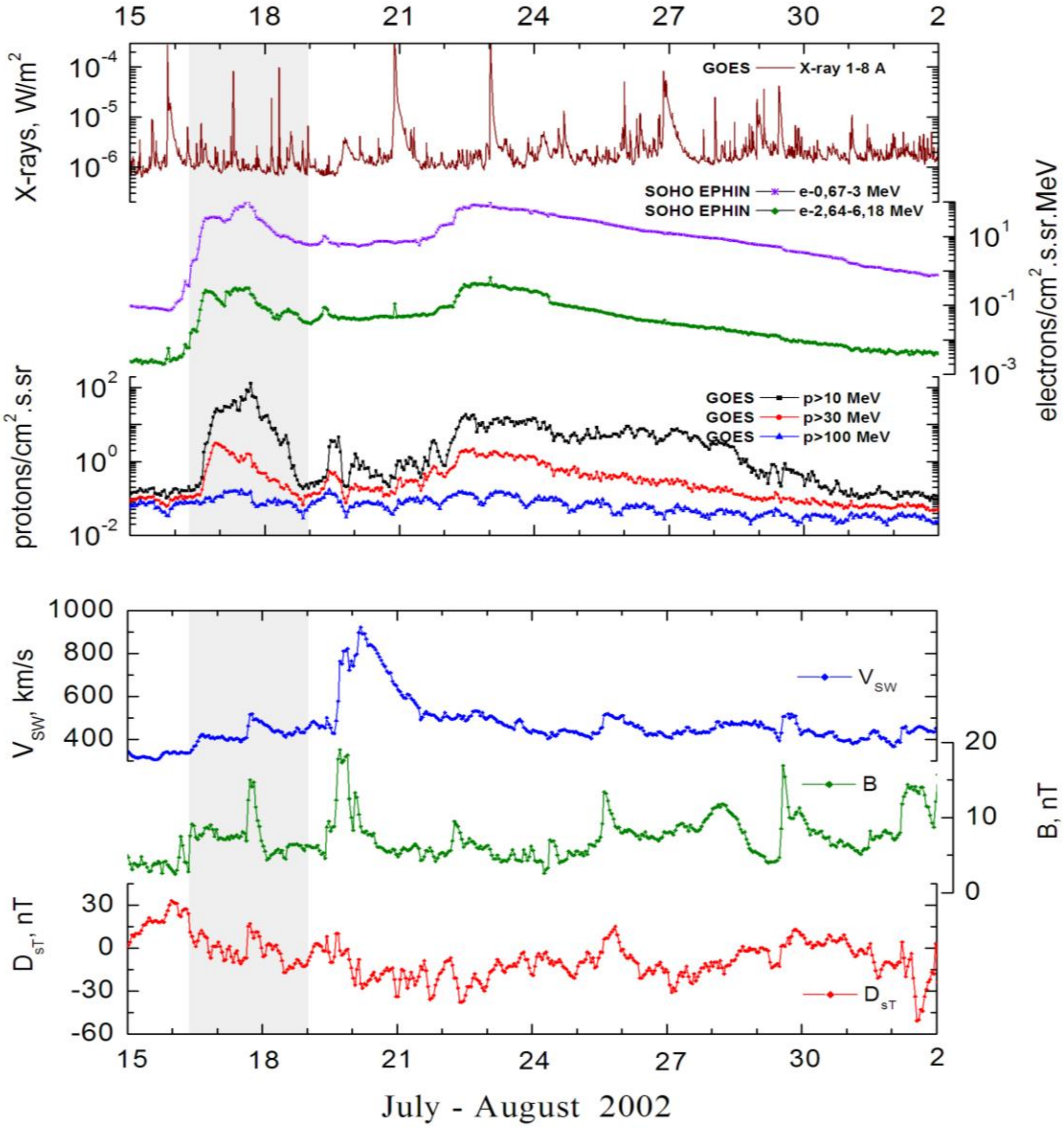
Ø solar flare $17d06^h58^m$, M8.5/1B, N20W16 AR10030

Main X-ray burst 1-8 Å: onset –$15d19^h59^m$, max – $15d20^h08^m$, Φ = 0.14 J/m^2

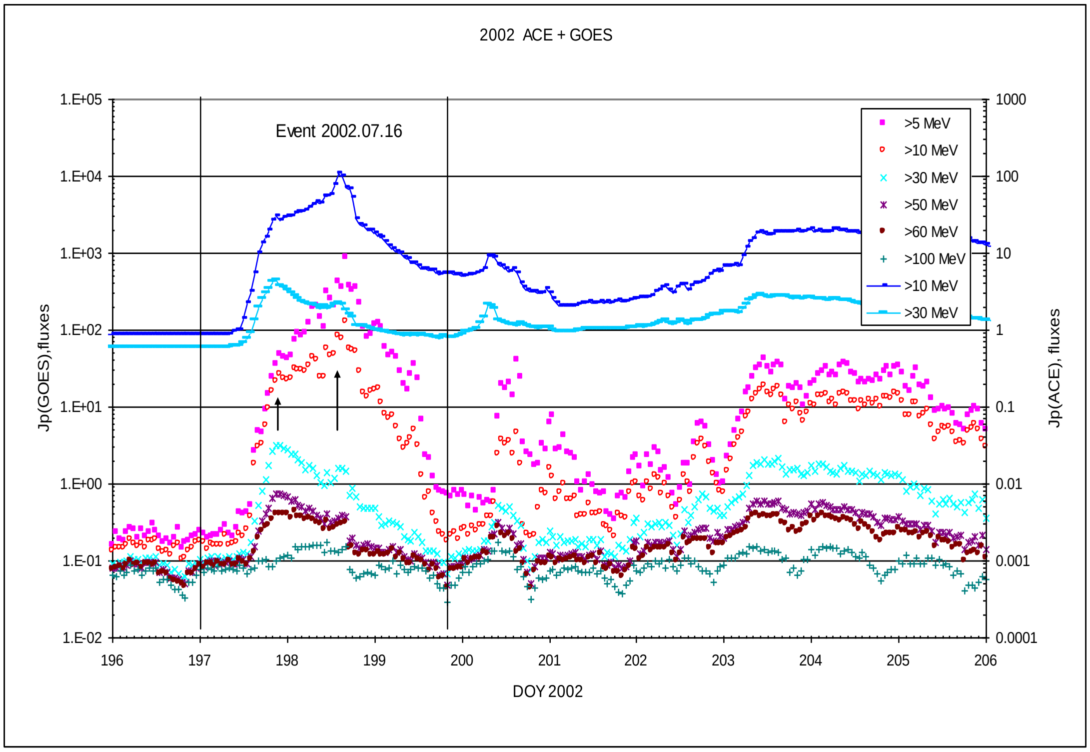
CME: $15d20^h30^m$; V = 1151 km/s; Δφ = 360^o; dA = 035^o

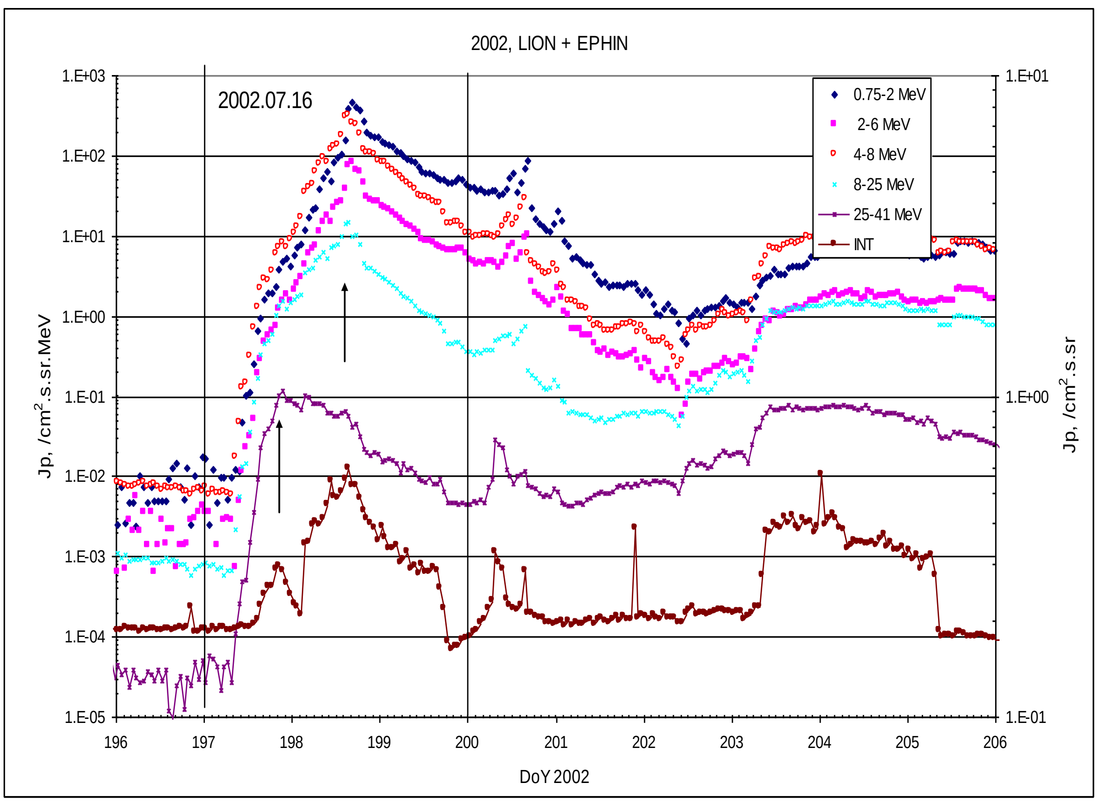
Δ SC $17d16^h04^m$

Particle fluxes and associated phenomena



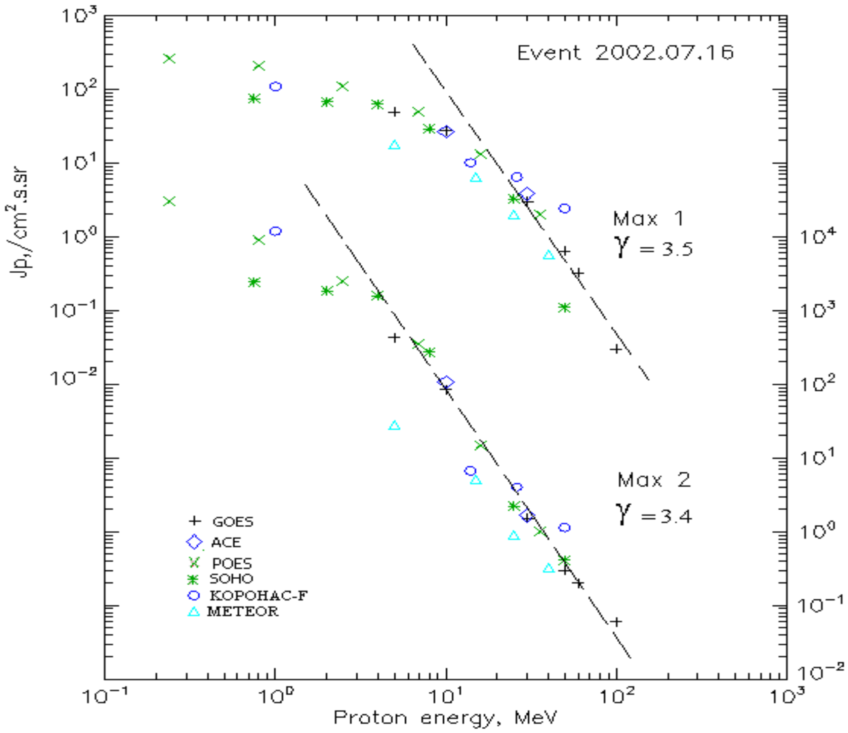
Time profiles of the proton fluxes for the event of 2002 July 16





Arrows on the profiles of the events indicate the time of the proton flux maxima, taken to build the proton spectra (see below)

Integral time-of-maximum proton spectrum



Integral fluxes of protons for the event of 2002 July 16

S/c, instruments	Ep, MeV	To	Tmax	Jmax, (cm2.s.sr)-1	Dura-tion	Comments
GOES-10						
EPS	>5	12^h	$22^h/17d14^h$	48.5/430	3d	
EPS	>10	12^h	$22^h/17d14^h$	27/85	3d	
EPS	>30	12^h	$22^h/17d14^h$	3/1.5	2d	
EPS	>50	12^h	$22^h/17d15^h$	0.64/0.3	2d	
EPS	>60	12^h	$22^h/17d14^h$	0.32/0.2	1d	
EPS	>100	13^h	$22^h/17d15^h$	0.03/0.06	1d	
METEOR						
CBM	>5	$<22^h$	$22^h/17d15^h$	18/28	3d	
CBM	>15	$<22^h$	$22^h/17d15^h$	6.5/5	3d	
CBM	>25	$<22^h$	$22^h/17d15^h$	2/0.9	2d	
CBM	>40	$<22^h$	$23^h/17d14^h$	0.6/0.3	1d	
BP	>90	-	-	-	-	
ChD	>600	-	-	-	-	
POES-16						
MEPED	>0.24	-	$22^h/17d17^h$	265/31200	-	
MEPED	>0.8	-	$22^h/17d17^h$	210/8930	-	
MEPED	>2.5	-	$21^h/17d17^h$	110/2480	-	
MEPED	>6.9	-	$20^h/17d16^h$	50/350	-	
MEPED	>16	-	$20^h/17d16^h$	13/15	-	
MEPED	>36	-	$19^h/17d16^h$	2/1	-	
MEPED	>70	-	-	-	-	
MEPED	>140	-	-	-	-	

CORONAS F						
MKL	>1.	-	$12^h/17d16^h$	108/11980	-	
MKL	>14	-	$12^h/17d16^h$	10/6.7	-	
MKL	>26	-	$12^h/17d16^h$	6.4/4	-	
MKL	>50	-	$12^h/17d16^h$	2.4/1.14	-	
ACE						
SIS	>10	12^h	$22^h/17d14^h$	26/107	2d	
SIS	>30	12^h	$21^h/17d14^h$	3.8/1.65	2d	
SOHO						
EPHIN (INT)	>50	14^h	$20^h/17d15^h$	0.1/0.4	2d	

Differential fluxes of protons for the event of 2002 July 16

S/c, instruments	ΔE, MeV	To	Tmax	Jmax, $(cm^2.s.sr.MeV)^{-1}$	Dura-tion	Comments
SOHO						
LION	0.75-2	08^h	$22^h/17d16^h$	5.2/470	2,5d	
LION	2-6	08^h	$22^h/17d16^h$	1.8/85	2,5d	
EPHIN	4-8	08^h	$21^h/17d15^h$	8.4/329	2,5d	
EPHIN	8-25	08^h	$21^h/17d15^h$	1.5/15	2,5d	
EPHIN	25-41	08^h	$21^h/17d14^h$	0.11/0.065	2,5d	
EPHIN	41-53	- “ -	- “ -	- “ -	- “ -	

References:

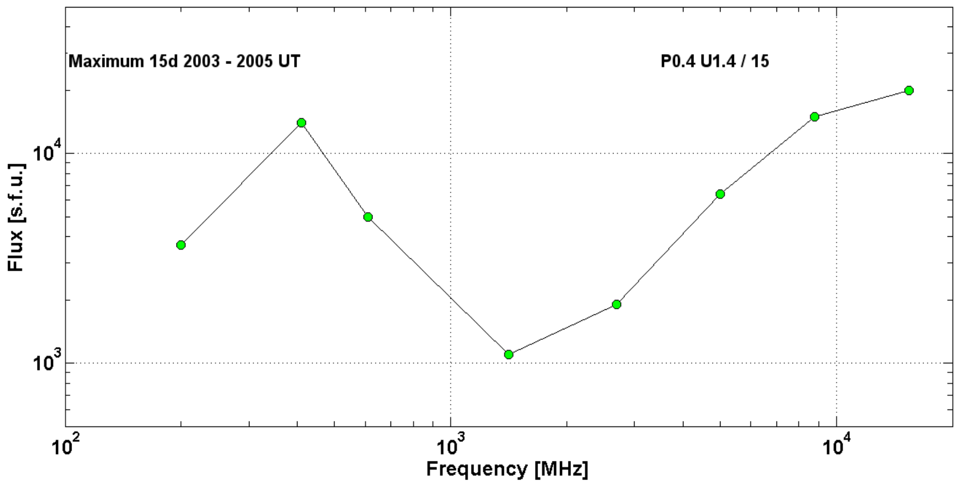
Kuwabara T., J.W. Bieber, J. Clem et al., 2006.

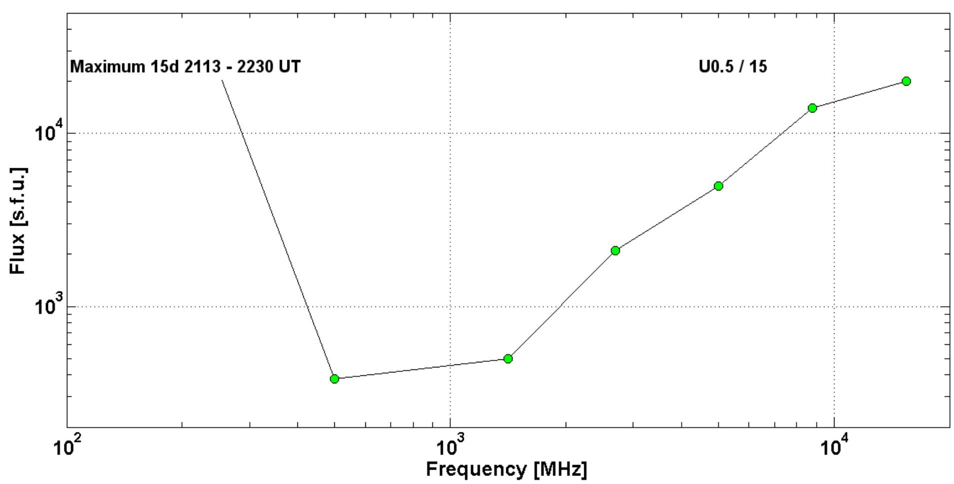
Electromagnetic and other phenomena that are sources and/or accompanying for the event of 2002 July 16

2002 July 15 ● AR10030 To event 425

Hα	6563 Å	1950	2011	>2334	N19W01	3B	FU
1 – 12	keV	1959	2008	2014		X3.0	1.4E-1
1 – 12	keV	2103	2132	2148		M1.8	4.3E-2
25-50	keV	202512	202802	205040		6989876	RHESSI
25-50	keV	205040	211414	212740		5761680	RHESSI
15.4	GHz	2003.0	2004.0	2156.0	P0.4 U1.4/15	4.30	
8.8	GHz	2001.0	2004.0	2146.0		4.18	
5	GHz	1958.0	2004.0	2204.0		3.81	
2.7	GHz	1957.0	2004.0	2221.0		3.28	
1.4	GHz	2001.0	2004.0	2228.0		3.04	
610	MHz	2003.0	2005.0	2225.0		3.70	
410	MHz	2001.0	2003.0	2304.0		4.15	
200	MHz	2003.0	2004.0	2015.0		3.56	
DS IV	30-80	1955		2213		3	
DS IV	25-180	2023		2319		2	
DS III	25-600	1954		2030	G	3	

15.4	GHz	2002.0	2230.0	2234.0	U0.5/15	4.30	
8.8	GHz	2001.0	2141.0	2234.0		4.15	
5	GHz	1957.0	2142.0	2234.0		3.70	
2.7	GHz	1955.0	2142.0	2234.0		3.32	
1.4	GHz	1956.0	2142.0	2234.0		2.70	
500	MHz	2003.0	2113.0	2148.0		2.58	
245	MHz	2001.0	2129.0	2221.0		4.40	
DS IV	57-1500	<2110		2214	F,S	3	
DS III	57-180	2214		>2400	S,C	1	
CME	WL	2030	1151 km/s	-25.6 km/s^2	360˚	035˚	
CME	WL	2130	1300 km/s	-7.3 km/s^2	188˚	045˚	



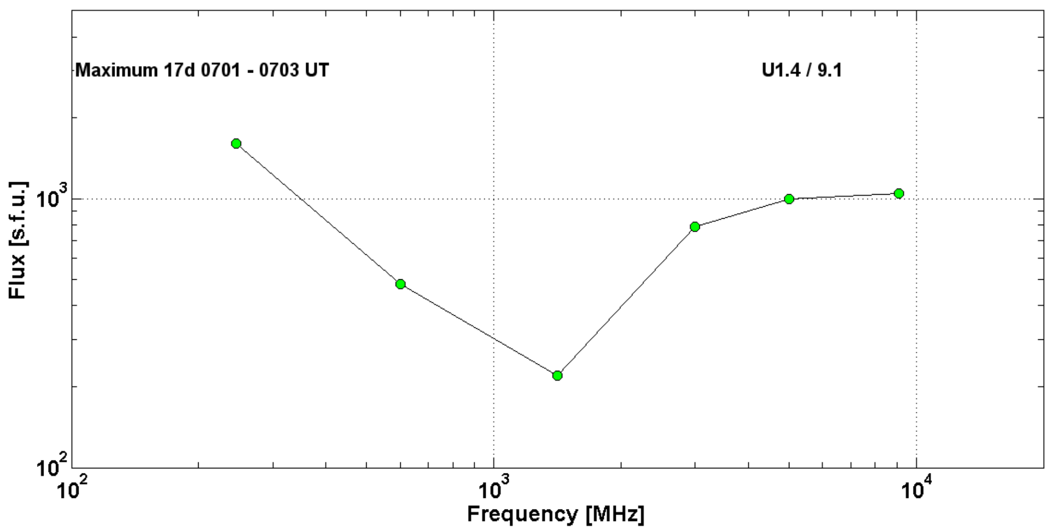


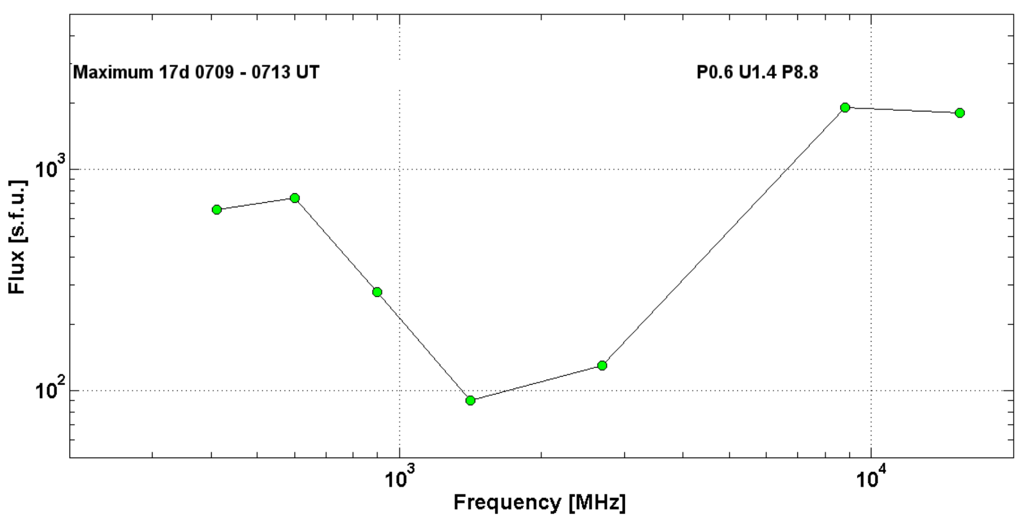
2002 July 17 Ø AR10030 To event 425

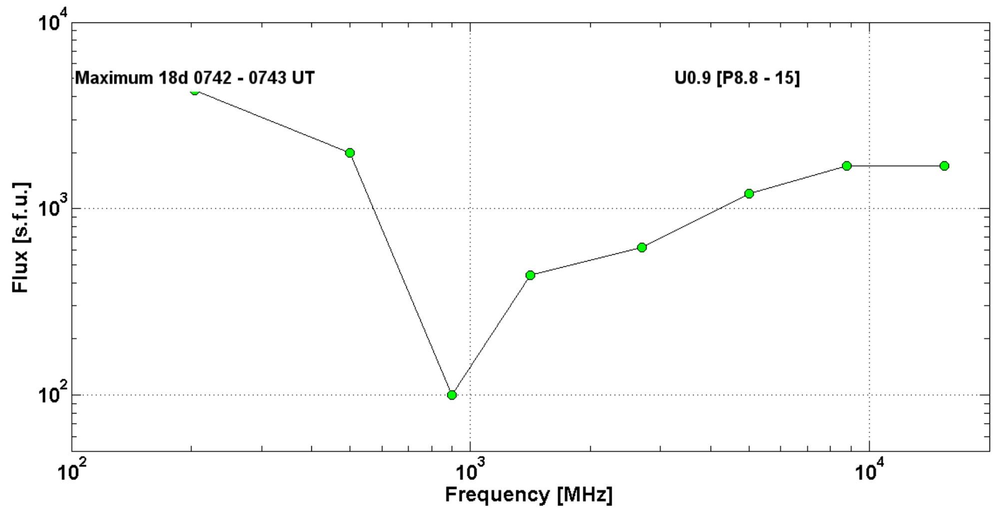
Hα	6563 Å	0701	0704	0753	N20W16	1B	FU
1 – 12	keV	0658	0713	0753		M8.5	5.3E-2
50-100	keV	065812	070650	071044		17337330	RHESSI
1300-4000	keV						SONG F

9.1	GHz	0658.5	0703.2	>0730.0	U1.4 / 9.1	3.02	
5	GHz	0700.0	0702.0	0716.0		3.00	
3	GHz	0700.2	0702.8	0715.9		2.90	
1.4	GHz	0700.0	0703.0	0714.0		2.34	
600	MHz	0700.1	0701.4	0725.5		2.68	
245	MHz	0657.0	~0702.0	0721.0		3.20	
DS II		0706		0710		2	
DS IV		0700		0722		3	
DS III	G	0700		0713	G	3	
DS V		0700		0706		2	
DS UNCLF	DC	0705		0708	DC	2	
15.4	GHz	0700.0	0712.0	0721.0		3.26	
8.8	GHz	0700.0	0712.0	0725.0	P0.6 U1.4 P8.8	3.28	
2.7	GHz	0708.0	0712.0	0713.0		2.11	
1.4	GHz	0711.0	0712.0	0713.0		1.95	
900	MHz	0658.0	0713.0			2.45	
600	MHz	0700.1	0711.8			2.87	
410	MHz	0701.0	0709.0	0721.0		2.82	
DS III	25-270	0709		0713	S,C,F	2	
DS III	25-115	0720		0721		2	
DS V	25-82	0720		0721		2	
DS UNCLF	190-270	0711		0712	C	2	
15.4	GHz	0742.0	0743.0	0748.0	U0.9 [P8.8-15]	3.23	
8.8	GHz	0741.0	0743.0	0750.0		3.23	
5	GHz	0740.0	0743.0	0751.0		3.08	
2.7	GHz	0741.0	0743.0	0744.0		2.79	
1.4	GHz	0741.0	0743.0	0750.0		2.64	
900	MHz	0740.3	0743.5	0755.3		~2.00	
500	MHz	0740.0	0743.0	0758.0		3.30	
204	MHz	0738.8	0742.5	0751.8		3.63	
DS II	F,H	0742		0758	F,H	3	
DS II		0755		0802		2	
DS IV		~0756		~1055		2	
DS I	GG,DC	0744		0745	GG,DC	2	
DS III	G	0740		0757	G	3	
DS V		0741		0744		3	
DS UNCLF	DC	0744		0746	DC	2	
CME	WL	0731	0716 km/s	-17.8 km/s^2	177°	032°	

Список 2002 г.







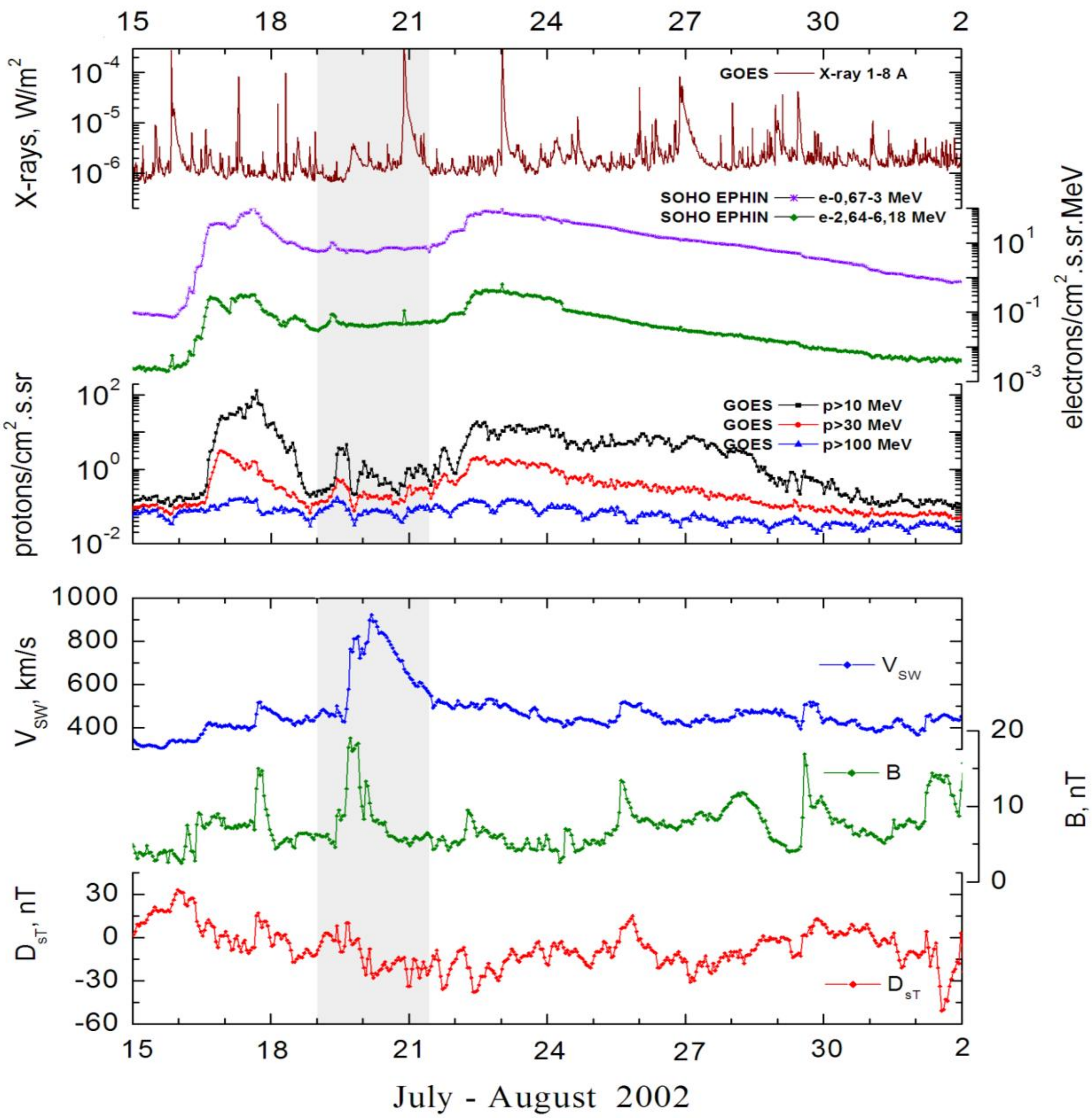
Список 2002 г.

Event 2002.07.19 – (2002-200) **№ 426**

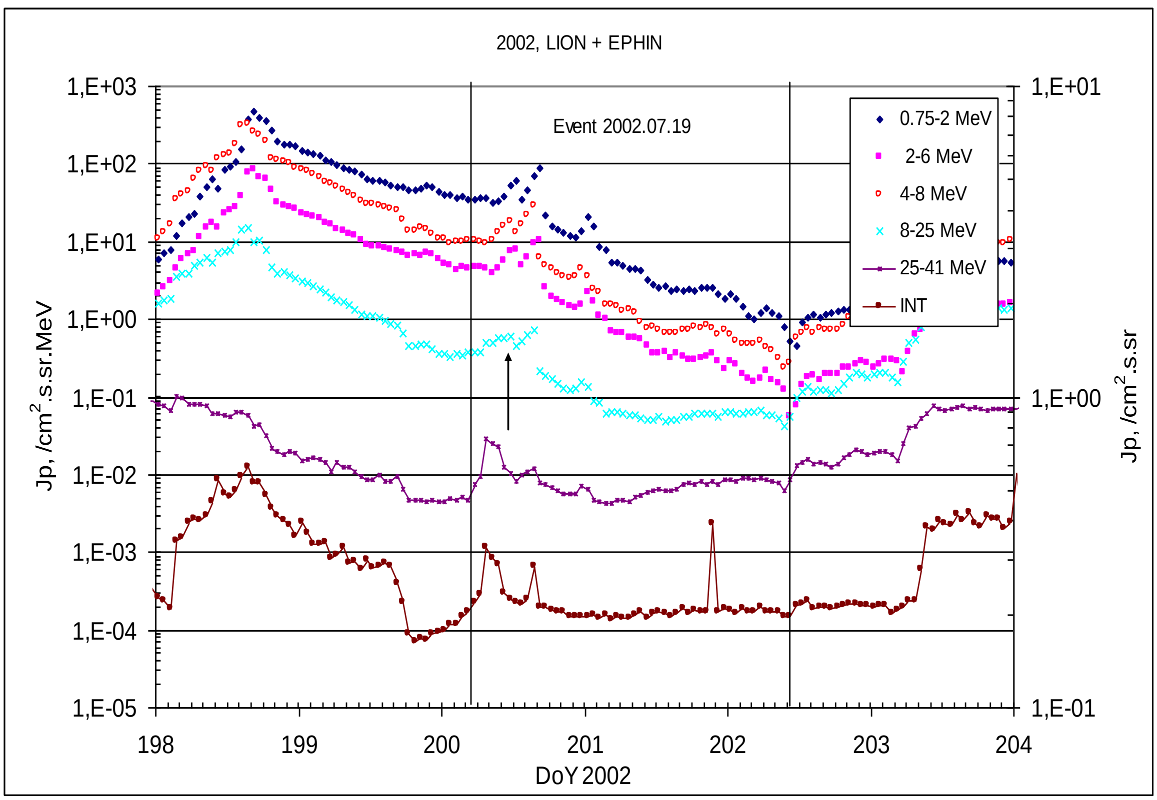
Particle event: To(Ep>10 MeV) – 19d05^h
Tmax(Ep>10 MeV) – 19d11^h, Jmax (Ep>10 MeV) – 3.6 /cm^2.s.sr
Duration of the event – 2 days
Quasimaximal energy of protons in the event – Eqm = 215 MeV

Sources: ⊙solar flare 18d07^{h}24^m, X1.8/2B, N19W33 AR10030;
◊ flare activity of AR10039, 3d behind E-limb
Main X-ray burst 1-8 Å: onset – 18d07^{h}24^m, max – 18d07^{h}44^m, Φ = 0.0056 J/m^2
CME: 18d08^{h}06^m, V = 1099 km/s, Δφ = 360^o, dA = 354^o;
▲SC 19d11^{h}09^m

Particle fluxes and associated phenomena

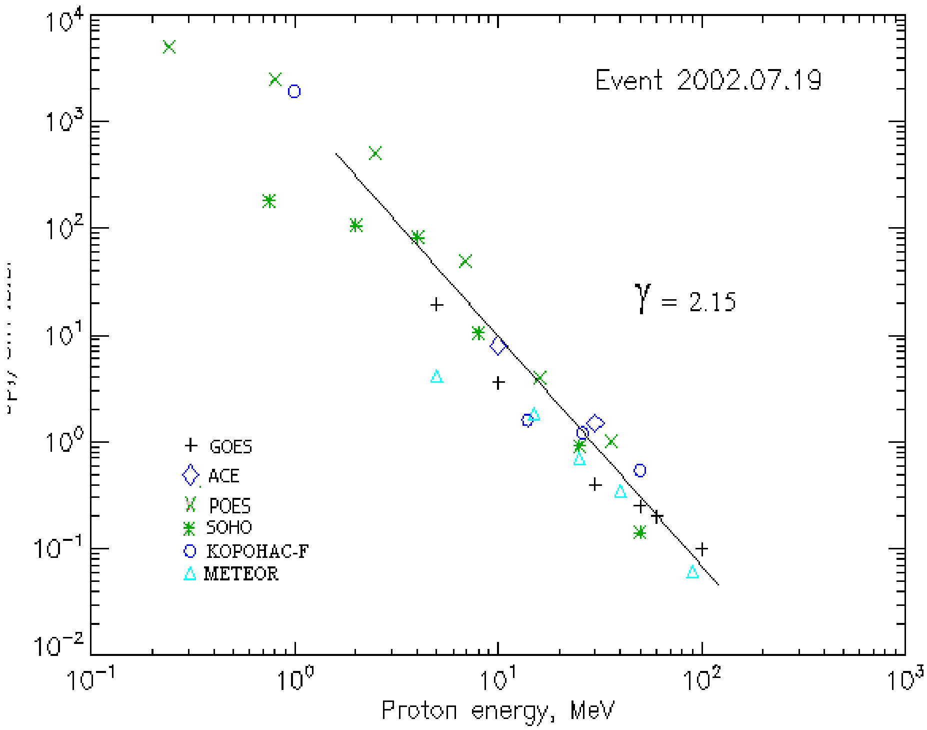


Time profiles of the proton fluxes for the event of 2002 July 19



Arrows on the profiles of the events indicate the time of the proton flux maxima, taken to build the proton spectra (see below)

Integral time-of-maximum proton spectrum



Integral fluxes of protons for the event of 2002 July 19

S/c, instruments	Ep, MeV	To	Tmax	Jmax, $(cm^2.s.sr)^{-1}$	Dura-tion	Comments
GOES-10						
EPS	>5	05^h	11^h	19.4	2d	
EPS	>10	05^h	11^h	3.6	2d	
EPS	>30	05^h	10^h	0.4	2d	
EPS	>50	-	10^h	0.25	2d	
EPS	>60	-	10^h	0.2	2d	
EPS	>100	-	10^h	0.1	2d	
METEOR						
CBM	>5	02^h	09^h	4.2	2d	
CBM	>15	02^h	09^h	1.8	1.5d	
CBM	>25	01^h	09^h	0.7	1.5d	
CBM	>40	01^h	09^h	0.35	1.4d	
BP	>90	01^h	09^h	0.06	1.0d	
ChD	>600	-	-	-	-	
POES-16						
MEPED	>0.24	-	14^h	5140	2d	
MEPED	>0.8	-	14^h	2520	2d	
MEPED	>2.5	-	12^h	510	2d	
MEPED	>6.9	-	12^h	50	2d	
MEPED	>16	-	10^h	4	2d	
MEPED	>36	-	10^h	1	2d	
MEPED	>70	-	-	-	-	
MEPED	>140	-	-	-	-	

CORONAS F						
MKL	>1.	-	15^h	1910	2d	
MKL	>14	-	15^h	1.6	2d	
MKL	>26	-	15^h	1.2	2d	
MKL	>50	-	15^h	0.54	2d	
ACE						
SIS	>10	05^h	09^h	8	2d	
SIS	>30	05^h	07^h	1.5	2d	
SOHO						
EPHIN (INT)	>50	$18d21^h$	07^h	0.14	1.5d	

Differential fluxes of protons for the event of 2002 July 19

S/c, instruments	ΔE, MeV	To	Tmax	Jmax, $(cm^2.s.sr.MeV)^{-1}$	Dura- tion	Comments
SOHO						
LION	0.75-2	-	12^h	60.2	2d	
LION	2-6	-	12^h	7.7	2d	
EPHIN	4-8	04^h	11^h	18	2d	
EPHIN	8-25	02^h	10^h	0.56	2d	
EPHIN	25-41	03^h	07^h	0.028	2d	
EPHIN	41-53	- “ -	- “ -	- “ -	- “ -	

Electromagnetic and other phenomena that are sources and/or accompanying for the event of 2002 July 19

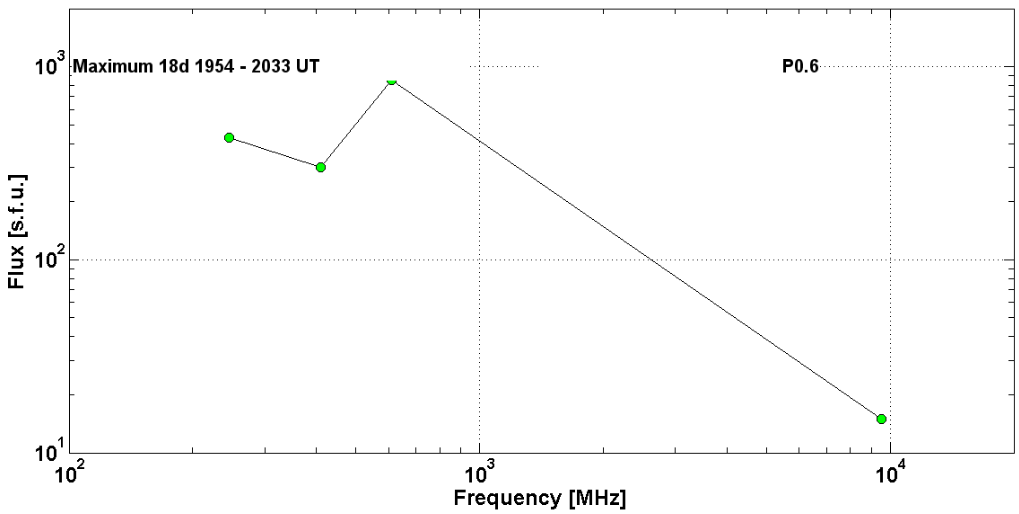
2002 July 18 ☉ AR10030 To event 426

Hα	6563 Å	0741	0743	0801	N19W33	2B	FU
1 – 12	keV	0724	0744	0749		X1.8	5.6E-2
CME	WL	0806	1099 km/s	$-30.2 km/s^2$	360°	354°	0806

2002 July 18 Ø AR10039 To event 426

Hα	6563 Å	No Flare Patrol					
1 – 12	keV	1952	1957	2006		C2.1	1.5E-3
12 - 25	keV	195256	195438	200308		137568	RHESSI

9.5	GHz	1953.7	1954.7	1955.6		1.18	
610	MHz	1949.0	2014.0	2045.0	P0.6	2.93	
410	MHz	1950.0	2000.0	2045.0		2.48	
245	MHz	2033.0	2033.0	2034.0		2.63	
DS III	25-300	2037		2039	B	3	
DS III	25-130	2047		2047	B	1	
DS V	25-180	2033		2035		2	
CME	WL	1931	2191 km/s	-129.3km/s^2	360˚	104˚	

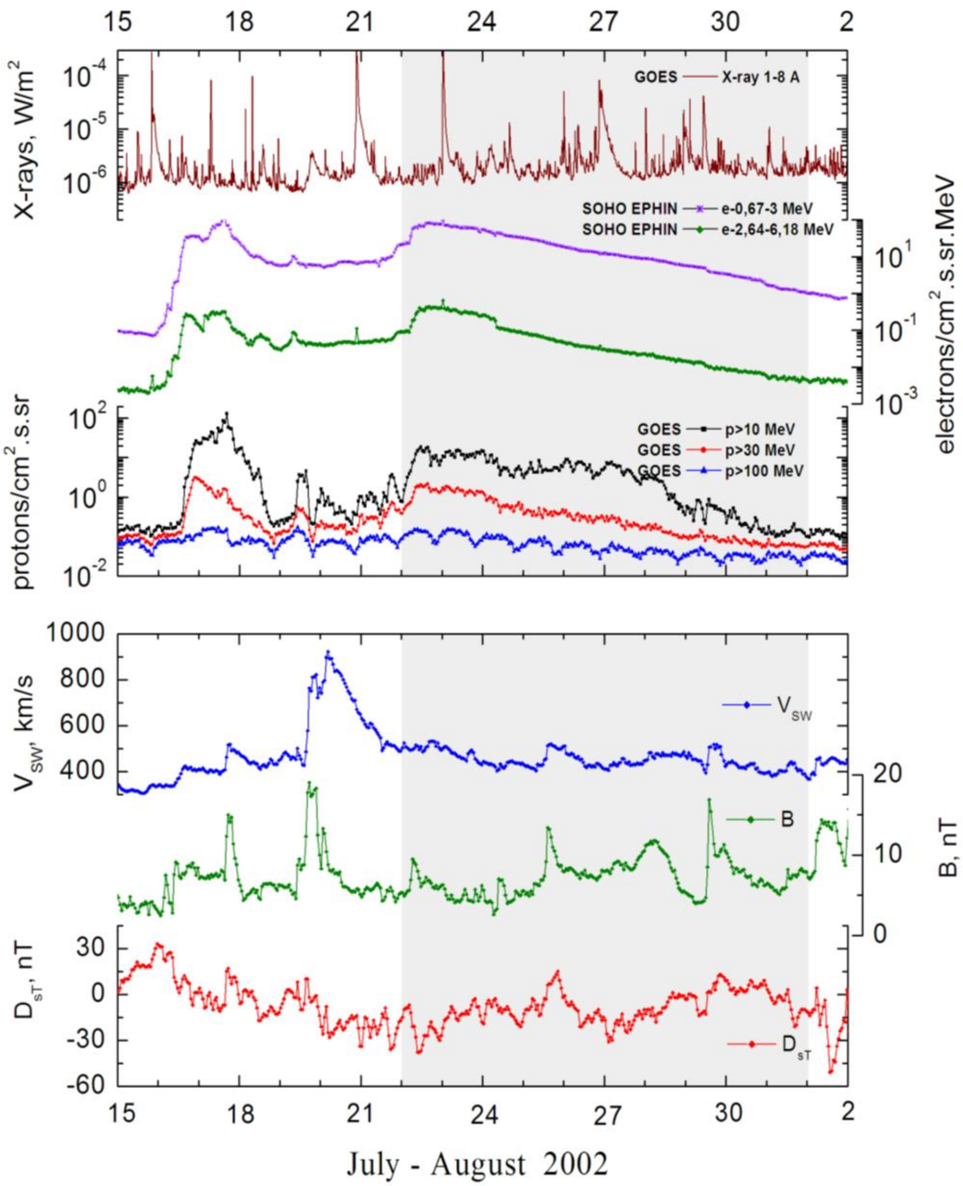


Event 2002.07.22 – (2002-203) **№ 427**

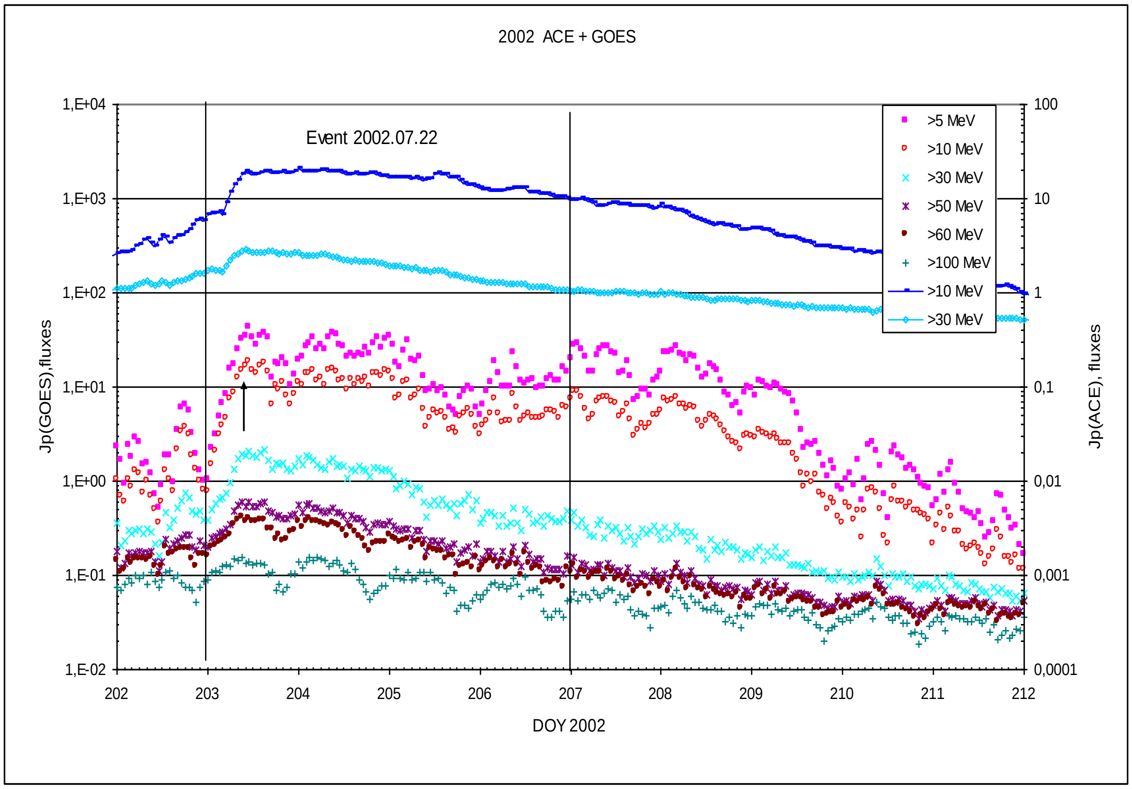
Particle event: To(Ep>10 MeV) – 22d01^h
Tmax(Ep>10 MeV) – 22d11^h, Jmax(Ep>10 MeV) – 18.5 /cm^2.s.sr
Duration of the event – 10 days
Quasimaximal energy of protons in the event – Eqm = 85 MeV

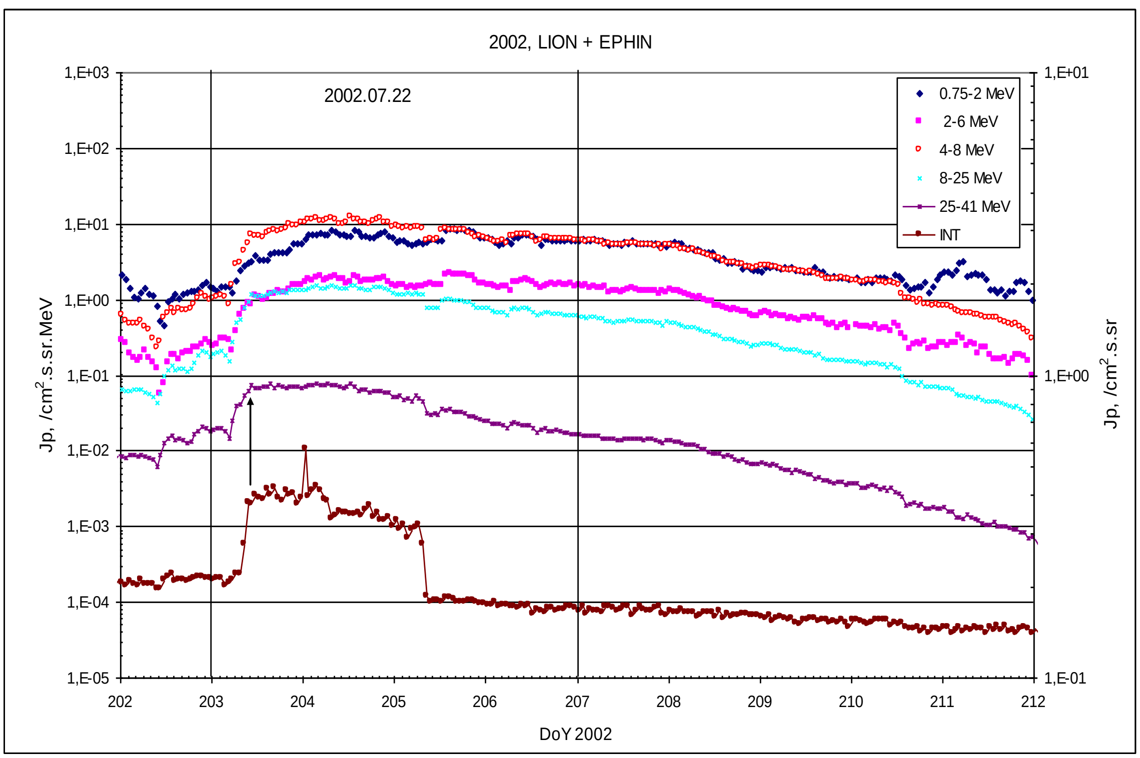
Sources: ⊙ solar flare 20d21^{h}04^m, X3.3/…, s13e90*, AR10039
Ø solar flare 23d00^{h}18^m, X4.8/2B, S12E70, AR10039
Main X-ray burst 1-8 Ǻ: onset – 20d21^{h}04^m, max – 20d21^{h}30^m, Φ = 0.72 J/m^2
CME: 20d22^{h}06^m, V = 1941 km/s, Δφ = 360^o, = 91^o
* − probable localization of the flare event

Particle fluxes and associated phenomena



Time profiles of the proton fluxes for the event of 2002 July 22

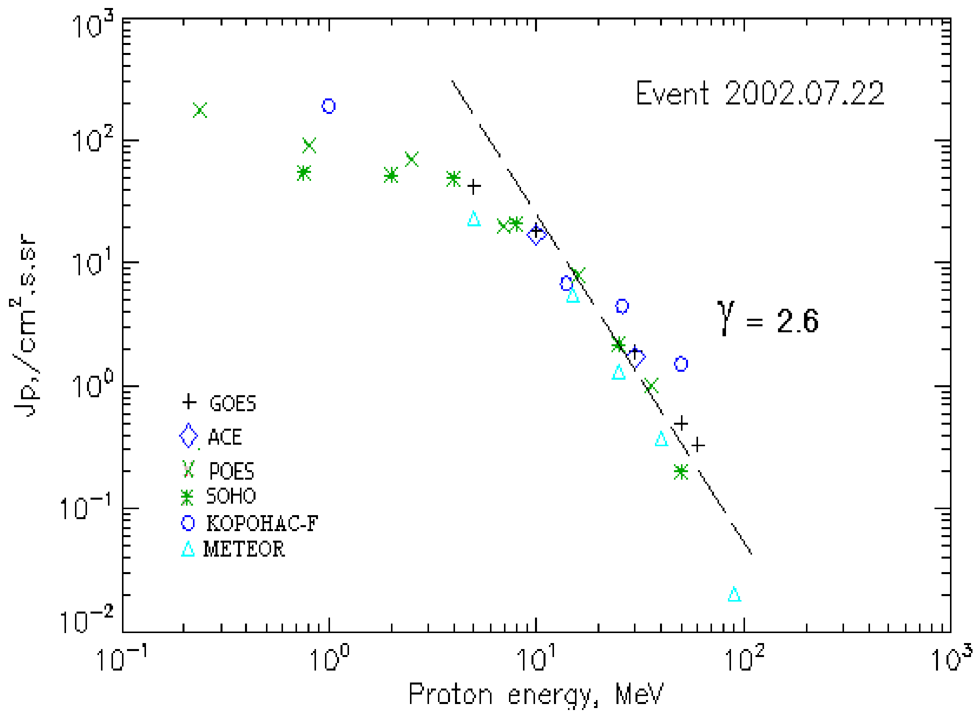




Arrows on the profiles of the events indicate the time of the proton flux maxima, taken to build the proton spectra (see below)

Список 2002 г.

Integral time-of-maximum proton spectrum



Integral fluxes of protons for the event of 2002 July 22

S/c, instruments	Ep, MeV	To	Tmax	Jmax, (cm2.s.sr)-1	Duration	Comments
GOES-10						
EPS	>5	01^h	11^h	42.4	10d	
EPS	>10	01^h	11^h	18.5	10d	
EPS	>30	01^h	12^h	1.9	9d	
EPS	>50	01^h	12^h	0.5	3d	
EPS	>60	01^h	12^h	0.33	3d	
EPS	>100	-	-	-	-	
METEOR						
CBM	>5	-	14^h	23.3	11d	
CBM	>15	-	12^h	5.6	9d	
CBM	>25	-	12^h	1.3	7d	
CBM	>40	-	12^h	0.37	3d	
BP	>90	-	12^h	0.02	-	
ChD	>600	-	-	-	-	
POES-16						
MEPED	>0.24	-	10^h	150	10d	
MEPED	>0.8	-	10^h	93	9d	
MEPED	>2.5	-	10^h	72	8d	
MEPED	>6.9	-	10^h	20	7d	
MEPED	>16	-	10^h	8	3d	
MEPED	>36	-	10^h	1	3d	
MEPED	>70	-	-	-	-	
MEPED	>140	-	-	-	-	

CORONAS F						
MKL	>1.	-	21^h	190	8d	
MKL	>14	-	21^h	6.8	7d	
MKL	>26	-	21^h	4.5	3d	
MKL	>50	-	21^h	1.5	3d	
ACE						
SIS	>10	04^h	10^h	17	4d	
SIS	>30	04^h	09^h	1.7	4d	
SOHO						
EPHIN (INT)	>50	05^h	11^h	0.2	2d	

Differential fluxes of protons for the event of 2002 July 22

S/c, instruments	ΔE, MeV	To	Tmax	Jmax, $(cm^2.s.sr.MeV)^{-1}$	Dura-tion	Comments
SOHO						
LION	0.75-2	06^h	11^h	2.6	11d	
LION	2-6	06^h	11^h	1	11d	
EPHIN	4-8	05^h	10^h	7	10d	
EPHIN	8-25	05^h	11^h	1.1	10d	
EPHIN	25-41	05^h	10^h	0.07	10d	

References:

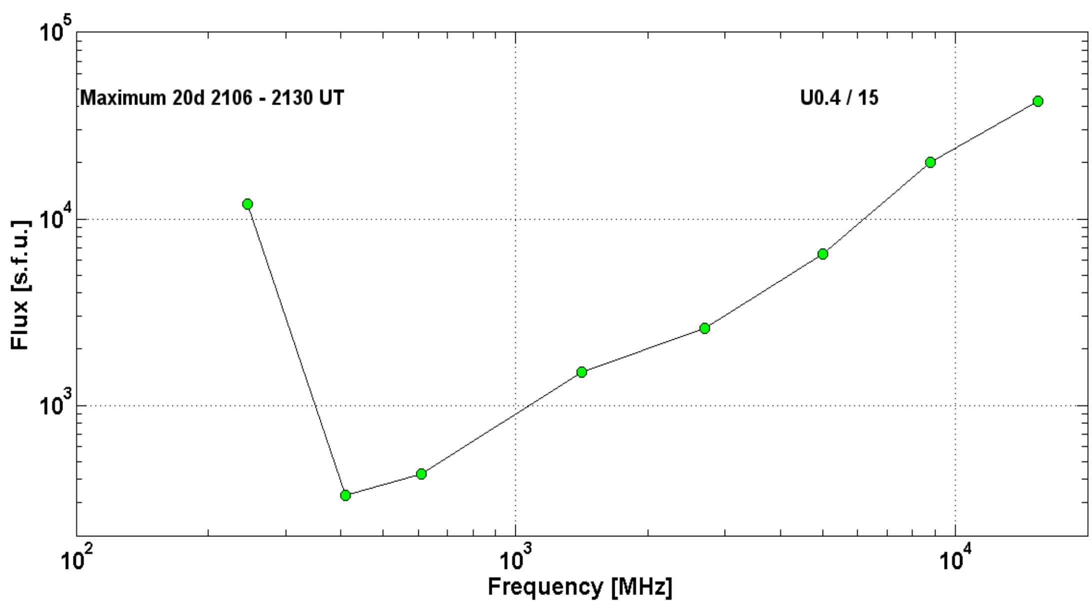
Yurchyshyn V., H. Wang, V. Abramenko et al., 2004.
Gan W.Q, 2004.
Kichigin G.N., L.I. Miroshnichenko, V.I. Sidorov et al., 2010.
Struminsky A.B., 2011.
Miroshnichenko L.I. and W.Q. Gan, 2012.
Kichigin G.N., L.I. Miroshnichenko, V.I. Sidorov et al., 2012.
Somov B.V., 2012.

Electromagnetic and other phenomena that are sources and/or accompanying for the event of 2002 July 22

2002 July 20 • AR10039 To event 427

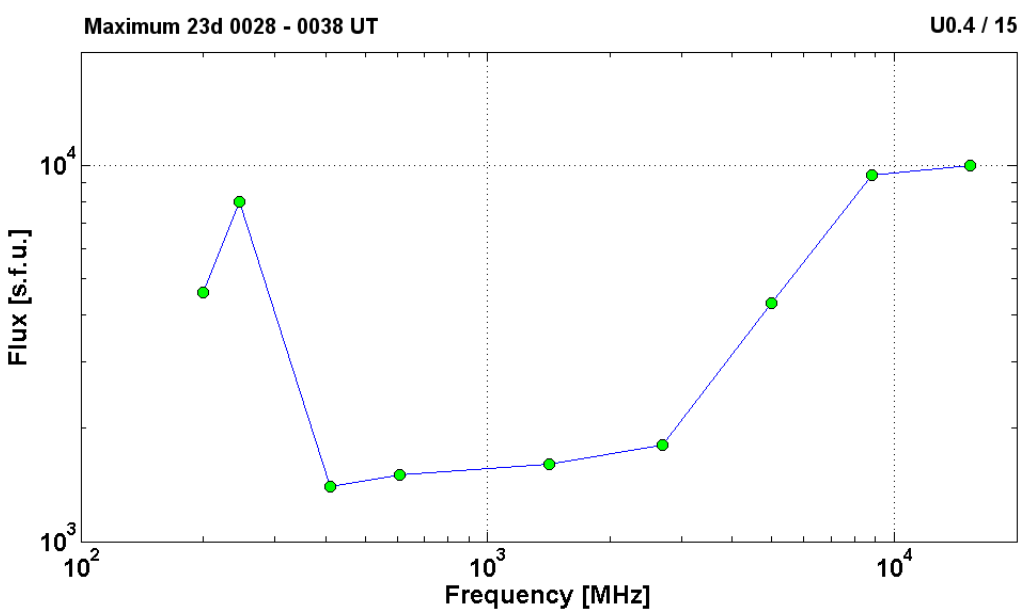
Hα	6563 Å	No Flare Patrol			s13e87*		
1 – 12	keV	2104	2130	2154		X3.3	7.2E-1
100-300	keV	213000	213810	215300		50909556	RHESSI
500-1300							SONG F
15.4	GHz	2105.0	2128.0	2203.0	U0.4 / 15	4.63	
8.8	GHz	2105.0	2130.0	2203.0		4.30	
5	GHz	2104.0	2130.0	2203.0		3.81	
2.7	GHz	2104.0	2129.0	2203.0		3.41	
1.4	GHz	2105.0	2127.0	2203.0		3.18	
610	MHz	2106.0	2109.0	2203.0		2.63	
410	MHz	2106.0	2130.0	2155.0		2.52	
245	MHz	2106.0	2106.0	2154.0		4.08	

DS II	30-240	2107		2128		3	
DS II	110-400	2110		2120	S,H	3	
DS IV	57-1300	2107		2126		1	
DS IV	60-1700	<2128		2152		1	
DS I	140-180	2140		2213	S	1	
DS III	57-330	2107		2111	G	3	
DS III	25-180	2107		2129	N	2	
DS III	57-1700	2127		2130	G	2	
15.4	GHz	2105.0	2128.0	2203.0	U0.4 / 15	4.63	
8.8	GHz	2105.0	2130.0	2203.0		4.30	
5	GHz	2104.0	2130.0	2203.0		3.81	
2.7	GHz	2104.0	2129.0	2203.0		3.41	
1.4	GHz	2105.0	2127.0	2203.0		3.18	
610	MHz	2106.0	2109.0	2203.0		2.63	
410	MHz	2106.0	2130.0	2155.0		2.52	
245	MHz	2106.0	2106.0	2154.0		4.08	
DS II	30-240	2107		2128		3	
DS II	110-400	2110		2120	S,H	3	
DS IV	57-1300	2107		2126		1	
DS IV	60-1700	<2128		2152		1	
DS I	140-180	2140		2213	S	1	
DS III	57-330	2107		2111	G	3	
DS III	25-180	2107		2129	N	2	
DS III	57-1700	2127		2130	G	2	
nº						Mauna Kea, Haleakala	
CME	WL	2206	1941 km/s	–	360˚	091˚	



2002 July 23 Ø AR10039 To event 427

Hα	6563 Å	0023	0029	0240	S12E70	2B	EF
1 – 12	keV	0018	0035	0047		X4.8	4.6E-1
300-800	keV	001816	003038	011608		188025680	RHESSI
6 – 12	keV	015216	015222	015428		95520	RHESSI
15.4	GHz	0023.0	0031.0	0145.0	U0.4 / 15	4.00	
8.8	GHz	0022.0	0038.0	0145.0		3.97	
5	GHz	0021.0	0038.0	0144.0		3.63	
2.7	GHz	0022.0	0029.0	0144.0		3.26	
1.4	GHz	0025.0	0028.0	0000.0		3.20	
610	MHz	0025.0	0029.0	0133.0		3.18	
410	MHz	0025.0	0029.0	0000.0		3.15	
245	MHz	0026.0	0029.0	0000.0		3.90	
200	MHz	0026.0	0029.0	0118.0		3.66	
DS II	25-260	0029		0053		3	
DS IV	57-1500	0028		0046		1	
DS IV	25-180	0050		0226		1	
DS I	75-160	0046		~0130	S,C	1	
DS III	57-1300	0027		0031	G	1	
DS III	25-180	0028		0031		2	
DS III	57-300	0038		0040	G	2	
CME	WL	0042	2285 km/s	–	360˚	087˚	

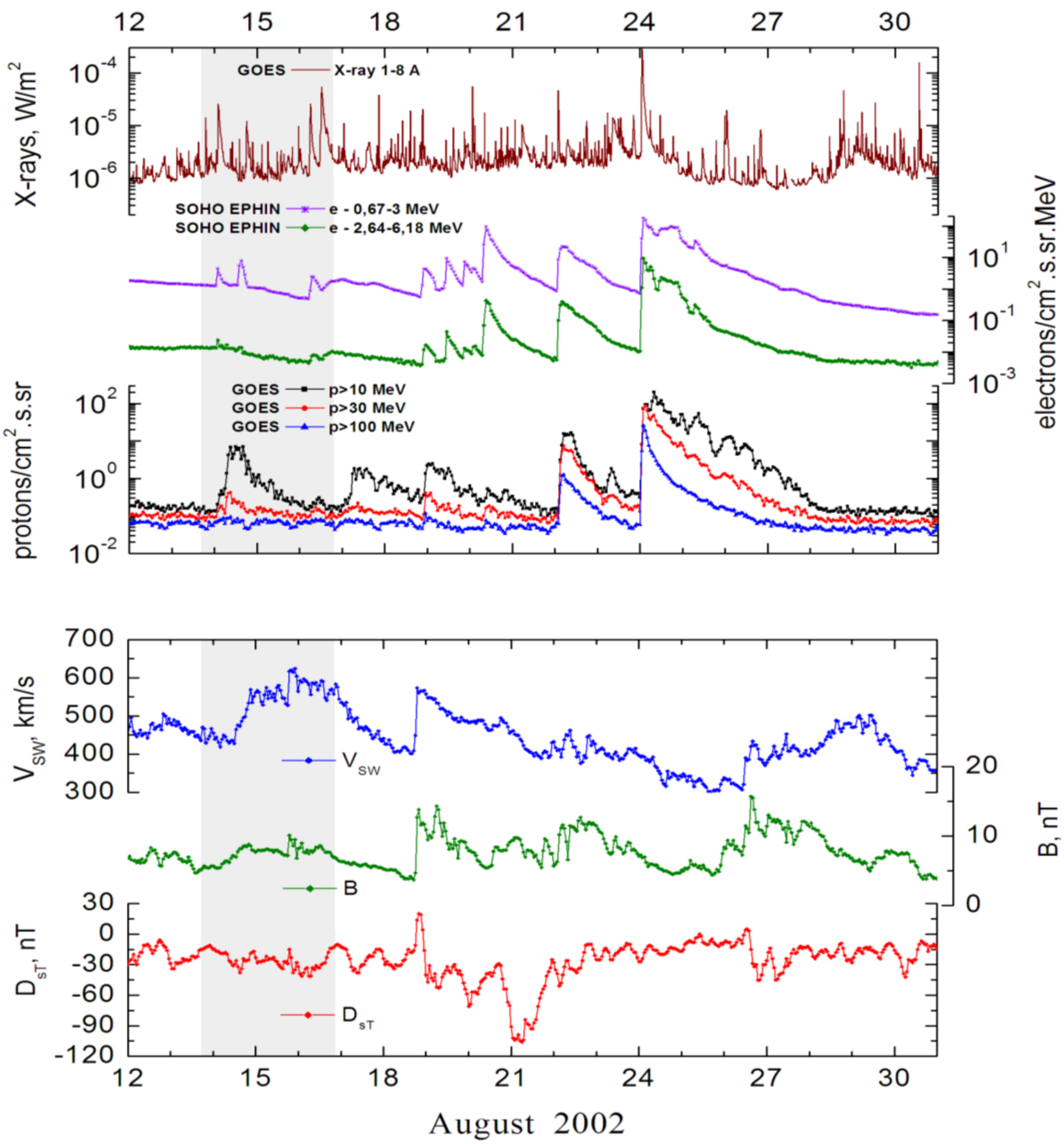


Event 2002.08.14 – (2002-226) **№ 428**

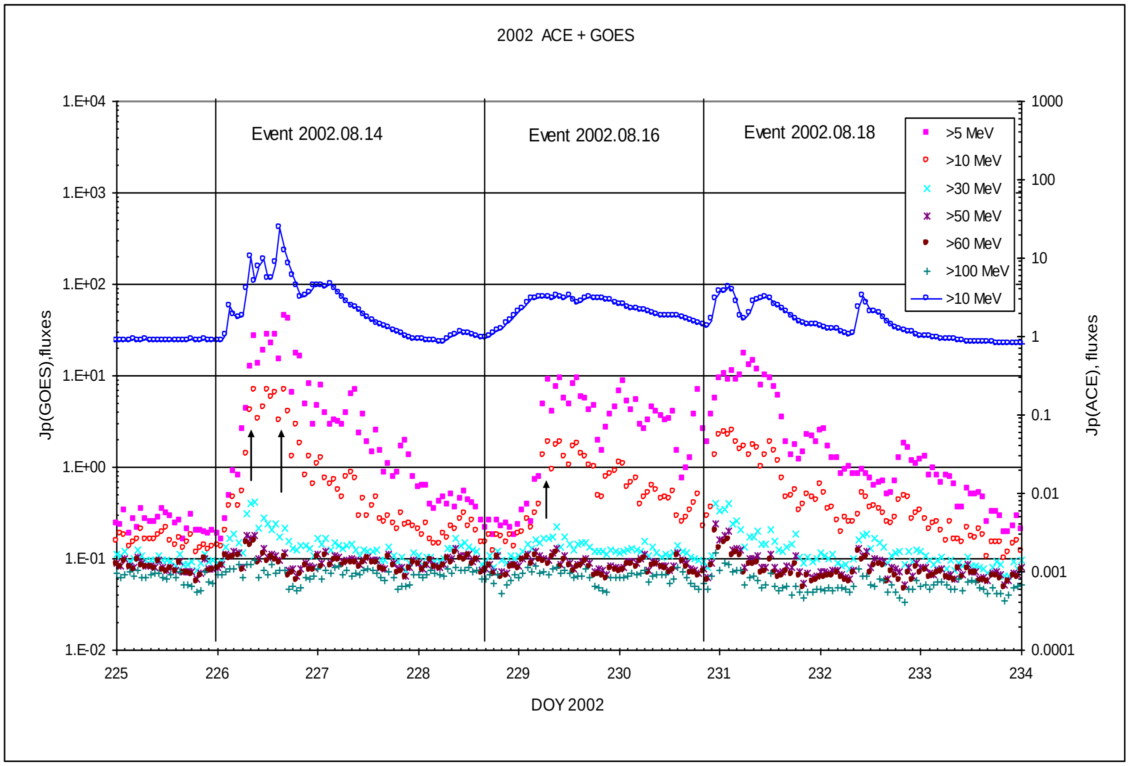
Particle event: To(Ep>10 MeV) – 14d06^h
Tmax$_1$(Ep>10 MeV) – 14d09^h, Jmax$_1$(Ep>10 MeV) – 6.7 /cm^2.s.sr
Tmax$_2$(Ep>10 MeV) – 14d16^h, Jmax$_2$(Ep>10 MeV) – 6.9 /cm^2.s.sr
Duration of the event – 2 days
Quasimaximal energy of protons in the event – Eqm$_1$ = 85 MeV
– Eqm$_2$ = 50 MeV

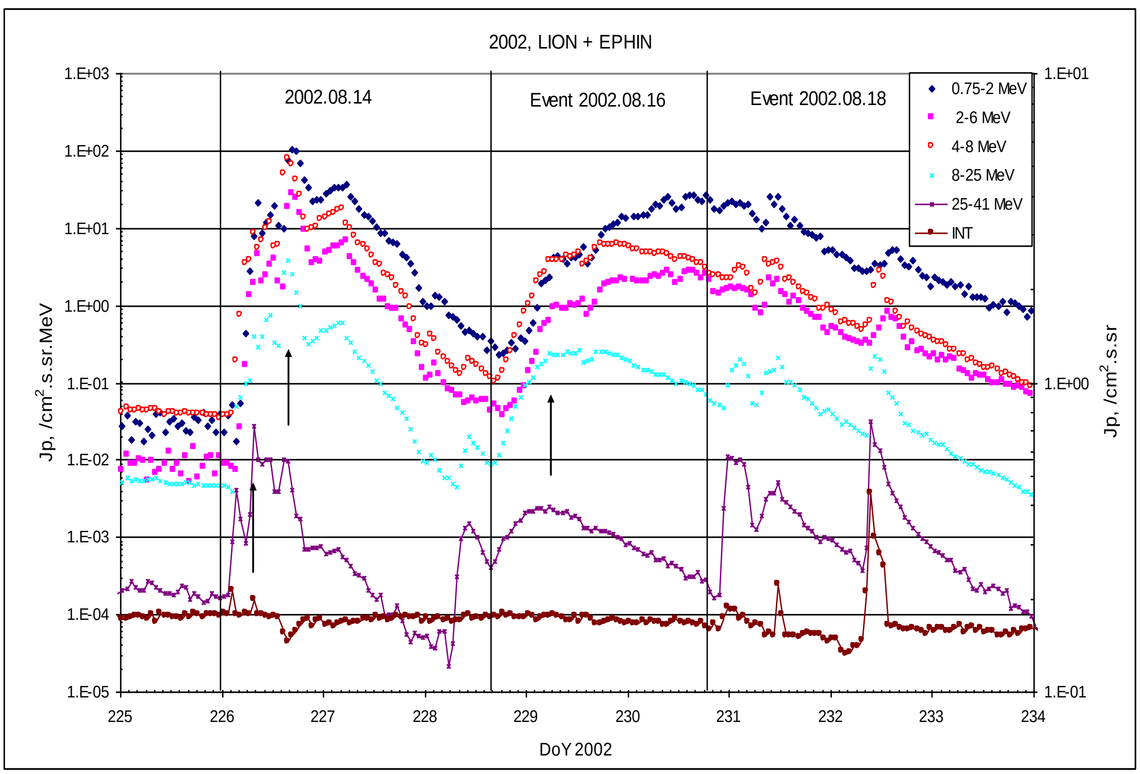
Sources: ● solar flare 14d01^{h}47^m, M2.3/1N, N10W54, AR10061
Main X-ray burst 1-8 Å: onset – 14d01^{h}47^m, max – 14d02^{h}12^m, Φ = 0.06 J/m^2
CME: 14d02^{h}30^m, V = 1309 km/s, Δφ = 133^o, dA = 282 ^{o};

Particle fluxes and associated phenomena



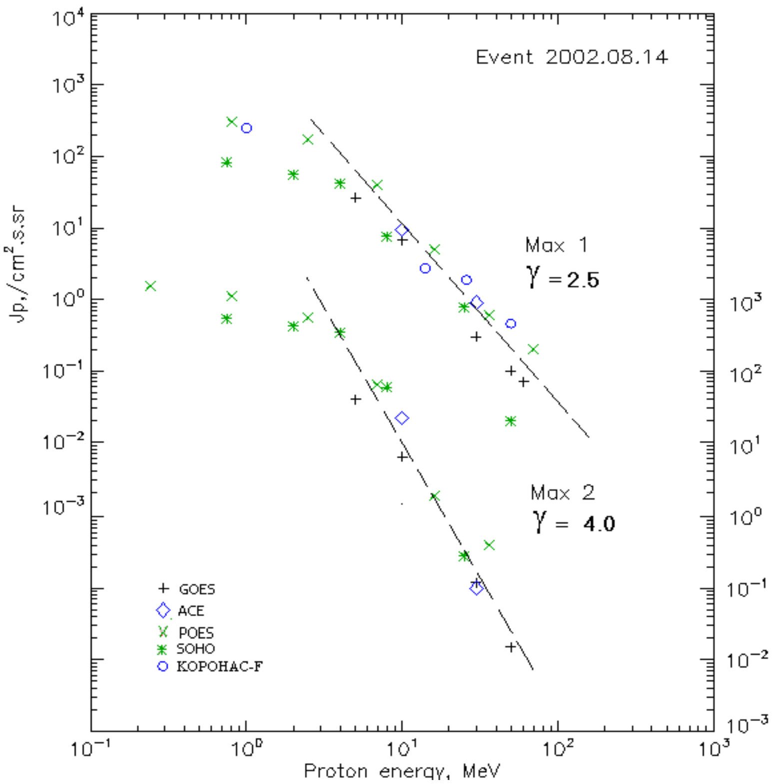
Time profiles of the proton fluxes for the event of 2002 August 14





Arrows on the profiles of the events indicate the time of the proton flux maxima, taken to build the proton spectra (see below)

Integral time-of-maximum proton spectrum



Integral fluxes of protons for the event of 2002 August 14

S/c, instruments	Ep, MeV	To	Tmax	Jmax, (cm2.s.sr)-1	Dura-tion	Comments
GOES 10						
EPS	>5	02^h	$09^h/16^h$	26.5/44	2d	
EPS	>10	02^h	$09^h/16^h$	6.7/6.9	2d	
EPS	>30	02^h	$09^h/16^h$	0.3/0.12	1d	
EPS	>50	02^h	$09^h/16^h$	0.1/0.015	1d	
EPS	>60	-	09^h/ -	0.07/ -	1d	
EPS	>100	-	-	-	-	
POES 16						
MEPED	>0.24	-	$10^h/16^h$	- /1720	2d	
MEPED	>0.8	-	$10^h/16^h$	310 /1220	2d	
MEPED	>2.5	-	$10^h/16^h$	170/630	2d	
MEPED	>6.9	-	$10^h/16^h$	40/70	2d	
MEPED	>16	-	$11^h/16^h$	5/2	1d	
MEPED	>36	-	$10^h/16^h$	0.6 /0.4	1d	
MEPED	>70	-	$10^h/16^h$	0.2/ -	1d	
MEPED	>140	-	-	-	-	
CORONAS F						
MKL	>1.	-	08^h/ -	250/ -	2d	
MKL	>14	-	08^h/ -	2.7/ -	1d	
MKL	>26	-	08^h/ -	1.85/ -	1d	
MKL	>50	-	08^h/ -	0.46/ -	1d	

ACE						
SIS	>10	02^h	$09^h/15^h$	9.5/23.8	2d	
SIS	>30	02^h	$09^h/15^h$	0.9/0.1	2d	
SOHO						
EPHIN (INT)	>50	-	08^h/ -	0.02/ -	-	

Differential fluxes of protons for the event of 2002 August 14

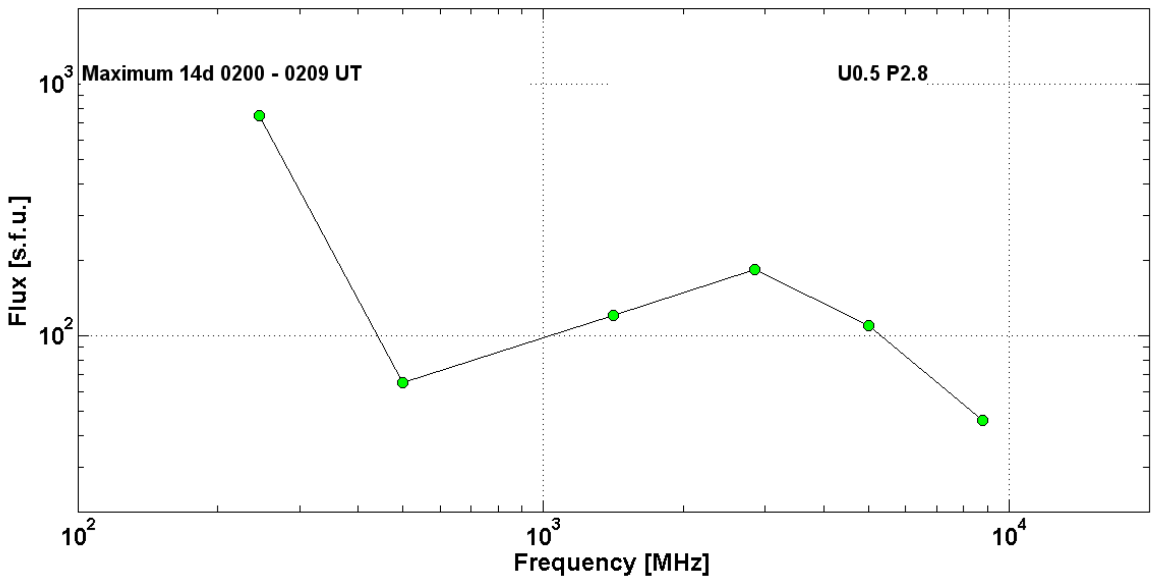
S/c, instruments	ΔE, MeV	To	Tmax	Jmax, $(cm^2.s.sr.MeV)^{-1}$	Dura-tion	Comments
SOHO						
LION	0.75-2	03^h	$09^h/16^h$	21.6/105	2.5d	
LION	2-6	03^h	$09^h/16^h$	4.6/28.6	2d	
EPHIN	4-8	03^h	$09^h/16^h$	8.6/77.9	2.5d	
EPHIN	8-25	03^h	$09^h/16^h$	0.4/3.8	2.5d	
EPHIN	25-41	02^h	07^h	0.027/0.009	2d	
EPHIN	41-53	- " -	- " -	- " -	- " -	

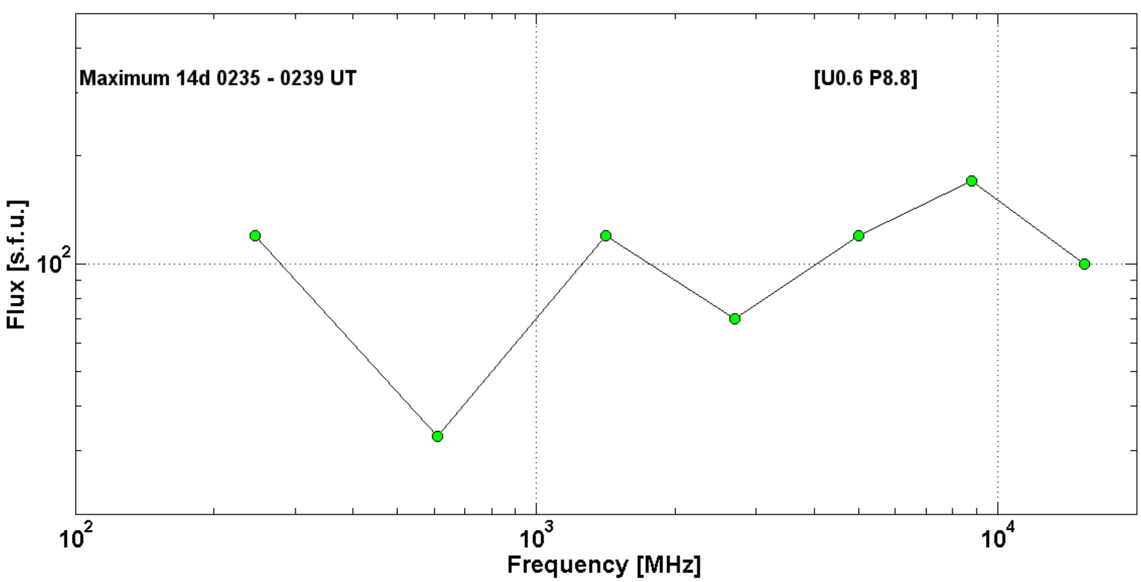
Electromagnetic and other phenomena that are sources and/or accompanying for the event of 2002 August 14

2002 August 14 ● AR10039 To event 428

Hα	6563 Å	0147	0201	0343	N09W54	1N	EF
1 – 12	keV	0147	0212	0246		M2.3	6.0E-2
12-25	keV	021400	021422	023428		4238062	RHESSI
6-12	keV	023428	023606	031500		1477953	RHESSI
8.8	GHz	0201.0	0209.0	0210.0		1.66	
5	GHz	0149.0	0201.0	0308.0		2.04	
2.8	GHz	0143.0	0202.2	0259.0	U0.5 P2.8	2.26	
1.4	GHz	0144.0	0203.0	0000.0		2.08	
500	MHz	0145.0	0203.0	0245.0		1.81	
245	MHz	0152.0	0200.0	0223.0		2.88	
DS II	25-157	0157		0208		3	
DS III	25-140	0155		0158	G	1	
DS III	57-160	0157		0159	G	2	
DS V	25-144	0159		0205		3	

15.4	GHz	0232.0	0235.0	0246.0		2.00	
8.8	GHz	0232.0	0235.0	0246.0	[U0.6 P8.8]	2.23	
5	GHz	0232.0	0235.0	0246.0		2.08	
2.7	GHz	0232.0	0235.0	0246.0		1.85	
1.4	GHz	0239.0	0239.0	~0239.0		2.08	
610	MHz	0235.0	0235.0	~0235.0		1.52	
245	MHz	0234.0	0239.0	0246.0		2.08	
DS III	25-180	0300		0304		1	
DS III	25-400	0304		0305	B	2	
CME	WL	0230	1309 km/s	-28.5	133˚	282˚	





Event 2002.08.17 – (2002-229) **№ 429**

Particle event: To(Ep>10 MeV) – 17d00^h

Tmax(Ep>10 MeV) – 17d10^h, Jmax (Ep>10 MeV) – 1.7 /cm^2.s.sr

Duration of the event – 2 days

Quasimaximal energy of protons in the event – Eqm = 70 MeV

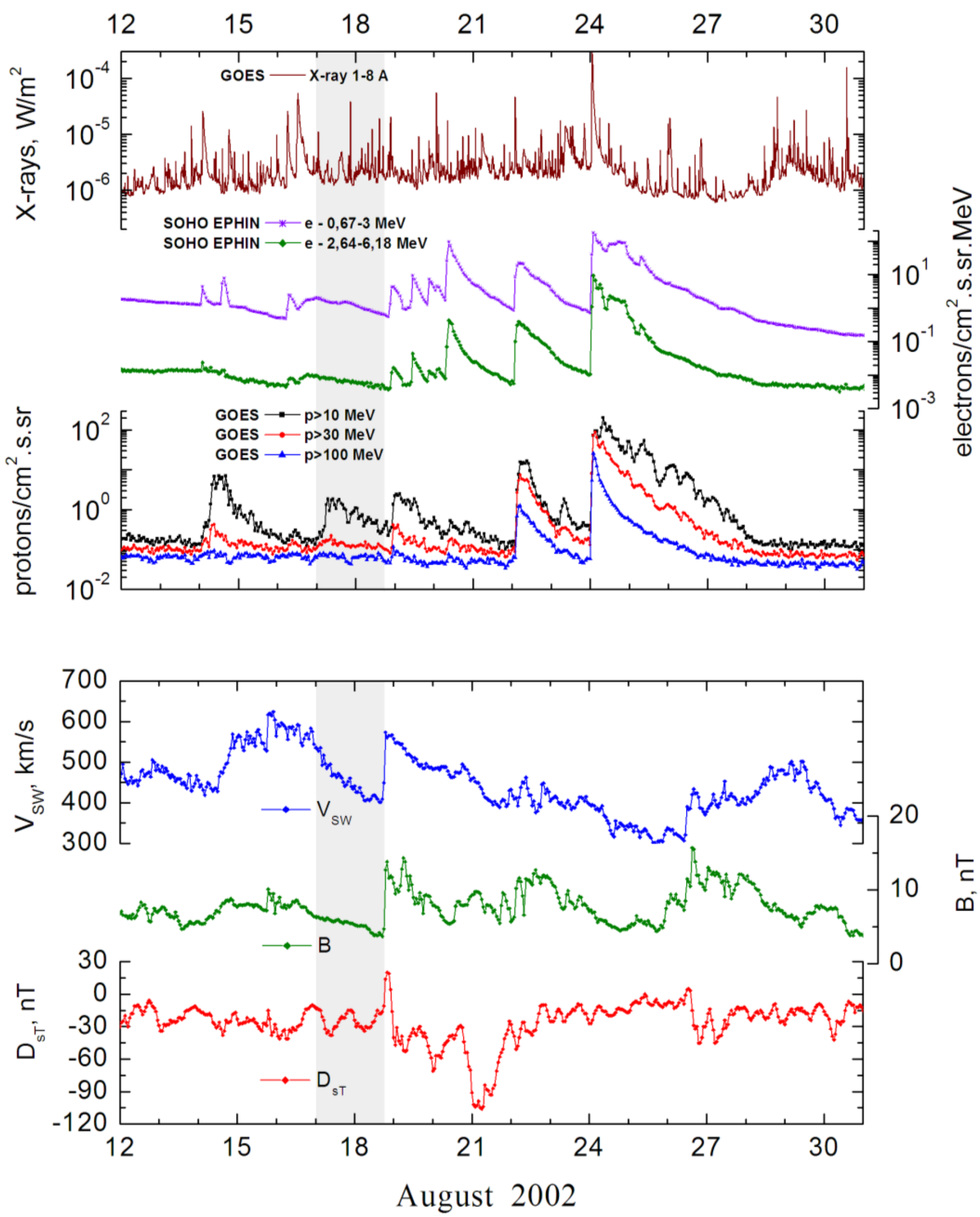
Sources: ● solar flare 16d11^{h}11^m, 2N/M5.2, S14E20, AR10069

Main X-ray burst 1-8 Å: onset – 16d11^{h}32^m, max – 16d12^{h}32^m, Φ = 0.16 J/m^2

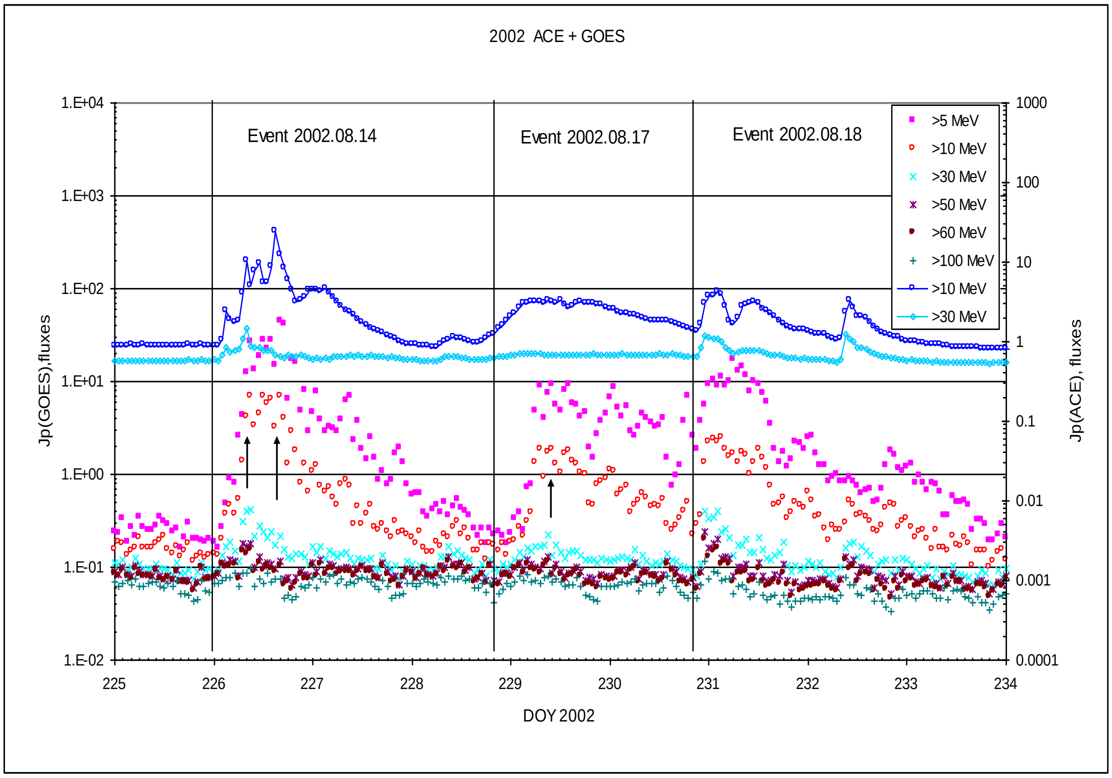
CME: 16d12^{h}30^m; V= 1585 km/s, Δφ = 360^o, dA= 121^o.

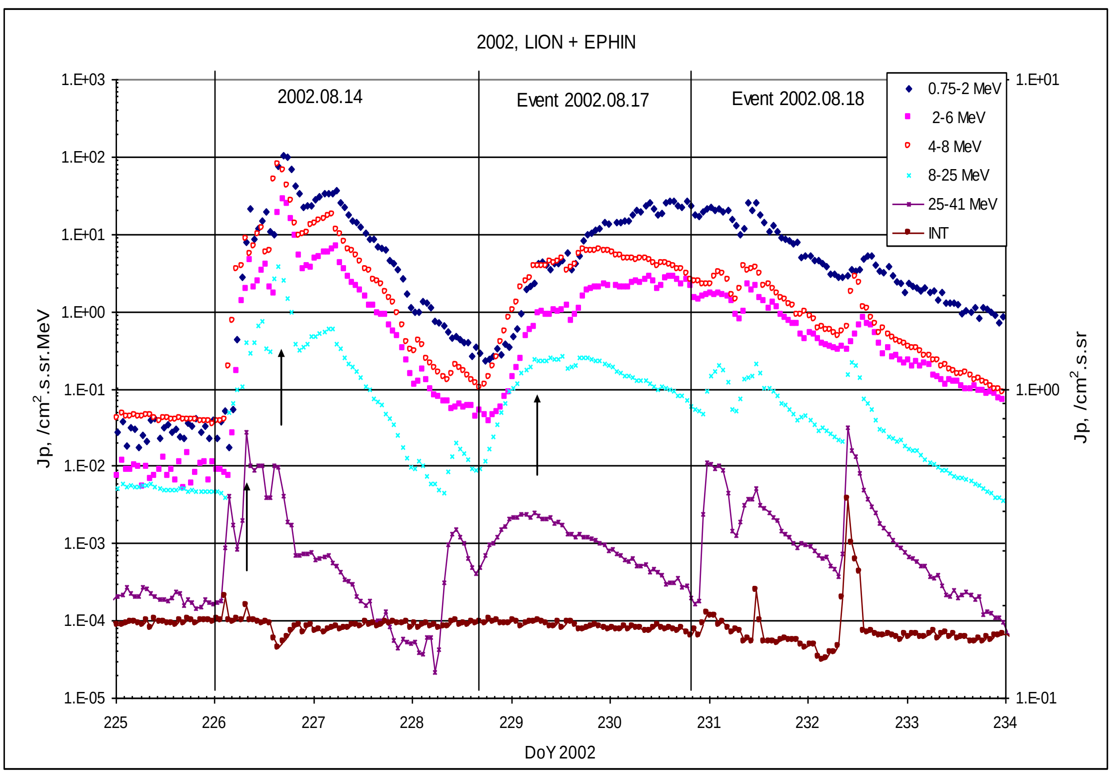
▲SC 18d18^{h}46^m;

Particle fluxes and associated phenomena



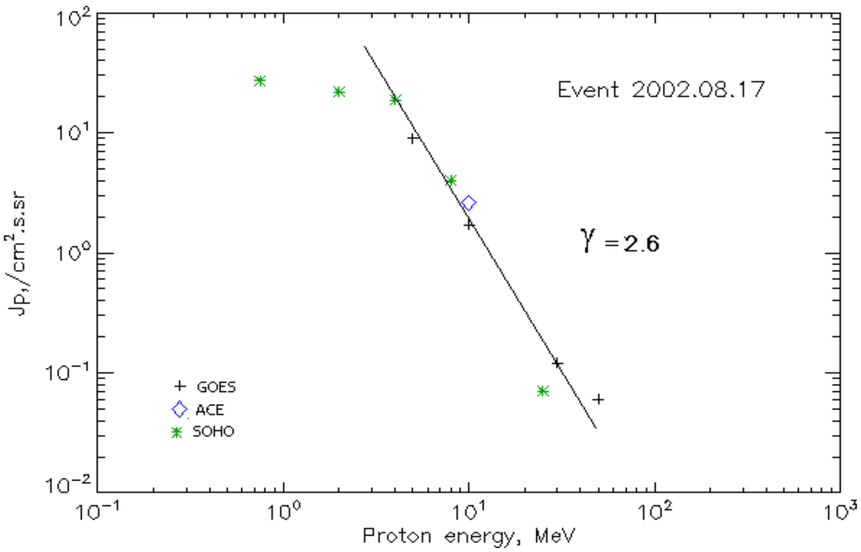
Time profiles of the proton fluxes for the event of 2002 August 17





Arrows on the profiles of the events indicate the time of the proton flux maxima, taken to build the proton spectra (see below)

Integral time-of-maximum proton spectrum



Integral fluxes of protons for the event of 2002 August 17

S/c, instruments	Ep, MeV	To	Tmax	Jmax, (cm2.s.sr)-1	Dura-tion	Comments
GOES 10						
EPS	>5	00^h	10^h	9	2d	
EPS	>10	00^h	10^h	1.7	2d	
EPS	>30	00^h	09^h	0.12	1d	
EPS	>50	-	09^h	0.06	-	
EPS	>60	-	-	-	-	
EPS	>100	-	-	-	-	
ACE						
SIS	>10	$16d18^h$	09^h	2.6	2d	
SIS	>30	-	-	-	-	
SOHO						
EPHIN (INT)	>50	-	-	-	-	

Differential fluxes of protons for the event of 2002 August 17

S/c, instruments	ΔE, MeV	To	Tmax	Jmax, $(cm^2.s.sr.MeV)^{-1}$	Dura-tion	Comments
SOHO						
LION	0.75-2	$16d19^h$	08^h	4.3	2d	
LION	2-6	$16d19^h$	08^h	1	2d	
EPHIN	4-8	$16d18^h$	08^h	3.7	2d	
EPHIN	8-25	$16d18^h$	08^h	0.23	2d	
EPHIN	25-41	$16d18^h$	08^h	0.0025	2d	
EPHIN	41-53	- " -	- " -	- " -	- " -	

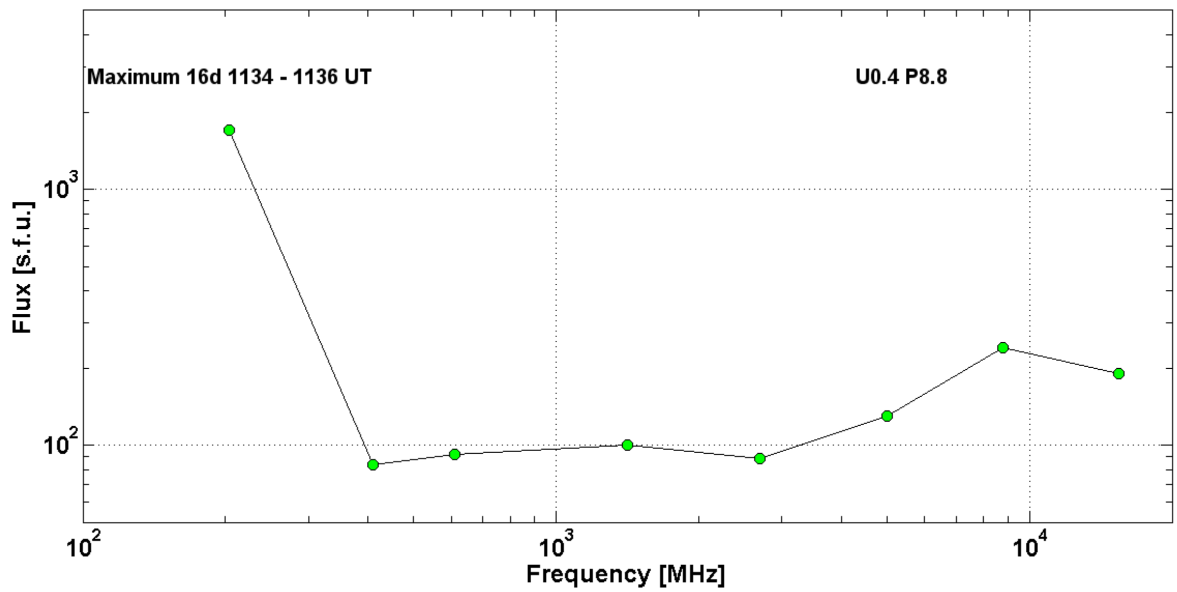
References:

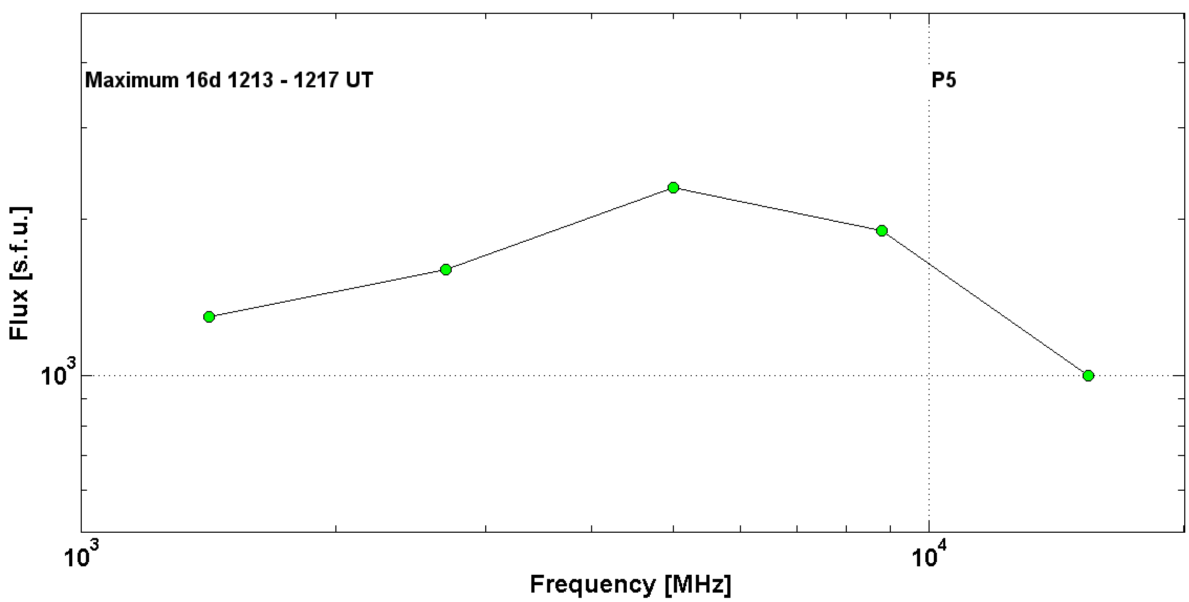
Kuwabara T., J.W. Bieber, J. Clem et al., 2006.
Veselovskij I.S., I.N. Myagkova, O.S. Yakovchuk, 2012.
Tylka A.J., O.E. Malandraki, G. Dorrian et al., 2013.

Electromagnetic and other phenomena that are sources and/or accompanying for the event of 2002 August 17

2002 August 16 ● AR10069 To event 429

Hα	6563 Å	1111	1213	1409	S14E20	2N	FH
1 – 12	keV	1132	1232	1307		M5.2	1.6E-1
50-100	keV	120604	122118	123156		20782080	RHESSI
25 – 50	keV	133824	134654	140616		1091448	RHESSI
15.4	GHz	1133.0	1135.0	1143.0		2.28	
8.8	GHz	1132.0	1135.0	1143.0	U0.4 P8.8	2.38	
5	GHz	1133.0	1135.0	0000.0		2.11	
2.7	GHz	1133.0	1136.0	1143.0		1.95	
1.4	GHz	1132.0	1135.0	1143.0		2.00	
610	MHz	1132.0	1134.0	1143.0		1.96	
410	MHz	1133.0	1135.0	1143.0		1.92	
204	MHz	1134.2	1135.3	1138.0		3.23	
DS II	45-65	1144		1147		2	
DS I	45-270	1156		~1335	S,C	2	
DS III	25-95	1127		1128	B	2	
DS III	55-270	1133		1141	GG,C	2	
DS III	30-75	1143		1205	N	2	
DS III	25-270	1145		1150	GG,FS	2	
DS III	25-180	1149		1205	N	2	
DS DCIM	130-4000	1132		1145	S,P	3	
15.4	GHz	1133.0	1213.0	1441.0		3.00	
8.8	GHz	1132.0	1213.0	1428.0		3.28	
5	GHz	1133.0	1213.0	1448.0	P5	3.36	
2.7	GHz	1134.0	1214.0	1426.0		3.20	
1.4	GHz	1132.0	1217.0	1412.0		3.11	
DS II	100-600	1205		1317		3	
DS II	25-180	1206		1224		3	
DS IV	25-180	1205		1726		3	
DS III	25-270	1203		1215	GG,FS	2	
DS III	25-270	1215		~1335	S	2	
DS CONT	45-270	1204		~1335	GG,FS	2	
DS DCIM	100-4000	1208		1317	P,C,S	3	
CME		1230	1585km/s	-67.1	360˚	121˚	





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Event 2002.08.18 – (2002-230) **№ 430**

Particle event: To(Ep>10 MeV) – 18d22^h

Tmax$_1$(Ep>10 MeV) – 19d03^h, Jmax$_1$(Ep>10 MeV) – 2.3 /cm^2.s.sr

Tmax$_2$(Ep>10 MeV) – 19d12^h, Jmax$_2$(Ep>10 MeV) – 1.8 /cm^2.s.sr

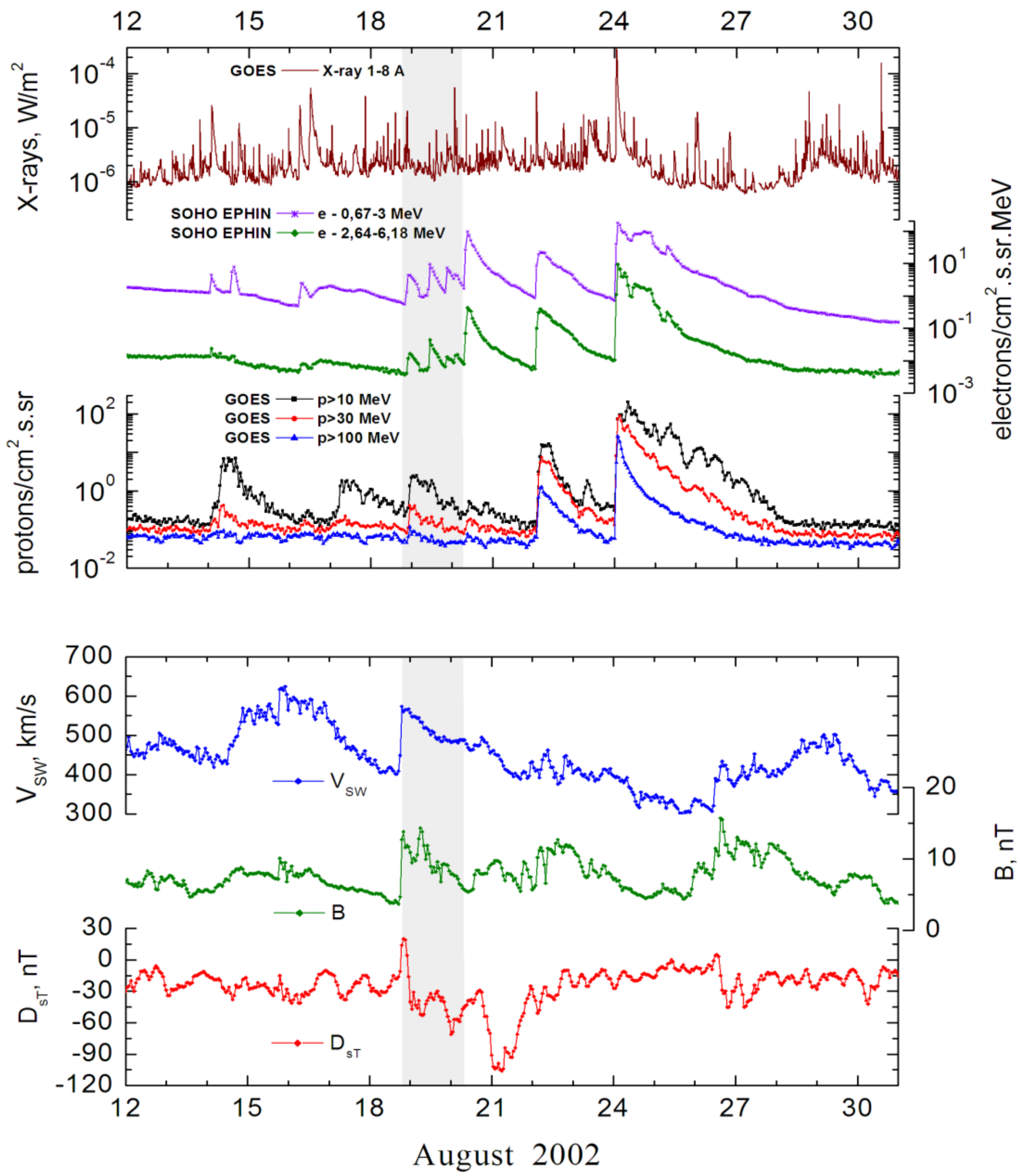
Duration of the event – 2 days

Quasimaximal energy of protons in the event – Eqm$_1$ = 75 MeV

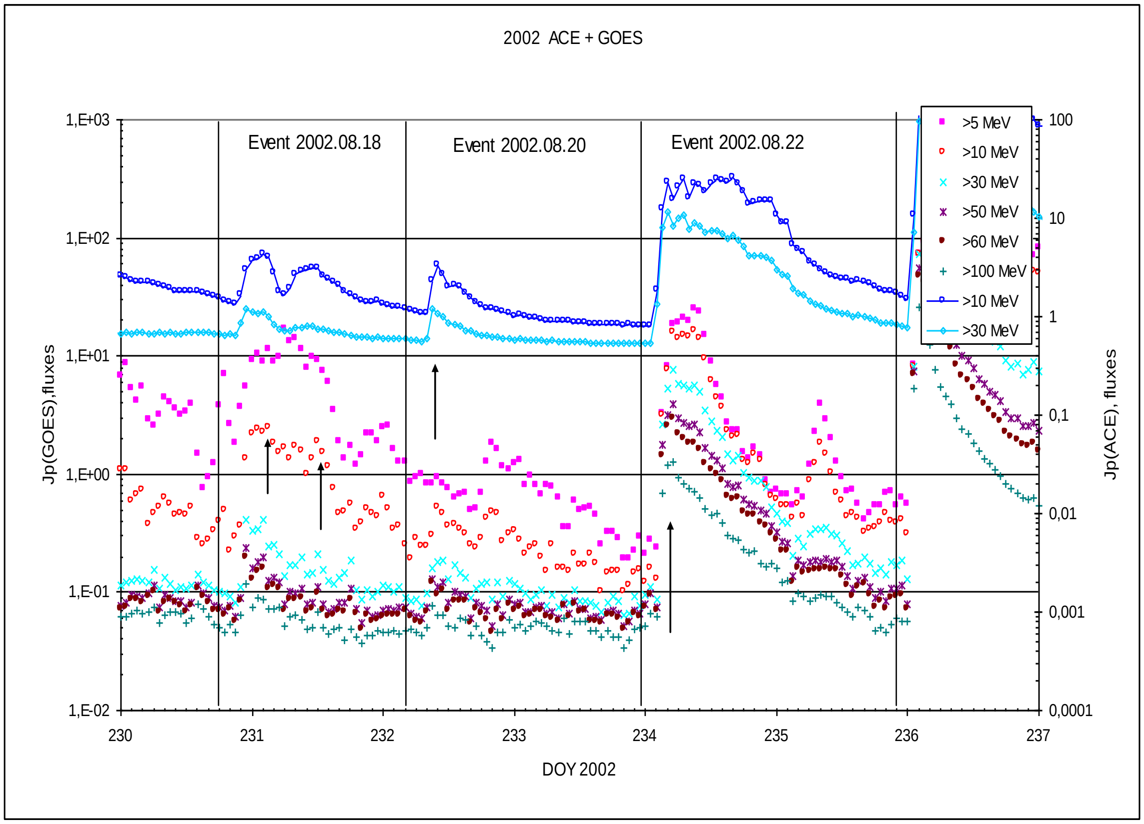
– Eqm$_2$ = 70 MeV

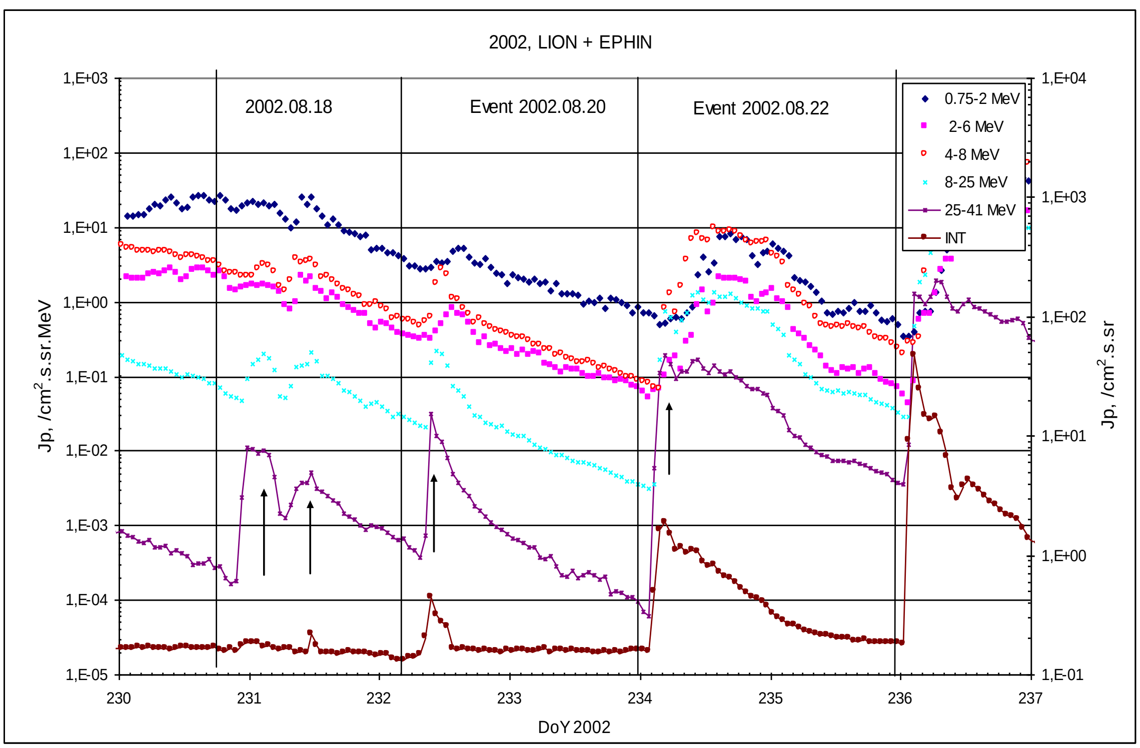
Sources: ● solar flare 18d21^{h}11^m, 1N/M2.2, S10W20, AR10069
Main X-ray burst 1–8 Å: onset – 18d21^{h}12^m, max – 18d21^{h}25^m, Φ = 0.22 J/m^2
CME: 18d21^{h}54^m, V = 0682 km/s, Δφ = 140^o, dA = 202^o.

Particle fluxes and associated phenomena



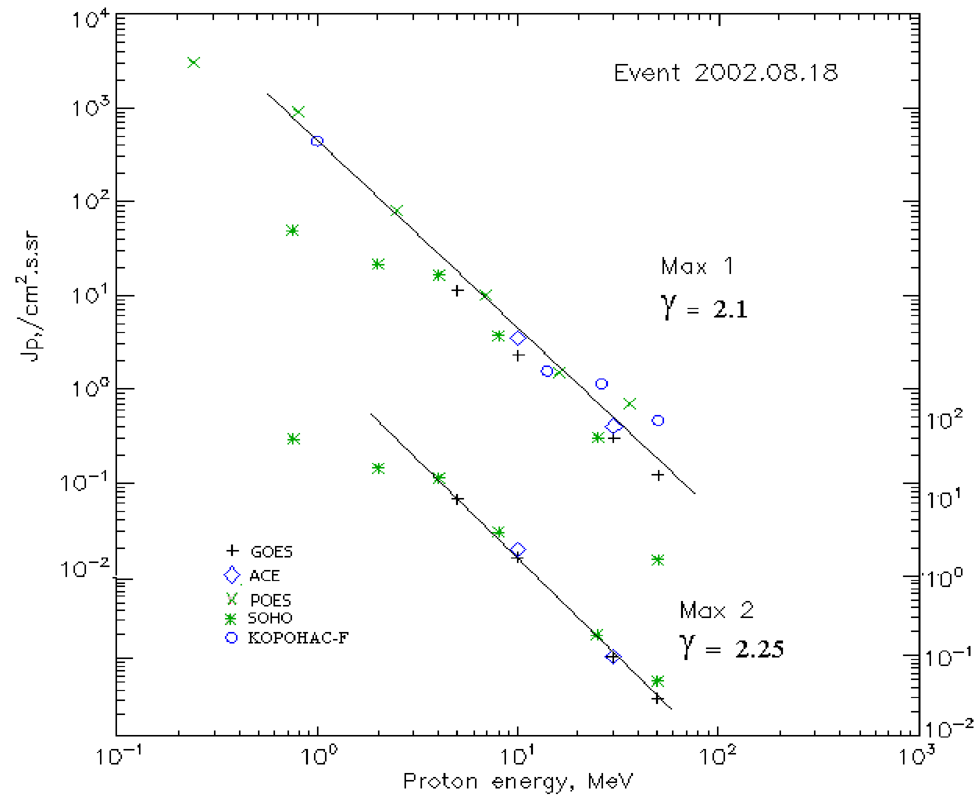
Time profiles of the proton fluxes for the event of 2002 August 18





Arrows on the profiles of the events indicate the time of the proton flux maxima, taken to build the proton spectra (see below)

Integral time-of-maximum proton spectrum



Integral fluxes of protons for the event of 2002 August 18

S/c, instruments	Ep, MeV	To	Tmax	Jmax, (cm2.s.sr)-1	Dura-tion	Comments
GOES 10						
EPS	>5	22^h	19d03^h/19d11^h	11.3/9.8	2d	
EPS	>10	22^h	19d03^h/19d12^h	2.3/1.8	2d	
EPS	>30	22^h	19d02^h/19d12^h	0.3/0.1	1.5d	
EPS	>50	22^h	19d02^h/19d12^h	0.12/0.03	1.5d	
EPS	>60	-	-	-	-	
EPS	>100	-	-	-	-	
POES 16						
MEPED	>0.24	-	19d07^h/ -	3120/ -	2d	
MEPED	>0.8	-	19d07^h/ -	910/ -	2d	
MEPED	>2.5	-	19d05^h/ -	84/ -	2d	
MEPED	>6.9	-	19d04^h/ -	10/ -	2d	
MEPED	>16	-	19d02^h/ -	1.5/ -	1.5d	
MEPED	>36	-	19d02^h/ -	0.7/ -	1.5d	
MEPED	>70	-	-	-	-	
MEPED	>140	-	-	-	-	
CORONAS F						
MKL	>1.	-	19d00^h/ -	445/ -	2d	
MKL	>14	-	19d00^h/ -	1.6/ -	1.5d	
MKL	>26	-	19d00^h/ -	1.14/ -	1.5d	
MKL	>50	-	19d00^h/ -	0.46/ -	1.5d	

ACE						
SIS	>10	22^h	$19d02^h/19d12^h$	3.5/2.25	2d	
SIS	>30	22^h	$19d02^h/19d11^h$	0.4/0.1	1d	
SOHO						
EPHIN (INT)	>50	22^h	$19d02^h/19d11^h$	0.015/0.05	-	

Differential fluxes of protons for the event of 2002 August 18

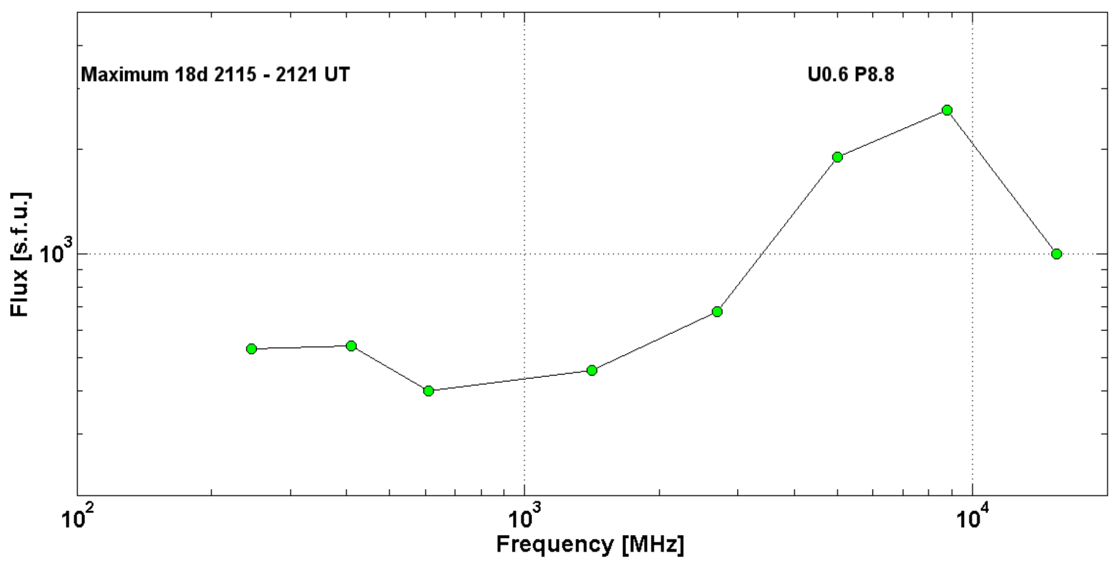
S/c, instruments	ΔE, MeV	To	Tmax	Jmax, $(cm^2.s.sr.MeV)^{-1}$	Dura-tion	Comments
SOHO						
LION	0.75-2	22^h	$19d01^h/19d11^h$	22/25.2	2d	
LION	2-6	22^h	$19d01^h/19d11^h$	1.6/2	2d	
EPHIN	4-8	22^h	$19d03^h/19d11^h$	3.2/3.6	2d	
EPHIN	8-25	22^h	$19d03^h/19d11^h$	0.2/0.21	2d	
EPHIN	25-41	22^h	$19d02^h/19d11^h$	0.01/0.005	2d	
EPHIN	41-53	- “ -	- “ -	- “ -	- “ -	

Electromagnetic and other phenomena that are sources and/or accompanying for the event of 2002 August 18

2002 August 18 • AR10069 To event 430

Hα	6563 Å	2111	2l21	2200	S10W20	1N	FH
1 – 12	keV	2112	2125	2137		M2.2	2.2E-2
15.4	GHz	2115.0	2121.0	2131.0		3.00	
8.8	GHz	2113.0	2121.0	2134.0	U0.6 P8.8	3.41	
5	GHz	2113.0	2121.0	2132.0		3.28	
2.7	GHz	2114.0	2121.0	2130.0		2.83	
1.4	GHz	2114.0	2115.0	2125.0		2.66	
610	MHz	2113.0	2116.0	2124.0		2.60	
410	MHz	2113.0	2115.0	2123.0		2.73	
245	MHz	2111.0	2116.0	2139.0		2.72	

DS II	28-180	2124		2155		1	
DS II	25-130	2124		2135		3	
DS IV	25-180	2136		0140		1	
DS IV	30-80	2142		2320		2	
DS III	25-2000	2110		2122	G	3	
DS III	25-80	2142		2142	B	1	
DS III	330-530	2144		2148	G	1	
DS III	25-500	2159		2203	G	2	
DS CONT	60-110	2135		>2400		3	
CME	WL	2154	0682km/s	1.9 km/s^2	140˚	202˚	



Event 2002.08.20 – (2002-232) **и** **№ 431**

Particle event: To(Ep>10 MeV) – 20d09^h

Tmax(Ep>10 MeV) – 20d10^h, Jmax (Ep>10 MeV) – 2.5 /cm^2.s.sr *)

Duration of the event – 1 day *)

Quasimaximal energy of protons in the event – Eqm = 80 MeV

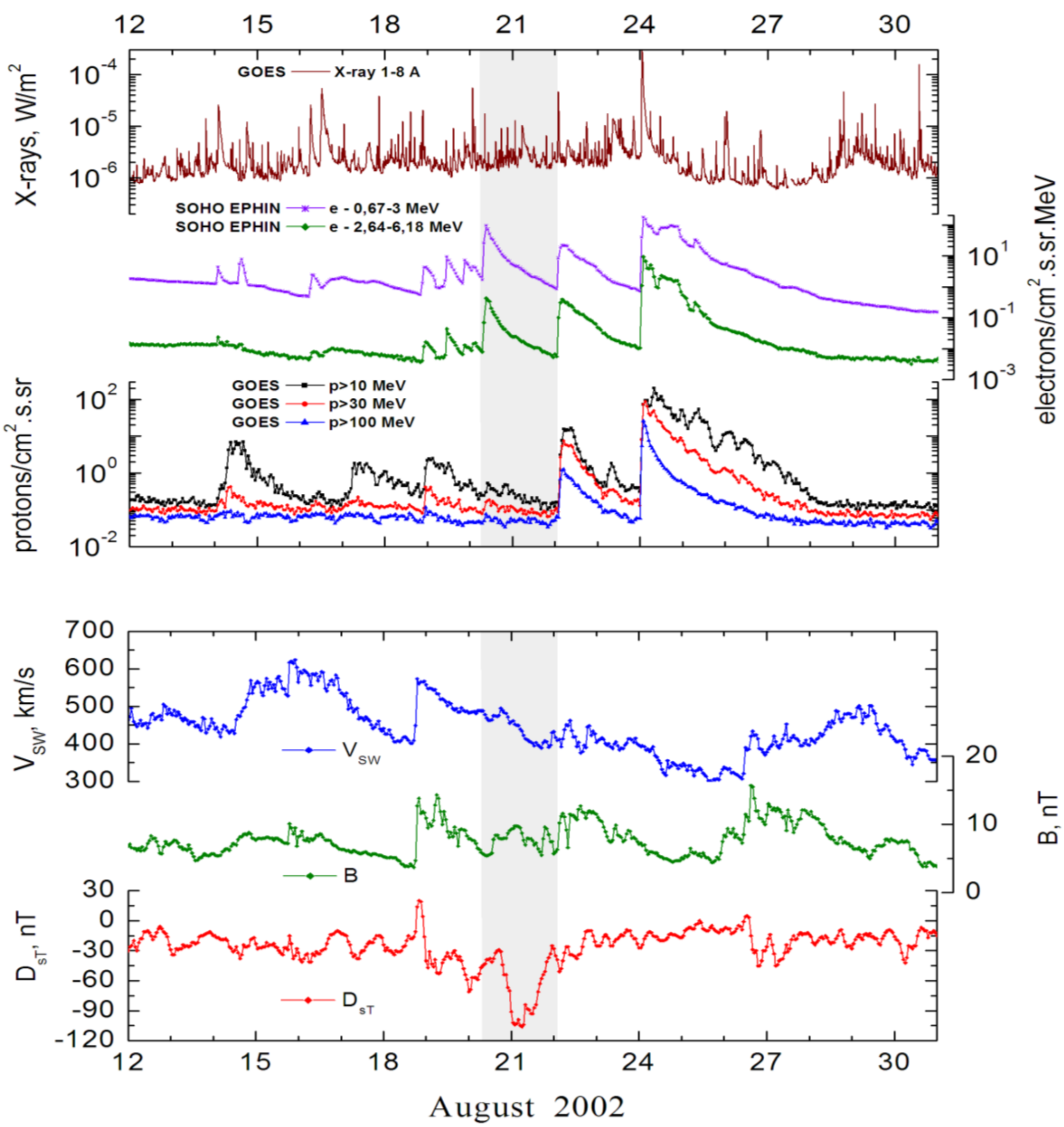
*) Data from ACE (SIS)

Sources: ● solar flare 20d01^{h}33^m, M5.0/1B, S10W35, AR10069

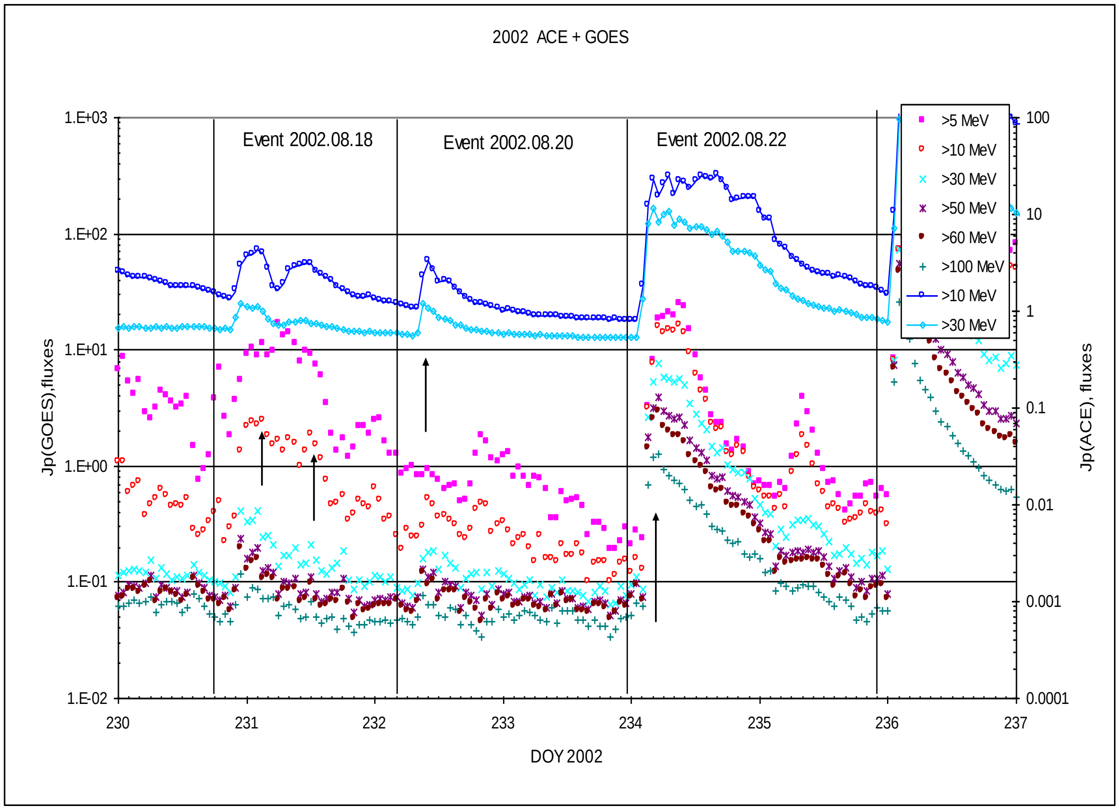
Main X-ray burst 1-8 Å: onset – 20d01^{h}33^m, max – 20d01^{h}40^m, Φ = 0.12 J/m^2

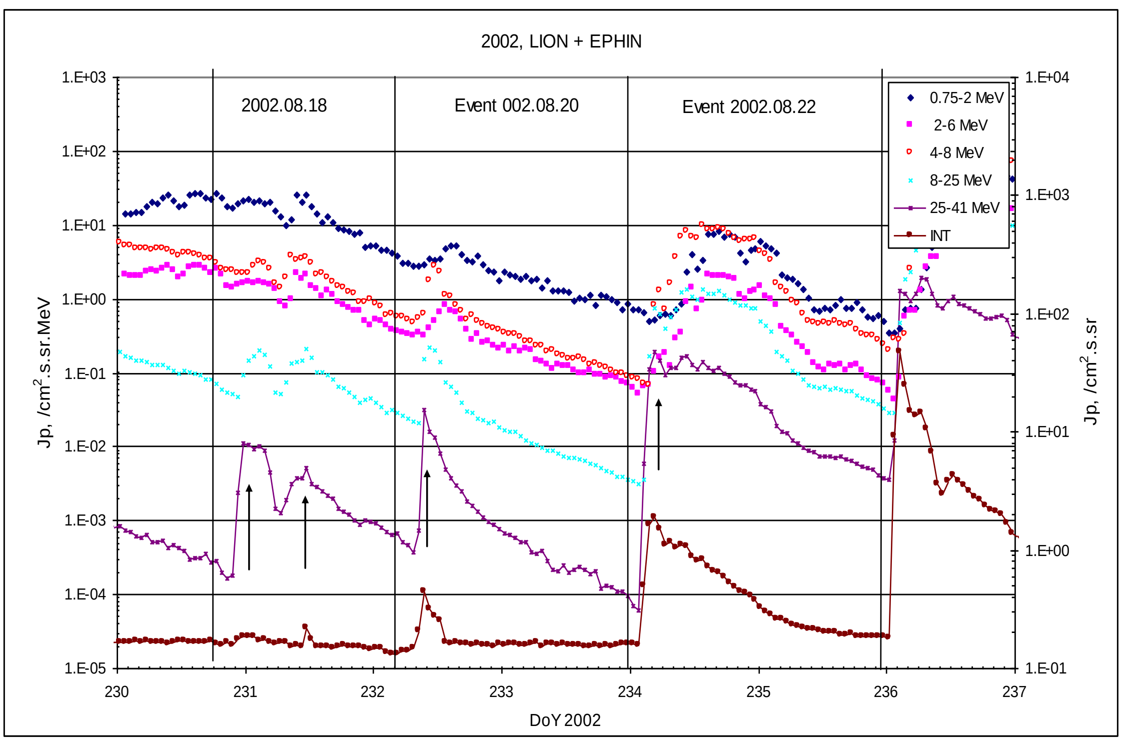
CME: 20d01^{h}54^m;V = 0961 km/s, Δφ = 360^o,dA = 121^o.

Particle fluxes and associated phenomena



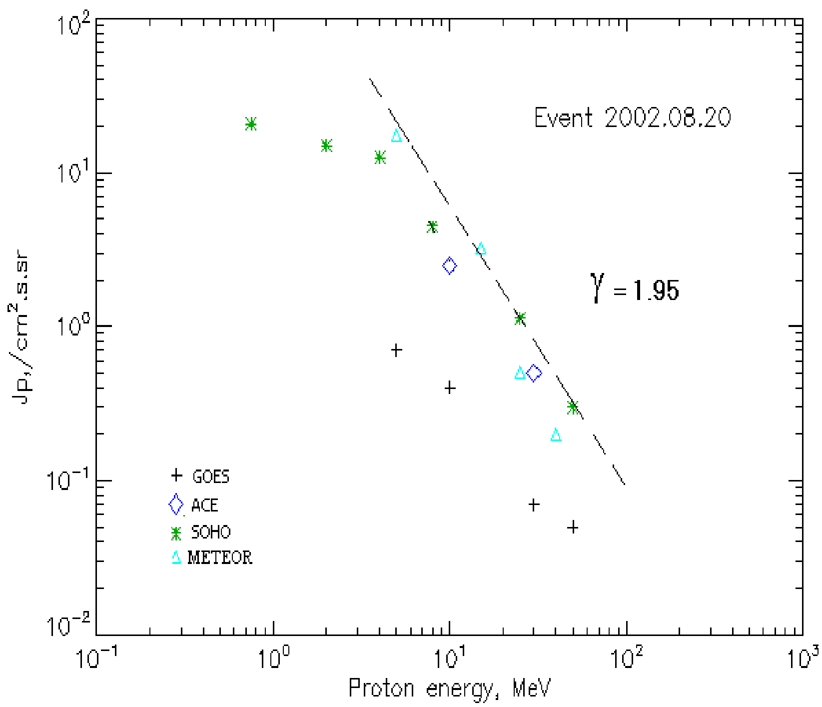
Time profiles of the proton fluxes for the event of 2002 August 20





Arrows on the profiles of the events indicate the time of the proton flux maxima, taken to build the proton spectra (see below)

Integral time-of-maximum proton spectrum



Integral fluxes of protons for the event of 2002 August 20

S/c, instruments	Ep, MeV	To	Tmax	Jmax, $(cm2.s.sr)^{-1}$	Duration	Comments
GOES 10						
EPS	>5	09^h	10^h	0.7	2d	
EPS	>10	09^h	10^h	0.4	2d	
EPS	>30	08^h	11^h	0.07	2d	
EPS	>50	08^h	11^h	0.05	2d	
EPS	>60	-	-	-	-	
EPS	>100	-	-	-	-	
METEOR						
CBM	>5	09^h	10^h	17.3	1.2d	
CBM	>15	09^h	10^h	3.2	1.2d	
CBM	>25	09^h	10^h	0.5	0.7d	
CBM	>40	09^h	10^h	0.2	0.7d	
BP	>90	-	-	-	-	
ChD	>600	-	-	-	-	
ACE						
SIS	>10	09^h	10^h	2.5	1d	
SIS	>30	08^h	10^h	0.5	1d	
SOHO						
EPHIN (INT)	>50	08^h	10^h	0.3	1d	

Differential fluxes of protons for the event of 2002 August 20

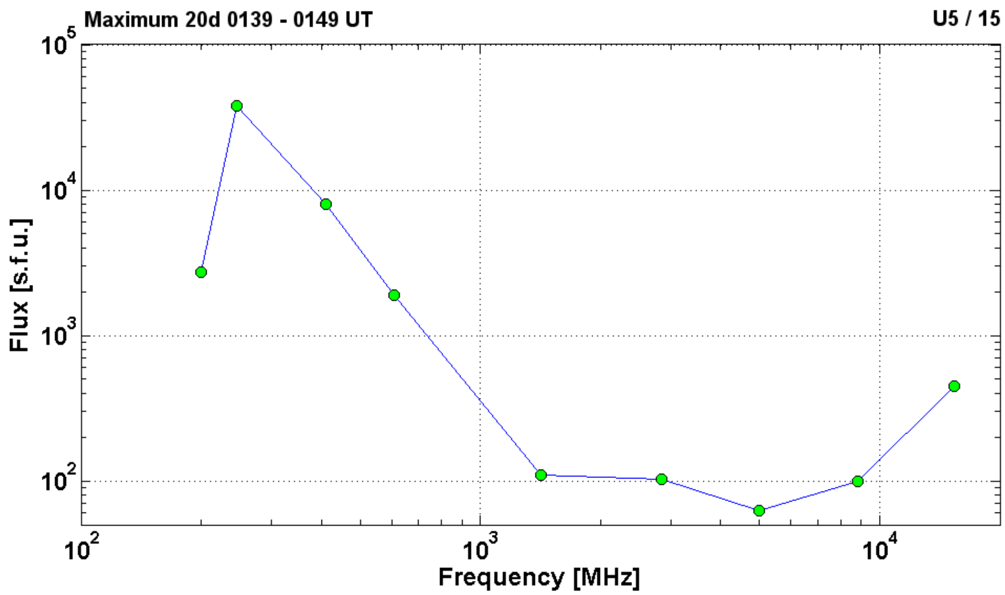
S/c, instruments	ΔE, MeV	To	Tmax	Jmax, $(cm^2.s.sr.MeV)^{-1}$	Dura-tion	Comments
SOHO						
LION	0.75-2	08^h	14^h	4.7	2d	
LION	2-6	08^h	13^h	0.75	2d	
EPHIN	4-8	08^h	11^h	2	2d	
EPHIN	8-25	08^h	11^h	0.2	2d	
EPHIN	25-41	08^h	10^h	0.03	2d	
EPHIN	41-53	- " -	- " -	- " -	- " -	

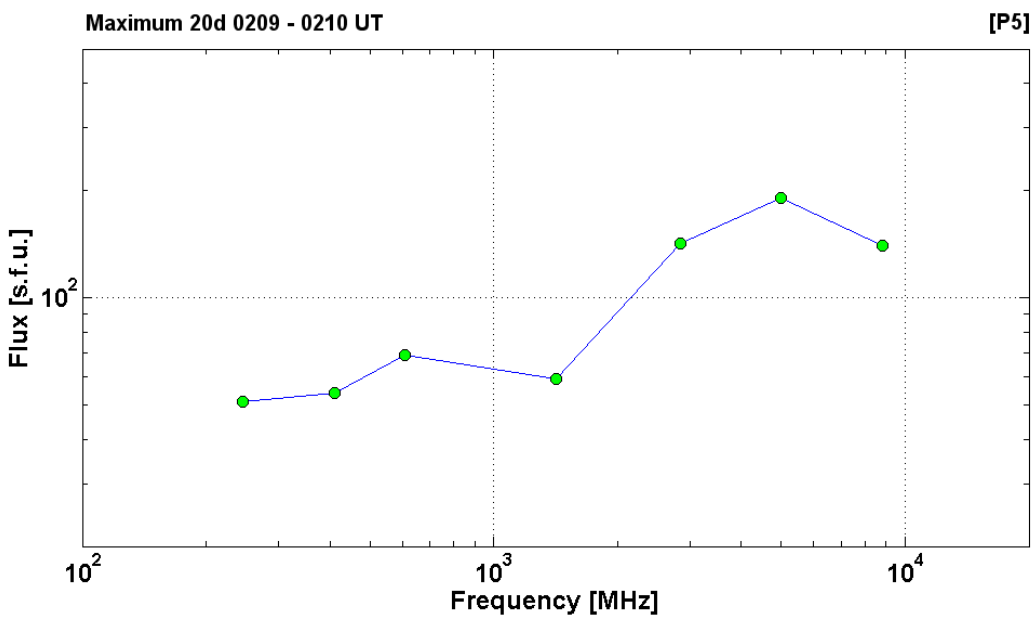
Electromagnetic and other phenomena that are sources and/or accompanying for the event of 2002 August 20

2002 August 20 ● AR10069 To event 431

Hα	6563 Å	0135	0140	0202	S10W35	1B	EF
1 – 12	keV	0133	0140	0143		M5.0	1.2E-2
25 – 50	keV	013044	014022	014836		6439679	RHESSI
12 – 25	keV	014836	015022	015816		697067	RHESSI
15.4	GHz	0149.0	0149.0	0151.0	U5 / 15	2.65	
8.8	GHz	0139.0	0140.0	0141.0		2.00	
5	GHz	0139.0	0139.0	0140.0		1.80	
2.8	GHz	0137.0	0139.5	0152.0		2.01	
1.4	GHz	0138.0	0139.0	0139.0		2.04	
610	MHz	0138.0	0139.0	0000.0		3.28	
410	MHz	0134.0	0139.0	0142.0		3.90	
245	MHz	0134.0	0139.0	0143.0		4.58	
200	MHz	0137.0	0139.0	0147.0		3.43	
DS III	25-1600	0134		0149	G	3	
8.8	GHz	0208.0	0209.0	0210.0		2.15	
5	GHz	0207.0	0209.0	0214.0	[P5]	2.28	
2.8	GHz	0204.0	0209.1	0230.0		2.15	
1.4	GHz	0208.0	0209.0	0210.0		1.77	
610	MHz	0209.0	0209.0	0210.0		1.84	
410	MHz	0209.0	0209.0	~0209.0		1.73	
245	MHz	0210.0	0210.0	~0210.0		1.71	
DS I	100-180	0247		0350	S	1	
DS III	57-160	0208		0209	G	3	
DS III	25-270	0208		0212	G	2	
DS III	57-1000	0210		0210	G	1	
DS III	57-130	0211		0212	G	2	

15.4	GHz	0254.0	0255.0	0301.0		2.26	
8.8	GHz	0255.0	0257.0	0258.0		1.86	
200	MHz	0258.0	0258.0	0312.0		2.18	
DS I	100-180	0247		0350	S	1	
CME	WL	0154	0961 km/s	1.7 km/s^2	157˚	210˚	





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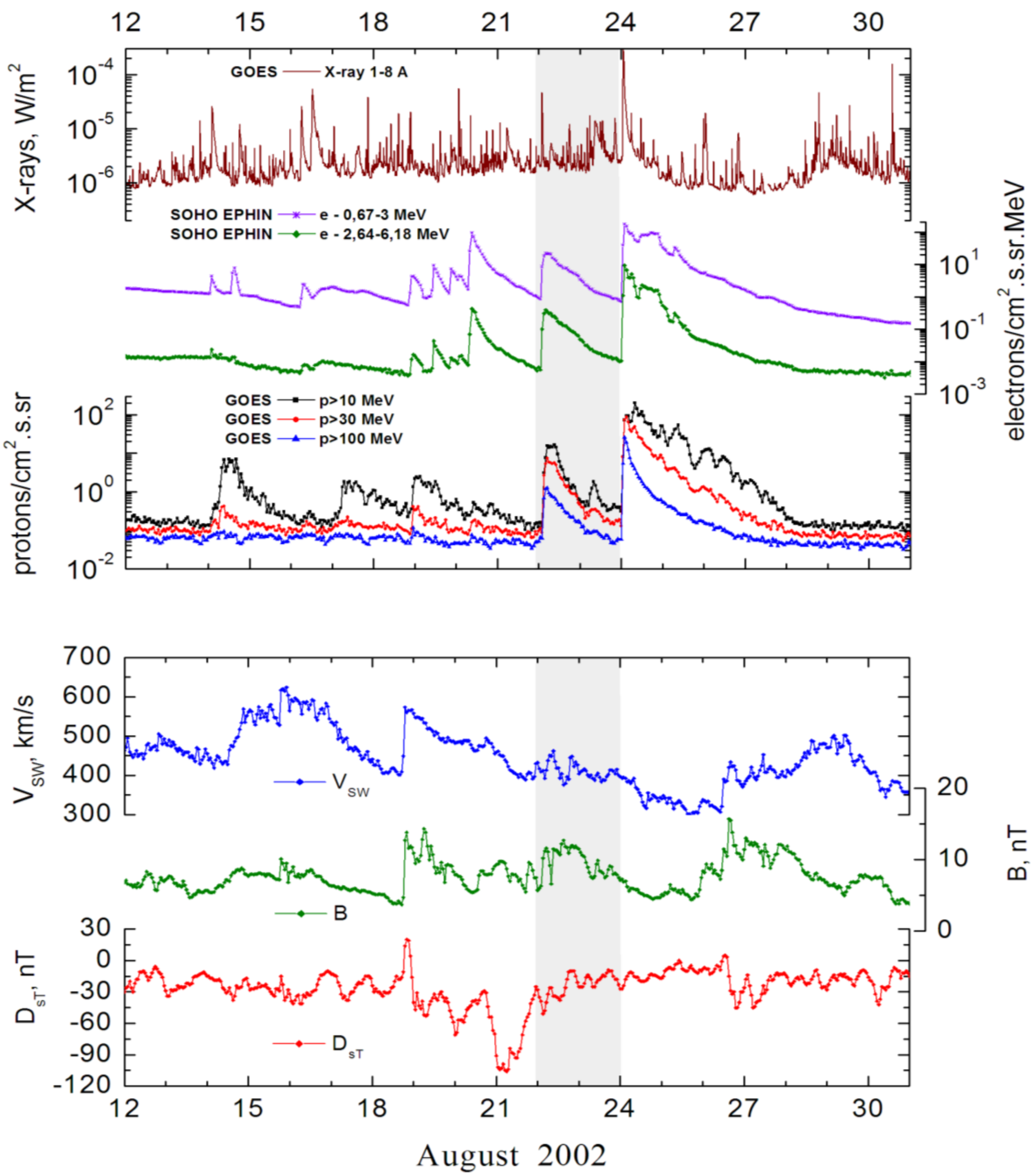
Event 2002.08.22 – (2002-234) **№ 432**

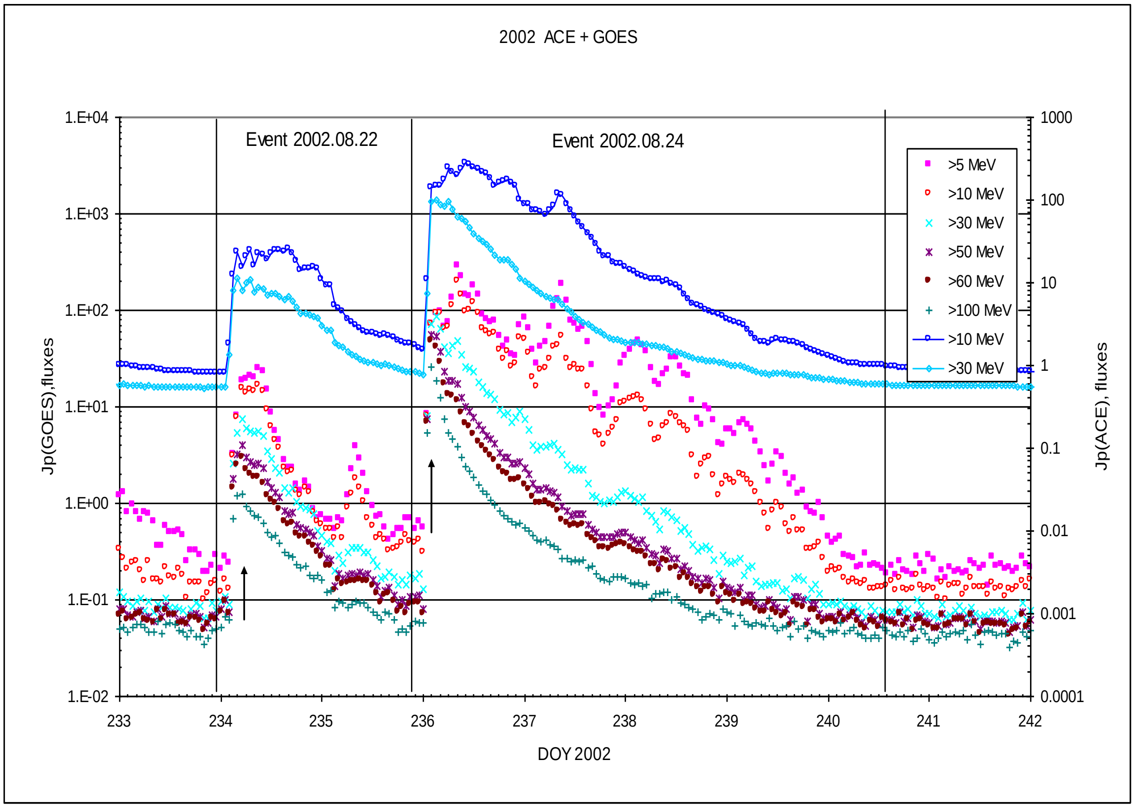
Particle event: To(Ep>10 MeV) – 22d03^h
Tmax(Ep>10 MeV) – 22d05^h, Jmax (Ep>10 MeV) – 16 /cm^2.s.sr
Duration of the event – 2 days
Quasimaximal energy of protons in the event – Eqm = 450 MeV

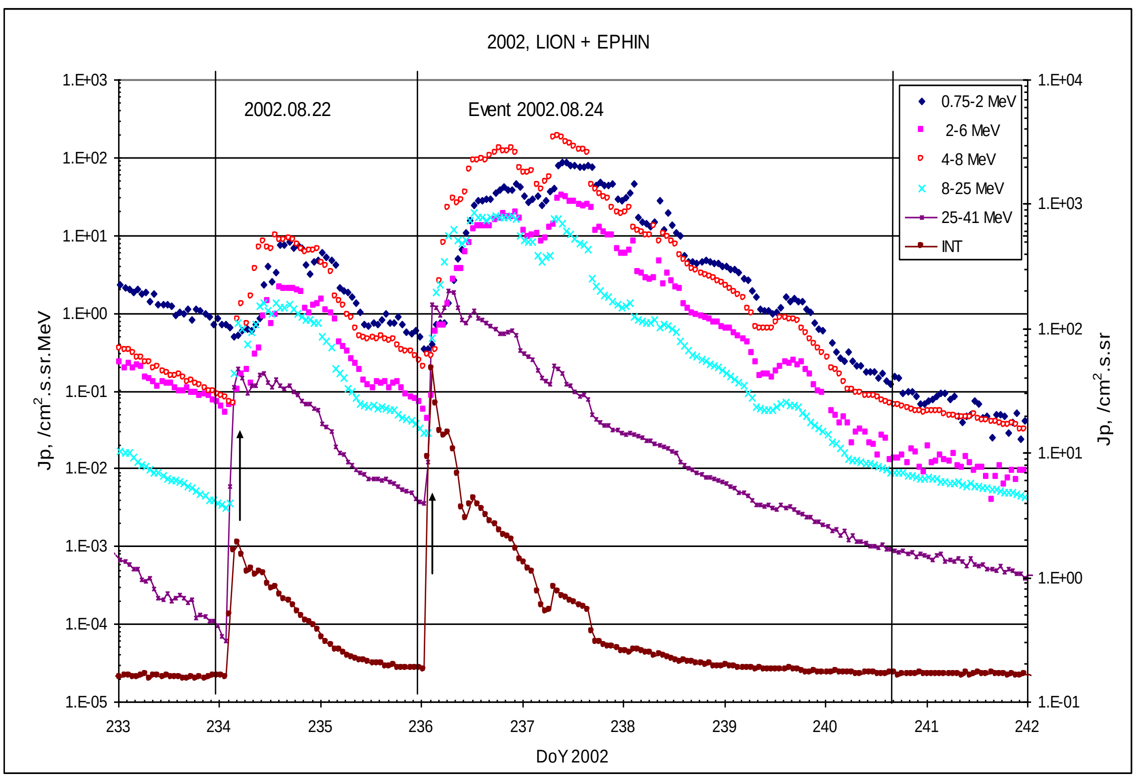
Sources: ● solar flare 22d01^{h}47^m, M5.4/2B, S07W62, AR10069
Main X-ray burst 1-8 Å onset – 22d01^{h}47^m, max – 22d01^{h}57^m, Φ = 0.033 J/m^2
CME: 22d02^{h}06^m; V -= 998 km/s, Δφ = 360^o, dA = 231^o.

Particle fluxes and associated phenomena



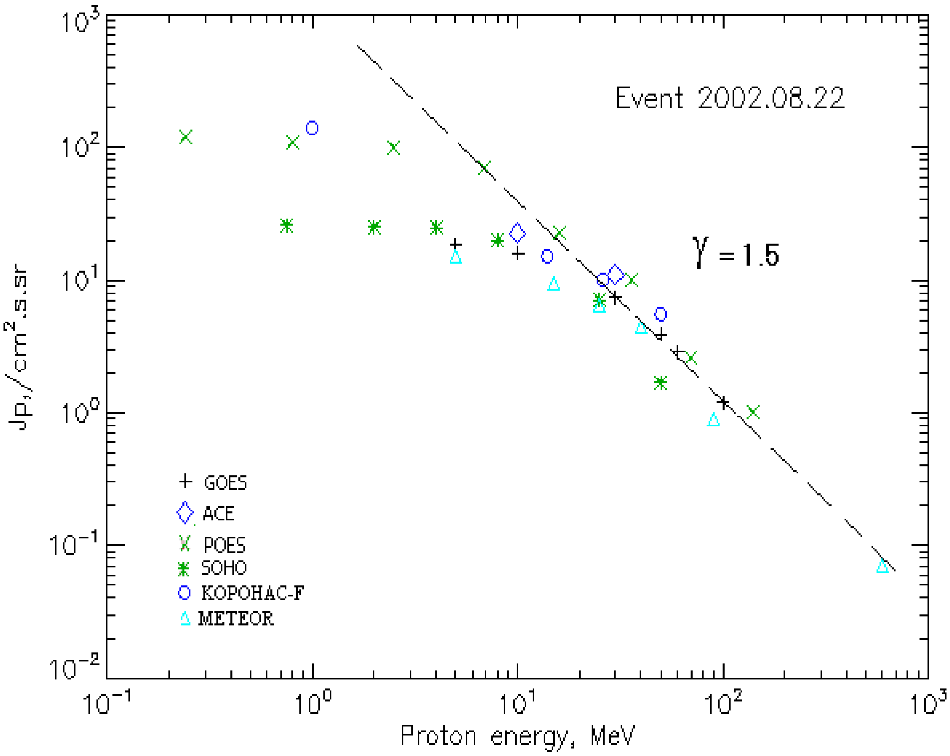
Time profiles of the proton fluxes for the event of 2002 August 22





Arrows on the profiles of the events indicate the time of the proton flux maxima, taken to build the proton spectra (see below)

Integral time-of-maximum proton spectrum



Integral fluxes of protons for the event of 2002 August 22

S/c, instruments	Ep, MeV	To	Tmax	Jmax, (cm2.s.sr)-1	Duration	Comments
GOES-10						
EPS	>5	03^h	05^h	18.3	2d	
EPS	>10	03^h	05^h	16	2d	
EPS	>30	03^h	05^h	7.4	2d	
EPS	>50	03^h	05^h	3.9	2d	
EPS	>60	03^h	05^h	2.9	2d	
EPS	>100	03^h	05^h	1.2	2d	
METEOR						
CBM	>5	03^h	06^h	15	2d	
CBM	>15	03^h	05^h	9.5	2d	
CBM	>25	03^h	05^h	6.5	2d	
CBM	>40	03^h	05^h	4.4	2d	
BP	>90	03^h	05^h	0.9	1.5d	
ChD	>600	03^h	05^h	0.07	1d	
POES-16						
MEPED	>0.24	-	05^h	120	2d	
MEPED	>0.8	-	05^h	110	2d	
MEPED	>2.5	-	05^h	100	2d	
MEPED	>6.9	-	05^h	70	2d	
MEPED	>16	-	05^h	23	2d	
MEPED	>36	-	05^h	10	2d	
MEPED	>70	-	05^h	2.6	2d	
MEPED	>140	-	05^h	1	2d	

CORONAS F						
MKL	>1.	-	05^h	140	2d	
MKL	>14	-	05^h	15	2d	
MKL	>26	-	05^h	10	2d	
MKL	>50	-	05^h	5.5	2d	
ACE						
SIS	>10	02^h	04^h	22.6	2d	
SIS	>30	02^h	04^h	11	2d	
SOHO						
EPHIN (INT)	>50	02^h	04^h	1.7	1d	

Differential fluxes of protons for the event of 2002 August 22

S/c, instruments	ΔE, MeV	To	Tmax	Jmax, $(cm^2.s.sr.MeV)^{-1}$	Dura-tion	Comments
SOHO						
LION	0.75-2	02^h	06^h	0.5	2d	
LION	2-6	02^h	06^h	0.17	2d	
EPHIN	4-8	02^h	05^h	1.23	2d	
EPHIN	8-25	02^h	04^h	0.75	2d	
EPHIN	25-41	02^h	04^h	0.19	2d	
EPHIN	41-53	- “ -	- “ -	- “ -	- “ -	

References:

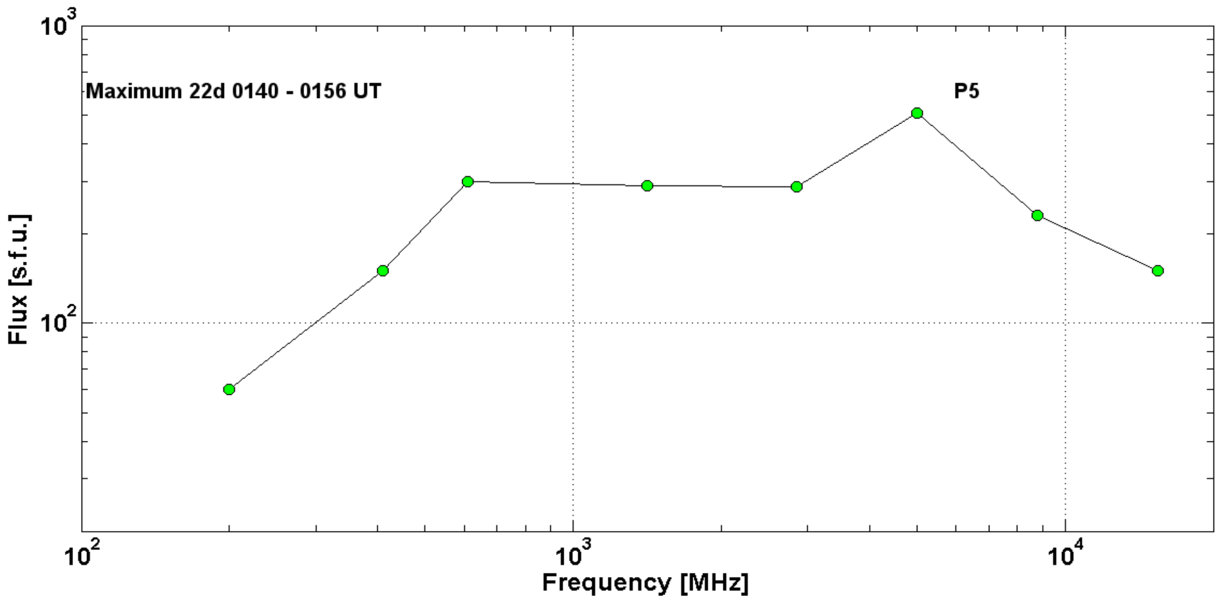
Veselovskij I.S., I.N. Myagkova, O.S. Yakovchuk, 2012.

Electromagnetic and other phenomena that are sources and/or accompanying for the event of 2002 August 22

2002 August 22 ● AR10069 To event 432

Hα	6563 Å	0151	0153	0225	S07W62	2B	EF
1 – 12	keV	0147	0157	0205		M5.4	3.3E-2
50-100	keV	014508	015422	022212		9830232	RHESSI

15.4	GHz	0153.0	0156.0	0208.0		2.18	
8.8	GHz	0151.0	0156.0	0206.0		2.36	
5	GHz	0150.0	0151.0	0200.0	P5	2.71	
2.8	GHz	0136.0	0152.3	0240.0		2.46	
1.4	GHz	0150.0	0151.0	0153.0		2.46	
610	MHz	0150.0	0153.0	0154.0		2.48	
410	MHz	0139.0	0140.0	0140.0		2.18	
200	MHz	0153.0	0154.0	0155.0		1.78	
DS II	25-200	0156		0205		2	
DS IV	25-180	0209		0218		1	
DS IV	57-280	~0210		>0358	FS	1	
DS III	57-1300	0151		0155	GG	3	
DS III	25-280	0151		0156	G	3	
DS III	57-130	0202		0203	G	3	
DS III	30-190	0206		0214	G	2	
CME	WL	0206	0998 km/s	-32.8km/s^2	360°	153°	



Список 2002 г.

Event 2002.08.24 – (2002-236) – GLE 64 **№ 433**

Particle event: To(Ep> 10MeV) – 24d01^{h}

Tmax(Ep>10 MeV) – 24d03^{h}, Jmax (Ep>10 MeV) – 92 /cm^{2}.s.sr

Duration of the event – 4 days

Quasimaximal energy of protons in the event – Eqm = 775 MeV

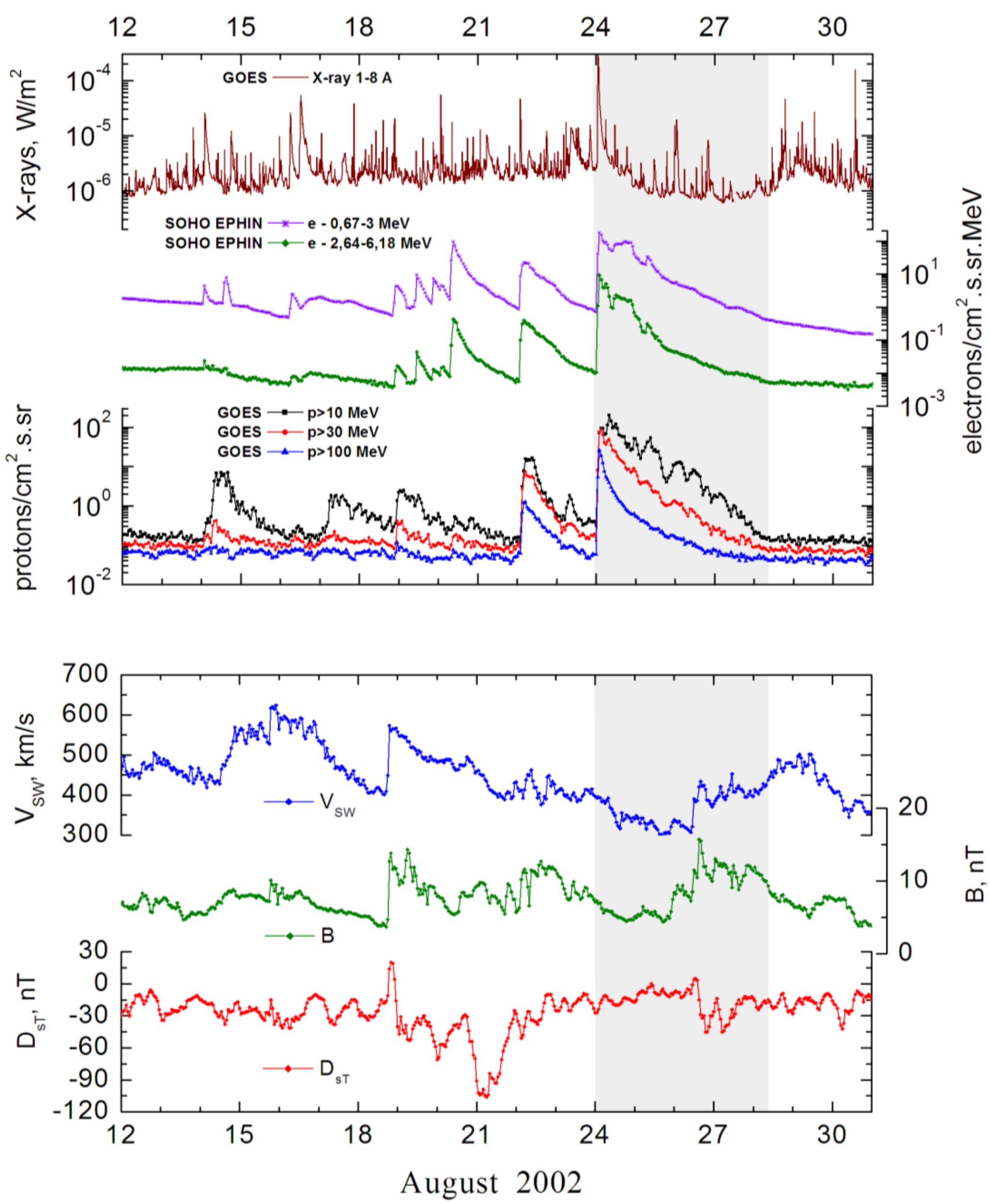
Sources: ● solar flare 24d00^{h}49^{m}, X3.1/1F, S02W81, AR10069

Main X-ray burst 1–8 Å: onset – 24d00^{h}49^{m}, max – 24d01^{h}12^{m}, Φ = 0.46 J/m^{2};

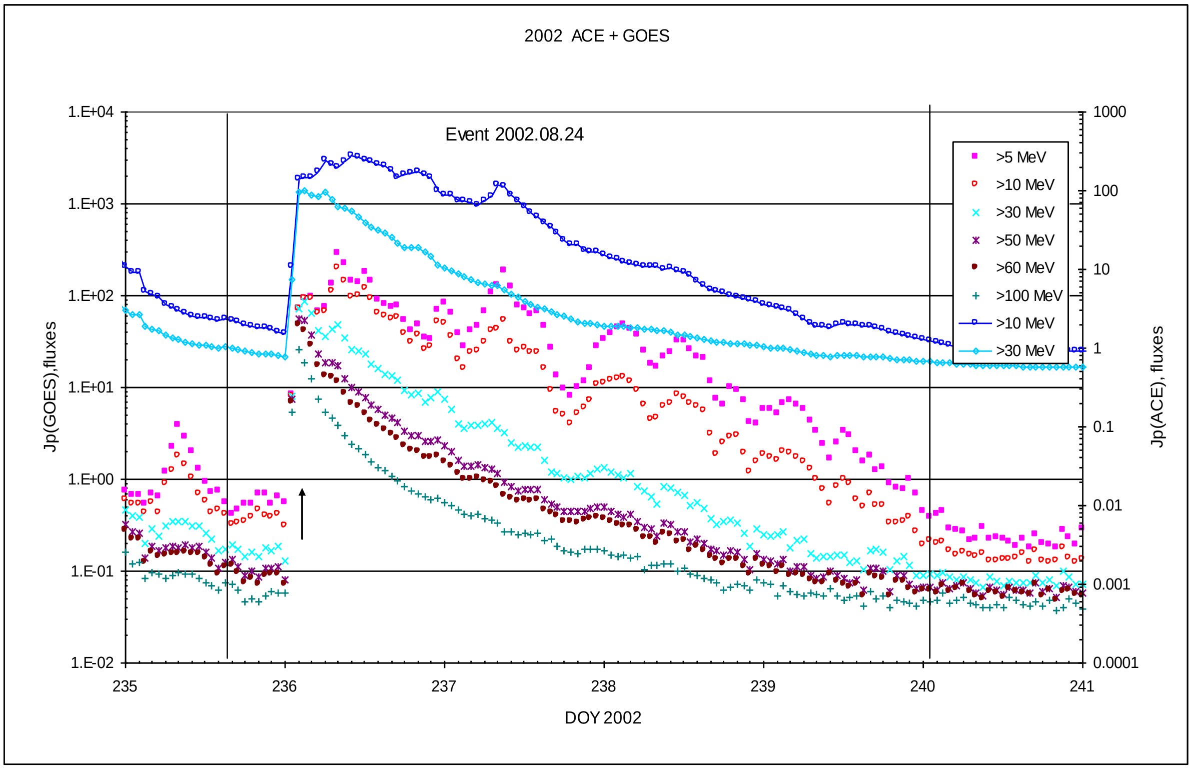
CME: 24d01^{h}27^{m}; V = 1913 km/s, Δφ = 360^{o}, dA = 270^{o} ;

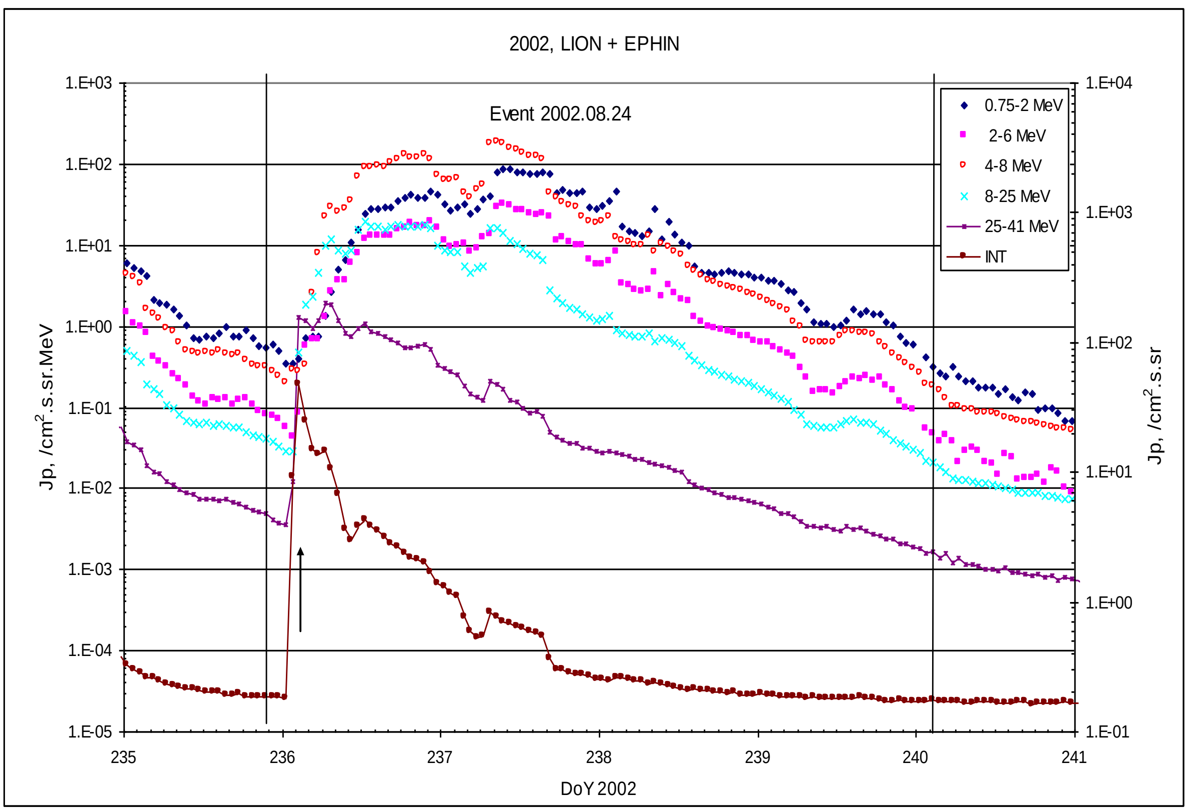
▲SC 26d11^{h}31^{m}

Particle fluxes and associated phenomena



Time profiles of the proton fluxes for the event of 2002 August 24

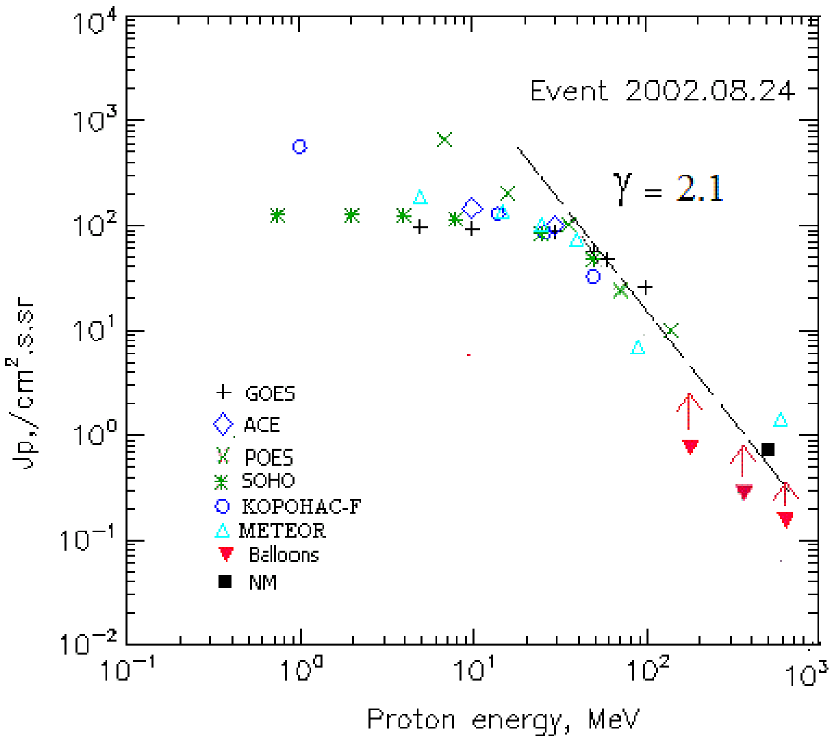




Arrows on the profiles of the events indicate the time of the proton flux maxima, taken to build the proton spectra (see below)

Список 2002 г.

Integral time-of-maximum proton spectrum



Integral fluxes of protons for the event of 2002 August 24

S/c, instruments	Ep, MeV	To	Tmax	Jmax, (cm2.s.sr)-1	Dura-tion	Comments
GOES-10						
EPS	>5	01^h	03^h	96	4d	
EPS	>10	01^h	03^h	92	4d	
EPS	>30	01^h	03^h	87	4d	
EPS	>50	01^h	02^h	56	3.5d	
EPS	>60	01^h	02^h	47	3.5d	
EPS	>100	01^h	02^h	26	3.5d	
METEOR						
CBM	>5	02^h	03^h	187	4d	
CBM	>15	02^h	03^h	134	4d	
CBM	>25	02^h	03^h	100	3d	
CBM	>40	02^h	03^h	73	3d	
BP	>90	02^h	03^h	7.1	2.5d	
ChD	>600	02^h	03^h	1.43	2d	
POES-16						
MEPED	>0.24	-	-	-	-	
MEPED	>0.8	-	-	-	-	
MEPED	>2.5	-	-	-	-	
MEPED	>6.9	-	04^h	730	4d	
MEPED	>16	-	04^h	190.	4d	
MEPED	>36	-	03^h	96	3.5d	
MEPED	>70	-	02^h	25	3.5d	
MEPED	>140	-	02^h	10	3.5d	

CORONAS F						
MKL	>1.	-	05^h	560	4d	
MKL	>14	-	05^h	128	3.5d	
MKL	>26	-	05^h	85	3.5d	
MKL	>50	-	05^h	32.5	3.5d	
ACE						
SIS	>10	01^h	03^h	146.	4d	
SIS	>30	01^h	03^h	100	4d	
SOHO						
EPHIN (INT)	>50	01^h	02^h	48	2.5d	
BALLOONS						
Mi	>183	-	07^h06^m-08^h06^m	0.76	-	
Mi	>359	-	07^h06^m-08^h06^m	0.27	-	
Mi	>647	-	07^h06^m-08^h06^m	0.15	-	
NM						
Network	>500	01^h	02^h	0.66	-	

Differential fluxes of protons for the event of 2002 August 24

S/c, instruments	ΔE, MeV	To	Tmax	Jmax, $(cm^2.s.sr.MeV)^{-1}$	Dura-tion	Comments
SOHO						
LION	0.75-2	01^h	04^h	0.65	4d	
LION	2-6	01^h	04^h	0.67	4d	
EPHIN	4-8	01^h	04^h	2.5	4d	
EPHIN	8-25	01^h	03^h	1.8	4d	
EPHIN	25-41	01^h	02^h	1.3	4d	
EPHIN	41-53	- “ -	- “ -	- “ -	- “ -	

References:

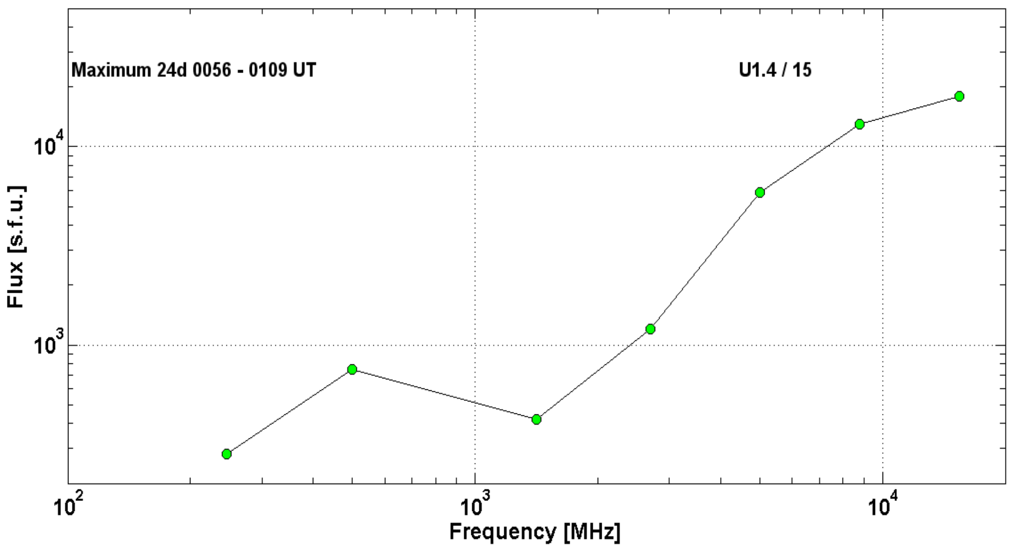
Struminsky A.B., 2003.
Kuwabara T., J.W. Bieber, J. Clem et al., 2006.
Miroshnichenko L.I. and J. Perez-Peraza, 2008.
Veselovskij I.S., I.N. Myagkova, O.S. Yakovchuk, 2012.

Electromagnetic and other phenomena that are sources and/or accompanying for the event of 2002 August 24

2002 August 24 ● AR10069 To event 433

Hα	6563 Å	0055	0103	0123	S02W81	1F	F
1 – 12	keV	0049	0112	0131		X3.1	4.6E-1
50–100	keV	004348	005730	005828		4036893	RHESSI
25–50	keV	012824	012954	023428		51893096	RHESSI
4–7	MeV						SONG F

15.4	GHz	0052.0	0100.0	0221.0	U1.4/15	4.26	
8.8	GHz	0051.0	0104.0	0219.0		4.11	
5	GHz	0050.0	0109.0	0219.0		3.77	
2.7	GHz	0050.0	0102.0	0207.0		3.08	
1.4	GHz	0054.0	0056.0	0146.0		2.62	
500	MHz	0053.0	0105.0	0119.0		2.88	
245	MHz	0101.0	0102.0	0128.0		2.45	
DS II	25-180	0101		0114		2	
DS IV	25-180	0115		0136		1	
DS III	60-1600	0101		0103	G	1	
DS III	57-180	0101		0104	G	3	
DS III	57-520	0104		0107	G	2	
DS CONT	57-200	~0108		0135		1	
CME	WL	0127	1913 km/s	32.8km/s^2	360˚	270˚	

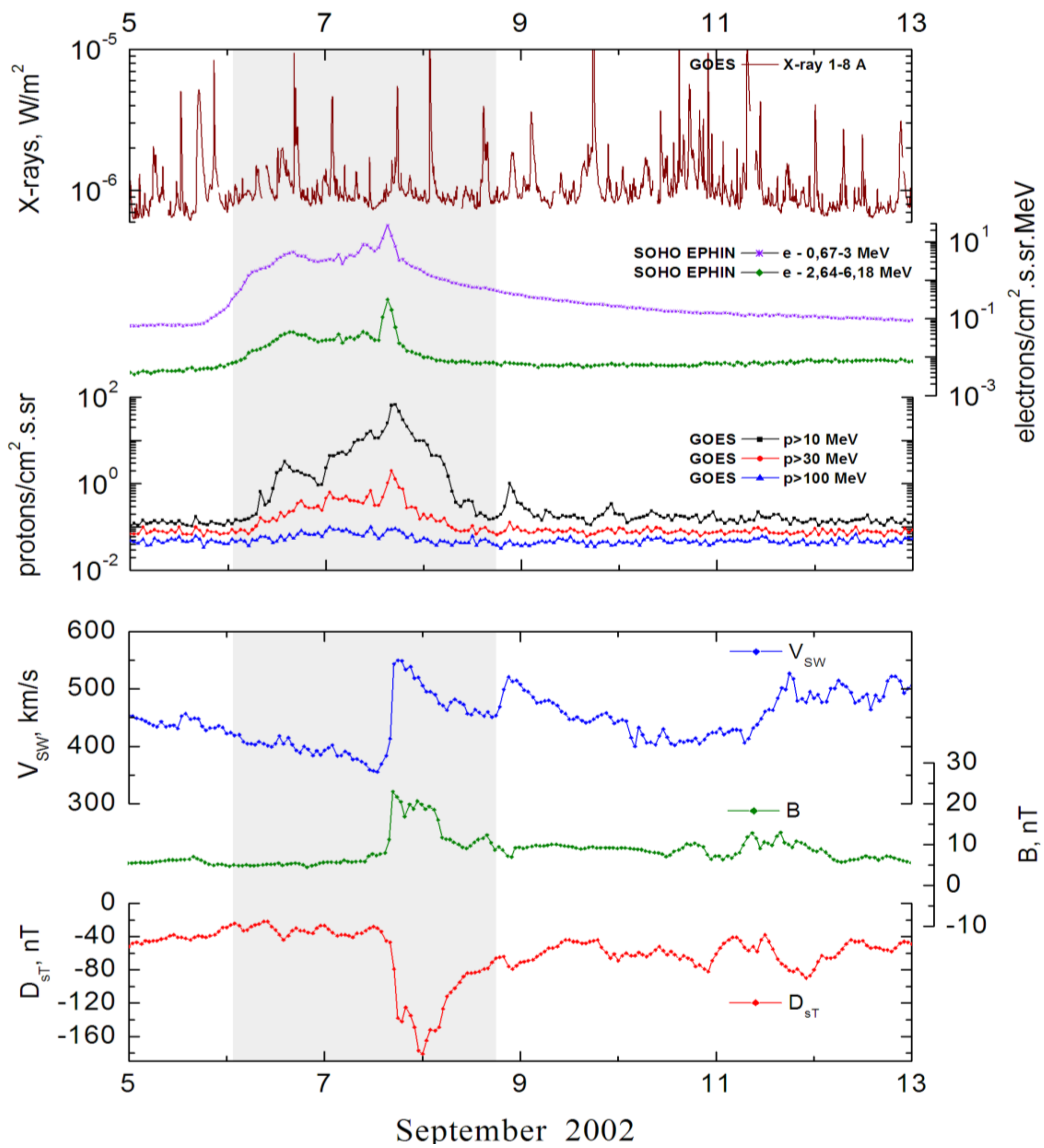


Event 2002.09.06 – (2002-249) **№ 434**

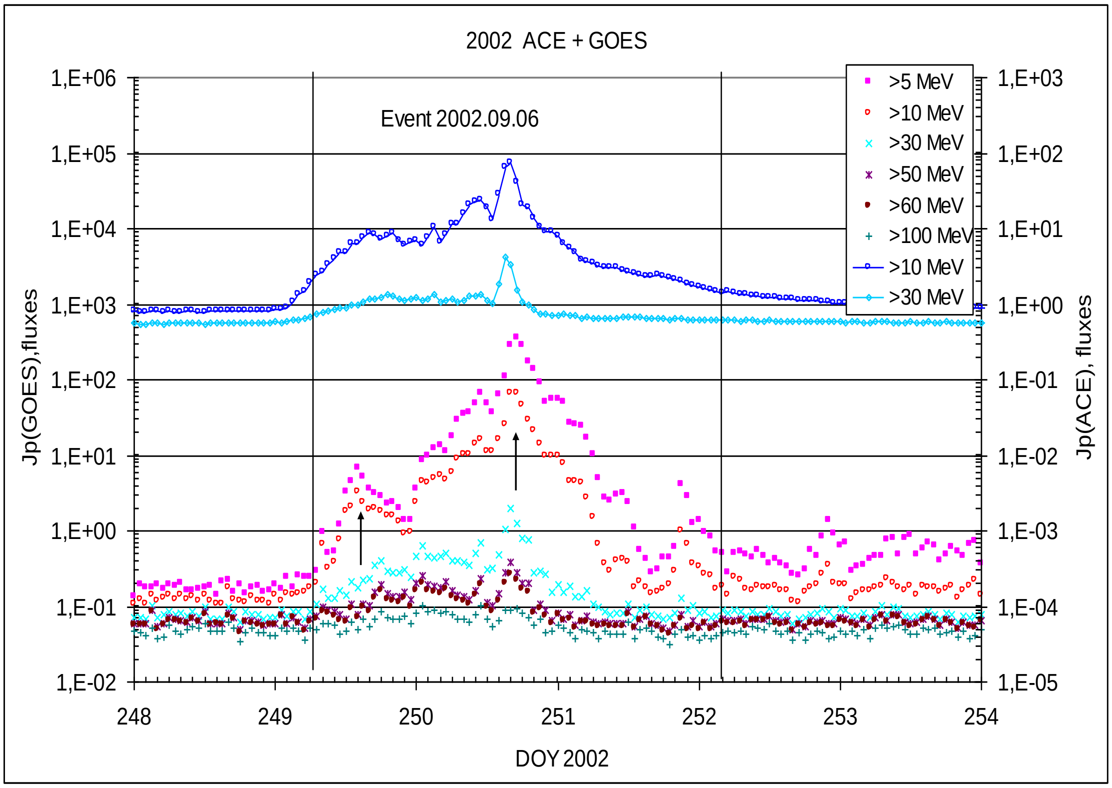
Particle event: To(Ep>10 MeV) – 06d06^h
Tmax$_1$(Ep>10 MeV) – 06d14^h, Jmax$_1$(Ep>10 MeV) – 3 /cm^2.s.sr
Tmax$_2$(Ep>10 MeV) – 07d17^h, Jmax$_2$(Ep>10 MeV) – 67 /cm^2.s.sr
Duration of the event – 3 days
Quasimaximal energy of protons in the event – Eqm$_1$ = 80 MeV
– Eqm$_2$ = 175 MeV

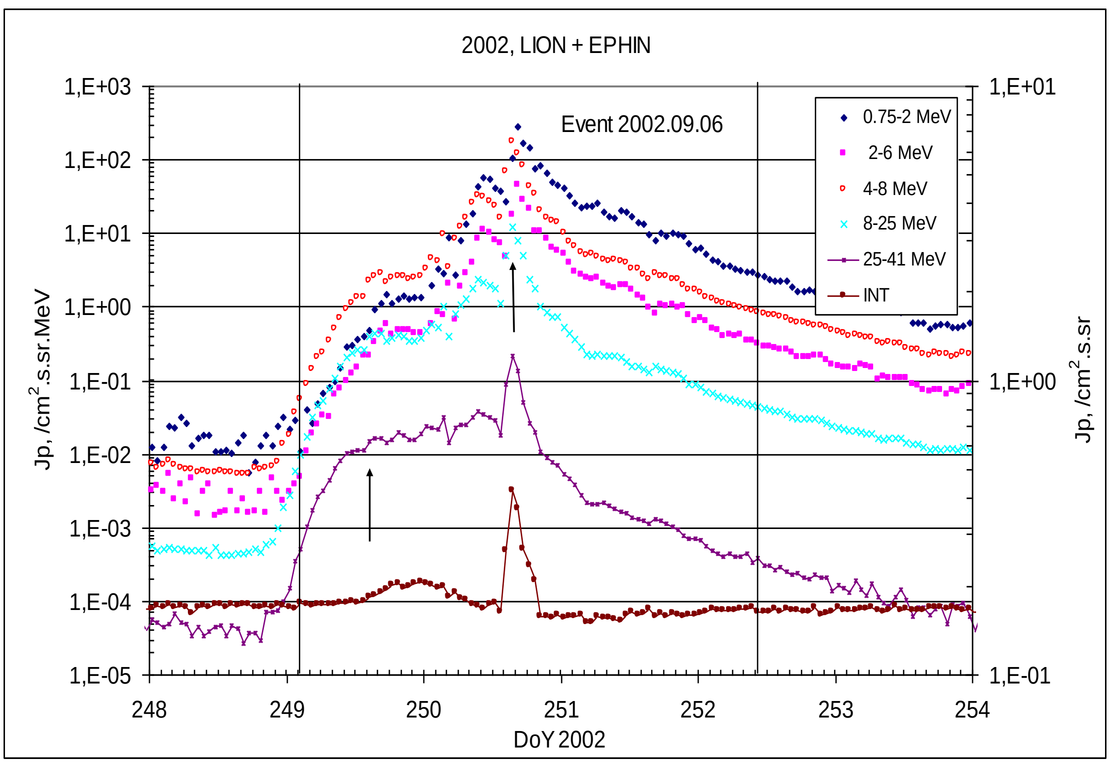
Sources: ⊙ solar flare 05d16^{h}18^m, C5.2/SF, N12E28, AR10102
Main X-ray burst 1-8 Å: onset – 05d16^{h}18^m, max – 05d17^h 06^m, Φ = 0.016 J/m^2
CME: 05d16^{h}54^m; V = 1748 km/s, Δφ = 360^o, dA = 114^o
▲SC 07d16^{h}38^m

Particle fluxes and associated phenomena



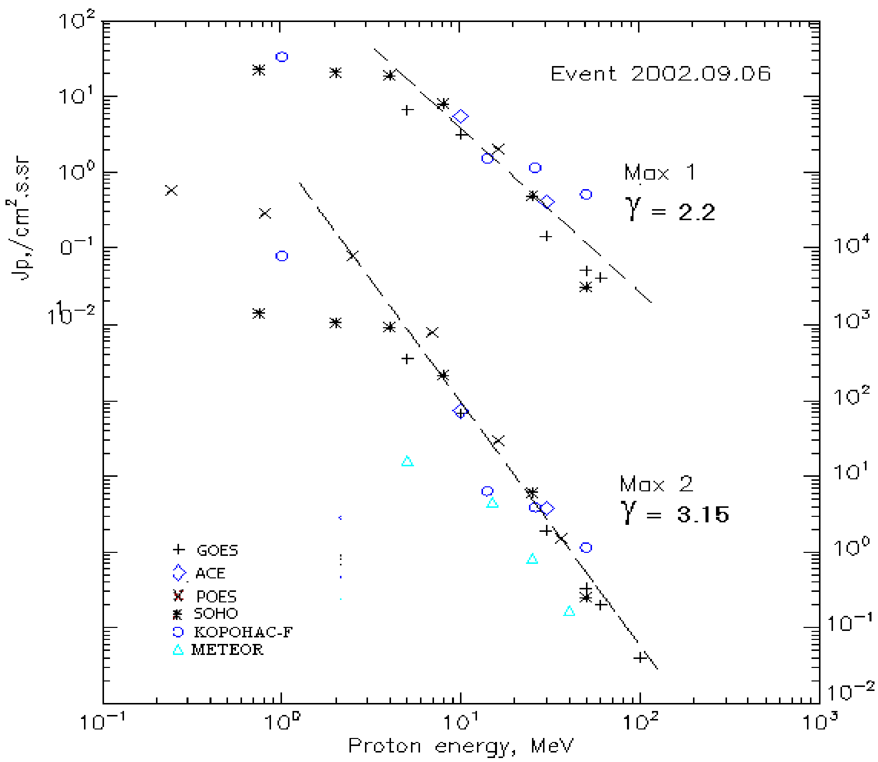
Time profiles of the proton fluxes for the event of 2002 September 06





Arrows on the profiles of the events indicate the time of the proton flux maxima, taken to build the proton spectra (see below)

Integral time-of-maximum proton spectrum



Integral fluxes of protons for the event of 2001 September 06

S/c, instruments	Ep, MeV	To	Tmax	Jmax, $(cm2.s.sr)^{-1}$	Dura-tion	Comments
GOES 10						
EPS	>5	06^h	$14^h/07d17^h$	6.6/360	3d	
EPS	>10	06^h	$14^h/07d17^h$	3/67	3d	
EPS	>30	07^h	$13^h/07d16^h$	0.14/1.9	3d	
EPS	>50	07^h	$13^h/07d16^h$	0.05/0.33	2d	
EPS	>60	07^h	$13^h/07d16^h$	0.04/0.2	2d	
EPS	>100	07^h	- $/07d16^h$	- /0.04	1d	
METEOR						
CBM	>5	-	- $/07d17^h$	- /16	2d	
CBM	>15	-	- $/07d17^h$	- /4.6	2d	
CBM	>25	-	- $/07d17^h$	- /0.83	1d	
CBM	>40	-	- $/07d17^h$	- /0.17	1d	
BP	>90	-	-	-	-	
ChD	>600	-	-	-	-	
POES 16						
MEPED	>0.24	-	$16^h/07d18^h$	-/59300	3d	
MEPED	>0.8	-	$16^h/07d18^h$	-/29600	3d	
MEPED	>2.5	-	$16^h/07d18^h$	-/7870	3d	
MEPED	>6.9	-	$16^h/07d18^h$	-/790	2d	
MEPED	>16	-	$16^h/07d18^h$	2/30	2d	
MEPED	>36	-	$16^h/07d18^h$	-/1.5	1d	
MEPED	>70	-	-	-	-	
MEPED	>140	-	-	-	-	

CORONAS F						
MKL	>1.	-	$18^{h}/07d18^{h}$	33/8150	3d	
MKL	>14	-	$18^{h}/07d18^{h}$	1.5/6.4	2d	
MKL	>26	-	$18^{h}/07d18^{h}$	1.14/3.9	2d	
MKL	>50	-	$18^{h}/07d18^{h}$	0.5/1.14	1d	
ACE						
SIS	>10	03^{h}	$13^{h}/07d16^{h}$	5.5/72.5	3d	
SIS	>30	05^{h}	$13^{h}/07d15^{h}$	0.4/3.8	2d	
SOHO						
EPHIN (INT)	>50	-	$18^{h}/07d15^{h}$	0.03/0.25	0.3d	

Differential fluxes of protons for the event of 2001 September 06

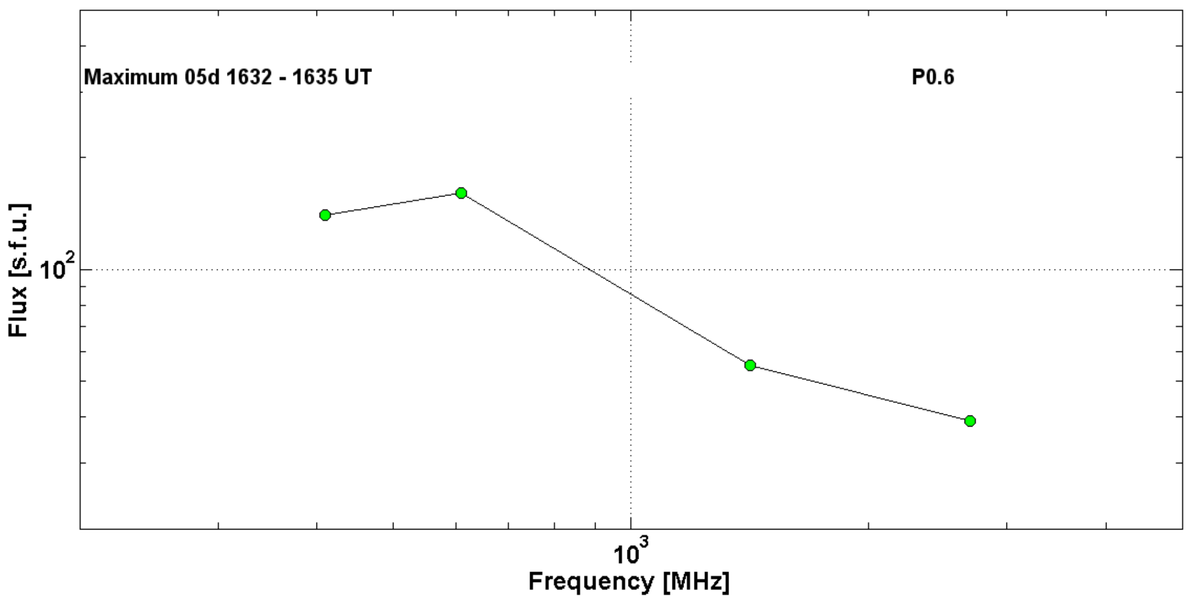
S/c, instru-ments	ΔE, MeV	To	Tmax	Jmax, $(cm^2.s.sr.MeV)^{-1}$	Dura-tion	Comments
SOHO						
LION	0.75-2	$05d23^{h}$	$17^{h}/07d16^{h}$	1.5/285	4d	
LION	2-6	$05d23^{h}$	$17^{h}/07d16^{h}$	0.58/46	4d	
EPHIN	4-8	$05d22^{h}$	$16^{h}/07d15^{h}$	2.7/178	4d	
EPHIN	8-25	$05d22^{h}$	$16^{h}/07d15^{h}$	0.44/12.2	4d	
EPHIN	25-41	$05d22^{h}$	$15^{h}/07d15^{h}$	0.016/0.21	4d	
EPHIN	41-53	- “ -	- “ -	- “ -	- “ -	

Electromagnetic and other phenomena that are sources and/or accompanying for the event of 2002 September 06

2002 September 05 ⊙ AR10102 To event 434

Hα	6563 Å	1630	1645	1745	N12E28	SF	FU
DSF		~1631		~1734	N08E31	06º	
1 – 12	keV	1618	1706	1735		C5.2	1.6E-2
6-12	keV	170620	170702	173008		121416	RHESSI

2.7	GHz	1632.0	1632.0	~1632.0		1.59	
1.4	GHz	1630.0	1634.0	1635.0		1.74	
610	MHz	1629.0	1635.0	1643.0	P0.6	2.20	
410	MHz	1631.0	1634.0	1636.0		2.15	
DS II	40-250	1633		1647		2	
DS I	200-350	~1710		~1733	S,N	1	
DS III	40-65	1628		1628	B	2	
DS CONT	25-180	1635		0429		1	
DS DCIM	320-700	1632		1637		2	
CME	WL	1654	1748 km/s	43.0 km/s^2	360˚	114˚	



Список 2002 г.

Event 2002.11.09 – (2002-313) **№ 435**

Particle event: To(Ep>10 MeV) – 09d17^h

Tmax$_1$(Ep>10 MeV) – 10d02^h, Jmax$_1$(Ep>10 MeV) – 150 /cm^2.s.sr

Tmax$_2$(Ep>10 MeV) – 10d13^h, Jmax$_2$(Ep>10 MeV) – 40 /cm^2.s.sr

Duration of the event – 2 days

Quasimaximal energy of protons in the event – Eqm$_1$ = 160 MeV

– Eqm$_2$ = 145 MeV

Sources: ● solar flare 09d13^{h}08^m, M4.6/2B, S04W29**,** AR10180

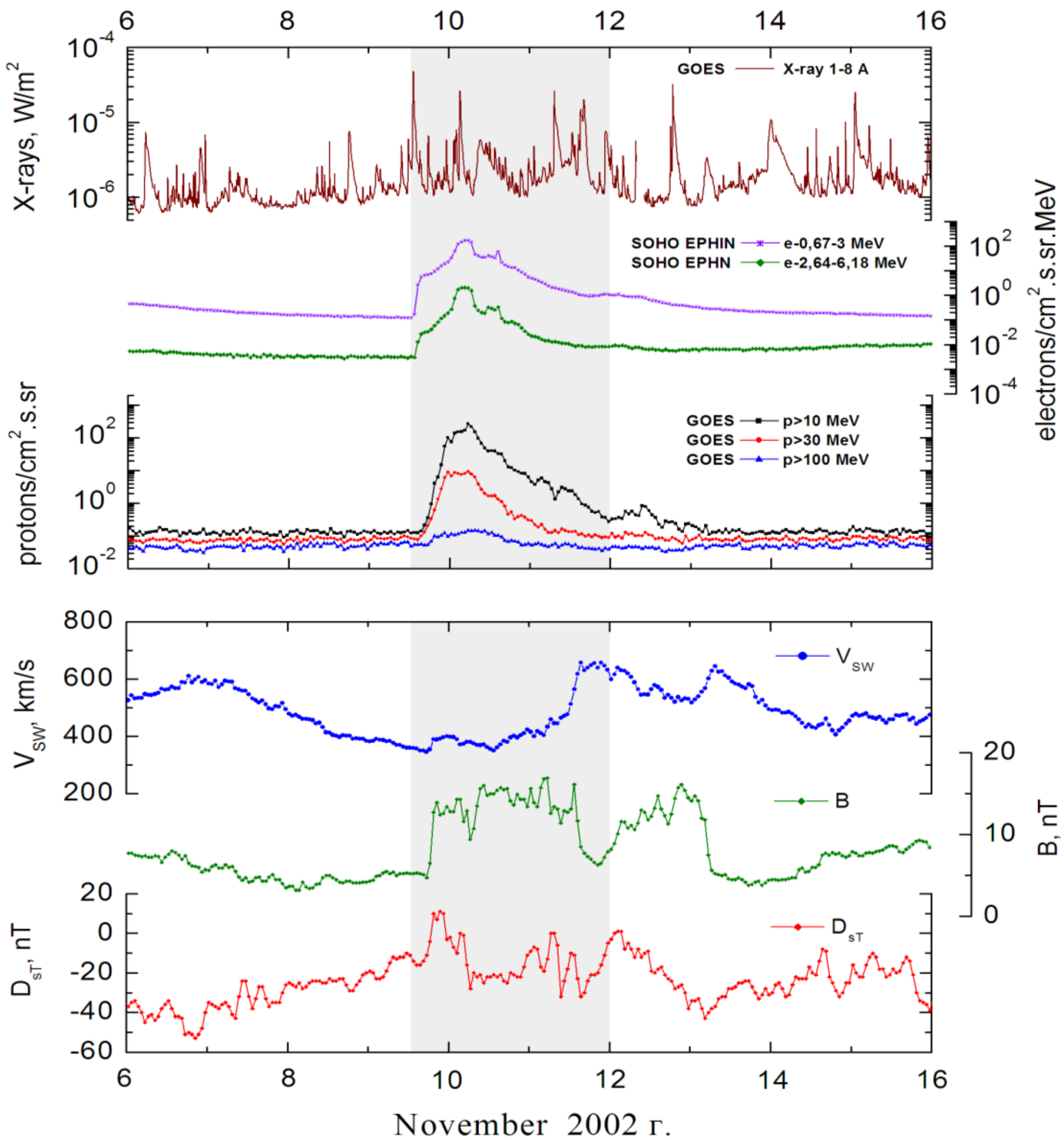
Ø solar flare 10d03^h 04^m, M2.4/2N, S12W37, AR10180

Main X-ray burst 1-8 Å: onset – 09d13^{h}08^m, max – 09d13^{h}23^m, Φ = 0.048 J/m^2

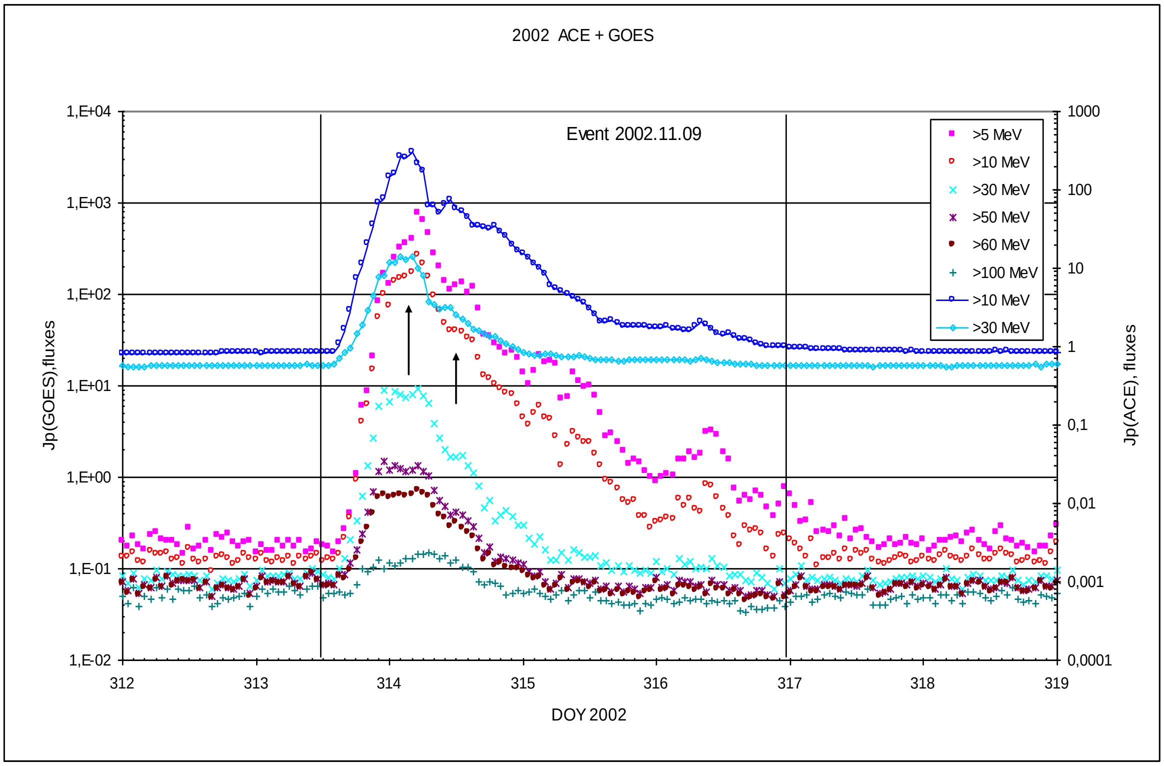
CME: 09d13^{h}32^m; V = 1838 km/s, Δφ = 360^o, dA = 233^o.

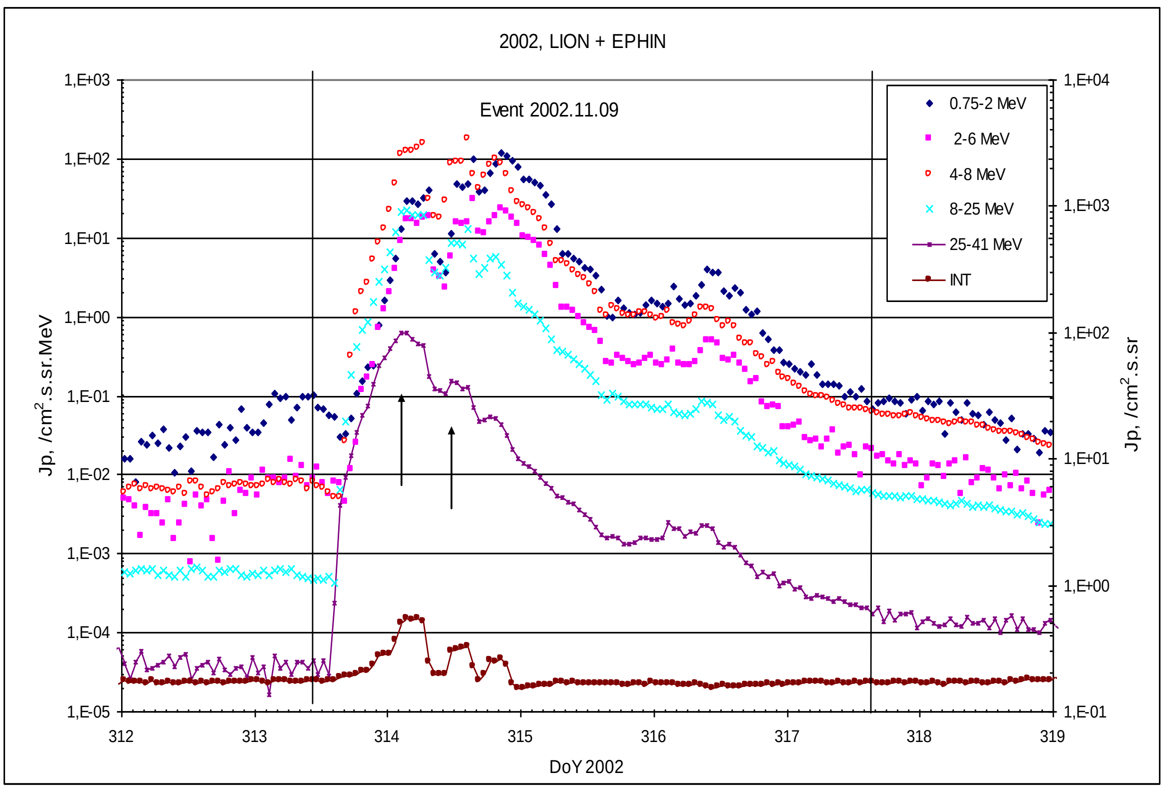
▲SC 09d17^{h}51^m; ▲09d18^{h}49^m; ▲11d12^{h}31^m

Particle fluxes and associated phenomena



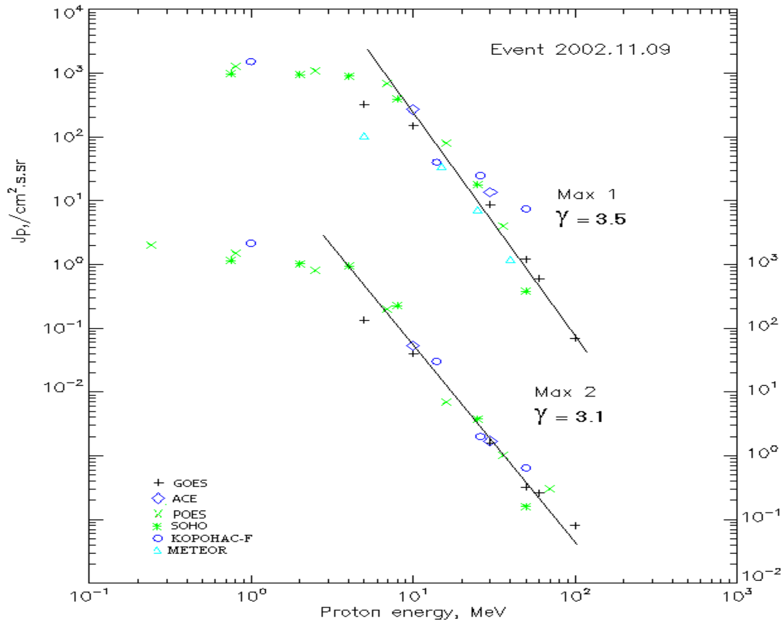
Time profiles of the proton fluxes for the event of 2002 November 09





Arrows on the profiles of the events indicate the time of the proton flux maxima, taken to build the proton spectra (see below)

Integral time-of-maximum proton spectrum



Integral fluxes of protons for the event of 2002 November 09

S/c, instruments	Ep, MeV	To	Tmax	Jmax, (cm2.s.sr)$^{-1}$	Dura-tion	Comments
GOES-10						
EPS	>5	17^h	10d02^h/10d13^h	324/135	2d	
EPS	>10	17^h	10d02^h/10d13^h	150/40	2d	
EPS	>30	17^h	10d01^h/10d13^h	8.7/1.6	2d	
EPS	>50	17^h	10d02^h/10d13^h	1.2/0.32	1d	
EPS	>60	17^h	10d02^h/10d13^h	0.6/0.26	1d	
EPS	>100	17^h	10d02^h/10d13^h	0.07 /0.08	1d	
METEOR						
CBM	>5	13^h	10d05^h/ -	104/ -	3d	
CBM	>15	13^h	10d05^h/ -	34/ -	2d	
CBM	>25	13^h	10d05^h/ -	7.3/ -	2d	
CBM	>40	13^h	10d05^h/ -	1.2/ -	2d	
BP	>90	-	-	-	-	
ChD	>600	-	-	-	-	
POES-16						
MEPED	>0.24	-	10d06^h/10d22^h	- /2120	3d	
MEPED	>0.8	-	10d06^h/10d22^h	1330/1530	2d	
MEPED	>2.5	-	10d05^h/10d22^h	1110/810	2d	
MEPED	>6.9	-	10d02^h/10d22^h	690/210	2d	
MEPED	>16	-	10d02^h/10d22^h	80/7	1d	
MEPED	>36	-	10d02^h/10d22^h	4/1	1d	
MEPED	>70	-	-	- /0.3	1d	
CORONAS F						
MKL	>1.	-	10d05^h/10d22^h	1530/2150	2d	
MKL	>14	-	10d02^h/10d22^h	40/30	1d	
MKL	>26	-	10d02^h/10d22^h	25//2	1d	
MKL	>50	-	10d02^h/10d22^h	7.4/0.64	1d	

ACE						
SIS	>10	15^h	$10d02^h/10d13^h$	270/53	2d	
SIS	>30	15^h	$10d02^h/10d13^h$	13.5/1.7	1d	
SOHO						
EPHIN (INT)	>50	15^h	$10d03^h/10d15^h$	0.38/0.16	2d	

Differential fluxes of protons for the event of 2002 November 09

S/c, instruments	ΔE, MeV	To	Tmax	Jmax, $(cm^2.s.sr.MeV)^{-1}$	Dura-tion	Comments
SOHO						
LION	0.75-2	17^h	$10d03^h/10d15^h$	29.5/98.4	3d	
LION	2-6	17^h	$10d03^h/10d15^h$	16.7/30.5	3d	
EPHIN	4-8	15^h	$10d03^h/10d14^h$	127/179	3d	
EPHIN	8-25	14^h	$10d03^h/10d14^h$	22/13	2d	
EPHIN	25-41	14^h	$10d03^h/10d14^h$	0.62/0.13	2d	
EPHIN	41-53	- “ -	- “ -	- “ -	- “ -	

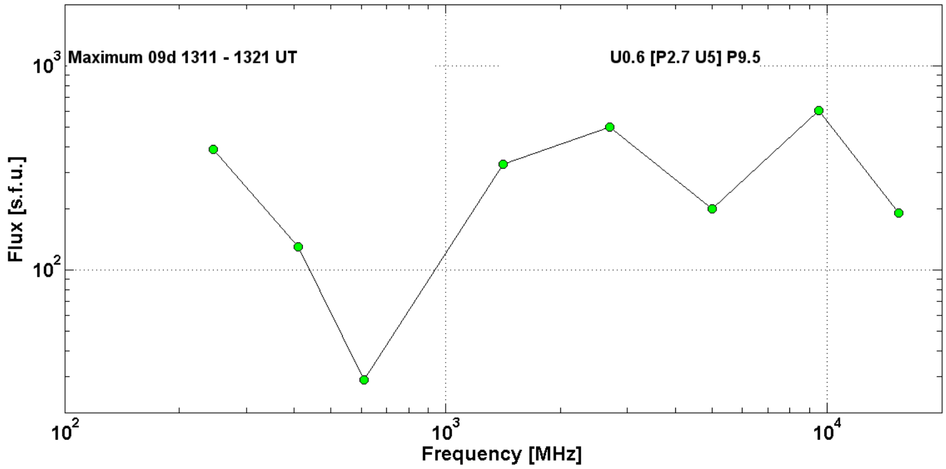
References:

Struminsky A., 2003.
Kuwabara T., J.W. Bieber, J. Clem et al., 2006.
Struminsky A.B., 2007.

Electromagnetic and other phenomena that are sources and/or accompanying for the event of 2002 November 09

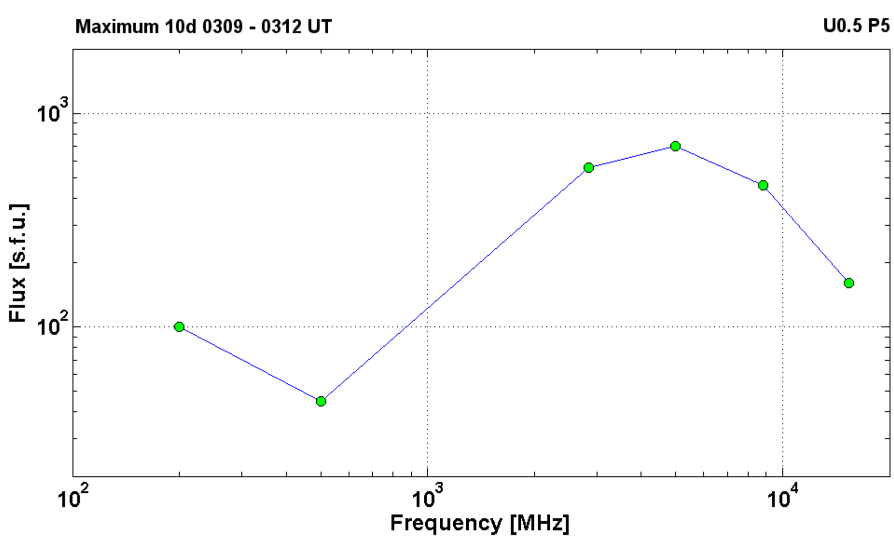
2002 November 09 ● AR10180 To event 435

Hα	6563 Å	1309	1322	1428	S12W29	M4.6/2B	FU
1 – 12	keV	1308	1323	1336		M4.6	4.8E-2
100–300	keV	130712	132150	132840		9681024	RHESSI
25 – 50	keV	1400	140534	140932		172848	RHESSI
12 – 25	keV	140932	141134	14262		140472	RHESSI
15.4	GHz	1312.0	1317.0	0000.0		2.28	
9.5	GHz	1310.0	1321.2	1328.1	U0.6 [P2.7 U5] P9.5	2.78	
5	GHz	1311.0	1312.0	0000.0		2.30	
2.7	GHz	1310.0	1316.0	0000.0		2.70	
1.4	GHz	1311.0	1316.0	0000.0		2.52	
610	MHz	1311.0	1311.0	~1311.0		1.46	
410	MHz	1312.0	1314.0	0000.0		2.11	
245	MHz	1309.0	1312.0	0000.0		2.59	
DS II	25-85	1317		1337		2	
DS IV	25-180	1307		1353		2	
DS IV	100-4000	1308		1324	P,F	3	
DS III	25-180	1402		1405		1	
DS DCIM	800-2000	1307		1330	GG,F,S,P	2	
DS DCIM	2000-4500	1310		1328	GG	2	
CME	WL	1332	1838km/s	$35.4\ km/s^2$	360˚	233˚	



2002 November 10 Ø AR10180 To event 435

Hα	6563 Å	0307	0314	0358	S12W37	2N	FU
1 – 12	keV	0304	0321	0335		M2.4	3.0E-2
100-300	keV	030520	031654	035508		7302648	HESSI
15.4	GHz	0311.0	0312.0	0313.0		2.20	
8.8	GHz	0309.0	0311.0	0315.0		2.66	
5	GHz	0308.0	0311.0	0317.0	U0.5 P5	2.85	
2.8	GHz	0301.0	0311.3	0333.0		2.75	
500	MHz	0307.0	0311.0	0321.0		1.65	
200	MHz	0307.0	0309.0	0317.0		2.00	
DS II		0314		0325	25-180	3	
DS II	FN	0317		0323	18-50	3	
DS II	FN	0320		0334	18-80	3	
DS II	SH	0320		0334	40-160	3	
DS III	GG	0307		0313	18-800	3	
DS III	G	0313		0319	23-480	1	
DS CONT		0325		0335	25-180	1	
CME		0330	1670km/s	35.4 km/s^2	360°	316°	



События 2003 г.

			Стр.
1.	Event 2003.05.28 – (2003-148)	№ 436	 528
2.	Event 2003.05.31 – (2003-151)	№ 437	 535
3.	Event 2003.06.18 – (2003-169)	№ 438	 540
4.	Event 2003.10.26 – (2003-299)	№ 439	 544
5.	Event 2003.10.28 – (2003-301) – GLE-65	№ 440	 549
6.	Event 2003.10.29 – (2003-302) – GLE-66	№ 441	 554
7.	Event 2003.11.02 – (2003-306) – GLE-67	№ 442	 559
8.	Event 2003.11.04 – (2003-308)	№ 443	 565
9.	Event 2003.11.20 – (2003-324)	№ 444	 571
10.	Event 2003.11.21 – (2003-325)	№ 445	 576
11.	Event 2003.12.02 – (2003-336)	№ 446	 581

Event 2003.05.28 – (2003-148) **№ 436**

Particle event: To(Ep>10 MeV) – 28d04^h

Tmax$_1$(Ep>10 MeV) – 28d11^h, Jmax$_1$(Ep>10 MeV) – 2 /cm^2.s.sr

Tmax$_2$(Ep>10 MeV) – 29d16^h, Jmax$_2$(Ep>10 MeV) – 77 /cm^2.s.sr

Duration of the event – 3 days

Quasimaximal energy of protons in the event – Eqm$_1$ = 170 MeV

– Eqm$_2$ = 175 MeV

Sun source: ● solar flare 27d22^{h}56^m, X1.3/2B, S06W20, AR10365*

solar flare 28d00^h 27^m, X3.6/2B, S06W20, AR10365*

Ø solar flare 29d00^h 20^m, X1.3/2B, S06W37, AR10365

Main X-ray burst 1-8 Å: onset – 27d22^{h}56^m, max – 27d23^{h}07^m, Φ = 0.071 J/m^2

– 28d00^h 17^m, max – 28d00^{h}27^m, Φ = 0.28 J/m^2

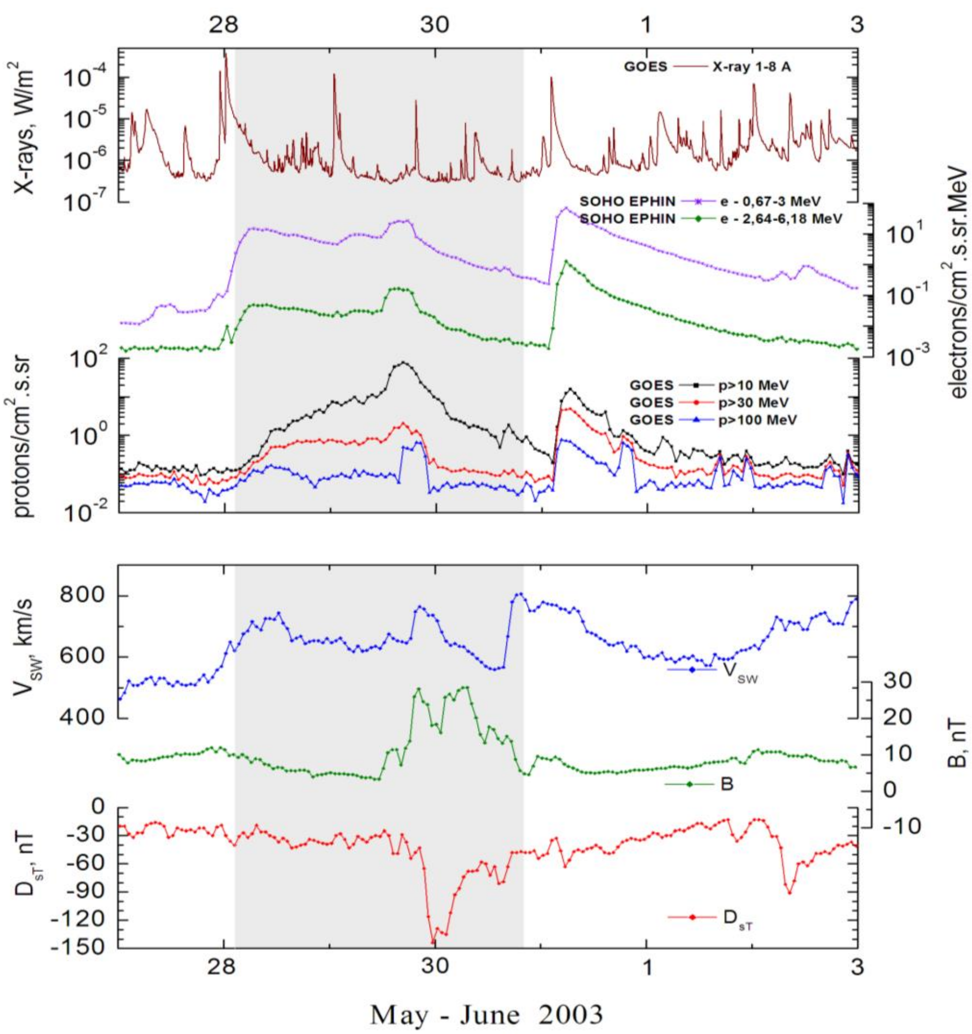
CME: 27d23^{h}50^m, V = 0964 km/s, Δφ = 360^o, dA = 067^o

CME: 28d00^{h}50^m, V = 1366 km/s, Δφ = 360^o, dA = 292^o

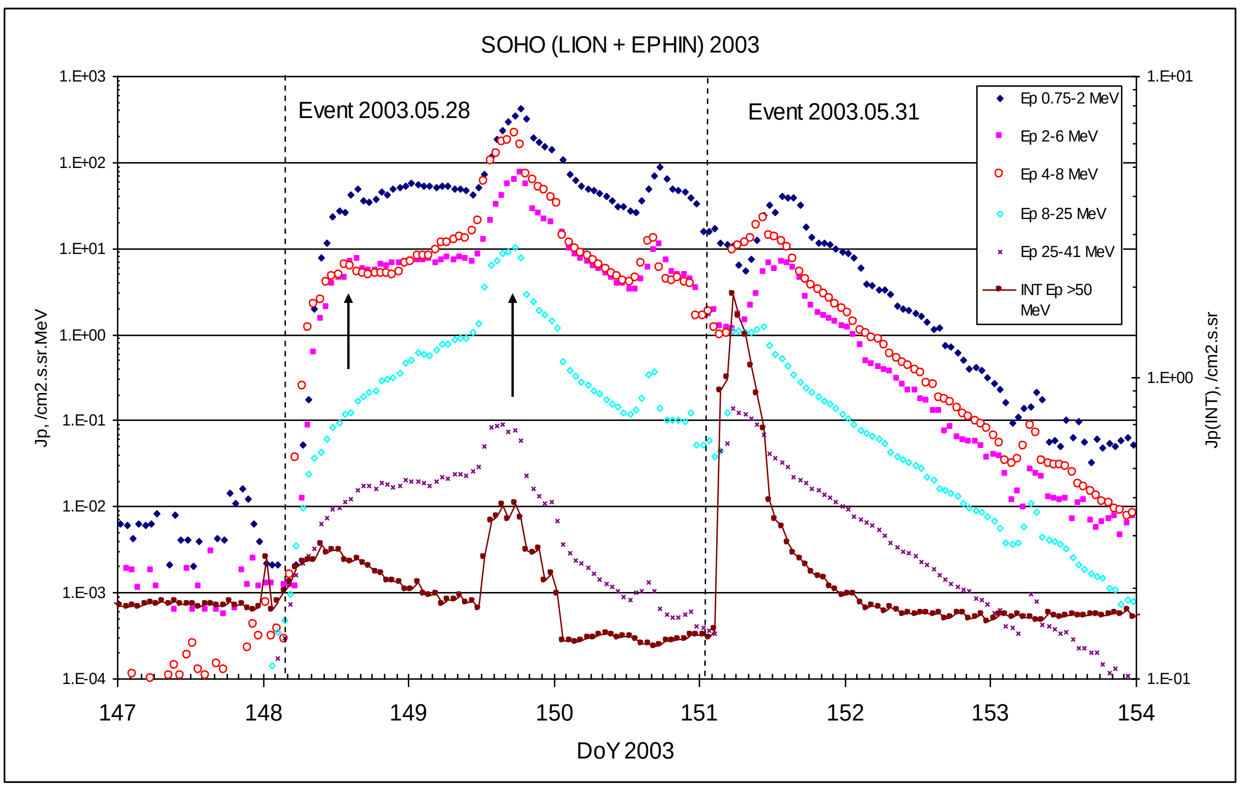
▲SC: 29d12^{h}24^m

*One flare event with two X-ray bursts

Particle fluxes and associated phenomena

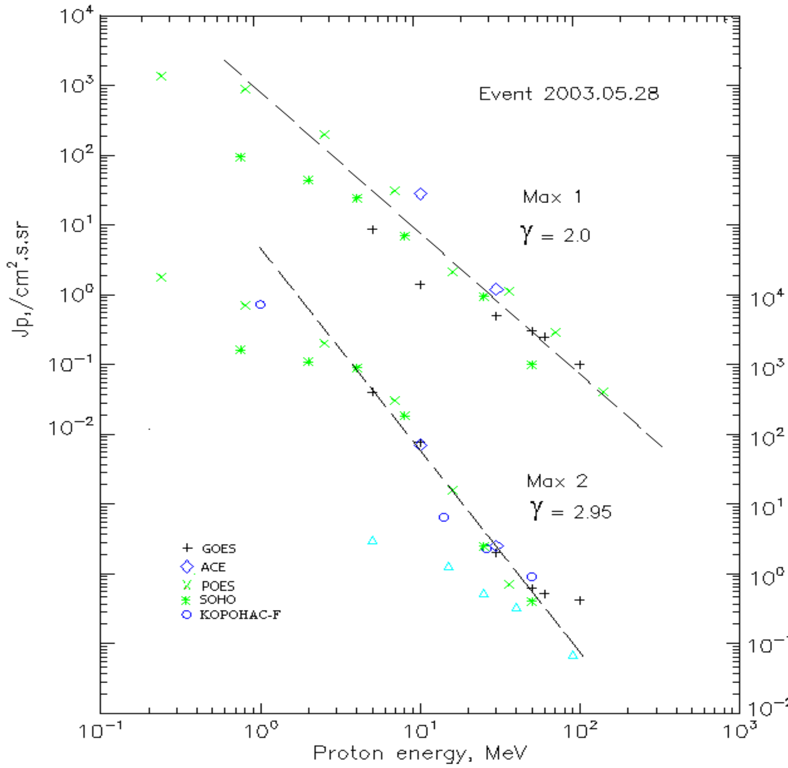


Time profiles of the proton fluxes for the event of 2003 May 28



Arrows on the profiles of the events indicate the time of the proton flux maxima, taken to build the proton spectra (see below)

Integral time-of-maximum proton spectrum



Integral fluxes of protons for the event of 2003 May 28

S/c, instruments	Ep, MeV	To	Tmax	Jmax, $(cm^2.s.sr)^{-1}$	Dura-tion	Comments
GOES-10						
EPS	>5	04^h	$28d11^h/29d16^h$	8.7/405	3d	
EPS	>10	04^h	$28d11^h/29d16^h$	2/77	3d	
EPS	>30	03^h	$28d11^h/29d16^h$	0.5/2	3d	
EPS	>50	03^h	$28d11^h/29d16^h$	0.3/0.62	3d	
EPS	>60	03^h	$28d11^h/29d16^h$	0.25/0.52	2d	
EPS	>100	06^h	$28d11^h/29d16^h$	0.1/0.42	2d	
METEOR						
CBM	>5	03^h36^m	- /$29d16^h$	3.1	1d	
CBM	>10	03^h36^m	- /$29d16^h$	1.3	1d	
CBM	>25	03^h36^m	- /$29d16^h$	0.53	1d	
CBM	>40	03^h36^m	- /$29d16^h$	0.33	1d	
BP	>90	03^h36^m	- /$29d16^h$	0.07	1d	
ChD	>600	-	-	-	-	
POES-16						
MEPED	>0.24	-	$28d11^h/29d16^h$	$61/1.8\cdot10^4$	3d	
MEPED	>0.8	-	$28d11^h/29d16^h$	$28/7\cdot10^3$	3d	
MEPED	>2.5	-	$28d11^h/29d16^h$	$9.2/2\cdot10^3$	3d	
MEPED	>6.9	-	$28d11^h/29d16^h$	3/320	3d	
MEPED	>16	-	$28d11^h/29d16^h$	0.8/16	3d	
MEPED	>36	-	$28d11^h/29d16^h$	0.4/0.7	3d	
MEPED	>70	-	-	-	-	
MEPED	>140	-	-	-	-	

CORONAS F						
MKL	>1.	-	$28d11^h/29d16^h$	$25/7.2\cdot 10^3$	3d	
MKL	>14	-	$28d11^h/29d16^h$	1.5/6.4	3d	
MKL	>26	-	$28d11^h/29d16^h$	0.7/2.3	3d	
MKL	>50	-	$28d11^h/29d16^h$	0.5/0.9	3d	
ACE						
SIS	>10	04^h	$28d11^h/29d16^h$	2.8/70	2.5d	
SIS	>30	03^h	$28d11^h/29d16^h$	1.2/2.5	2.5d	
SOHO						
EPHIN INT	>50	01^h	$28d11^h/29d16^h$	0.1/0.4	2d	

Differential fluxes of protons for the event of 2003 May 28

S/c, instruments	ΔE, MeV	To	Tmax	Jmax, $(cm^2.s.sr.MeV)^{-1}$	Dura-tion	Comments
SOHO						
LION	0.75-2	06^h	$28d11^h/29d16^h$	40.5/428	2d	
LION	2-6	06^h	$28d11^h/29d16^h$	6.5/62.7	2d	
EPHIN	4-8	05^h	$28d11^h/29d16^h$	5.4 /180	2d	
EPHIN	8-25	02^h	$28d11^h/29d16^h$	0.12 /9.2	2d	
EPHIN	25-41	01^h	$28d11^h/29d16^h$	0.013 /0.09	2d	
EPHIN	41-53	- " -	- " -	- " -	- " -	

References:

Kuwabara T., J.W. Bieber, J. Clem et al., 2006.

Electromagnetic and other phenomena that are sources and/or accompanying for the event of 2003 May 28

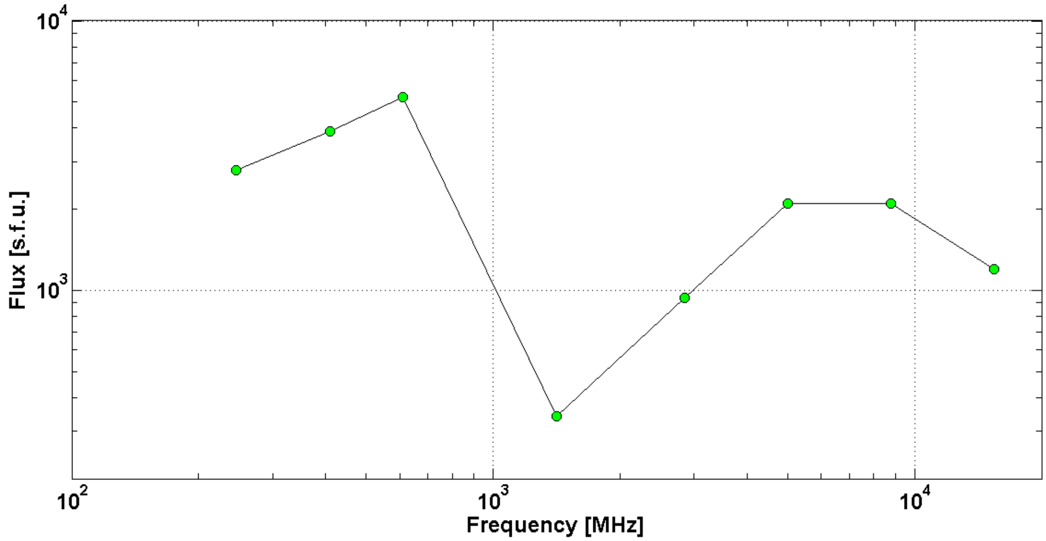
2003 May 28 ● AR10365 To event 436

Hα	6563 Å	2258	0047	0245	S06W20	2B	EFHTU
1 – 12	keV	2256	2307	2313		X1.3	7.1E-2
1 – 12	keV	0017	0027	0039		X3.6	2.8E-1
6–12	keV	230532	230610	231020		377798	RHESSI
6–12	keV	231020	231642	232656		299981	RHESSI
6–12	keV	23:25:56	23:27:50	23:30:20		28274	RHESSI
6–12	keV	23:30:20	23:35:02	23:36:56		32609	RHESSI
6–12	keV	23:36:56	23:38:30	23:41:48		28879	RHESSI
25–50	keV	23:41:48	23:43:46	23:47:32		287482	RHESSI
6–12	keV	23:47:32	23:48:38	23:49:20		10231	RHESSI
6–12	keV	00:01:12	00:01:42	00:03:44		20241	RHESSI
6–12	keV	00:42:32	00:43:22	00:45:24		1956	RHESSI
25-50	keV	00:45:24	01:03:34	01:45:12		9968246	RHESSI
50–150	keV	00:21		00:29			SONG F
4–7	MeV		>0021				SONG F

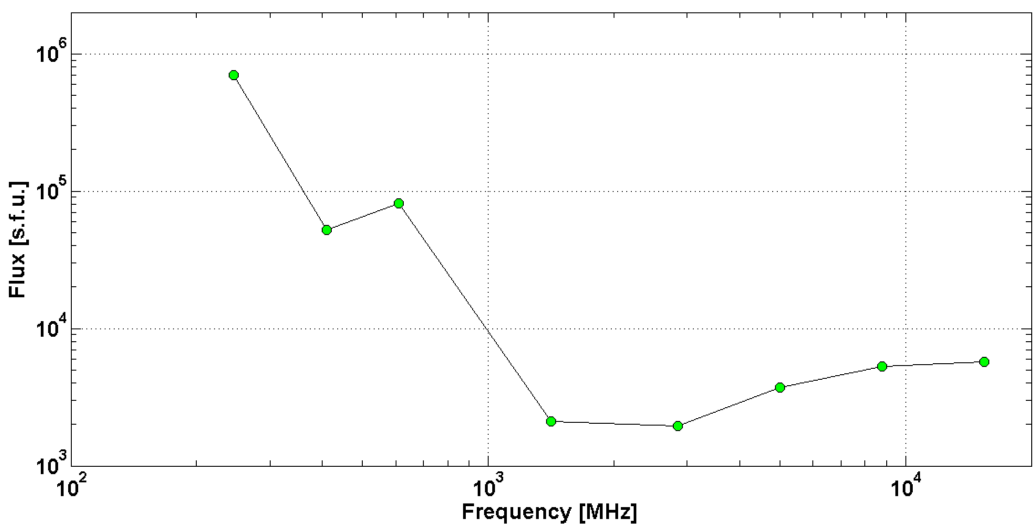
15.4	GHz	2301.0	2306.0	2318.0		3.08	
8.8	GHz	2259.0	2305.0	2327.0	P0.6 U1.4 P5-9	3.32	
5	GHz	2259.0	2306.0	2326.0		3.32	
2.8	GHz	2248.0	2306.8	2345.0		2.97	
1.4	GHz	2300.0	2301.0	2321.0		2.53	
610	MHz	2300.0	2309.0	2332.0		3.72	
410	MHz	2259.0	2304.0	2336.0		3.59	
245	MHz	2259.0	2303.0	2336.0		3.45	
DS II	50-300	2302		2310	F,N	3	
DS II	25-180	2306		2316		3	
DS IV	200-1400	2301		2317	F,S	2	
DS IV	25-180	2311		0145		2	
DS III	20-1400	2300		2307	GG	3	
15.4	GHz	0020.0	0023.0	0107.0	U1.4-2.8 / 15.4	3.76	
8.8	GHz	0019.0	0024.0	0109.0		3.72	
5	GHz	0020.0	0025.0	0154.0		3.57	
2.8	GHz	0013.0	0022.9	0036.0		3.29	
1.4	GHz	0021.0	0023.0	0121.0		3.32	
610	MHz	0021.0	0027.0	0124.0		4.91	
410	MHz	0021.0	0043.0	0207.0		4.72	
245	MHz	0022.0	0022.0	0139.0		5.85	
DS II	25-180	0026		0033		3	
DS IV	40-1600	0022		0241	F,S	3	
DS III	18-1800	0022		0027	G	3	
8.8	GHz	0228.0	0245.0	0248.0		1.87	
5	GHz	0218.0	0222.0	0246.0		1.94	
2.7	GHz	0218.0	0222.0	0225.0		2.00	
1.4	GHz	0215.0	0222.0	0229.0		2.23	
610	MHz	0207.0	0217.0	0239.0		4.00	
410	MHz	0207.0	0217.0	0300.0		4.68	
245	MHz	0207.0	0217.0	0300.0	0.2 \ 8.8	4.71	
ºn						Mauna Kea, Norikura	
CME	WL	2350	0964 km/s	-9.6 km/s^2	360˚	300˚	2350
CME	WL	0050	1366 km/s	25.9	360	292	0050

* One flare event with two X-ray bursts

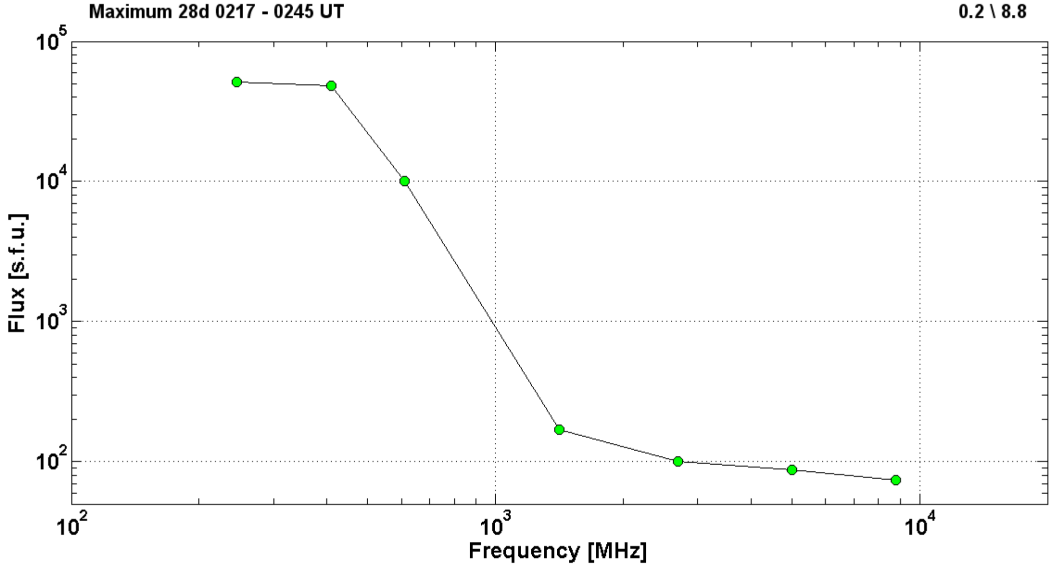
Maximum 27d 2301 - 2309 UT P0.6 U1.4 P5-9



Maximum 28d 0022 - 0043 UT U1.4-2.8 / 15.4



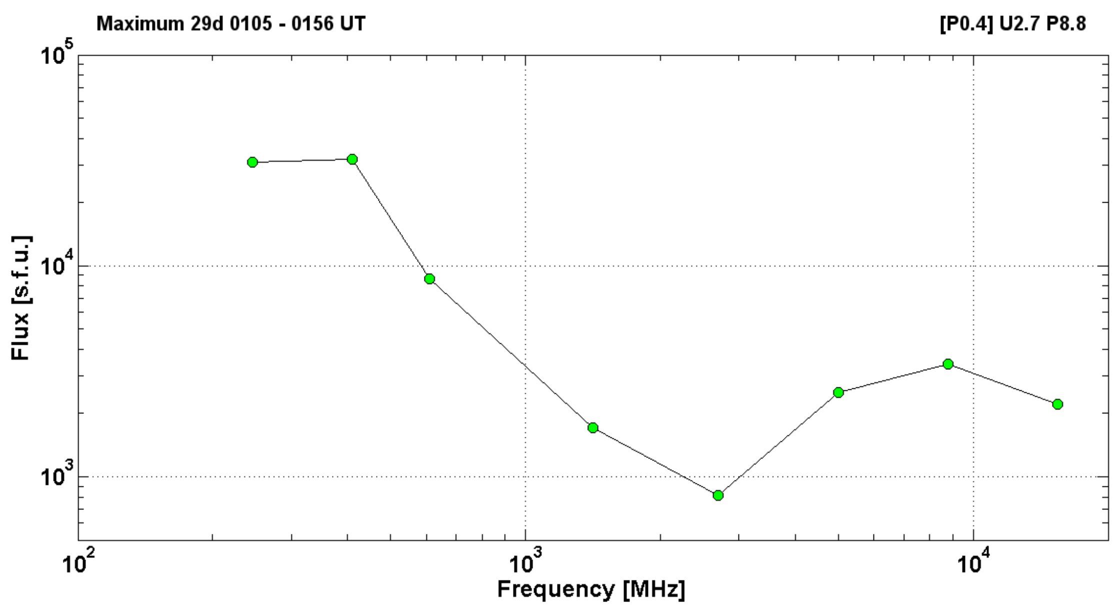
Maximum 28d 0217 - 0245 UT 0.2 \ 8.8



Список 2003 г.

2003 May 29 Ø AR10365 To event 436

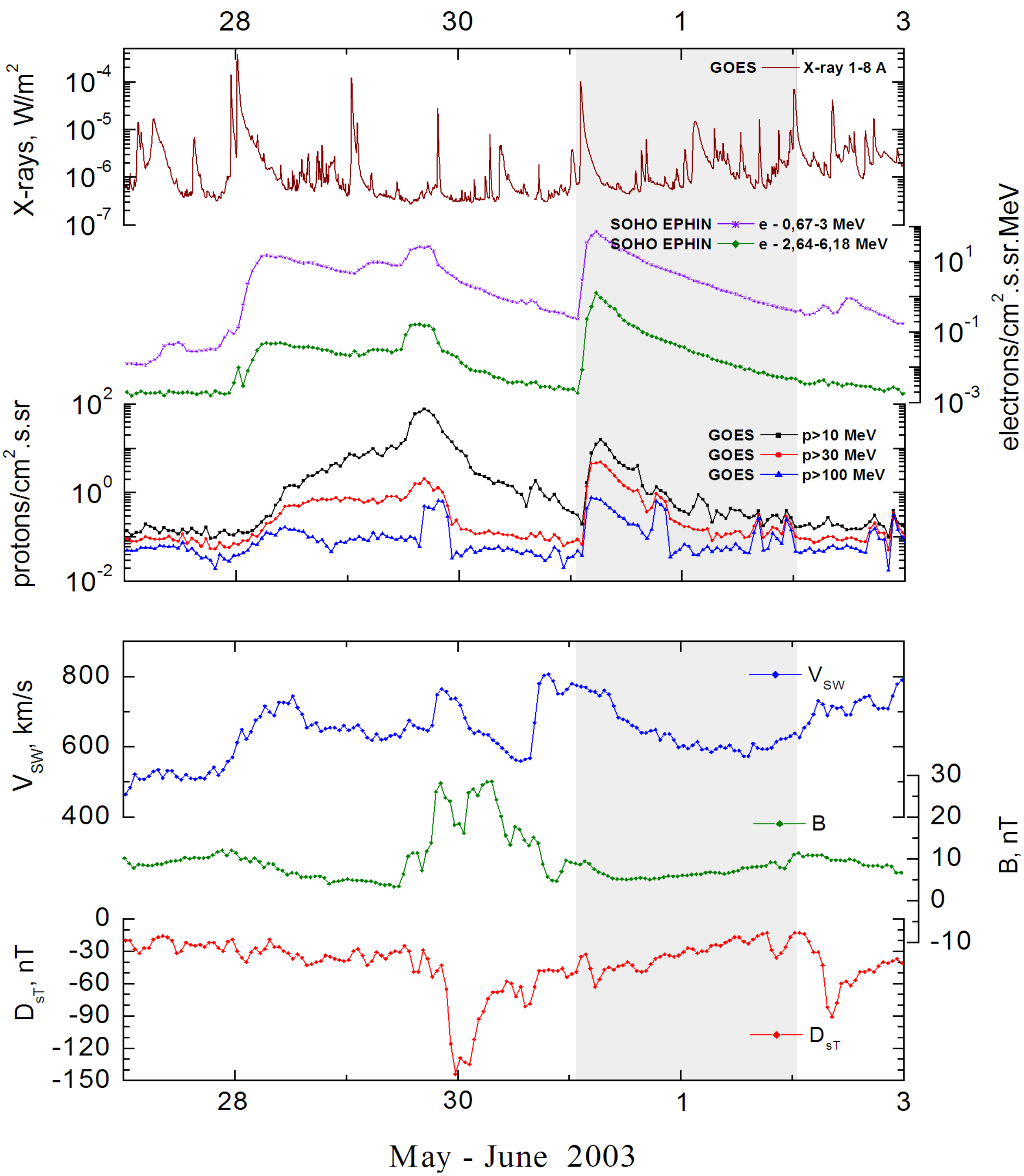
Hα	6563 Å	0020	0105	0223	S06W37	2B	FU
1 – 12	keV	0051	0105	0112		X1.3	6.8E-2
6-12	keV	004232	004322	004524		1956	RHESSI
25-50	keV	004524	010334	014512		9968246	RHESSI
12-25	keV	022040	022046	022440		106590	RHESSI
15.4	GHz	0059.0	0105.0	0213.0		3.34	
8.8	GHz	0058.0	0105.0	0217.0	[P0.4] U2.7 P8.8	3.53	
5	GHz	0058.0	0105.0	0217.0		3.40	
2.7	GHz	0058.0	0105.0	0213.0		2.91	
1.4	GHz	0058.0	0156.0	0158.0		3.23	
610	MHz	0058.0	0152.0	0215.0		3.94	
410	MHz	0059.0	0152.0	0212.0		4.51	
245	MHz	0058.0	0150.0	0222.0		4.49	
DS II	30-90	0106		0111	F,N	3	
DS IV	40-1800	0058		0213	F,S	2	
DS III	18-1000	0100		0106	G	3	
DS III	18-90	0108		0111	G	3	
DS III	30-300	0213		0216	G	3	
DS UNCLF	40-120	0113		0116		2	
CME	WL	0051	1237 km/s	-22.3km/s^2	360˚	260˚	



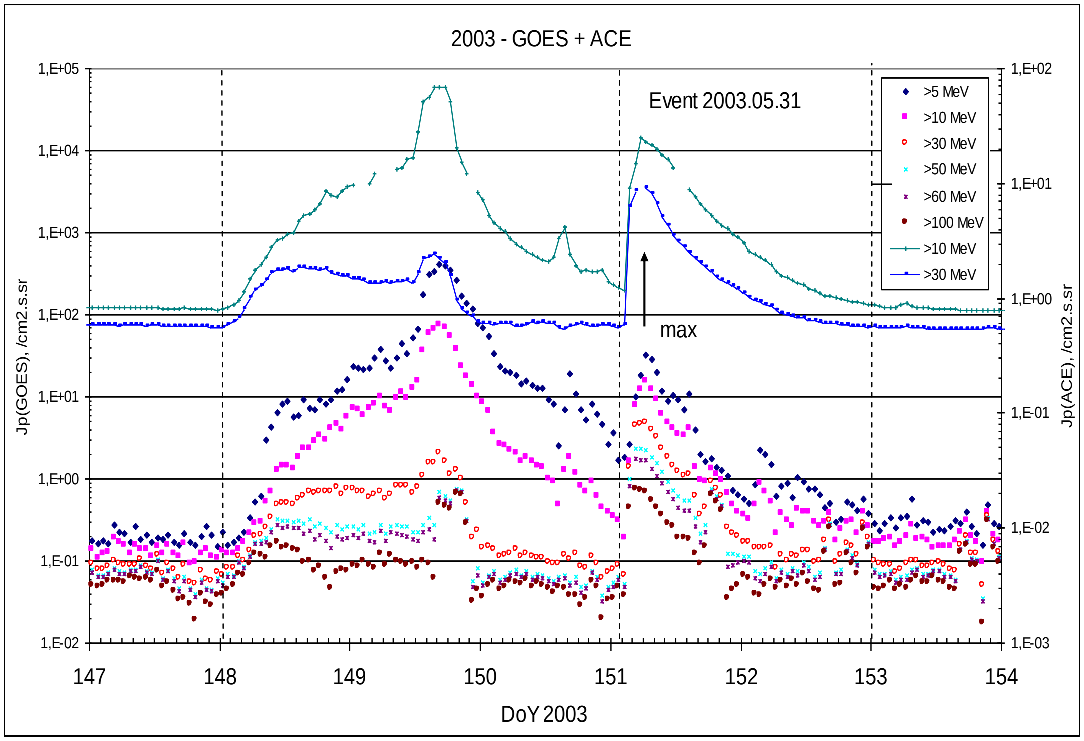
Particle event: To(Ep>10 MeV) – 31d03^h
Tmax(Ep>10 MeV) – 31d06^h, Jmax (Ep>10 MeV) – 15.6 /cm^2.s.sr
Duration of the event – 2 days
Quasimaximal energy of protons in the event – E qm = 415 MeV

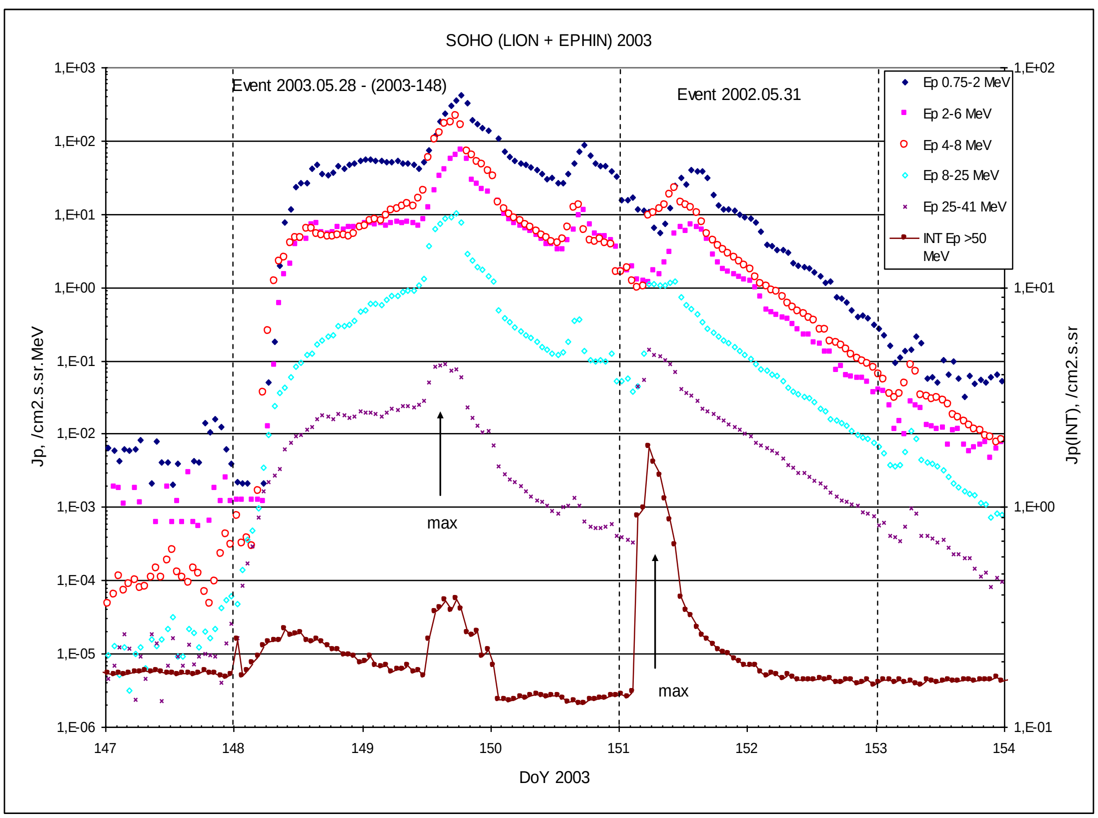
Sources: ● solar flare 31d02^{h}13^m, M9.3/2B, S07W65 AR10365
Main x-ray burst 1-8 Å: onset – 31d02^h 13^m, max – 31d02^{h}24^m, Φ = 0.085 Jo.m^{-2}
CME: 31d02^{h}30^m, V = 1835 km/s, Δφ = 360^o, dA = 256^o

Particle fluxes and associated phenomena



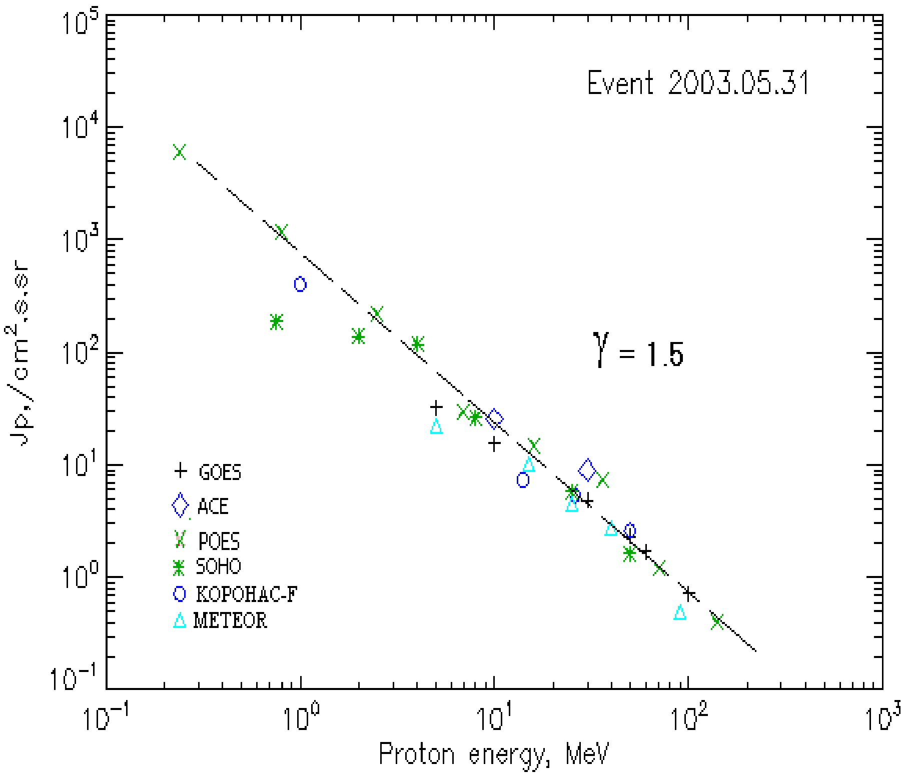
Time profiles of the proton fluxes for the event of 2003 May 31





Arrows on the profiles of the events indicate the time of the proton flux maxima, taken to build the proton spectra (see below)

Integral time-of-maximum proton spectrum



Integral fluxes of protons for the event of 2003 May 31

S/c, instruments	Ep, MeV	To	Tmax	Jmax, $(cm^2.s.sr)^{-1}$	Dura-tion	Comments
GOES-10						
EPS	>5	03^h	06^h	32.2	2d	
EPS	>10	03^h	06^h	15.6	2d	
EPS	>30	03^h	06^h	4.8	2d	
EPS	>50	03^h	04^h	2.3	2d	
EPS	>60	03^h	04^h	1.7	2d	
EPS	>100	03^h	04^h	0.72	1d	
METEOR						
CBM	>5	04^h	05^h	22	2d	
CBM	>10	04^h	05^h	10	1.5d	
CBM	>25	04^h	05^h	4.5	1d	
CBM	>40	04^h	05^h	2.7	1d	
BP	>90	04^h	04^h	0.5	1d	
ChD	>600	-	-	-	-	
POES-16						
MEPED	>0.24	-	16^h	$6 \cdot 10^3$	2d	
MEPED	>0.8	-	16^h	$1.2 \cdot 10^3$	2d	
MEPED	>2.5	-	16^h	220	2d	
MEPED	>6.9	-	08^h	32	2d	
MEPED	>16	-	06^h	15	2d	
MEPED	>36	-	06^h	7.5	2d	
MEPED	>70	-	04^h	1.2	1d	
MEPED	>140	-	04^h	0.4	1d	

CORONAS F						
MKL	>1.	-	08^h	420	2d	
MKL	>14	-	07^h	7.3	2d	
MKL	>26	-	05^h	5.4	2d	
MKL	>50	-	05^h	2.6	1d	
ACE						
SIS	>10	03^h	05^h	25.5	2d	
SIS	>30	03^h	06^h	9	2d	
SOHO						
EPHIN INT	>50	03h	05h	1.65	1d	

Differential fluxes of protons for the event of 2003 May 31

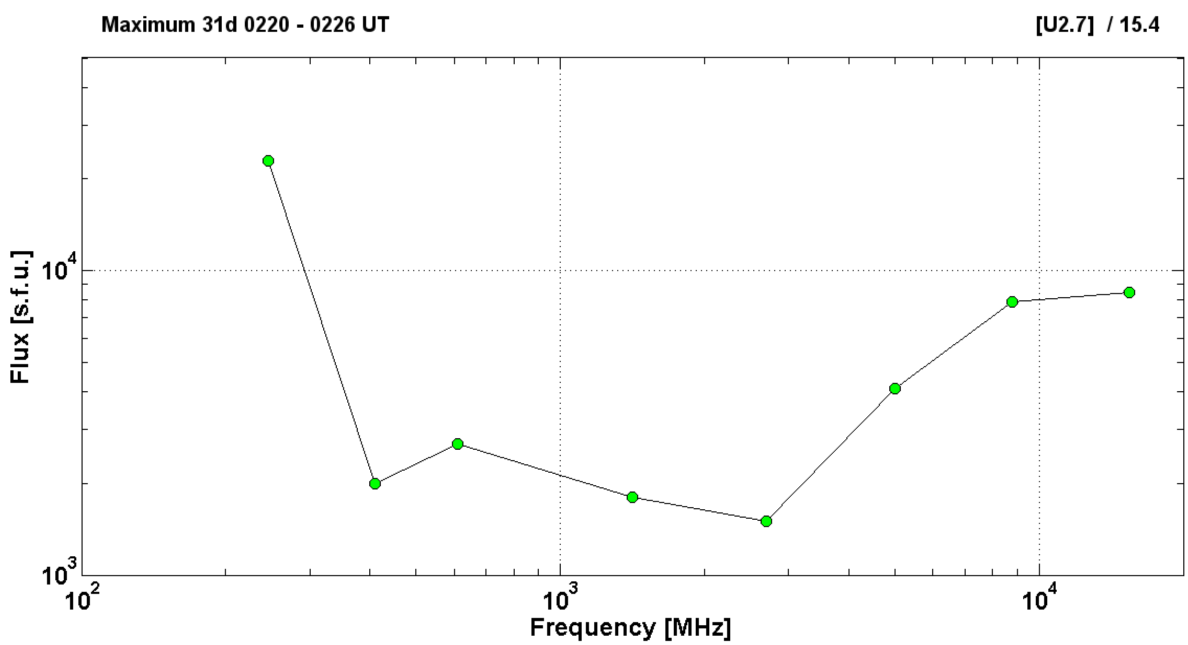
S/c, instruments	ΔE, MeV	To	Tmax	Jmax, $(cm^2.s.sr.MeV)^{-1}$	Dura-tion	Comments
SOHO						
LION	0.75-2	08^h	13^h	40	5d	
LION	2-6	08^h	13^h	7	5d	
EPHIN	4-8	05^h	10^h	22.8	5d	
EPHIN	8-25	05^h	09^h	1.2	4d	
EPHIN	25-41	03^h	05^h	0.15	4d	
EPHIN	41-53	- “ -	- “ -	- “ -	- “ -	

Electromagnetic and other phenomena that are sources and/or accompanying for the event of 2003 May 31

2003 May 31 ● AR10365 To event 437

Hα	6563 Å	0218	0223	0338	S07W65	2B	U
1 – 12	keV	0213	2224	0240		M9.3	8.5E-2
100 – 300	keV	022536	022702	023416		15794196	RHESSI
12-25	keV	030048	030118	031840		630884	RHESSI
12-25	keV	031840	031958	032444		112050	RHESSI

15.4	GHz	0217.0	0222.0	0247.0	[U2.7]/15.4	3.93	
8.8	GHz	0216.0	0223.0	0251.0		3.90	
5	GHz	0216.0	0224.0	0248.0		3.61	
2.7	GHz	0216.0	0225.0	0247.0		3.18	
1.4	GHz	0217.0	0224.0	0234.0		3.26	
610	MHz	0218.0	0220.0	0238.0		3.43	
410	MHz	0220.0	0226.0	0248.0		3.30	
245	MHz	0214.0	0222.0	0249.0		4.36	
DS II	35-180	0223		0235	S,H	3	
DS II	75-180	0223		0000		3	
DS IV	35-1800	0218		0254		2	
DS III	350-1000	0220		0221	G	2	
DS III	18-300	0221		0223	G	3	
DS V	25-180	0220		0227		3	
CME	WL	0230	1835 km/s	-2.4 km/s^2	360˚	256˚	

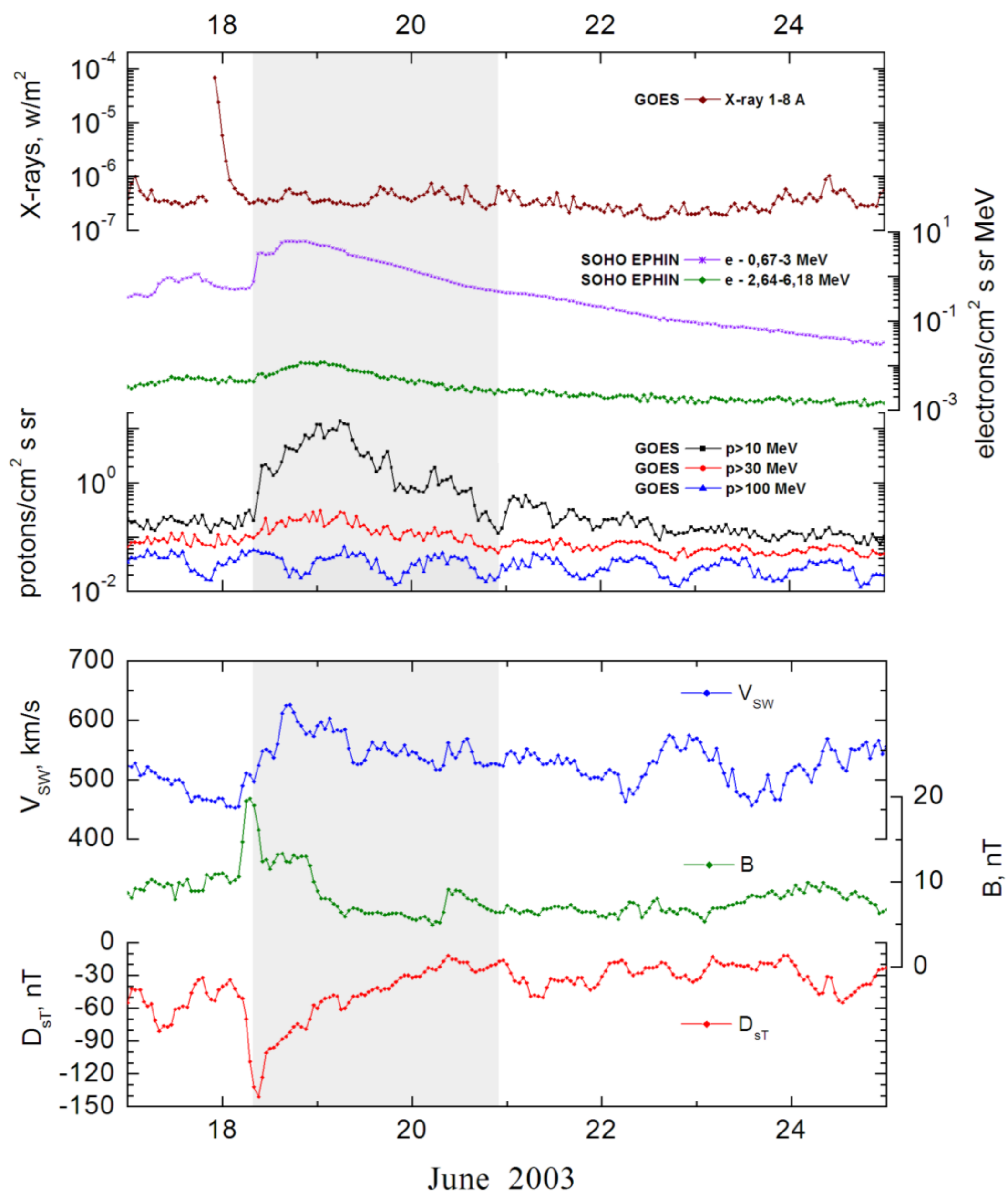


Event 2003.06.18 – (2003-169) **№ 438**

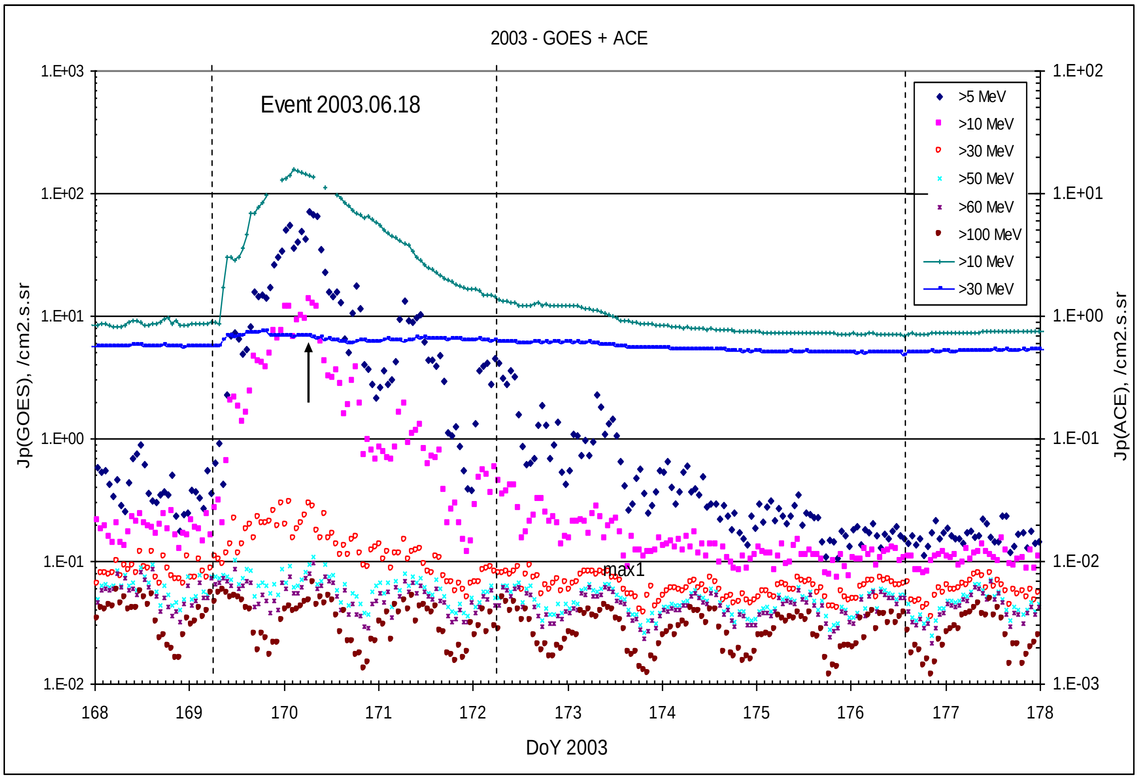
Particle event: To(Ep>10MeV) – 18d08^h
Tmax (Ep>10MeV) – 20d06^h, Jmax (Ep>10MeV) – 10.2 /cm^2.s.sr
Duration of the event – 2 days
Quasimaximal energy of protons in the event – Eqm = 180 MeV

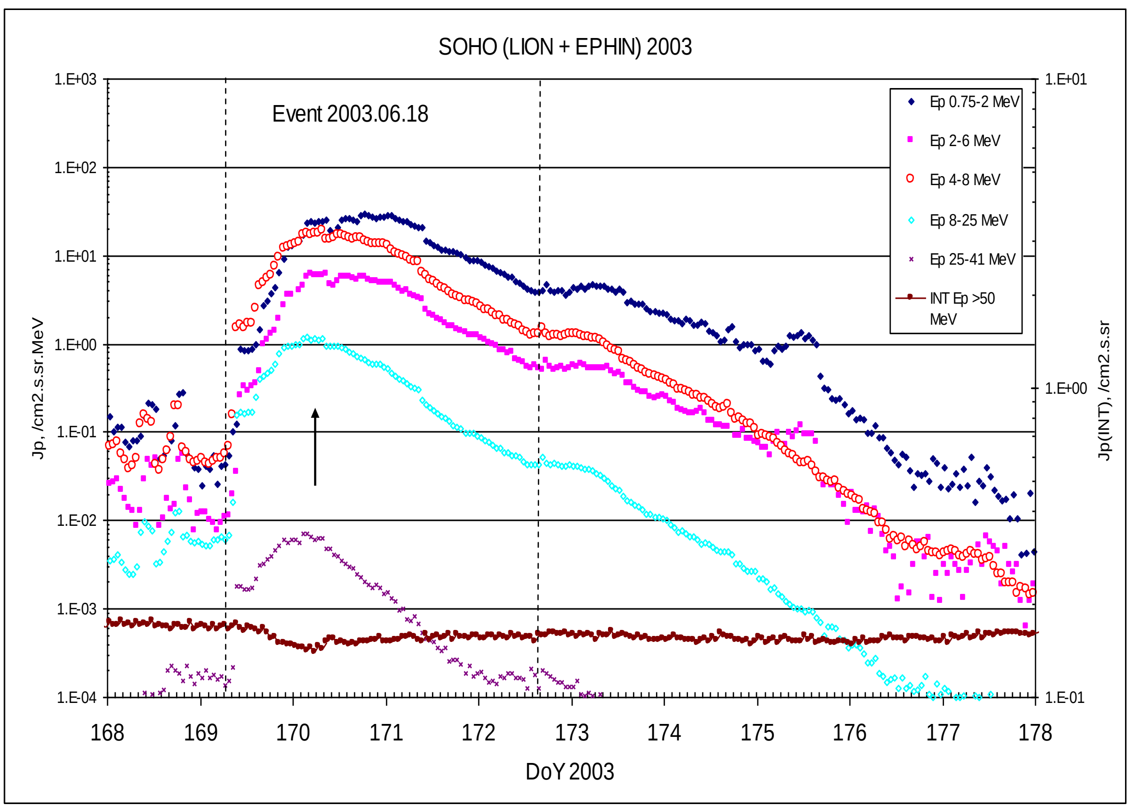
Sun source: ⊙ solar flare 17d22^h 27^m, M6.8/..., s12e60*, AR10368
Main X-ray burst 1-8 Å: onset – 17d22^{h}27^m, max – 17d22^{h}55^m, Φ = 0.096 Jo.m^{-2}
CME: 17d23^{h}18^m, V =1813 km/s, Δφ = 360^o, dA = 117º
ΔSC 18d05^{h}12^m
* − probable localization of the flare event

Particle fluxes and associated phenomena



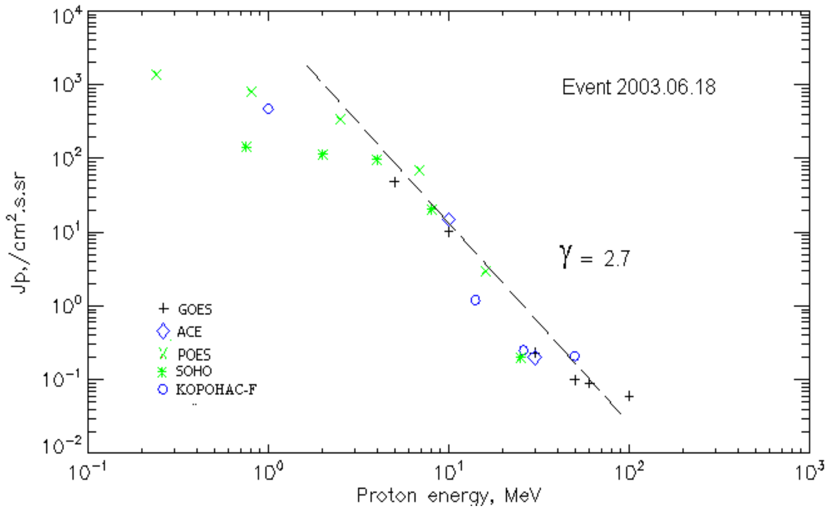
Time profiles of the proton fluxes for the event of 2003 June 18





Arrows on the profiles of the events indicate the time of the proton flux maxima, taken to build the proton spectra (see below)

Integral time-of-maximum proton spectrum



Integral fluxes of protons for the event of 2003 June 18

S/c, instruments	Ep, MeV	To	Tmax	Jmax, $(cm^2.s.sr)^{-1}$	Dura-tion	Comments
GOES-10						
EPS	>5	06^h	$19d05^h$	48	3d	
EPS	>10	06^h	$19d05^h$	10.2	3d	
EPS	>30	06^h	$19d05^h$	0.23	3d	
EPS	>50	06^h	$19d05^h$	0.1	3d	
EPS	>60	06^h	$19d05^h$	0.09	3d	
EPS	>100	06^h	$19d05^h$	0.06	3d	
POES-16						
MEPED	>0.24	-	$19d05^h$	1400	2d	
MEPED	>0.8	-	$19d05^h$	800	2d	
MEPED	>2.5	-	$19d05^h$	340	2d	
MEPED	>6.9	-	$19d05^h$	70	2d	
MEPED	>16	-	$19d05^h$	3	2d	
MEPED	>36	-	-	-	2d	
MEPED	>70	-	-	-	1d	
MEPED	>140	-	-	-	1d	
CORONAS F						
MKL	>1.	-	$19d05^h$	471	2d	
MKL	>14	-	$19d05^h$	1.2	2d	
MKL	>26	-	$19d05^h$	0.25	2d	
MKL	>50	-	$19d05^h$	0.21	1d	
ACE						
SIS	>10	07^h	$19d05^h$	15	3d	
SIS	>30	07^h	$19d05^h$	0.2	1d	
SOHO						
EPHIN INT	>50	-	-	-	-	

Differential fluxes of protons for the event of 2003 June 18

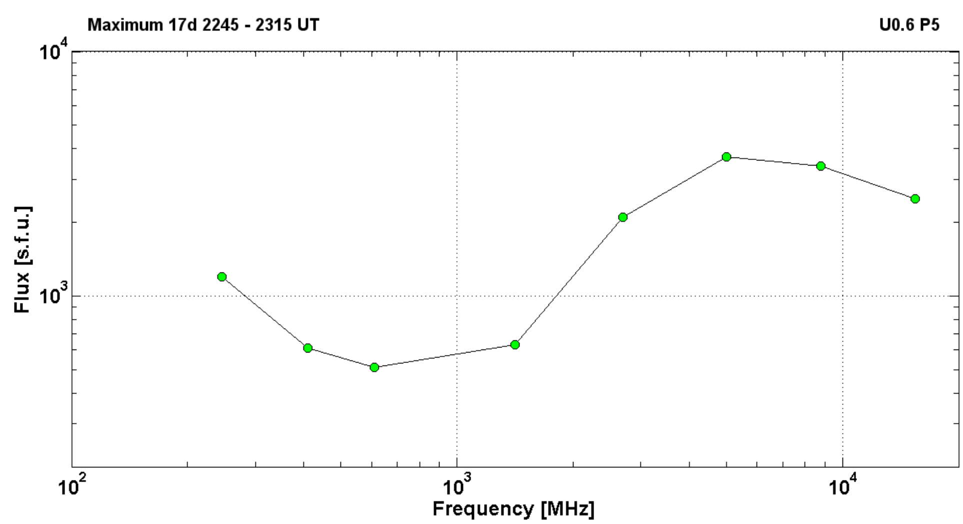
S/c, instruments	ΔE, MeV	To	Tmax	Jmax, $(cm^2.s.sr.MeV)^{-1}$	Dura-tion	Comments
SOHO						
LION	0.75-2	06^h	$19d05^h$	22.4	8d	
LION	2-6	06^h	$19d05^h$	6	8d	
EPHIN	4-8	06^h	$19d05^h$	18.9	8d	
EPHIN	8-25	06^h	$19d05^h$	1.2	8d	
EPHIN	25-41	06^h	$19d03^h$	0.07	3d	
EPHIN	41-53	- " -	- " -	- " -	- " -	

Electromagnetic and other phenomena that are sources and/or accompanying for the event of 2003 June 18

2003 June 17 ● AR10386 To event 438

Hα	6563 Å	No Flare Patrol			s12e53		
1 – 12	keV	2227	2255	2312		M6.8	9.6E-2
50-100	keV	222232	224946	230716		35645838	RHESSI
15.4	GHz	2241.0	2253.0	2312.0		3.40	
8.8	GHz	2239.0	2253.0	2316.0		3.53	
5	GHz	2238.0	2253.0	2318.0	U0.6 P5	3.57	
2.7	GHz	2239.0	2254.0	2322.0		3.32	
1.4	GHz	2238.0	2245.0	2322.0		2.80	
610	MHz	2239.0	2246.0	2329.0		2.71	
410	MHz	2239.0	2315.0	2334.0		2.79	
245	MHz	2243.0	2245.0	2334.0		3.08	
DS II		2248		2300		2	
DS II		2255		2256		3	
DS IV		2243		2336		2	
DS III	B	2244		2244	B	3	
DS III	GG	2245		2259	GG	2	
CME	WL	2318	1825 km/s	$-2.9\ km/s^2$	360˚	117˚	

* − probable localization of the flare event



Event 2003.10.26 – (2003-299) **№ 439**

Particle event: To(Ep>10 MeV) – 26d18^h

Tmax$_1$(Ep>10 MeV) – 26d20^h, Jmax$_1$(Ep>10 MeV) – 230 /cm^2.s.sr

Tmax$_2$(Ep>10 MeV) – 27d02^h, Jmax$_2$(Ep>10 MeV) – 360 /cm^2.s.sr

Duration of the event – 2 days

Quasimaximal energy of protons in the event – Eqm$_1$ = 340 MeV

– Eqm$_2$ = 400 MeV

Sources: ● solar flare 26d17^{h}21^m, X1.2/1N, N02W38 AR10484

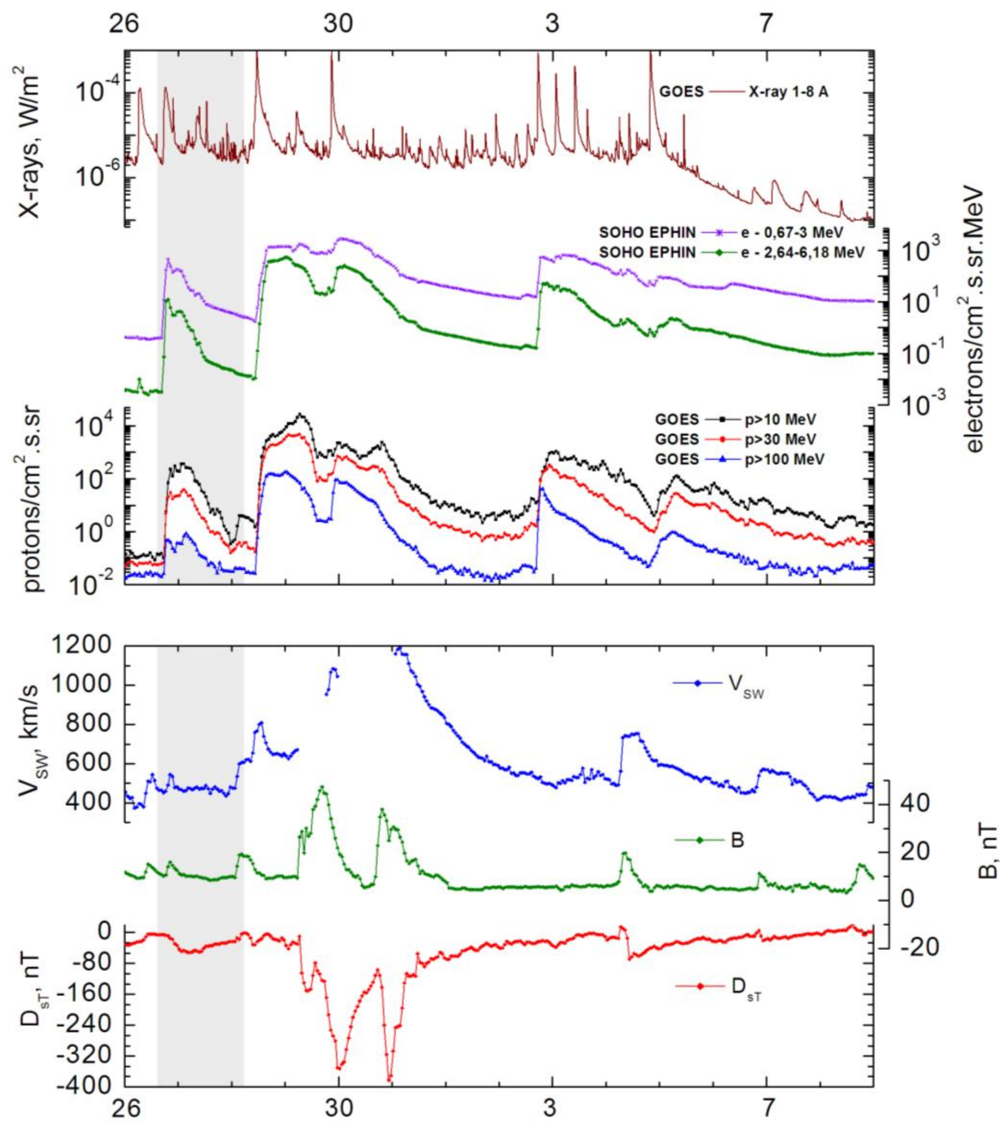
Ø solar flare 27d09^{h}21^m, M5.0/SF, S15E26 AR10486

Main X-ray burst 1-8 Å: onset – 26d17^{h}21^m, max – 26d18^{h}19^m, Φ = 0.63 J/m^2

CME: 26d17^{h}54^m; V = 1754 km/s; Δφ = 171º; dA = 235º

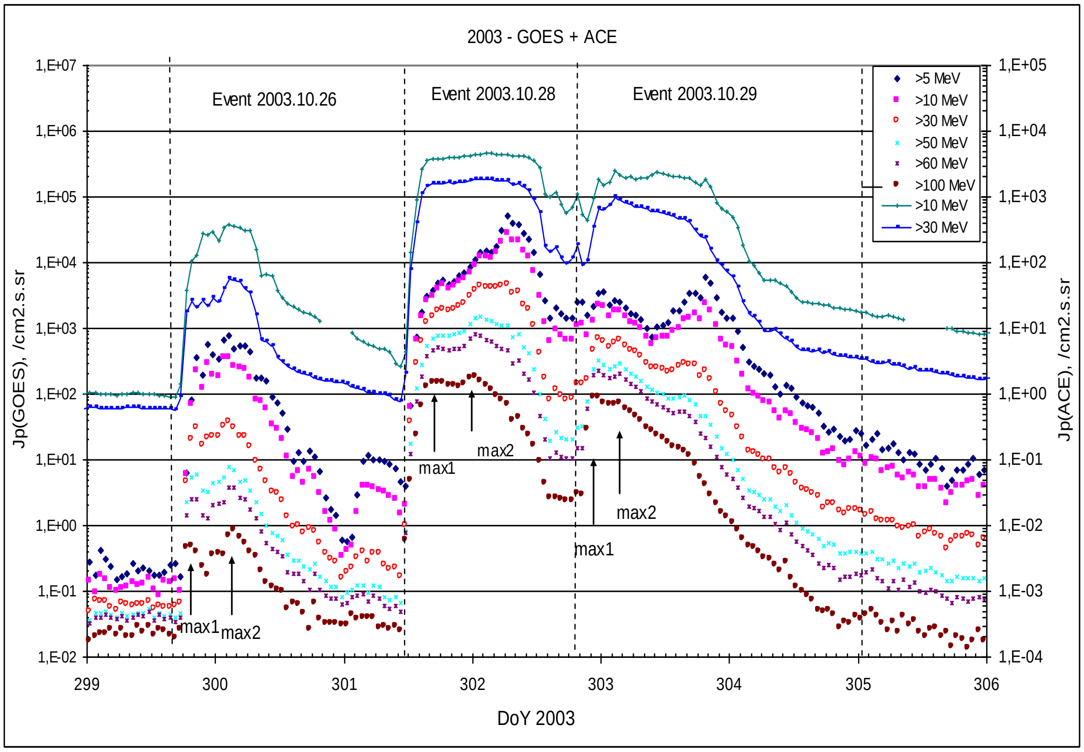
▲SC 26d19^{h}08^m;

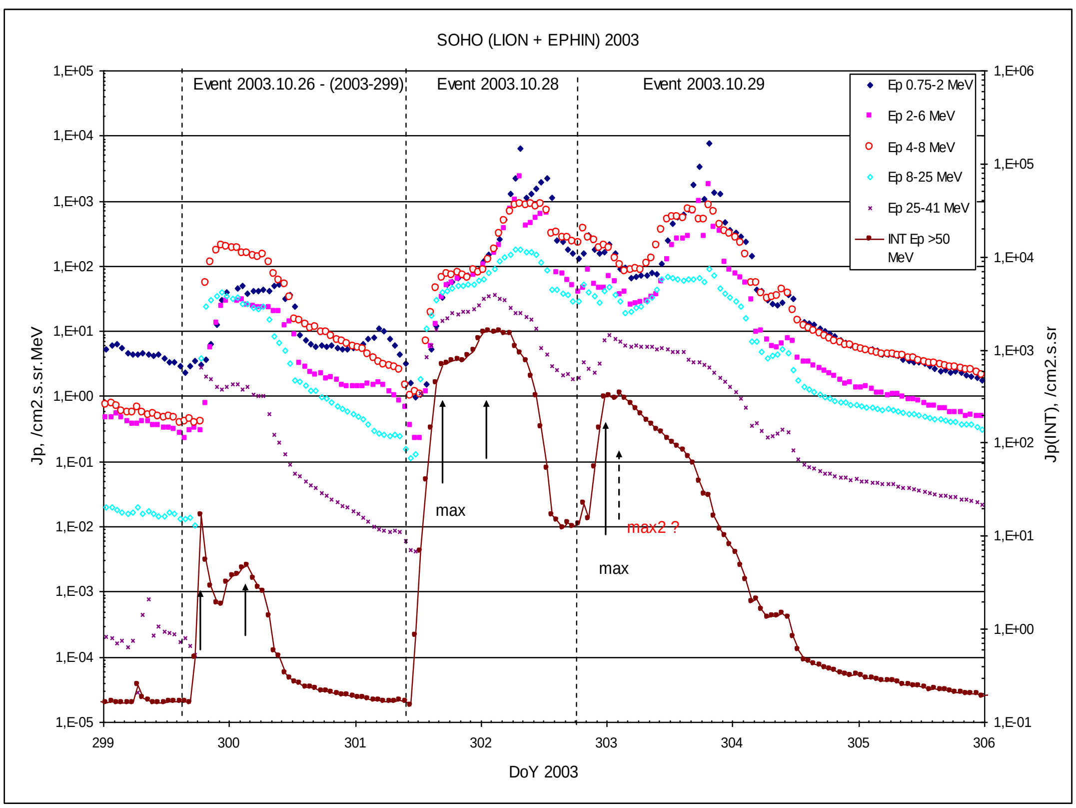
Particle fluxes and associated phenomena



October - November 2003

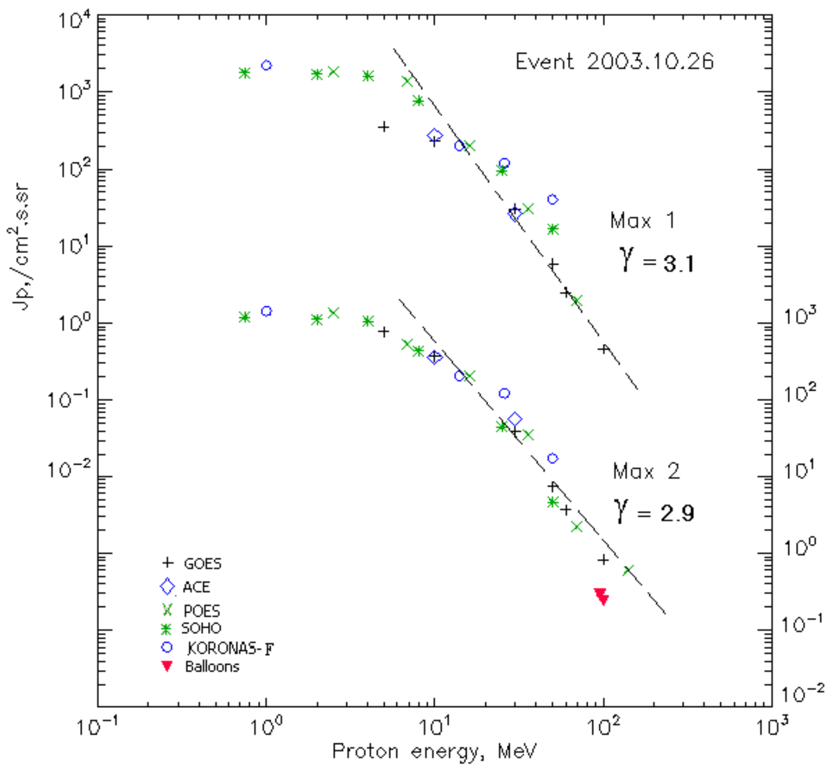
Time profiles of the proton fluxes for the event of 2003 October 26





Arrows on the profiles of the events indicate the time of the proton flux maxima, taken to build the proton spectra (see below)

Integral time-of-maximum proton spectrum



Integral fluxes of protons for the event of 2003 October 26

S/c, instruments	Ep, MeV	To	Tmax	Jmax, $(cm^2.s.sr)^{-1}$	Dura-tion	Comments
GOES-10						
EPS	>5	18^h	$20^h/27d02^h$	354/758	2d	
EPS	>10	18^h	$20^h/27d02^h$	230/360	2d	
EPS	>30	18^h	$20^h/27d02^h$	30.3/38	2d	
EPS	>50	18^h	$20^h/27d02^h$	5.9/7.3	2d	
EPS	>60	18^h	$19^h/27d02^h$	2.5/3.7	2d	
EPS	>100	18^h	$19^h/27d02^h$	0.46/0.83	2d	
POES-16						
MEPED	>0.24	-	-	-	-	
MEPED	>0.8	-	-	-	-	
MEPED	>2.5	-	$19^h/27d04^h$	$1.8\cdot10^3/1.3\cdot10^3$	2d	
MEPED	>6.9	-	$19^h/27d04^h$	$1.4\cdot10^3/520$	2d	
MEPED	>16	-	$19^h/27d04^h$	230/240	2d	
MEPED	>36	-	$19^h/27d04^h$	30/35	2d	
MEPED	>70	-	$19^h/27d04^h$	2/2.2	2d	
MEPED	>140	-	- /$27d04^h$	- /0.6	2d	
CORONAS F						
MKL	>1.	-	$23^h/27d05^h$	$2.2\cdot10^3/1.4\cdot10^3$	2d	
MKL	>14	-	$23^h/27d05^h$	240/220	2d	
MKL	>26	-	$22^h/27d05^h$	125/120	2d	
MKL	>50	-	$22^h/27d05^h$	40/17	2d	

ACE						
SIS	>10	17^{h}	21^{h}/27d03^{h}	273/352	2d	
SIS	>30	17^{h}	19^{h}/27d03^{h}	26/55.5	2d	
SOHO						
EPHIN (INT)	>50	17^{h}	18^{h}/27d03^{h}	16.6/4.6	1.5d	
BALLOONS						
Mu	>96		- /27d10^{h}	- /0.29		
Mu	>100		- /27d10^{h}	- /0.24		

Differential fluxes of protons for the event of 2003 October 26

S/c, instruments	ΔE, MeV	To	Tmax	Jmax, $(cm^{2}.s.sr.MeV)^{-1}$	Dura-tion	Comments
SOHO						
LION	0.75-2	20^{h}	23^{h}/27d06^{h}	38/42	2d	
LION	2-6	19^{h}	23^{h}/27d05^{h}	34/22.5	2d	
EPHIN	4-8	19^{h}	22^{h}/27d06^{h}	212/150	2d	
EPHIN	8-25	18^{h}	22^{h}/27d05^{h}	39.6/22.3	2d	
EPHIN	25-41	18^{h}	18^{h}/27d03^{h}	2.8/1.4	2d	
EPHIN	41-53	- “ -	- “ -	- “ -	- “ -	

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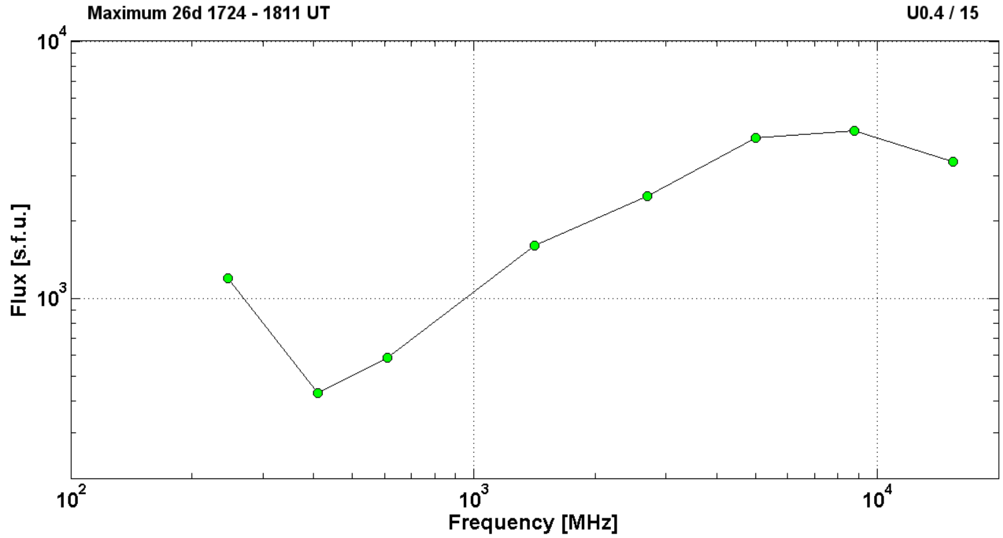
Veselovskij I.S., I.N. Myagkova, O.S. Yakovchuk, 2012.

Electromagnetic and other phenomena that are sources and/or accompanying for the event of 2003 October 26

2003 October 26 ● AR10484 To event 439

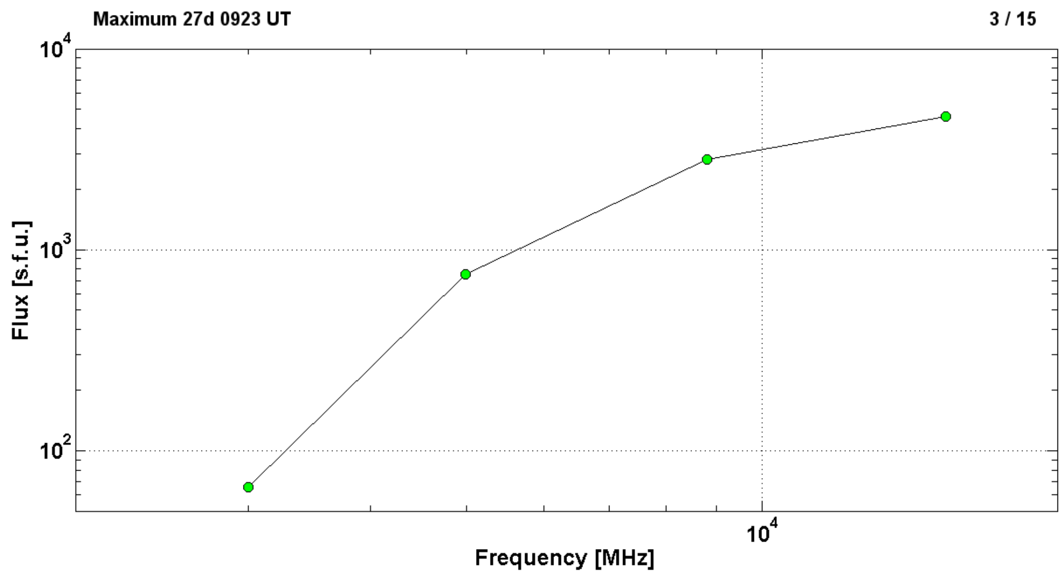
Hα	6563 Å	1721	1733	2016	N02W38	1N	F
1 – 12	keV	1721	1819	1921		X1.2	6.3E-1
15.4	GHz	1715.0	1731.0	1919.0	U0.4 / 15	3.53	
8.8	GHz	1715.0	1731.0	1908.0		3.65	
5	GHz	1712.0	1731.0	1920.0		3.62	
2.7	GHz	1715.0	1731.0	1920.0		3.40	
1.4	GHz	1718.0	1756.0	1820.0		3.20	
610	MHz	1720.0	1758.0	1826.0		2.77	
410	MHz	1720.0	1811.0	1849.0		2.63	
245	MHz	1722.0	1724.0	1908.0		3.08	
DS II	25-100	1735		1743		2	
DS CONT	30-45	1804		1853		1	
CME	WL	1754	1537 km/s	$4.8 km/s^{2}$	171º	235º	

HESSI - gap



2003 October 26 ● AR10486 To event 439

Hα	6563 Å	0923	0925	0946	S15E26	SF	F
1 – 12	keV	0921	0927	0932		M5.0	2.6E-2
15.4	GHz	0922.0	0923.0	0931.0	3 / 15	3.66	
8.8	GHz	0905.0	0923.0	0938.0		3.45	
5	GHz	0922.0	0923.0	0927.0		2.88	
3	GHz	0922.9	0923.6	0926.2		1.82	
DS III	25-155	0922		0923	G,C	2	
DS DCIM	800-4000	0917		0926	C	3	



Event 2003.10.28 – (2003-301) – GLE-65 **№ 440**

Particle event: To(Ep>10 MeV) – 28d12^h

Tmax$_1$(Ep>10 MeV) – 28d18^h, Jmax$_1$(Ep>10 MeV) – $4.6\cdot10^3$ /cm^2.s.sr

Tmax$_2$(Ep>10 MeV) – 29d02^h, Jmax$_2$(Ep>10 MeV) – $1.2\cdot10^4$ /cm^2.s.sr

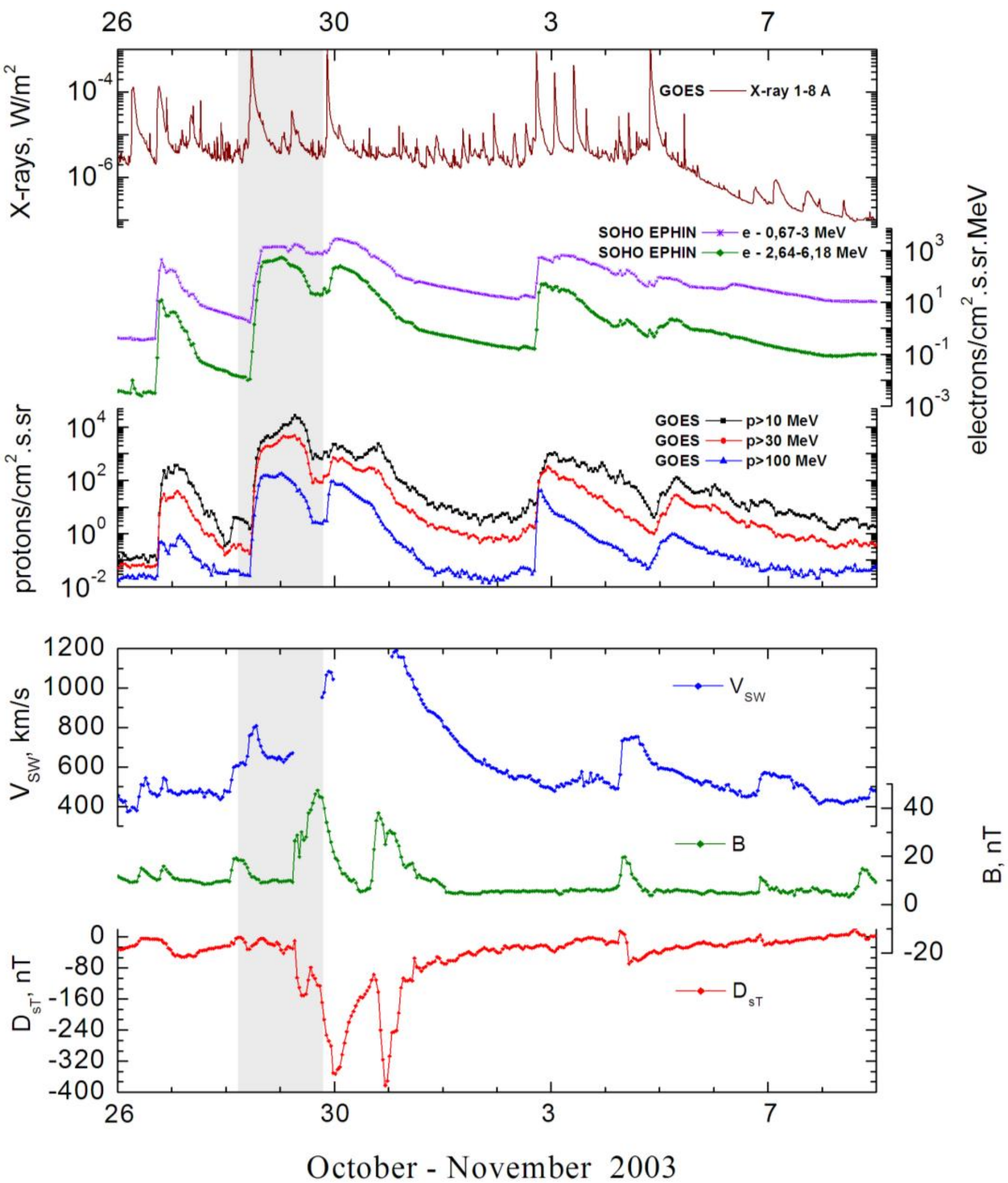
Duration of the event – 1 day

Quasimaximal energy of protons in the event – Eqm$_1$ = 3340 MeV

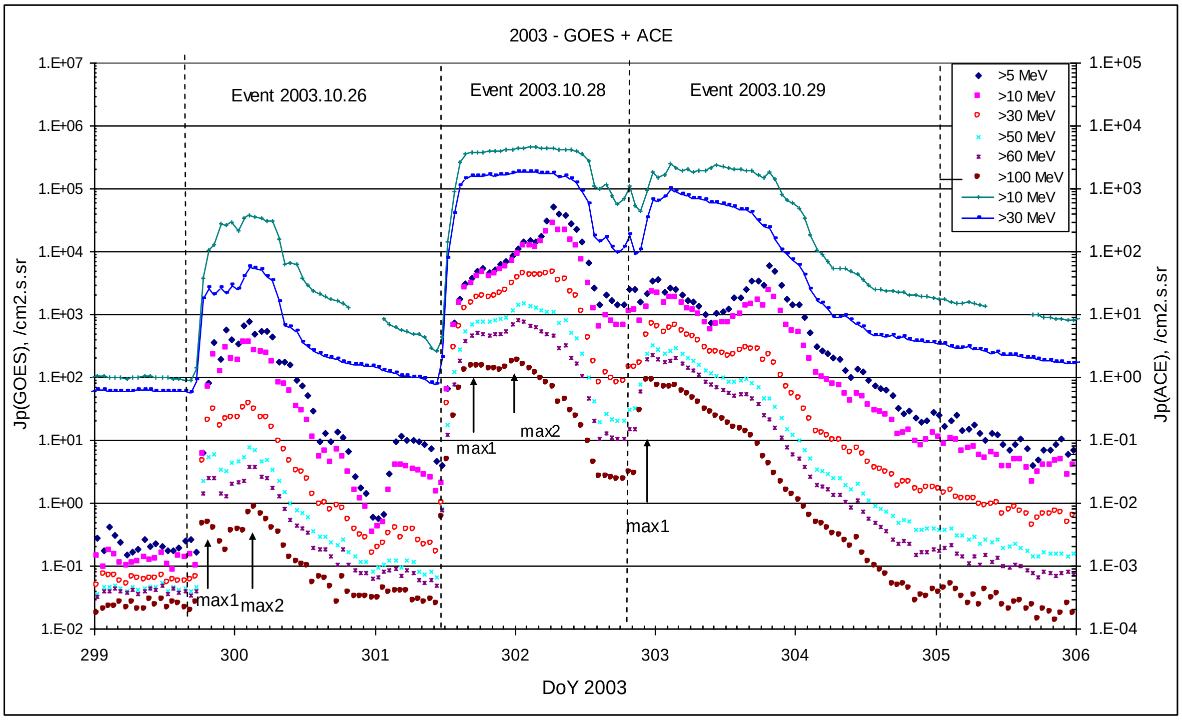
– Eqm$_2$ = 1025 MeV

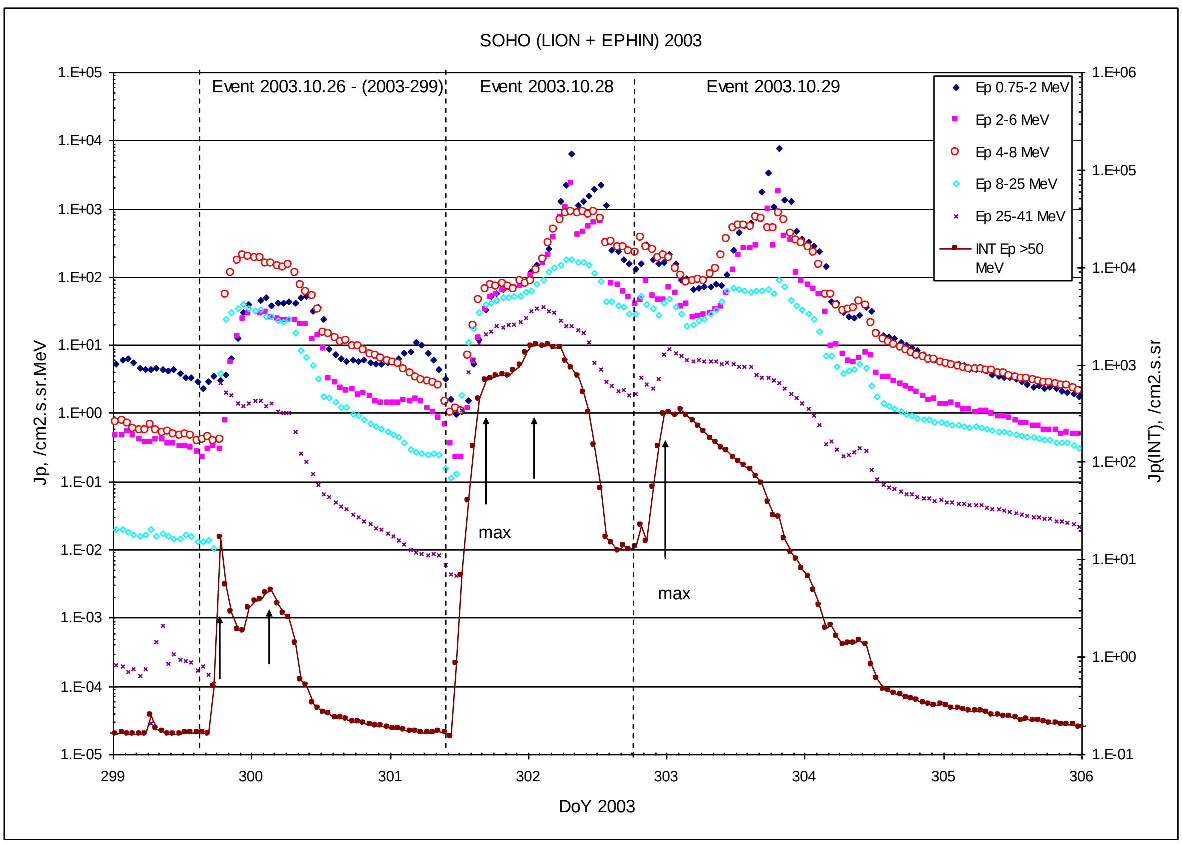
Sources ● solar flare 28d09^{h}51^m, X17.2/4B, S16E08, AR10486
Main X-ray burst 1-8 Å: onset – 28d09^{h}51^m, max – 28d11^{h}10^m, Φ = 1.8 J/m^2
CME: 28d11^{h}30^m; V=2459 km/s; $\Delta\varphi$ = 360º; dA = 015º
▲SC 28d19^{h}08^m ; ▲SC 29d06^{h}11^m

Particle fluxes and associated phenomena



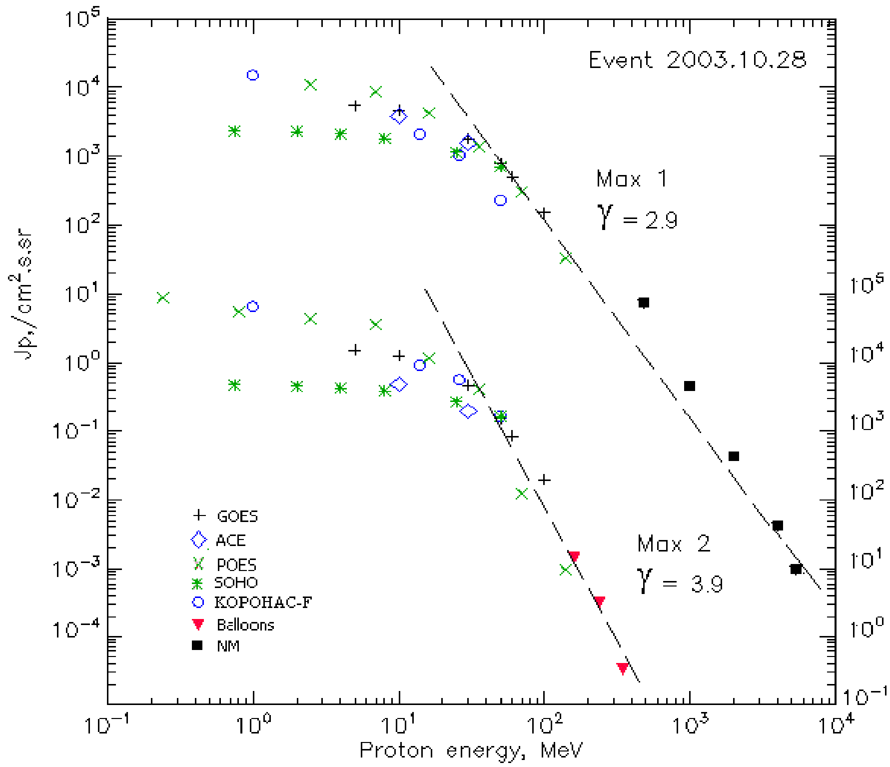
Time profiles of the proton fluxes for the event of 2003 October 28





Arrows on the profiles of the events indicate the time of the proton flux maxima, taken to build the proton spectra (see below)

Integral time-of-maximum proton spectrum



Integral fluxes of protons for the event of 2003 October 28

S/c, instruments	Ep, MeV	To	Tmax	Jmax, $(cm^2.s.sr)^{-1}$	Duration	Comments
GOES-10						
EPS	>5	12^h	$18^h/29d02^h$	$5.5\cdot10^3/1.4\cdot10^4$	1d	
EPS	>10	12^h	$18^h/29d02^h$	$4.6\cdot10^3/1.2\cdot10^4$	1d	
EPS	>30	12^h	$17^h/29d02^h$	$1.8\cdot10^3/4.4\cdot10^3$	1d	
EPS	>50	12^h	$17^h/29d01^h$	$790/1.45\cdot10^3$	1d	
EPS	>60	12^h	$17^h/29d01^h$	510/820	1d	
EPS	>100	12^h	$16^h/29d01^h$	150/185	1d	
POES-16						
MEPED	>0.24	-	$^-/29d07^h$	$-/8.1\cdot10^4$	1d	
MEPED	>0.8	-	$-/29d07^h$	$-/5.2\cdot10^4$	1d	
MEPED	>2.5	-	$16^h/29d07^h$	$1.1\cdot10^4/4.1\cdot10^4$	1d	
MEPED	>6.9	-	$16^h/29d07^h$	$8.7\cdot10^3/3.4\cdot10^4$	1d	
MEPED	>16	-	$16^h/29d07^h$	$4.2\cdot10^3/1.1\cdot10^4$	1d	
MEPED	>36	-	$16^h/29d07^h$	$1.4\cdot10^3/3.8\cdot10^3$	1d	
MEPED	>70	-	$16^h/29d07^h$	310/ 120	1d	
MEPED	>140	-	$16^h/29d07^h$	33/ 9	1d	
CORONAS F						
MKL	>1.	-	$15^h/29d07^h$	$1.5\cdot10^4/6.2\cdot10^4$	1d	
MKL	>14	-	$15^h/29d07^h$	$2.1\cdot10^3/8.6\cdot10^3$	1d	
MKL	>26	-	$15^h/29d07^h$	$1.0\cdot10^3/5.3\cdot10^3$	1d	
MKL	>50	-	$15^h/29d07^h$	$230/1.6\cdot10^3$	1d	

ACE						
SIS	>10	12^h	$17^h/29d02^h$	$3.9 \cdot 10^3/4.9 \cdot 10^3$	1d	
SIS	>30	12^h	$17^h/29d01^h$	$1.6 \cdot 10^3/1.9 \cdot 10^3$	1d	
SOHO						
EPHIN (INT)	>50	12^h	$17^h/29d02^h$	704/1580	1d	
BALLOONS						
Mu	>160	-	$- /23^h \div 29d01^h$	- /13.4	-	
Mu	>242	-	$- /23^h \div 29d01^h$	- /3	-	
Mu	>348	-	$- /23^h \div 29d01^h$	- /0.32	-	
NM						
Network	>433	-	$11^h 55^m/ -$	7.6/ -	-	
Network	>1000	-	$11^h 55^m/ -$	0.44/ -	-	
Network	>2000	-	$11^h 55^m/ -$	0.042/ -	-	
Network	>3700	-	$11^h 55^m/ -$	0.005/ -	-	
Network	>5800	-	$11^h 55^m/ -$	0.0009/ -	-	

Differential fluxes of protons for the event of 2003 October 28

S/c, instruments	ΔE, MeV	To	Tmax	Jmax, $(cm^2.s.sr.MeV)^{-1}$	Dura-tion	Comments
SOHO						
LION	0.75-2	14^h	$17^h/29d02^h$	50/150	1.5d	
LION	2-6	14^h	$17^h/29d01^h$	48/102	1.5d	
EPHIN	4-8	13^h	$17^h/29d01^h$	77/87	1.5d	
EPHIN	8-25	12^h	$17^h/29d01^h$	39/64	1.5d	
EPHIN	25-41	12^h	$17^h/29d02^h$	16/36	1d	
EPHIN	41-53	- “ -	- “ -	- “ -	- “ -	

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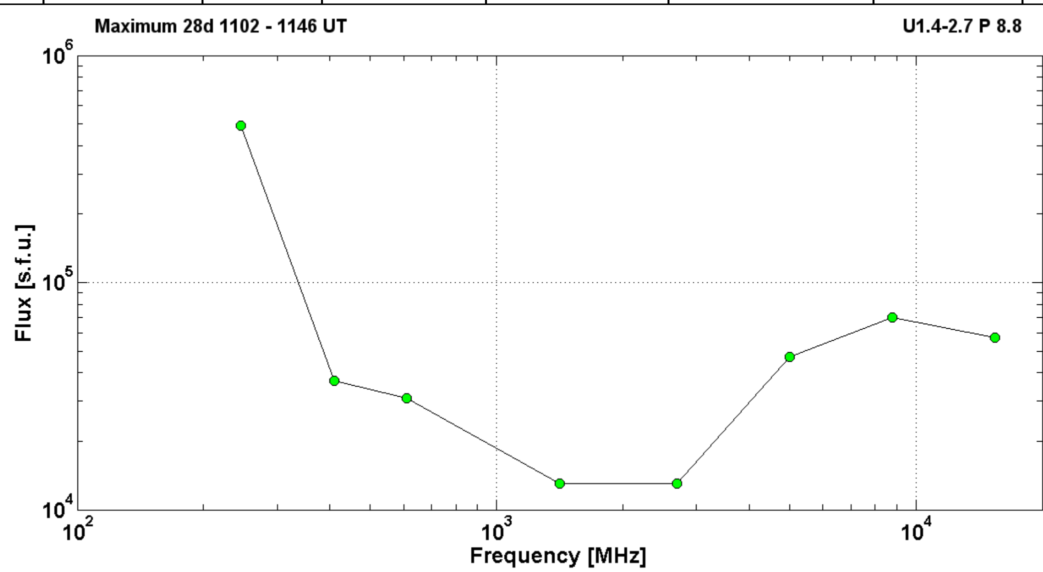
Electromagnetic and other phenomena that are sources and/or accompanying for the event of 2003 October 28

2003 October 28 ● AR10486 To event 440

Hα	6563 Å	<1001	~1205	>1420	S16E08	4B	FU
1 – 12	keV	0951	1110	1124		X17.2	1.8E00
25-50	keV	094016	095322	095400		271440	RHESSI
25-50	keV	102832	103530	103700		14146876	RHESSI
800-7000	keV	103700	111410	113012		14146876	RHESSI
50–150	keV	1102		1113			SONG-F
60–100	MeV		>1103				SONG-F
15.4	GHz	1004.0	1104.0	1456.0		4.76	
8.8	GHz	1003.0	1107.0	1456.0	U1.4-2.7 P 8.8	4.85	
5	GHz	1004.0	1112.0	1448.0		4.67	
2.7	GHz	1014.0	1114.0	1459.0		4.11	
1.4	GHz	1131.0	1146.0	0000.0		4.11	
610	MHz	1014.0	1117.0	1508.0		4.49	
410	MHz	1005.0	1104.0	1508.0		4.57	
245	MHz	1015.0	1102.0	1508.0		5.69	
DS II	100-1400	1100		1129		3	
DS II	25-180	1102		1111		3	
DS IV	100-4000	1012		1515	P,C,F,S,	3	
DS IV	25-180	1033		1531		3	
DS III	400-4000	0949		0955	GG,C	3	
DS III	25-270	1013		1031	GG,F,S	2	
DS III	25-270	1058		1111	GG,C	3	
DS CONT	50-270	~1030		>1224		3	
DS DCIM	2000-4500	1005		1236	GG	3	
DS DCIM	800-2000	1058		1336	GG,S,P,F,S	3	
n°						CORONAS-F	
n°						Tsumed, (S, A, T)	
CME	WL	1130	2459 km/s	-105.2 km/s^2	360°	015°	1130

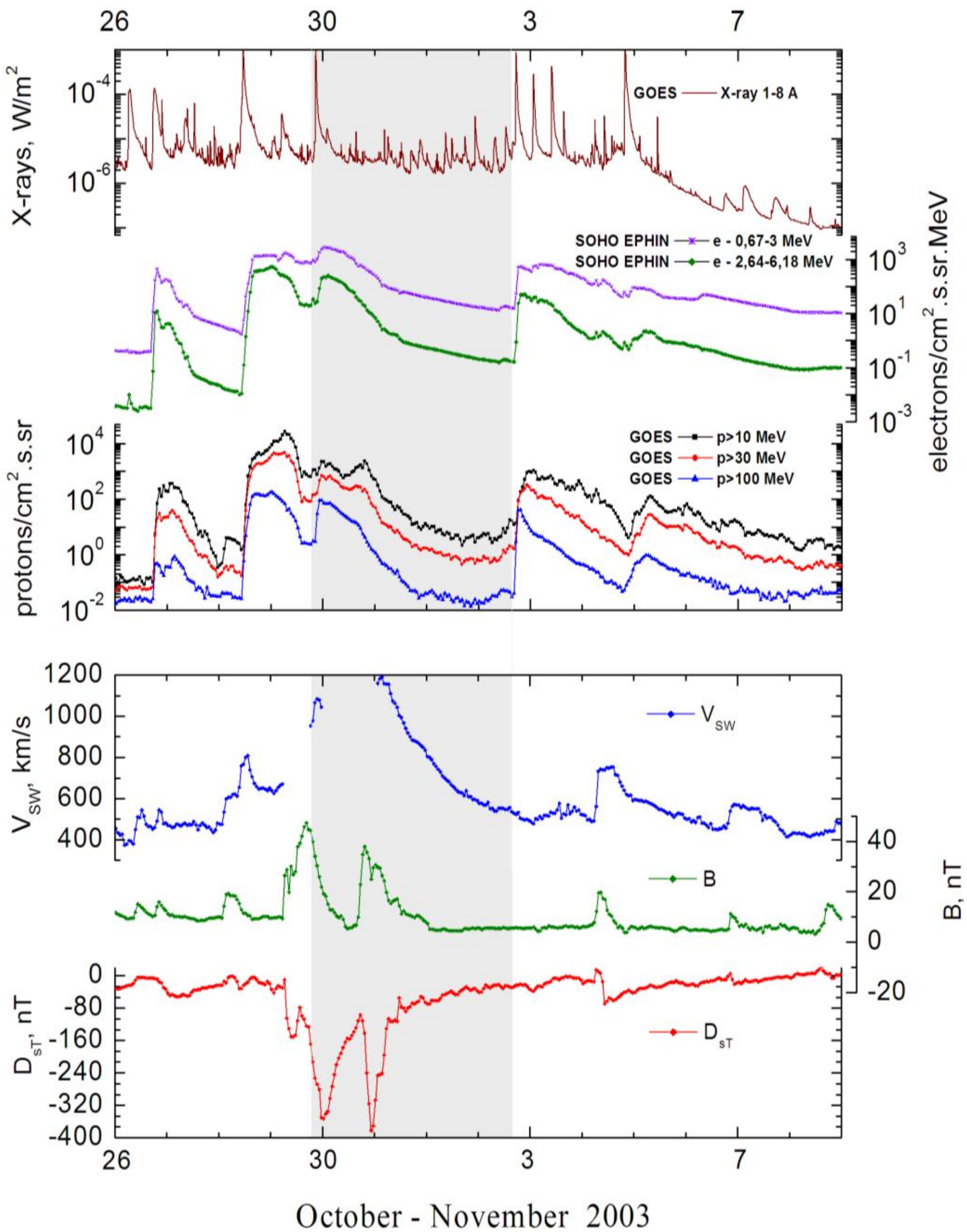


Event 2003.10.29 – (2003-302) – GLE-66 **№ 441**

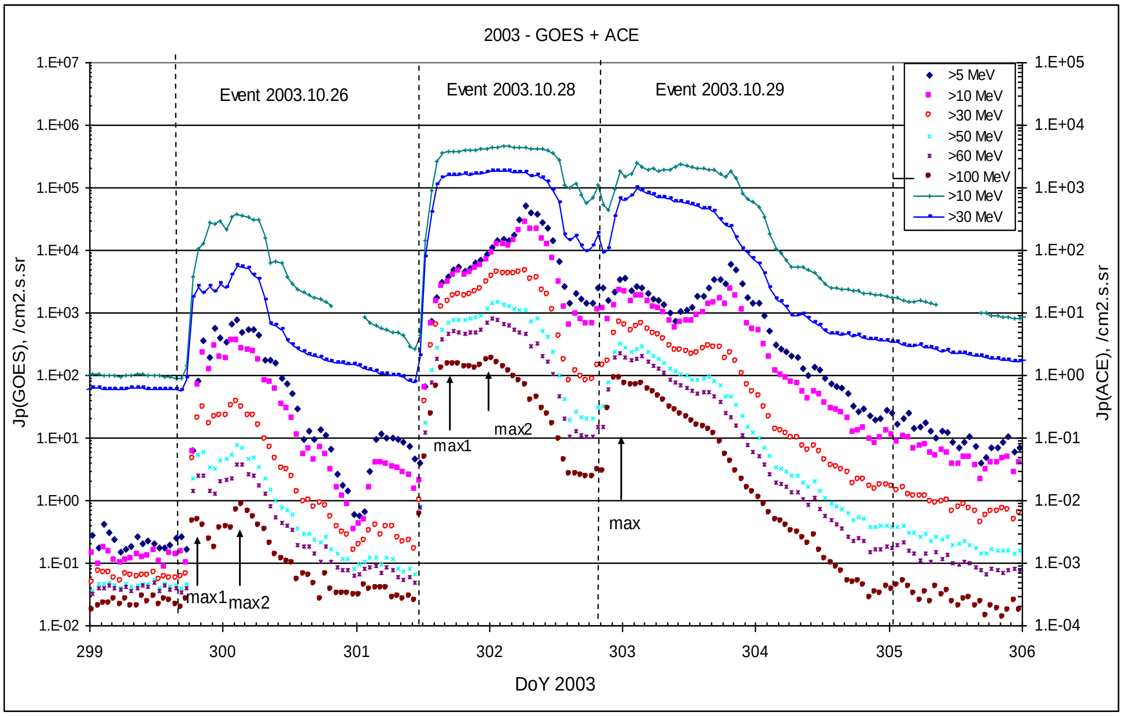
Particle event: To(Ep>10 MeV) – 29d22^h
Tmax(Ep>10 MeV) – 29d23^h, Jmax(Ep>10 MeV) – 2230 /cm^2.s.sr
Duration of the event – 2 days
Quasimaximal energy of protons in the event – Eqm = 810 MeV

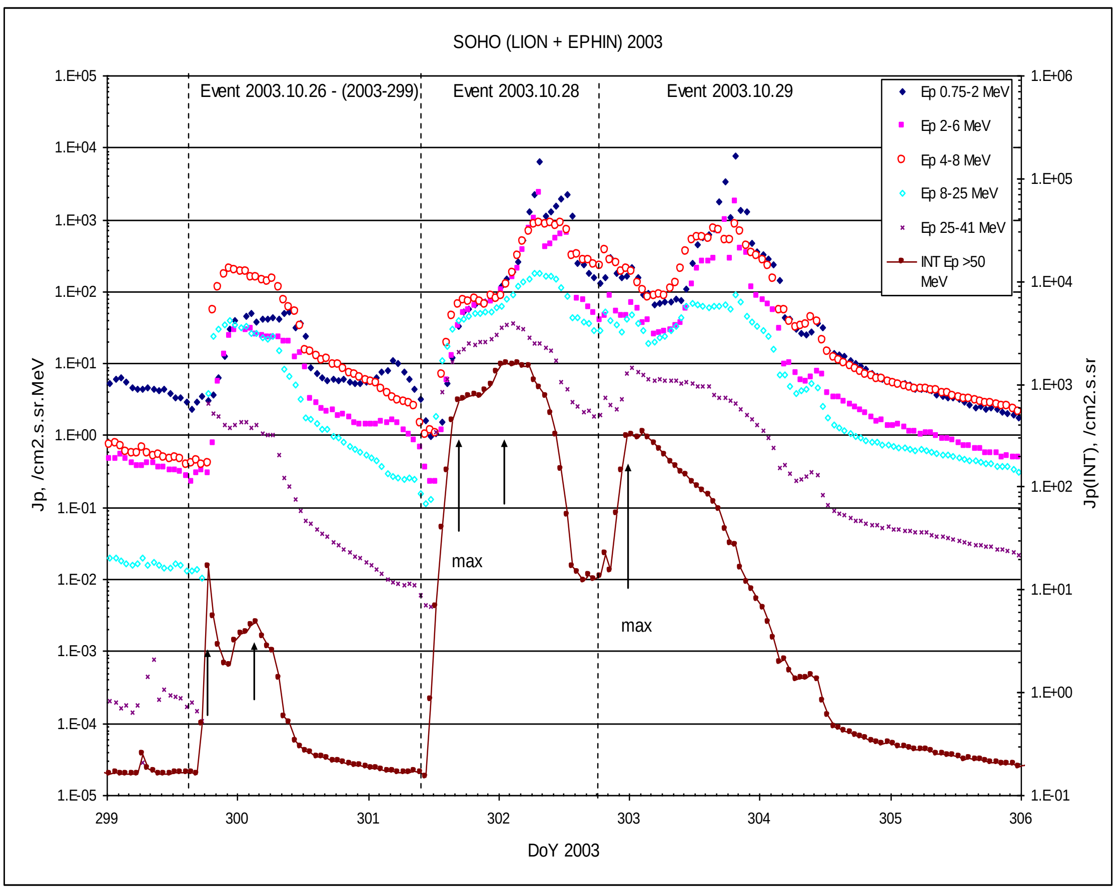
Sources: ● solar flare 29d20^{h}37^m, X10.0/2B, S15W02, AR10486
Ø solar flare 30d01^{h}53^m, 1F/M1.6, N08W22, AR10488
Main X-ray burst 1-8 Å: onset – 29d20^{h}37^m, max – 29d20^{h}49^m, Φ = 0.87 J/m^2
CME: 29d20^{h}54^m; V = 2459 km/s ; Δφ = 360º; dA = 190º
▲SC 29d06^{h}11^m

Particle fluxes and associated phenomena



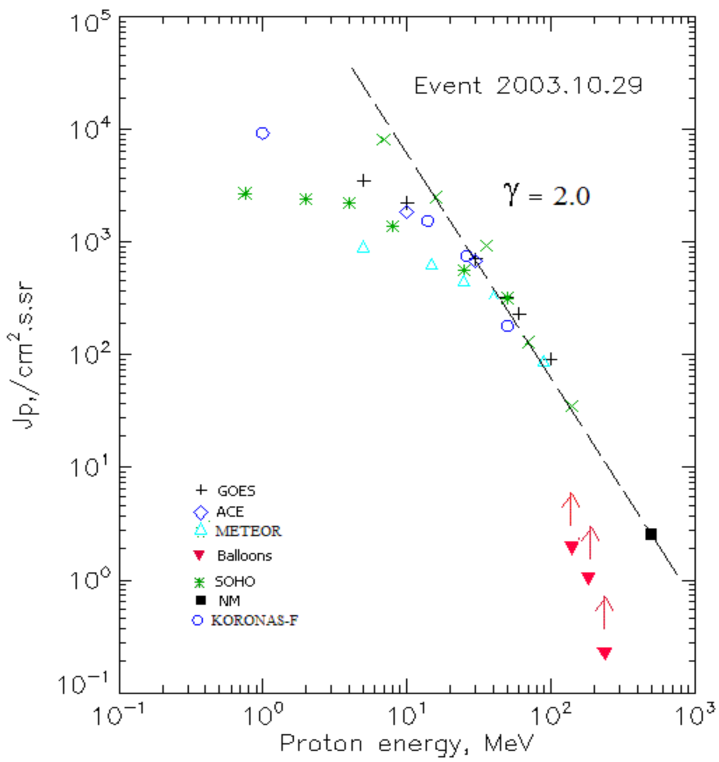
Time profiles of the proton fluxes for the event of 2003 October 29





Arrows on the profiles of the events indicate the time of the proton flux maxima, taken to build the proton spectra (see below)

Integral time-of-maximum proton spectrum



Integral fluxes of protons for the event of 2003 October 29

S/c, instruments	Ep, MeV	To	Tmax	Jmax, $(cm^2.s.sr)^{-1}$	Dura-tion	Comments
GOES-10						
EPS	>5	22^h	$30d01^h$	3520	2.5d	
EPS	>10	22^h	23^h	2230	2.5d	
EPS	>30	21^h	23^h	707	2d	
EPS	>50	21^h	23^h	320	2d	
EPS	>60	21^h	23^h	230	2d	
EPS	>100	21^h	23^h	91	2d	
METEOR						
CBM	>5	20^h	$30d01^h$	920	2.5d	
CBM	>10	20^h	$30d00^h$	640	2.5d	
CBM	>25	20^h	23^h	460	2.5d	
CBM	>40	20^h	23^h	330	2d	
BP	>90	20^h	23^h	90	2d	
ChD	>600	-	-	-	-	
POES-16						
MEPED	>0.24	-	-	-	-	.
MEPED	>0.8	-	-	-	-	
MEPED	>2.5	-	-	-	-	
MEPED	>6.9	-	23^h	8120	2.5d	
MEPED	>16	-	23^h	2520	2.5d	
MEPED	>36	-	23^h	930	2.5d	
MEPED	>70	-	23^h	130	2d	
MEPED	>140	-	23^h	35	2d	

CORONAS F						
MKL	>1.	-	24^{h}	9240	2.5d	
MKL	>14	-	24^{h}	1550	2d	
MKL	>26	-	24^{h}	750	2d	
MKL	>50	-	24^{h}	180	2d	
ACE						
SIS	>10	22^{h}	23^{h}	1840	2d	
SIS	>30	22^{h}	23^{h}	680	2d	
SOHO						
EPHIN (INT)	>50	21^{h}	$30d01^{h}$	320	1.5d	
BALLOONS						
Mu	>141	-	$20^{h}30^{m}$	1.9	-	Before
Mu	>183	-	$20^{h}30^{m}$	1	-	maximum
Mu	>238	-	$20^{h}30^{m}$	0.22	-	
NM						
Network	>500	-	$21^{h}30^{m}$	2.5	-	

Differential fluxes of protons for the event of 2003 October 29

S/c, instruments	ΔE, MeV	To	Tmax	Jmax, $(cm^2.s.sr.MeV)^{-1}$	Dura-tion	Comments
SOHO						
LION	0.75-2	22^{h}	$30d00^{h}$	220	2d	
LION	2-6	22^{h}	$30d00^{h}$	70	2d	
EPHIN	4-8	22^{h}	$30d00^{h}$	210	2d	
EPHIN	8-25	22^{h}	$30d00^{h}$	48	2d	
EPHIN	25-41	22^{h}	$30d00^{h}$	8.7	2d	
EPHIN	41-53	- “ -	- “ -	- “ -	- “ -	

References;

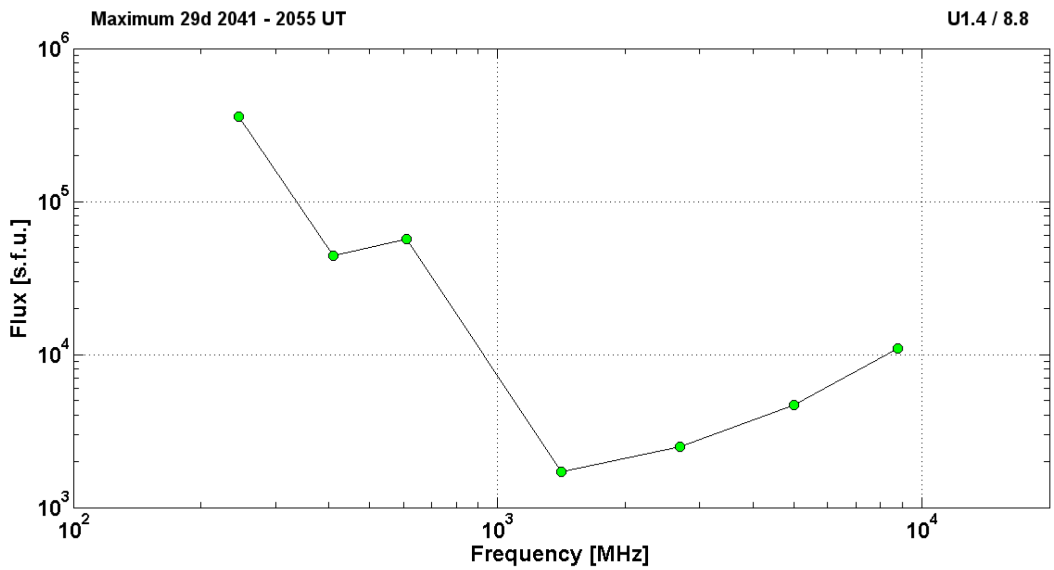
Kuwabara T., K. Munakata, S. Yasue et al., 2004.
Dmitriev A.V., H.-C. Yeh, J.-K. Chao et al., 2006.
Kuwabara T., J.W. Bieber, J. Clem et al., 2006.
Miroshnichenko L.I. and J. Perez-Peraza, 2008.
Lario D., A. Aran, R.B. Decker, 2009.
Veselovskij I.S., I.N. Myagkova, O.S. Yakovchuk, 2012.
Lario D., R.B. Decker, and A. Aran, 2008.

Electromagnetic and other phenomena that are sources and/or accompanying for the event of 2003 October 29

2003 October 29 ● AR10486 To event 441

Hα	6563 Å	2037	2042	2253	S15W02	2B	UZ
1 – 12	keV	2037	2049	2101		X10.0	8.7E-1
100–300	keV	203556	2048:4	210824		247490912	RHESSI
50–150	keV	2038		2055			SONG-F
4–7	MeV		>1103				SONG-F

8.8	GHz	2039.0	2043.0	2052.0	U1.4 / 8.8	4.04	
5	GHz	2039.0	2043.0	2053.0		3.67	
2.7	GHz	2039.0	2041.0	0000.0		3.40	
1.4	GHz	2039.0	2043.0	2057.0		3.23	
610	MHz	2040.0	2054.0	2059.0		4.76	
410	MHz	2041.0	2055.0	2059.0		4.64	
245	MHz	2042.0	2042.0	0000.0		5.56	
DS II	60-430	2042		~2050	F,N	3	
DS II	25-180	2044		2053		3	
DS IV	25-1200	2057		2220		3	
DS III	18-380	2042		2044	G	3	
DS III	120-1200	2049		2100	GG	3	
CME	WL	2054	2029 km/s	-146.5.2 km/s^2	360º	190º	

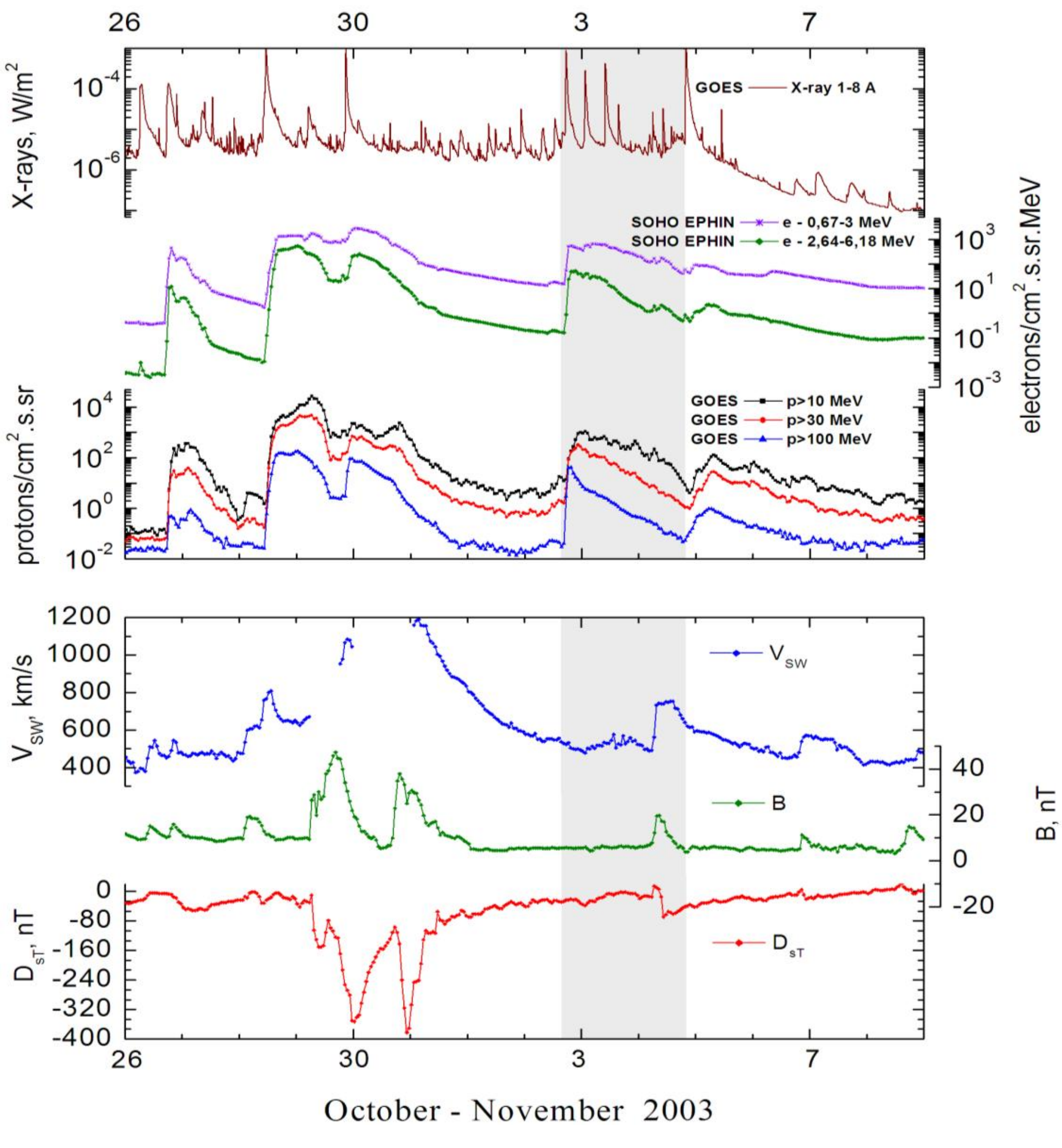


Event 2003.11.02 – (2003-306) – GLE-67 **№ 442**

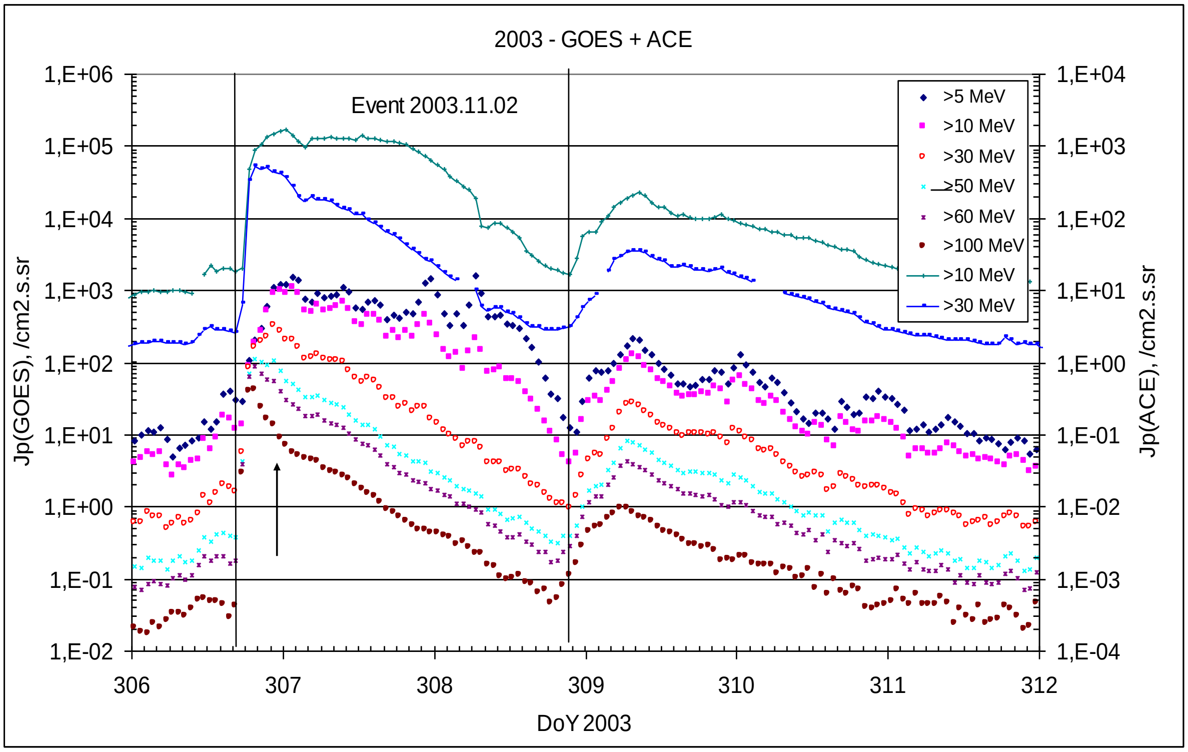
Particle event: To(Ep>10 MeV) – 02d17^h
Tmax(Ep>10 MeV) – 02d23^h, Jmax (Ep>10 MeV) – 990 /cm^2.s.sr
Duration of the event – 2 days
Quasimaximal energy of protons in the event – Eqm = 1700 MeV

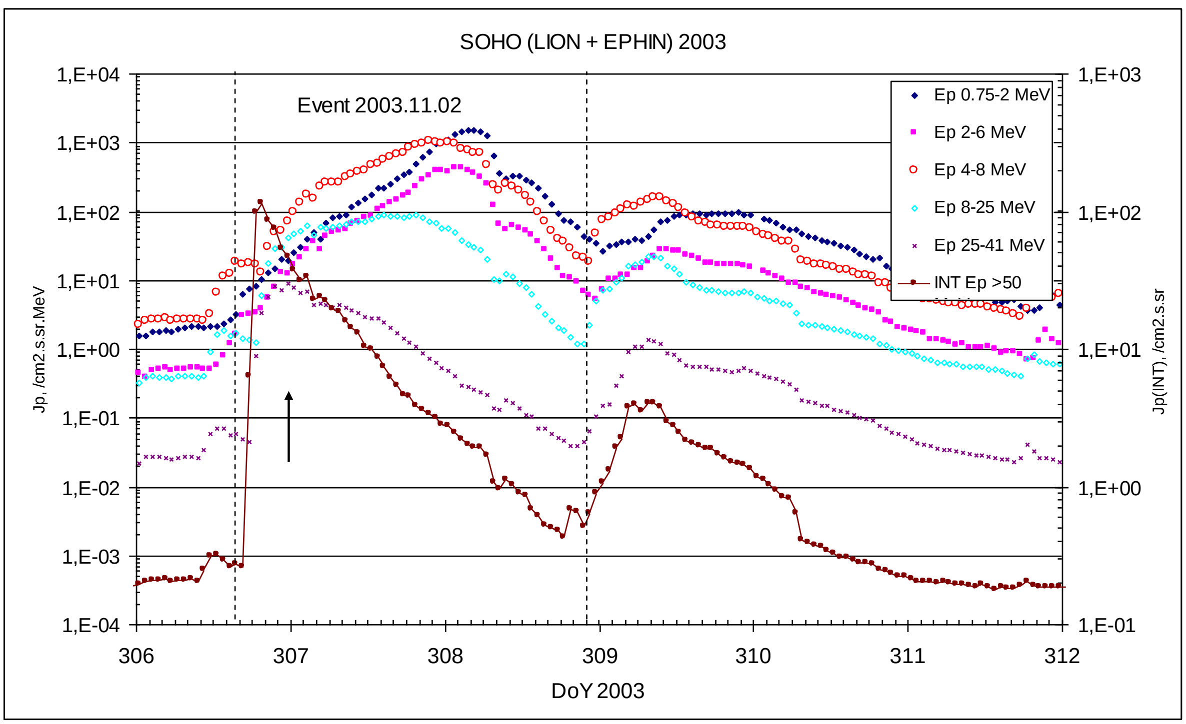
Sources: ● solar flare 02d17^{h}03^m, X8.3/2B, S14W56, AR10486
Ø solar flare 01d22^{h}26^m, M3.2/1N, S12W60, AR10486 *
Ø solar flare 03d01^{h}06^m, 2B/X2.3, N10W83, AR10488
Main X-ray burst 1-8 Å: onset – 02d17^{h}03^m, max – 02d17^{h}25^m, Φ = 0.91 J/m^2
CME: 02d17^{h}30^m, V = 2598 km/s; Δφ = 360^o; dA = 265^o
▲SC: 04d06^{h}25^m
* - Contribution of event beginning

Particle fluxes and associated phenomena



Time profiles of the proton fluxes for the event of 2003 November 02

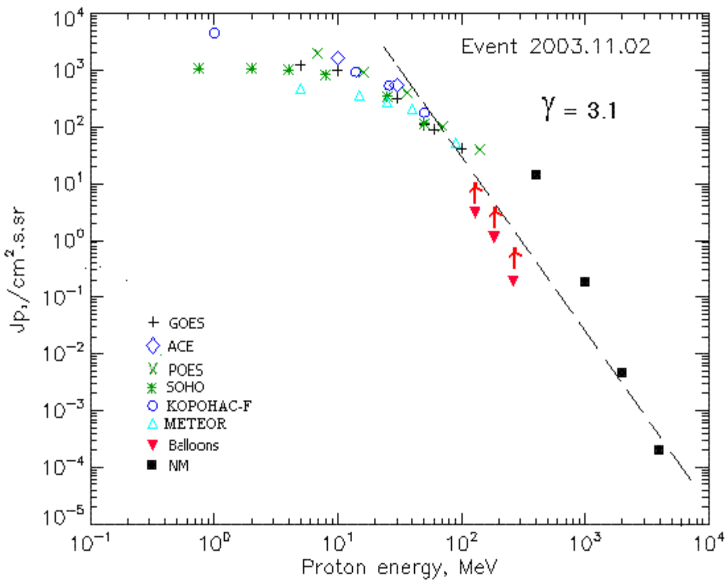




Arrows on the profiles of the events indicate the time of the proton flux maxima, taken to build the proton spectra (see below)

Список 2003 г.

Integral time-of-maximum proton spectrum



Integral fluxes of protons for the event of 2003 November 02

S/c, instruments	Ep, MeV	To	Tmax	Jmax, $(cm^2.s.sr)^{-1}$	Dura-tion	Comments
GOES-10						
EPS	>5	17^h	23^h	1220	2d	
EPS	>10	17^h	23^h	990	2d	
EPS	>30	17^h	22^h	320	2d	
EPS	>50	17^h	20^h	110	2d	
EPS	>60	17^h	19^h	89.5	2d	
EPS	>100	17^h	19^h	42	2d	
METEOR						
CBM	>5	17^h	21^h	470	2d	
CBM	>10	17^h	21^h	355	2d	
CBM	>25	17^h	19^h	270	2d	
CBM	>40	17^h	19^h	214	2d	
BP	>90	17^h	19^h	53	2d	
ChD	>600					
POES-16						
MEPED	>0.24	-	-	-	-	
MEPED	>0.8	-	-	-	-	
MEPED	>2.5	-	-	-	-	
MEPED	>6.9	-	21^h	2070	2d	
MEPED	>16	-	19^h	930	2d	
MEPED	>36	-	19^h	420	2d	
MEPED	>70	-	18^h	110	2d	
MEPED	>140	-	18^h	40	2d	
CORONAS F						
MKL	>1.	-	19^h	4520	2d	
MKL	>14	-	19^h	940	2d	
MKL	>26	-	19^h	540	2d	
MKL	>50	-	19^h	180	2d	

ACE						
SIS	>10	17^h	23^h	1630	2d	
SIS	>30	17^h	20^h	540	2d	
SOHO						
EPHIN (INT)	>50	17^h	19^h	117	2d	
BALLOONS						
Mu	>129	-	$03d(00^h56^m \div 01^h32^m)$	3	-	After
Mu	>184	-	$03d(00^h56^m \div 01^h32^m)$	1.13	-	maximum
Mu	>263	-	$03d(00^h56^m \div 01^h32^m)$	0.19	-	
NM						
Network	>433	-	18^h	15.5	-	
Network	>1000	-	18^h	0.183	-	
Network	>2000	-	18^h	0.00465	-	
Network	>3700	-	18^h	0.00018	-	

Differential fluxes of protons for the event of 2003 November 02

S/c, instruments	ΔE, MeV	To	Tmax	Jmax, $(cm^2.s.sr.MeV)^{-1}$	Dura-tion	Comments
SOHO						
LION	0.75-2	14^h	23^h	18.6	2.5d	
LION	2-6	13^h	23^h	12.4	2.5d	
EPHIN	4-8	12^h	22^h	47	2.5d	
EPHIN	8-25	12^h	22^h	28.7	2.5d	
EPHIN	25-41	18^h	22^h	8.2	2d	
EPHIN	41-53	- “ -	- “ -	- “ -	- “ -	

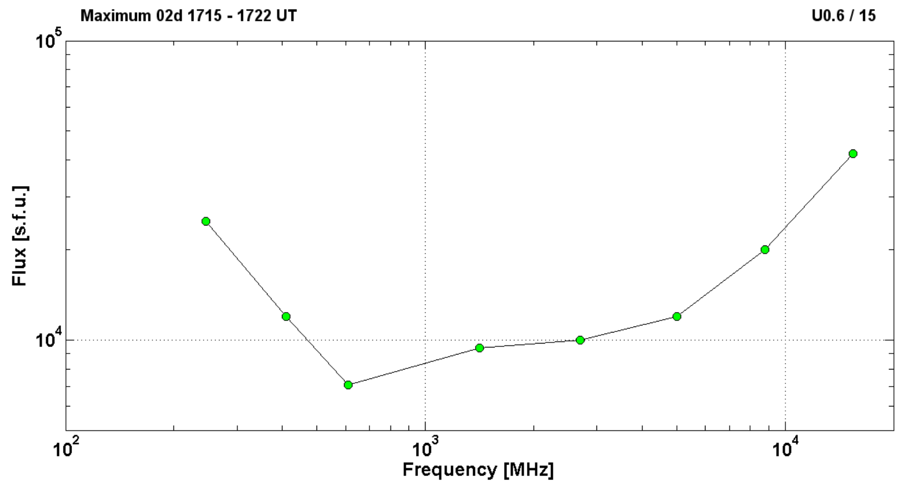
References:
Kuwabara T., J.W. Bieber, J. Clem et al., 2006.
Kuznetsov S.N., B.Yu. Yushkov, and K. Kudela, 2007.
Miroshnichenko L.I. and J. Perez-Peraza, 2008.
Veselovskij I.S., I.N. Myagkova, O.S. Yakovchuk, 2012.
Maurchev E.A., Yu.V. Balabin, E.V. Vashenyuk et al., 2013.

Electromagnetic and other phenomena that are sources and/or accompanying for the event of 2003 November 02

2003 November 02 ● AR10486 To event 442

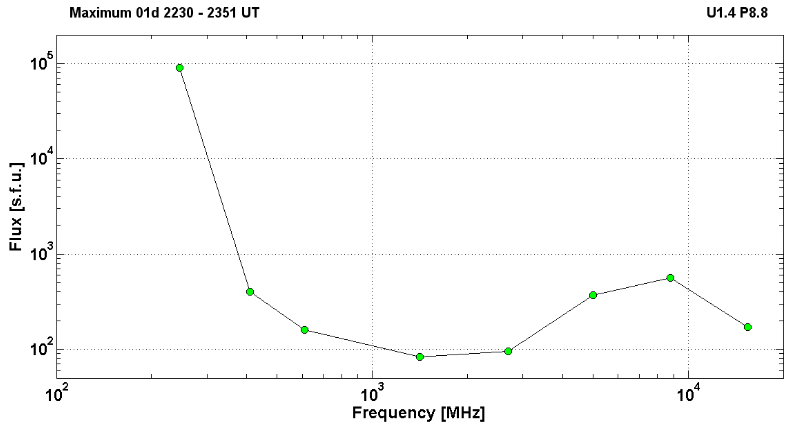
Hα	6563 Å	1704	1717	1954	S14W56	2B	UZ
1 – 12	keV	1703	1725	1739		X8.3	9.1E-1
800-7000	keV	170916	172246	173028		434251584	RHESSI
6-12	keV	173028	174230	174436		5220713	RHESSI
15.4	GHz	1703.0	1719.0	1830.0	U0.6 / 15	4.62	
8.8	GHz	1704.0	1721.0	1818.0		4.30	
5	GHz	1703.0	1722.0	1803.0		4.08	
2.7	GHz	1703.0	1717.0	1758.0		4.00	
1.4	GHz	1711.0	1720.0	1836.0		3.97	
610	MHz	1712.0	1718.0	1836.0		3.85	
410	MHz	1711.0	1715.0	1836.0		4.08	
245	MHz	1714.0	1715.0	1835.0		4.40	

DS II	25-180	1714		1737		3	
DS IV	30-80	1714		1824		3	
DS III	25-180	1714		1800	N	2	
ºn							Bolivia
CME	WL	1730	2598 km/s	-32.4 km/s^2	360º	265º	



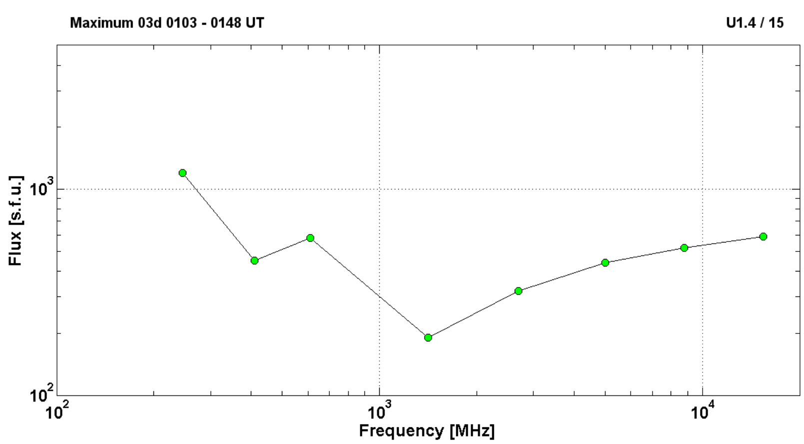
2003 November 01 Ø AR10486 To event 442

Hα	6563 Å	2228	2234	2312	S12W60	1N	FU
1 – 12	keV	2226	2238	2249		M3.2	2.8E-2
50-100	keV	222456	223426	224812		14352336	RHESSI
15.4	GHz	2229.0	2233.0	2242.0		2.23	
8.8	GHz	2228.0	2230.0	2242.0	U1.4 P8.8	2.75	
5	GHz	2229.0	2230.0	2239.0		2.57	
2.7	GHz	2230.0	2232.0	2234.0		1.98	
1.4	GHz	2348.0	2348.0	~2348.0		1.92	
610	MHz	2345.0	2351.0	2354.0		2.20	
410	MHz	2237.0	2237.0	2242.0		2.60	
245	MHz	2234.0	2235.0	2240.0		4.95	
DS II	25-290	2224		2257		3	
DS II	20-45	2248		2302	UE	3	
DS II	25-180	2336		2255		1	
DS IV	70-150	2243		2333		2	
DS III	18-330	2234		2235	G	3	
DS III	20-200	2239		>2400	S,C	2	
DS CONT	200-750	2345		2356		1	
DS UNCLF	180-430	2237		2240		1	
DS UNCLF	18-30	2307		2313		3	
CME	WL	2306	0899km/s	-26.3km/s^2	360º	224º	



2003 November 03 Ø AR10488 To event 442

Hα	6563 Å	0106	0131	0237	N10W83	2B	EF
1 – 12	keV	0109	0130	0145		X2.7	3.6E-1
25-50	keV	010120	012526	020128		354025280	RHESSI
6-12	keV	023744	023746	023828		64704	RHESSI
50–150	keV	0117		0129			SONG F
0.5–1.3	MeV		>0117				SONG F
15.4	GHz	0101.0	0121.0	0202.0	U1.4 / 15	2.77	
8.8	GHz	0101.0	0121.0	0147.0		2.72	
5	GHz	0059.0	0121.0	0149.0		2.64	
2.7	GHz	0103.0	0121.0	0134.0		2.51	
1.4	GHz	0101.0	0103.0	0126.0		2.28	
610	MHz	0059.0	0122.0	0151.0		2.76	
410	MHz	0117.0	0148.0	0148.0		2.65	
245	MHz	0105.0	0105.0	0201.0		3.08	
DS II	50-200	0124		0129		3	
DS IV	20-850	0108		0136		1	
DS IV	25-115	0131		0406		1	
DS III	18-340	0108		0118	G	3	
DS III	18-250	0133		0226	S,C	3	
n°						Mauna Kea, Haleakala	
CME	WL	0159	0827 km/s	-28.3 km/s^2	065°	324°	

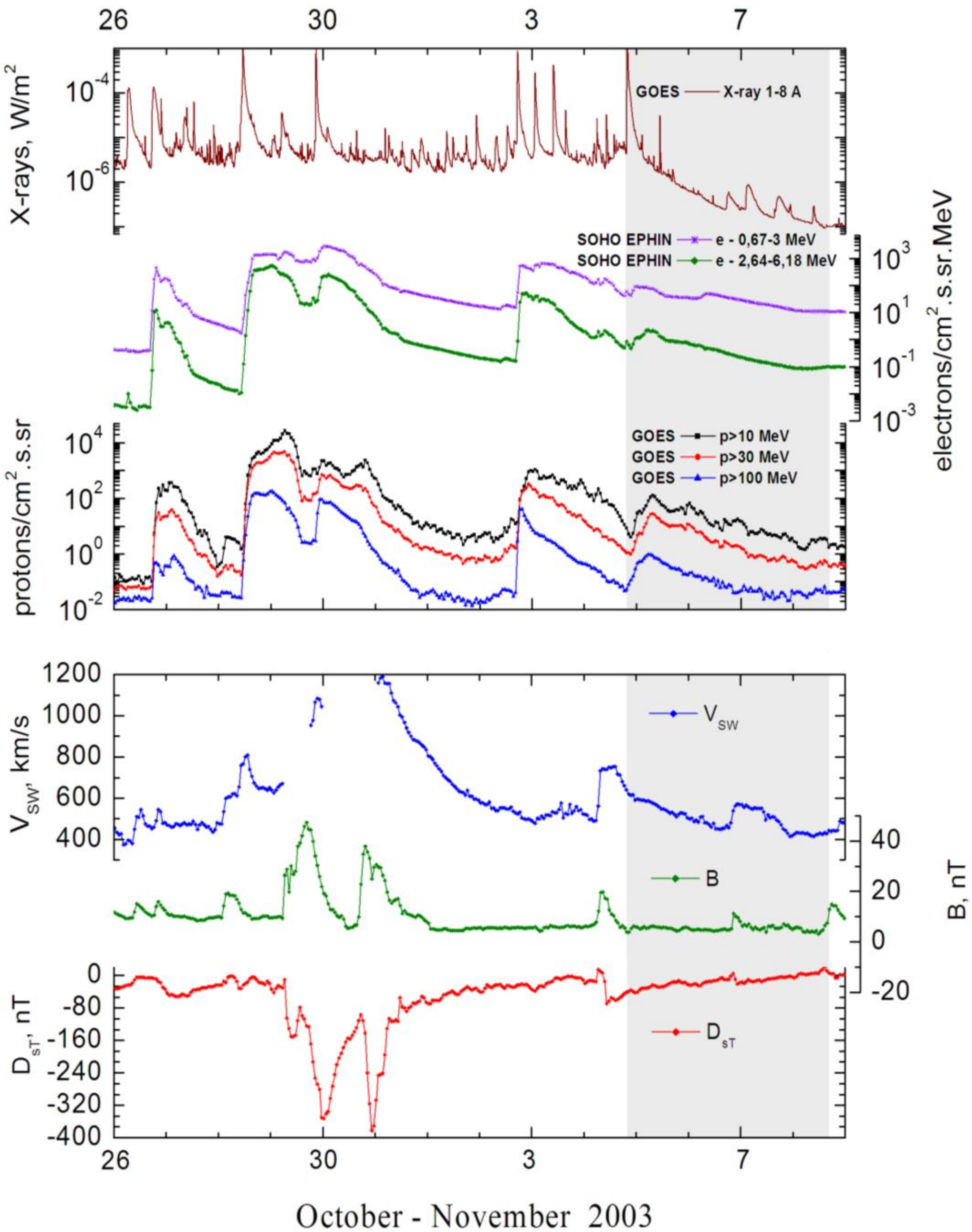


Event 2003.11.04 – (2003-308) **№ 443**

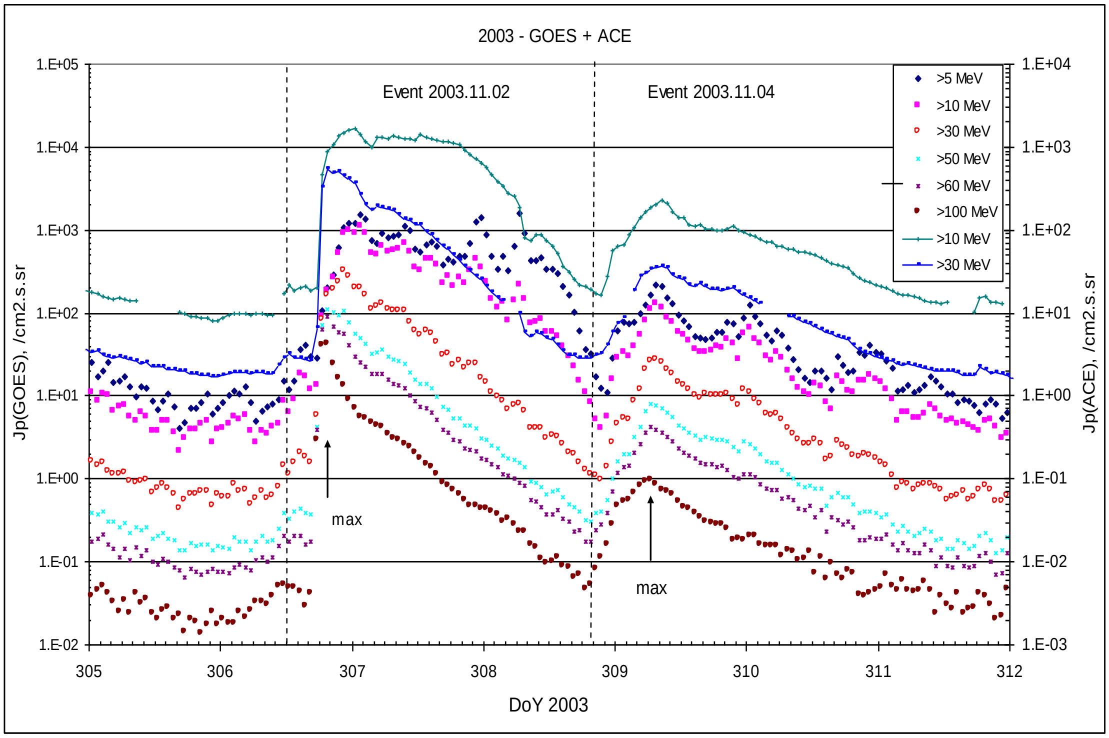
Particle event: To(Ep>10 MeV) – 04d22^h
Tmax(Ep>10 MeV) – 05d07^h, Jmax (Ep>10 MeV) – 126 /cm^2.s.sr
Duration of the event – 4 days
Quasimaximal energy of protons in the event – Eqm = 445 MeV

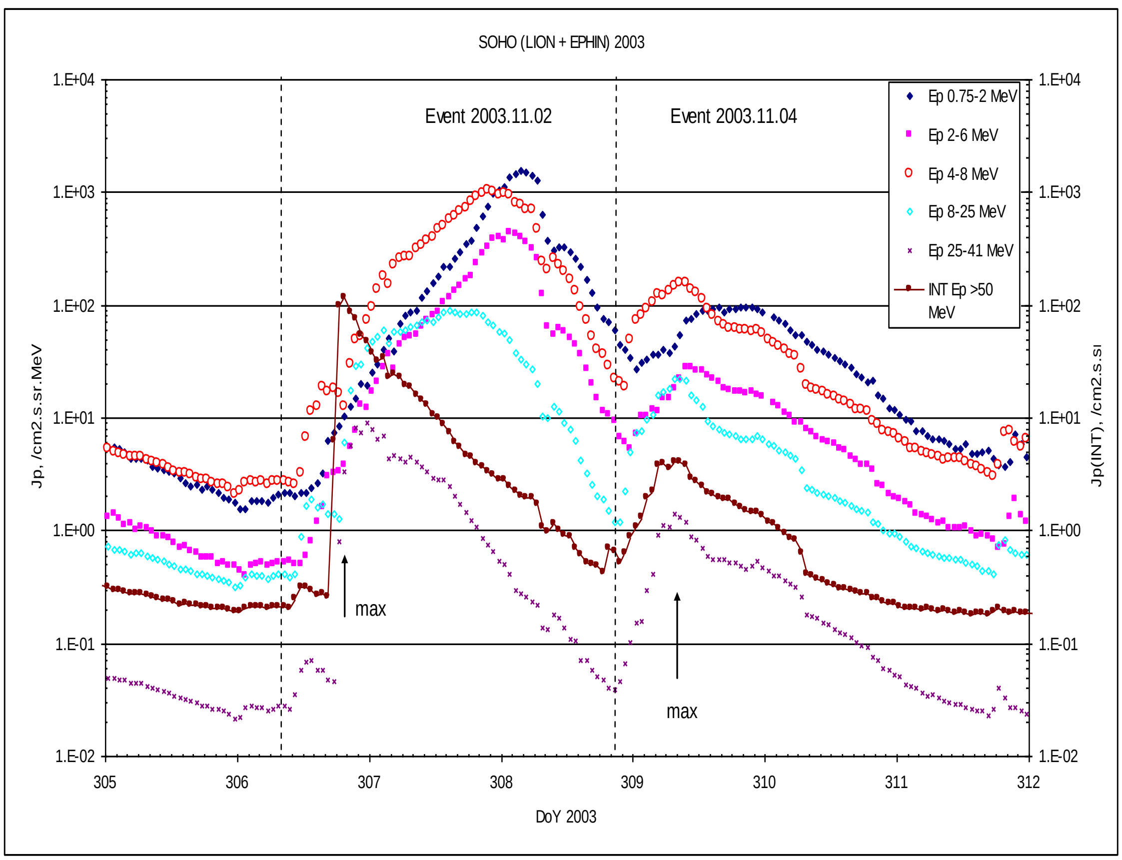
Sources: ● solar flare 04d19^{h}29^m, X>17.5/3B, S19W83, AR10486
Ø solar flare 05d10^{h}46^m, M5.3/SF, S16W90, AR10486
Main X-ray burst 1-8 Å: onset – 04d19^{h}29^m, max – 04d19^{h}50^m, Φ = 2.3 J/m^2
CME: 04d19^{h}54^m, V = 2657 km/s, Δφ = 360^o, dA = 260º

Particle fluxes and associated phenomena



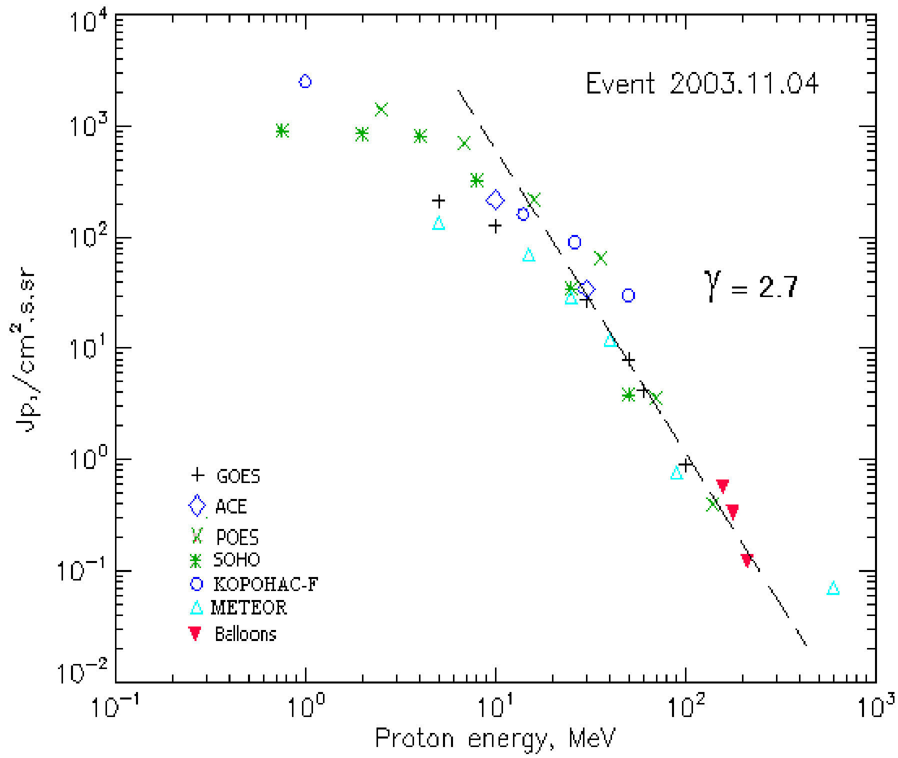
Time profiles of the proton fluxes for the event of 2003 November 04





Arrows on the profiles of the events indicate the time of the proton flux maxima, taken to build the proton spectra (see below)

Integral time-of-maximum proton spectrum



Integral fluxes of protons for the event of 2003 November 04

S/c, instruments	Ep, MeV	To	Tmax	Jmax, $(cm^2.s.sr)^{-1}$	Dura-tion	Comments
GOES-10						
EPS	>5	23^h	$05d07^h$	212	4d	
EPS	>10	22^h	$05d07^h$	126	4d	
EPS	>30	22^h	$05d07^h$	27	4d	
EPS	>50	21^h	$05d06^h$	7.9	4d	
EPS	>60	21^h	$05d06^h$	4.2	3d	
EPS	>100	20^h	$05d06^h$	0.9	3d	
METEOR						
CBM	>5	23^h	$05d08^h$	137	4d	
CBM	>10	22^h	$05d08^h$	71	4d	
CBM	>25	22^h	$05d08^h$	29	3d	
CBM	>40	22^h	$05d06^h$	12	3d	
BP	>90	22^h	$05d06^h$	0.76	2d	
ChD	>600	22^h	$05d06^h$	0.07	1d	
POES-16						
MEPED	>0.24	-	-	-	-	
MEPED	>0.8	-	-	-	-	
MEPED	>2.5	-	$05d06^h$	1420	4d	
MEPED	>6.9	-	$05d06^h$	710	4d	
MEPED	>16	-	$05d06^h$	220	4d	
MEPED	>36	-	$05d06^h$	65	4d	
MEPED	>70	-	$05d06^h$	3.6	3d	
MEPED	>140	-	$05d06^h$	0.4	3d	

CORONAS F						
MKL	>1.	-	05d07^h	2540	4d	
MKL	>14	-	05d07^h	160	4d	
MKL	>26	-	05d07^h	90	4d	
MKL	>50	-	05d07^h	30	3d	
ACE						
SIS	>10	19^h	05d08^h	216	4d	
SIS	>30	22^h	05d08^h	34	3d	
SOHO						
EPHIN (INT)	>50	22^h	05d07^h	3.8	3d	
BALLOONS						
Mi	>158	-	05d07^h	0.56	-	
Mi	>177	-	05d07^h	0.33	-	
Mi	>213	-	05d07^h	0.12	-	

Differential fluxes of protons for the event of 2003 November 04

S/c, instruments	ΔE, MeV	To	Tmax	Jmax, (cm^2.s.sr.MeV)$^{-1}$	Dura-tion	Comments
SOHO						
LION	0.75-2	23^h	05d06^h	38	5d	
LION	2-6	23^h	05d06^h	14.5	4d	
EPHIN	4-8	23^h	05d06^h	121	4d	
EPHIN	8-25	23^h	05d06^h	17	4d	
EPHIN	25-41	22^h	05d06^h	1.1	3d	

References:

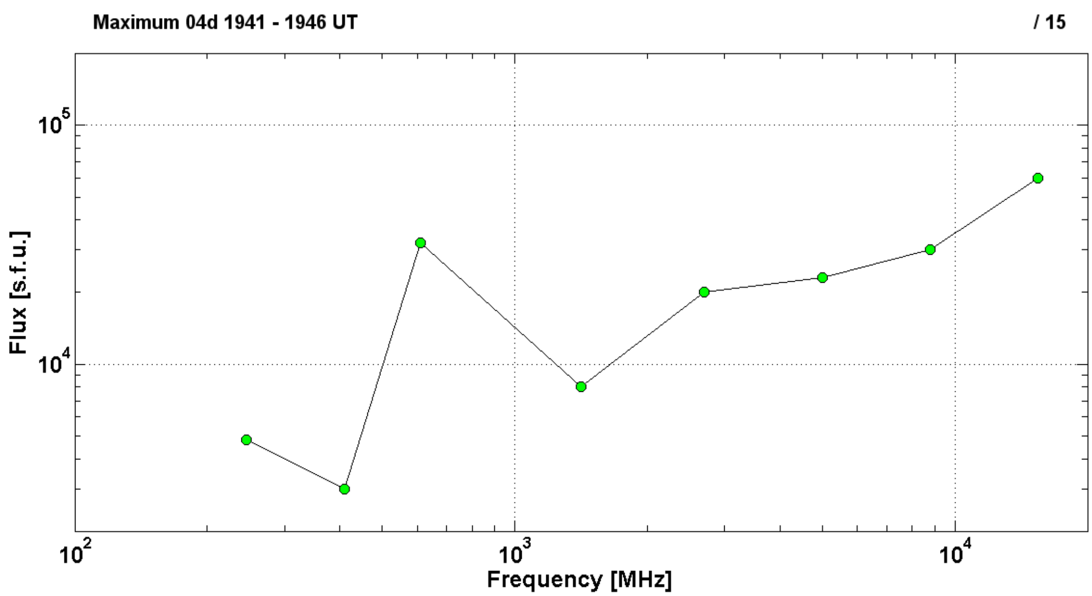
Plainaki C., A. Belov, E. Eroshenko et al.,2005.
Dmitriev A.V., H.-C. Yeh, J.-K. Chao et al., 2006.
Kuwabara T., J.W. Bieber, J. Clem et al., 2006.
Kuwabara T., J.W. Bieber, J. Clem et al., 2006.
Veselovskij I.S., I.N. Myagkova, O.S. Yakovchuk, 2012.

Electromagnetic and other phenomena that are sources and/or accompanying for the event of 2003 November 04

2003 November 04 • AR10486 To event 443

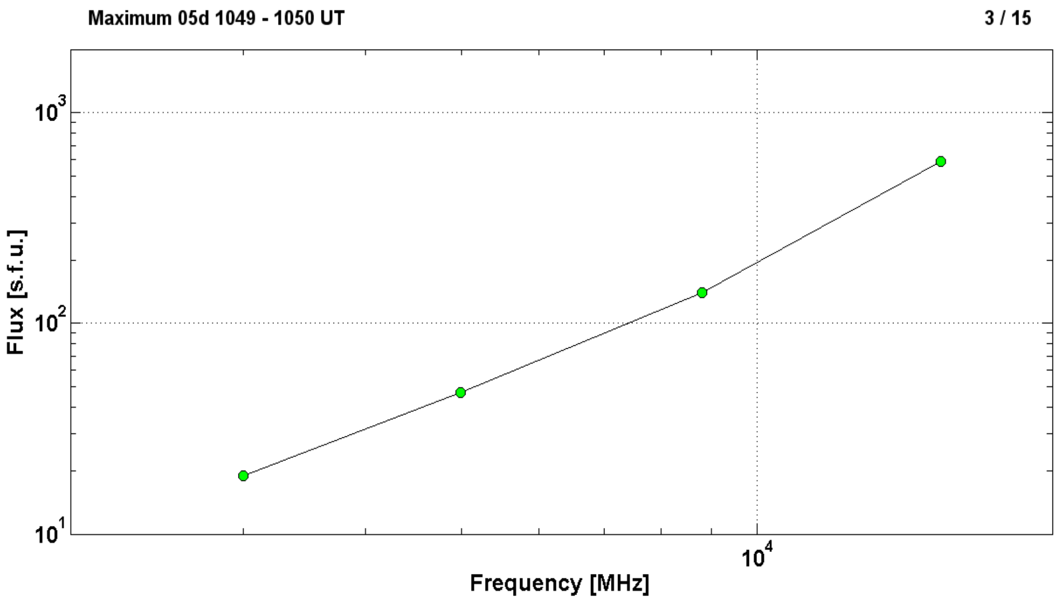
Hα	6563 Å	1932	1957	2049	S19W83	3B	FZ
1 – 12	keV	1929	1950	2006		X>17.5	2.3E00
50-100	keV	192816	193822	193916		3265828	RHESSI
25-50	keV	201512	201602	202156		7718513	RHESSI
6-12	keV	202156	202354	203100		9181674	RHESSI
25-50	keV	203228	203438	204028		6256194	RHESSI
6-12	keV	204028	204202	204500		3023174	RHESSI
12-25	keV	204500	204742	211520		12714261	RHESSI
50–150	keV	1932		1957			SONG F
100–200	MeV						SONG F

15.4	GHz	1933.0	1945.0	2121.0	/ 15	4.78	
8.8	GHz	1933.0	1946.0	2058.0		4.48	
5	GHz	1933.0	1945.0	2113.0		4.36	
2.7	GHz	1933.0	1946.0	2116.0		4.30	
1.4	GHz	1933.0	1944.0	2102.0		3.90	
610	MHz	1933.0	1944.0	2101.0		4.51	
410	MHz	<1933.0	1942.0	>1943.0		3.48	
245	MHz	1932.0	1941.0	2000.0		3.68	
DS II		1943		1947		3	
DS II	30-80	<2000		2006	UE	3	
DS II	23-170	2003		2008	F,N	3	
DS IV	20-45	1947		2017		2	
DS III	25-180	2002		2013	G	3	
DS III	23-57	2047		2056	G	3	
ºn						Halea	
CME	WL	1954	2657 km/s	434.8 km/s^2	360º	260º	



2003 November 05 Ø AR10486 To event 443

Hα	6563 Å	1051	1051	1058	S16W90	SF	
1 – 12	keV	1046	1052	1056		M5.3	1.7E-02
15.4	GHz	1049.0	1049.0	1050.0	3 / 15	2.77	
8.8	GHz	<1050.0	~1050.0	>1050.0		2.15	
5	GHz	<1050.0	~1050.0	>1050.0		1.67	
3	GHz	1049.4	1049.6	1050.4		1.28	
DS DCIM	2000-4000	1049		1050	C	2	



Список 2003 г.

Event 2003.11.20 – (2003-324) **№ 444**

Particle event: To(Ep>10 MeV) – 20d08^h

Tmax(Ep>10 MeV) – 20d11^h, Jmax (Ep>10 MeV) – 4.4 /cm^2.s.sr

Duration of the event – 1 day

Quasimaximal energy of protons in the event – Eqm = 140 MeV

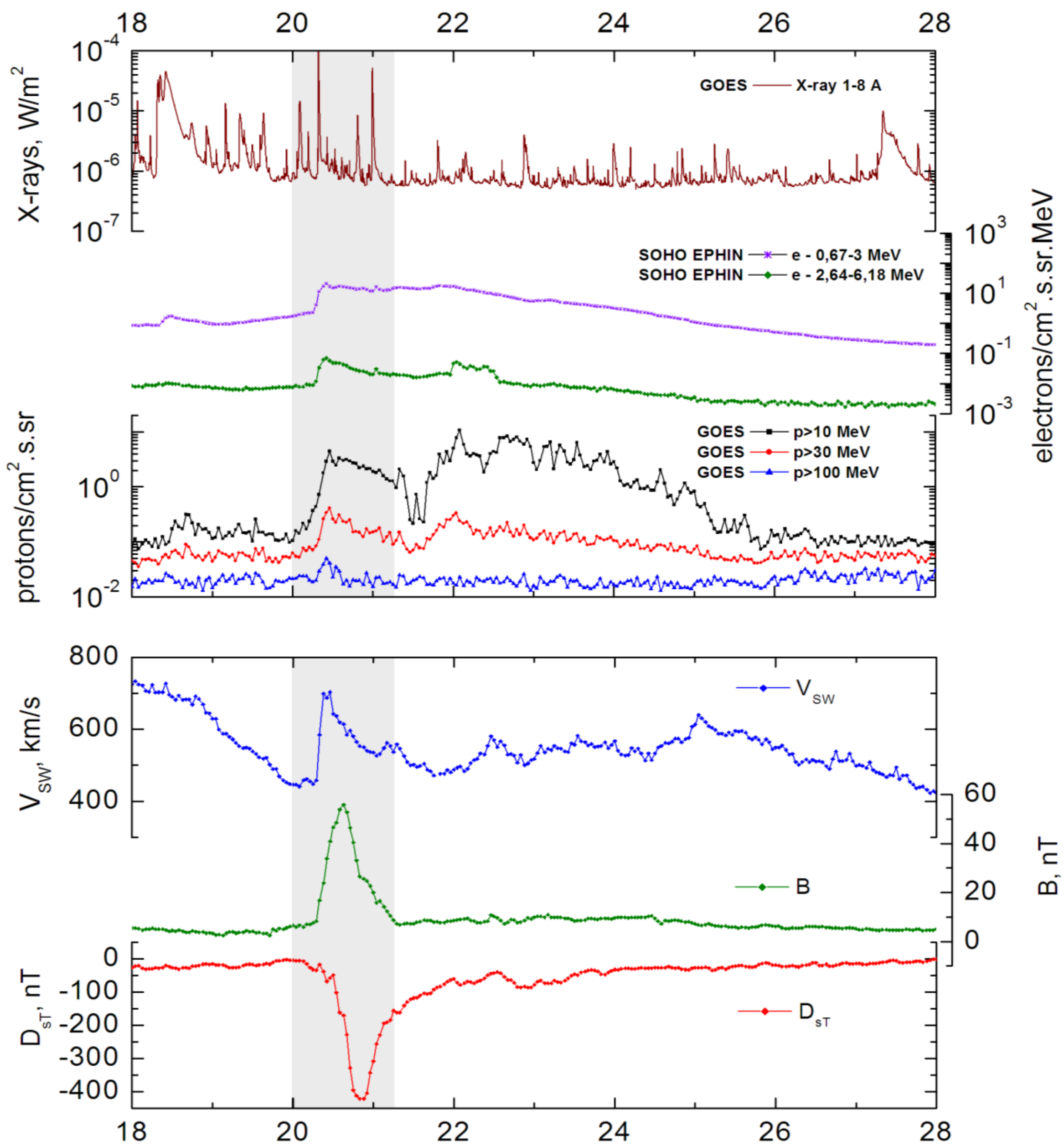
Sources: ● solar flare 20d07^{h}35^m, M9.6/2B, N01W08, AR10501

Main X-ray burst 1-8 Å: onset – 20d07^{h}35^m, max – 20d07^{h}47^m, Φ = 0.06 J/m^2

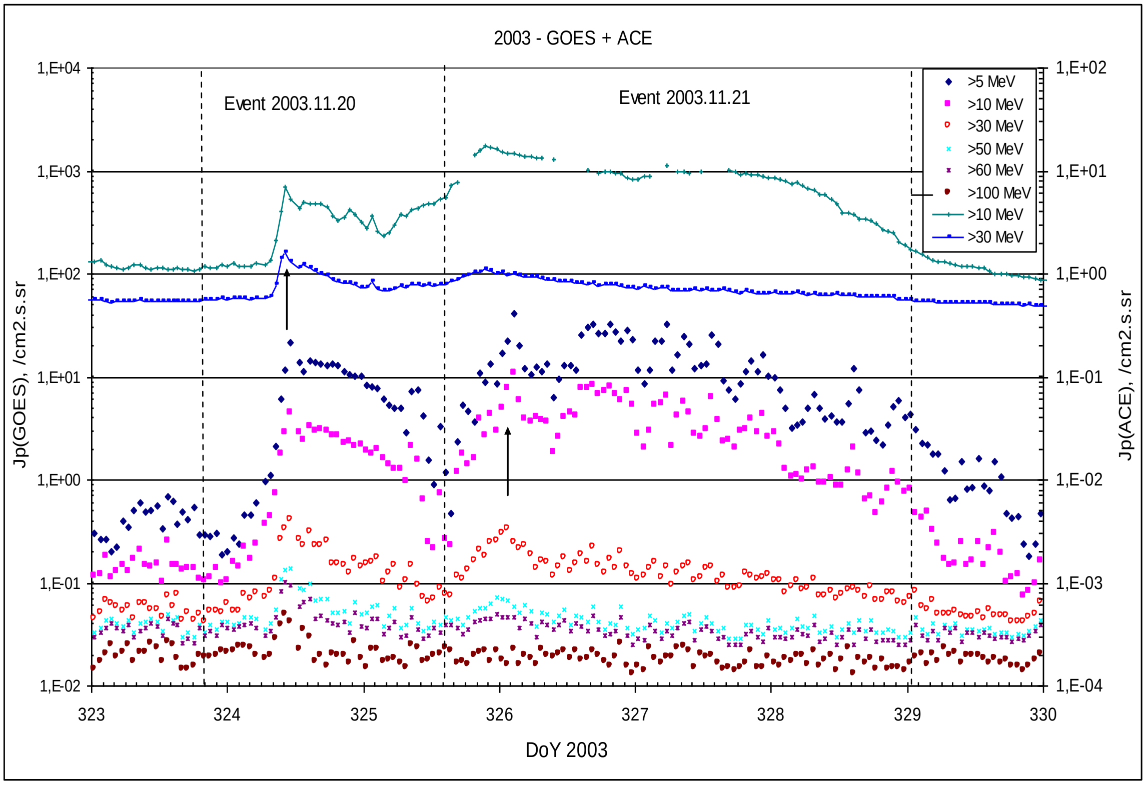
CME: 20d08^{h}06^m, V = 669 km/s, Δφ = 360^o, dA = 219^o

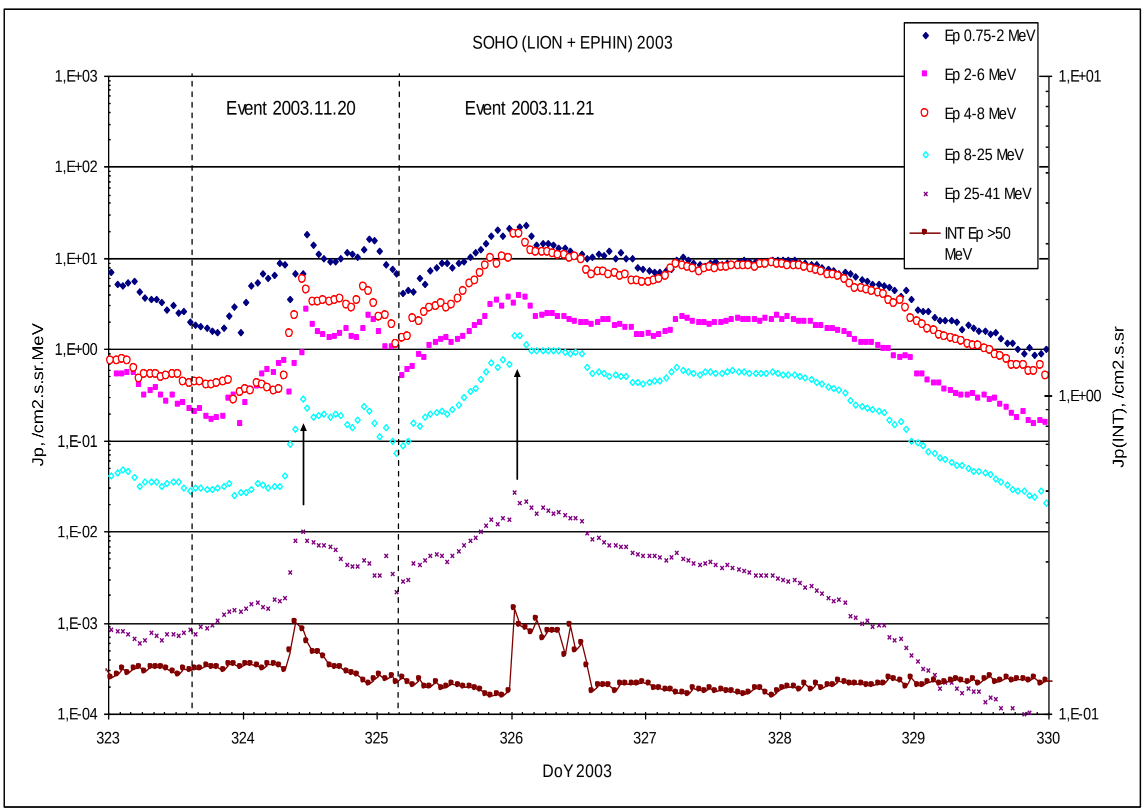
▲SC: 20d08^{h}03^m

Particle fluxes and associated phenomena



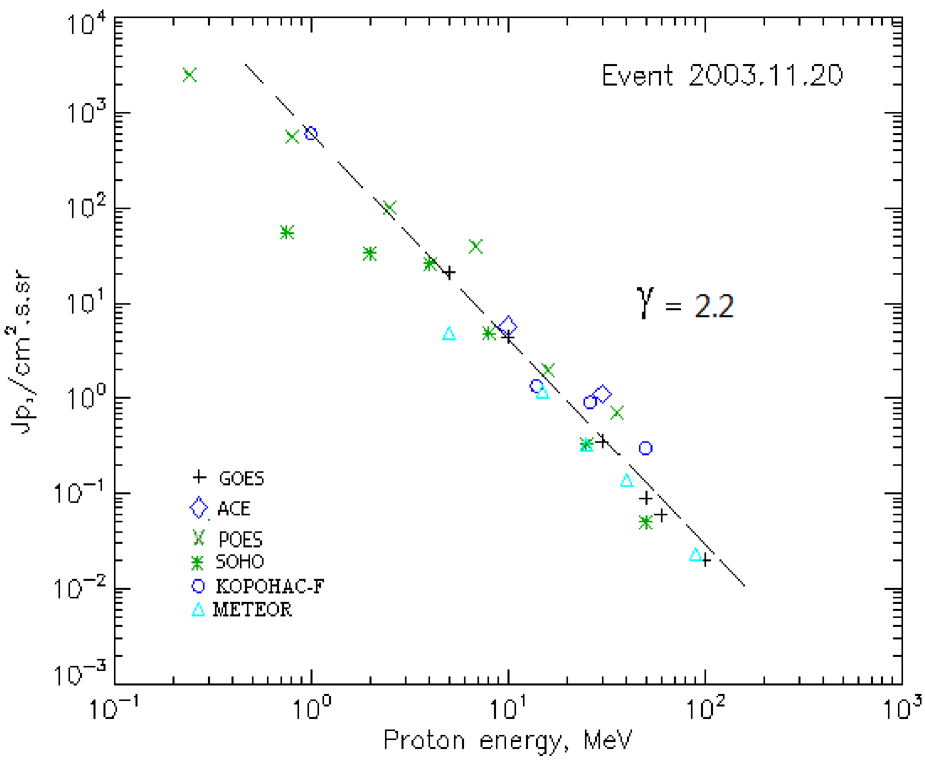
Time profiles of the proton fluxes for the event of 2003 November 20





Arrows on the profiles of the events indicate the time of the proton flux maxima, taken to build the proton spectra (see below)

Integral time-of-maximum proton spectrum



Integral fluxes of protons for the event of 2003 November 20

S/c, instruments	Ep, MeV	To	Tmax	Jmax, $(cm^2.s.sr)^{-1}$	Dura-tion	Comments
GOES-10						
EPS	>5	06^h	11^h	21.2	1d	
EPS	>10	08^h	11^h	4.4	1d	
EPS	>30	08^h	11^h	0.35	1d	
EPS	>50	09^h	11^h	0.09	1d	
EPS	>60	09^h	10^h	0.06	1d	
EPS	>100	09^h	10^h	0.02	1d	
METEOR						
CBM	>5	08^h	11^h	4.8	1d	
CBM	>10	09^h	11^h	1.16	0.7d	
CBM	>25	10^h	12^h	0.32	0.7d	
CBM	>40	10^h	12^h	0.14	0.5d	
BP	>90	09^h	10^h	0.023	0.3d	
ChD	>600					
POES-16						
MEPED	>0.24	-	12^h	2570	1d	
MEPED	>0.8	-	12^h	550	1d	
MEPED	>2.5	-	12^h	110	1d	
MEPED	>6.9	-	12^h	40	1d	
MEPED	>16	-	12^h	2	1d	
MEPED	>36	-	12^h	0.7	1d	
MEPED	>70	-	-	-	-	
MEPED	>140	-	-	-	-	

CORONAS F						
MKL	>1.	-	12^h	660	1d	
MKL	>14	-	12^h	1.35	1d	
MKL	>26	-	12^h	0.9	1d	
MKL	>50	-	12^h	0.3	1d	
ACE						
SIS	>10	08^h	10^h	5.7	1d	
SIS	>30	08^h	10^h	1.1	1d	
SOHO						
EPHIN (INT)	>50	08^h	09^h	0.05	0.5d	

Differential fluxes of protons for the event of 2003 November 20

S/c, instruments	ΔE, MeV	To	Tmax	Jmax, $(cm^2.s.sr.MeV)^{-1}$	Dura-tion	Comments
SOHO						
LION	0.75-2	01^h	11^h	17.5	1d	
LION	2-6	02^h	11^h	2.5	1d	
EPHIN	4-8	07^h	10^h	5.3	1d	
EPHIN	8-25	07^h	10^h	0.26	1d	
EPHIN	25-41	08^h	10^h	0.01	1d	
EPHIN	41-53	- “ -	- “ -	- “ -	- “ -	

References:

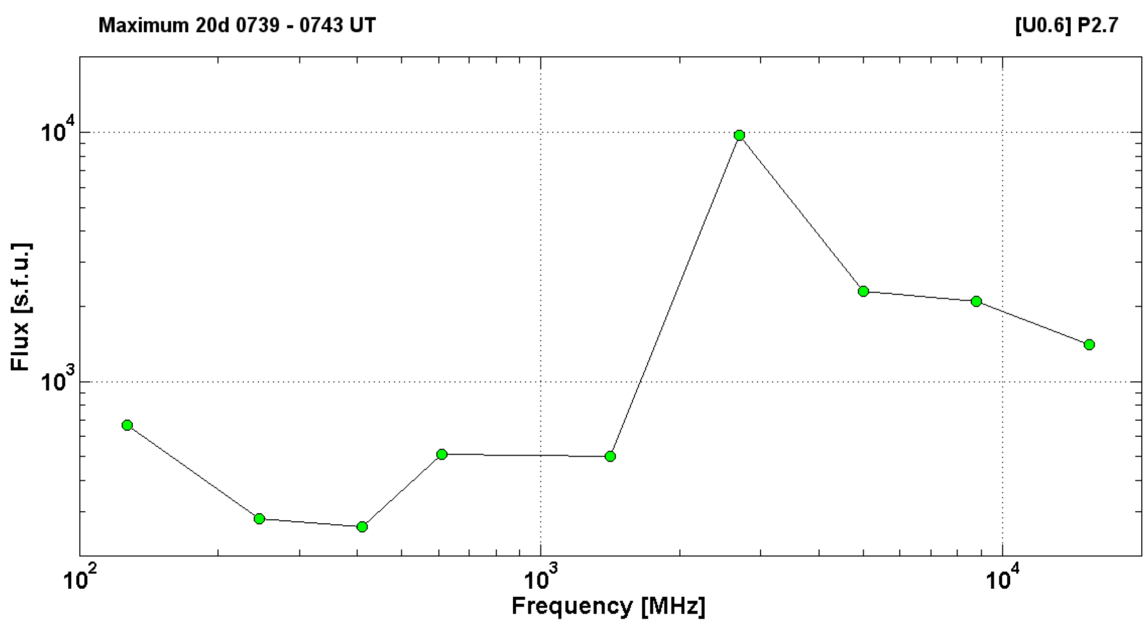
Kuwabara T., J.W. Bieber, J. Clem et al., 2006.

Electromagnetic and other phenomena that are sources and/or accompanying for the event of 2003 November 20

2003 November 20 ● AR10501 To event 444

Hα	6563Å	0738	0740	0836	N01W08	2B	FH
1 – 12	keV	0735	0747	0753		M9.6	6.0E-2
12-25	keV	071104	071254	071624		82992	RHESSI
12-25	keV	080008	080050	082704		335064	RHESSI
12-25	keV	082704	082842	082842		19262	RHESSI
50–150	keV	0803		0816			SONG F
0.5–1.3	MeV						SONG F

15.4	GHz	0738.0	0740.0	0753.0		3.15	
8.8	GHz	0737.0	0740.0	0757.0		3.32	
5	GHz	0737.0	0739.0	0754.0		3.36	
2.7	GHz	0736.0	0739.0	0749.0	[U0.6] P2.7	3.99	
1.4	GHz	0737.0	0739.0	0744.0		2.70	
610	MHz	0735.0	0740.0	0742.0		2.71	
410	MHz	0735.0	0743.0	0745.0		2.41	
245	MHz	0738.0	0739.0	0745.0		2.45	
127	MHz	0735.7	0739.7	0744.0		2.83	
DS IV	25-113	0741		0900		1	
DS I	50-270	0739		0743	GG,DC	2	
DS I	200-400	~0758		~1442	S,N	2	
DS III	18-700	0736		0743	G	3	
DS III	25-180	0748		1506	N	2	
DS III	40-400	<0752		~0843	CG,N	2	
DS V	25-180	0738		0741		3	
DS CONT	25-270	0738		~0744		2	
CME	WL	0806	0669 km/s	-23.8km/s^2	360º	219º	



Event 2003.11.21 – (2003-325) **№ 445**

Particle event: To(Ep>10 MeV) – 21d08^h

Tmax(Ep>10 MeV) – 22d02^h, Jmax (Ep>10 MeV) – 10.7 /cm^2.s.sr

Duration of the event – 4 days

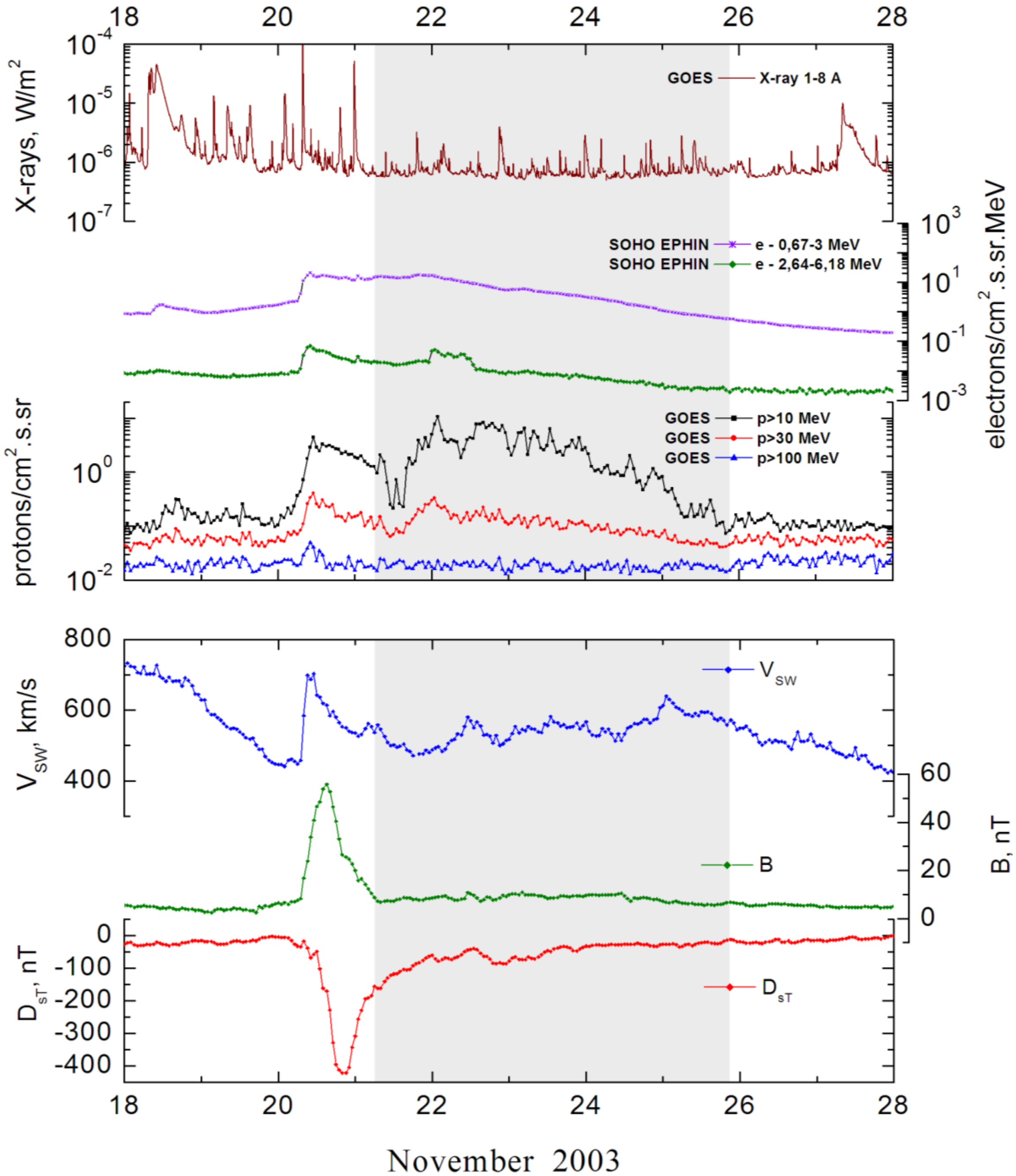
Quasimaximal energy of protons in the event – Eqm = 80 MeV

Sources: ● solar flare 20d23^{h}42^m, M5.8/2B, N02W17, AR10501

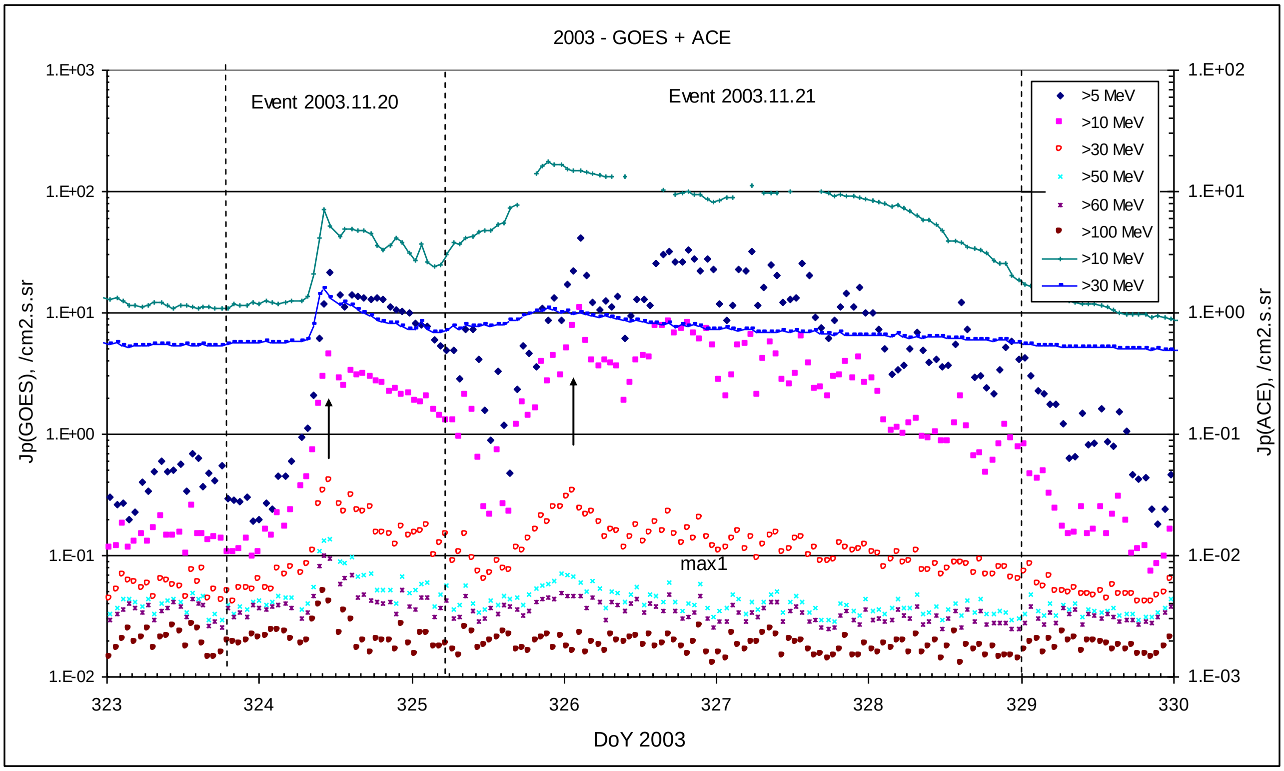
Main X-ray burst 1-8 Å: onset – 20d23^{h}42^m, max – 20d23^{h}53^m, Φ = 0.028 J/m^2

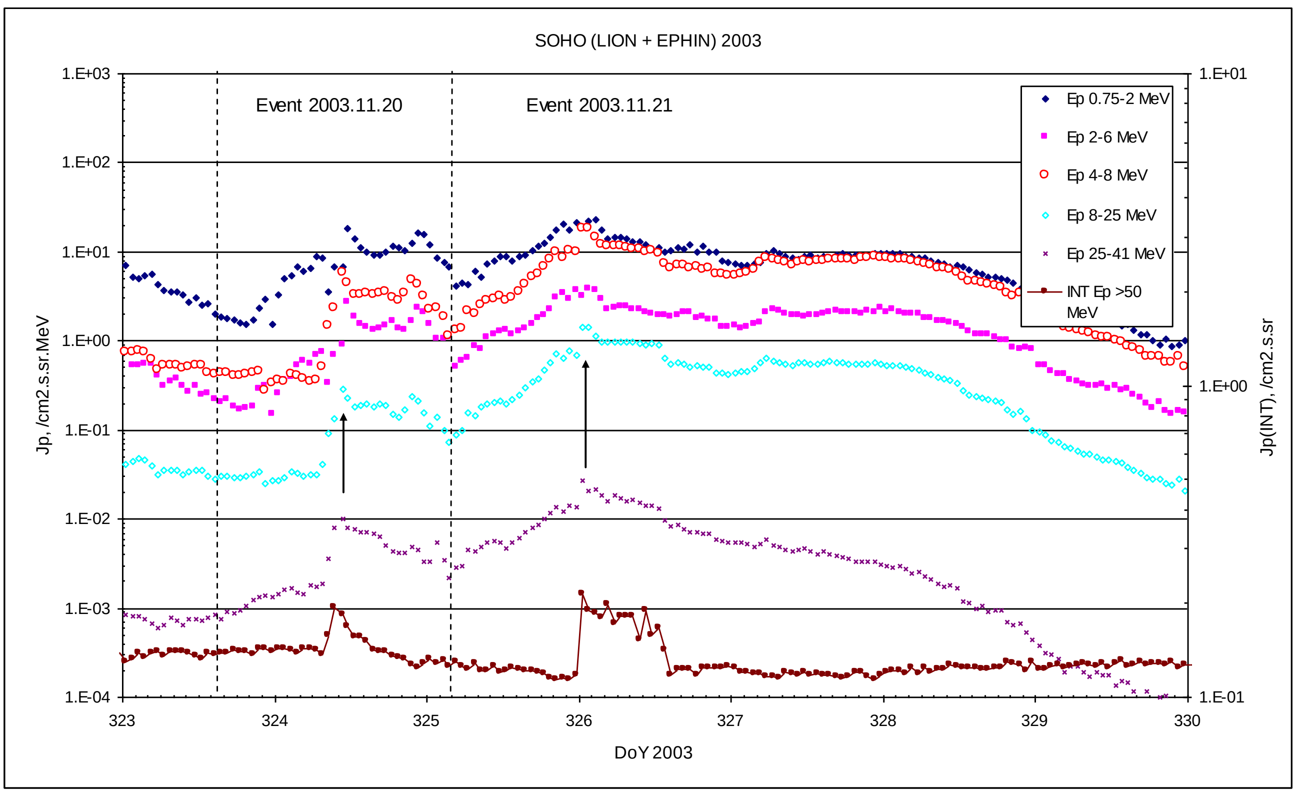
CME: 21d00^{h}26^m; V = 494 km/s; Δφ = 052^o; dA = 237^o

Particle fluxes and associated phenomena



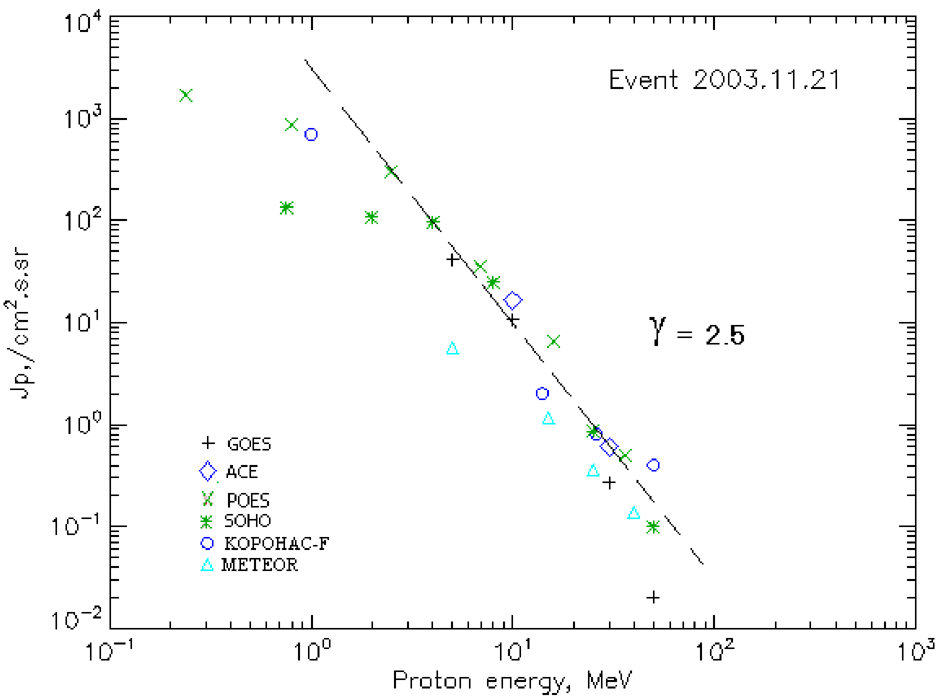
Time profiles of the proton fluxes for the event of 2003 November 21





Arrows on the profiles of the events indicate the time of the proton flux maxima, taken to build the proton spectra (see below)

Integral time-of-maximum proton spectrum



Integral fluxes of protons for the event of 2003 November 21

S/c, instruments	Ep, MeV	To	Tmax	Jmax, $(cm^2.s.sr)^{-1}$	Dura-tion	Comments
GOES-10						
EPS	>5	08^h	$22d02^h$	41	5d	
EPS	>10	08^h	$22d02^h$	11	4d	
EPS	>30	08^h	$22d01^h$	0.3	3d	
EPS	>50	08^h	$22d01^h$	0.02	2d	
EPS	>60	-	-	-	-	
EPS	>100	-	-	-	-	
METEOR						
CBM	>5	08^h	$22d00^h$	5.7	3d	
CBM	>10	09^h	$22d00^h$	1.17	2d	
CBM	>25	09^h	$22d00^h$	0.36	1.5d	
CBM	>40	09^h	$22d00^h$	0.14	1d	
BP	>90	-	-	-	-	
ChD	>600	-	-	-	-	
POES-16						
MEPED	>0.24	-	23^h	1740	5d	
MEPED	>0.8	-	23^h	870	5d	
MEPED	>2.5	-	23^h	320	5d	
MEPED	>6.9	-	23^h	35	4d	
MEPED	>16	-	23^h	6.5	3d	
MEPED	>36	-	23^h	0.5	2d	
MEPED	>70	-	-	-	-	
MEPED	>140	-	-	-	-	

CORONAS F						
MKL	>1.	-	24^h	720	5d	
MKL	>14	-	24^h	2	4d	
MKL	>26	-	24^h	0.8	3d	
MKL	>50	-	24^h	0.4	2d	
ACE						
SIS	>10	08^h	24^h	16.5	4d	
SIS	>30	07^h	24^h	0.6	1d	
SOHO						
EPHIN (INT)	>50	23^h	$22d01^h$	0.1	0.3d	

Differential fluxes of protons for the event of 2003 November 21

S/c, instruments	ΔE, MeV	To	Tmax	Jmax, $(cm^2.s.sr.MeV)^{-1}$	Dura-tion	Comments
SOHO						
LION	0.75-2	08^h	$22d03^h$	22	5d	
LION	2-6	08^h	$22d02^h$	3.8	5d	
EPHIN	4-8	07^h	$22d02^h$	17.8	5d	
EPHIN	8-25	07^h	$22d02^h$	1.4	5d	
EPHIN	25-41	07^h	$22d01^h$	0.027	5d	
EPHIN	41-53	- " -	- " -	- " -	- " -	

References:

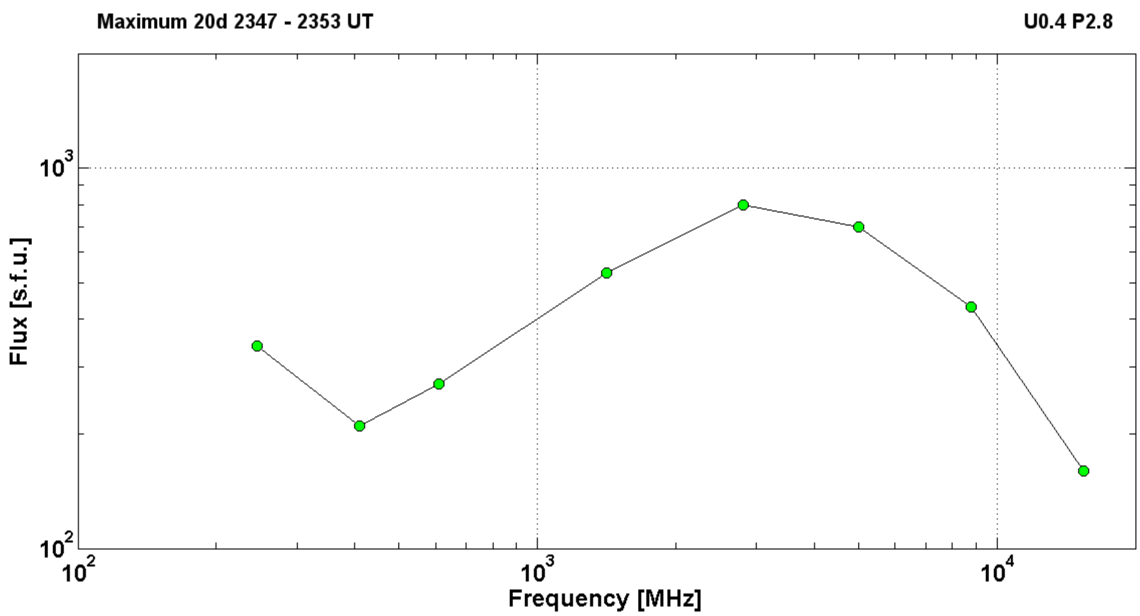
Kuwabara T., J.W. Bieber, J. Clem, et.al., 2006.

Electromagnetic and other phenomena that are sources and/or accompanying for the event of 2003 November 21

2003 November 21 ● AR10501 To event 445

Hα	6563 Å	2346	2354	0031	N02W17	2B	F
1 – 12	keV	2342	2353	2358		M5.8	2.8E-02
6–12	keV	235628	235754	000248		35568	RHESSI
6–12	keV	000852	000918	001024		5400	RHESSI
6–12	keV	002024	002514	003420		89832	RHESSI
12-25	keV	003420	004854	005416		530784	RHESSI

15.4	GHz	2352.0	2353.0	2354.0		2.20	
8.8	GHz	2346.0	2348.0	2355.0		2.63	
5	GHz	2346.0	2348.0	0000.0		2.85	
2.8	GHz	2345.0	2349.0	2357.0	U0.4 P2.8	2.90	
1.4	GHz	2346.0	2349.0	2352.0		2.72	
610	MHz	2346.0	2347.0	2351.0		2.43	
410	MHz	2348.0	2348.0	0000.0		2.32	
245	MHz	2345.0	2348.0	0000.0		2.53	
DS III	18-1400	2347		2351	G	3	
DS III	18-420	2352		2354	G	3	
DS III	18-50	2356		2356	B	3	
DS III	25-180	2356		0248	N	1	
DS III	18-1000	0025		0030	G	3	
CME	WL	0026	0494 km/s	-3.3 km/s^2	052º	237º	

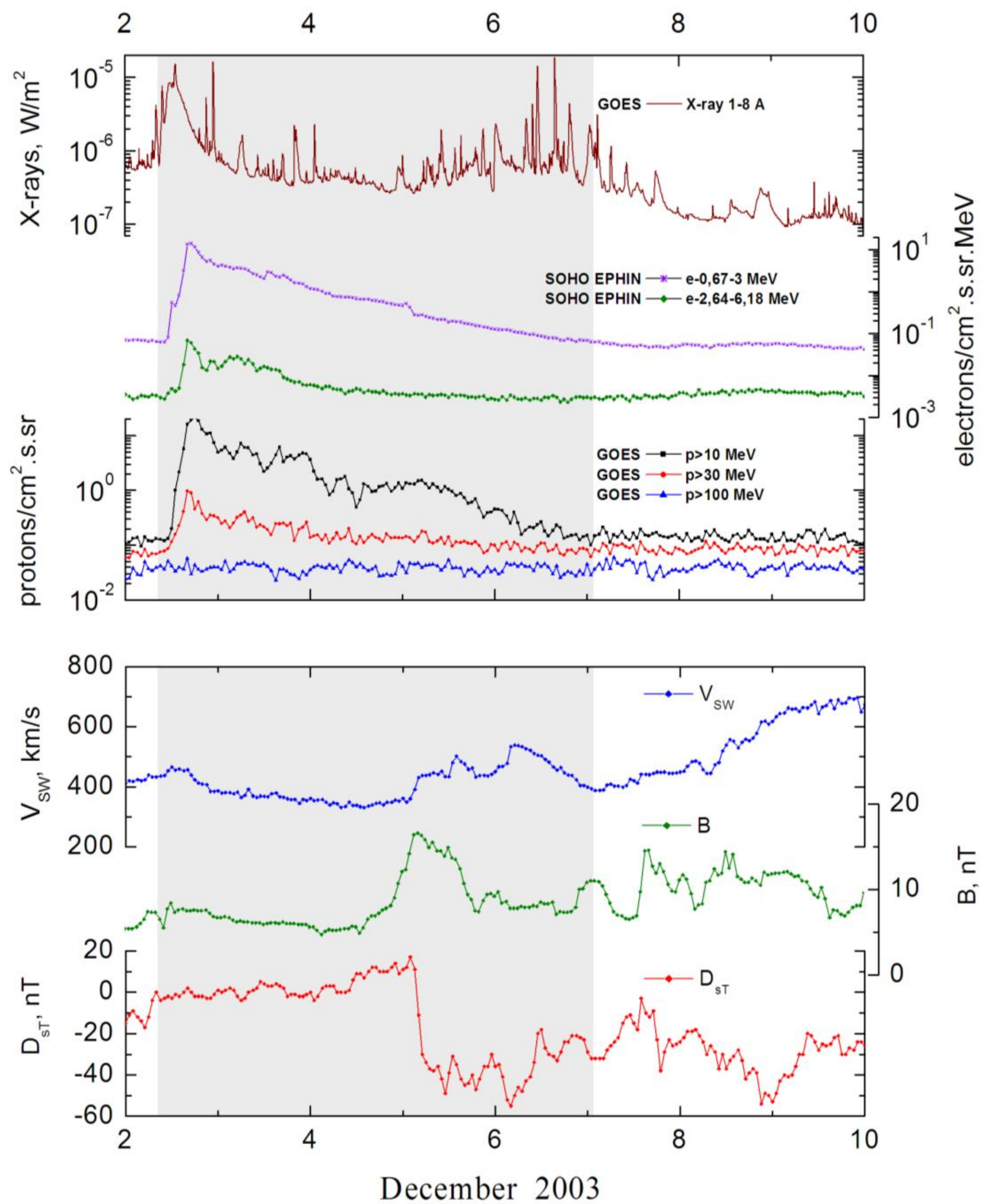


Event 2003.12.02 – (2003-336) **№ 446**

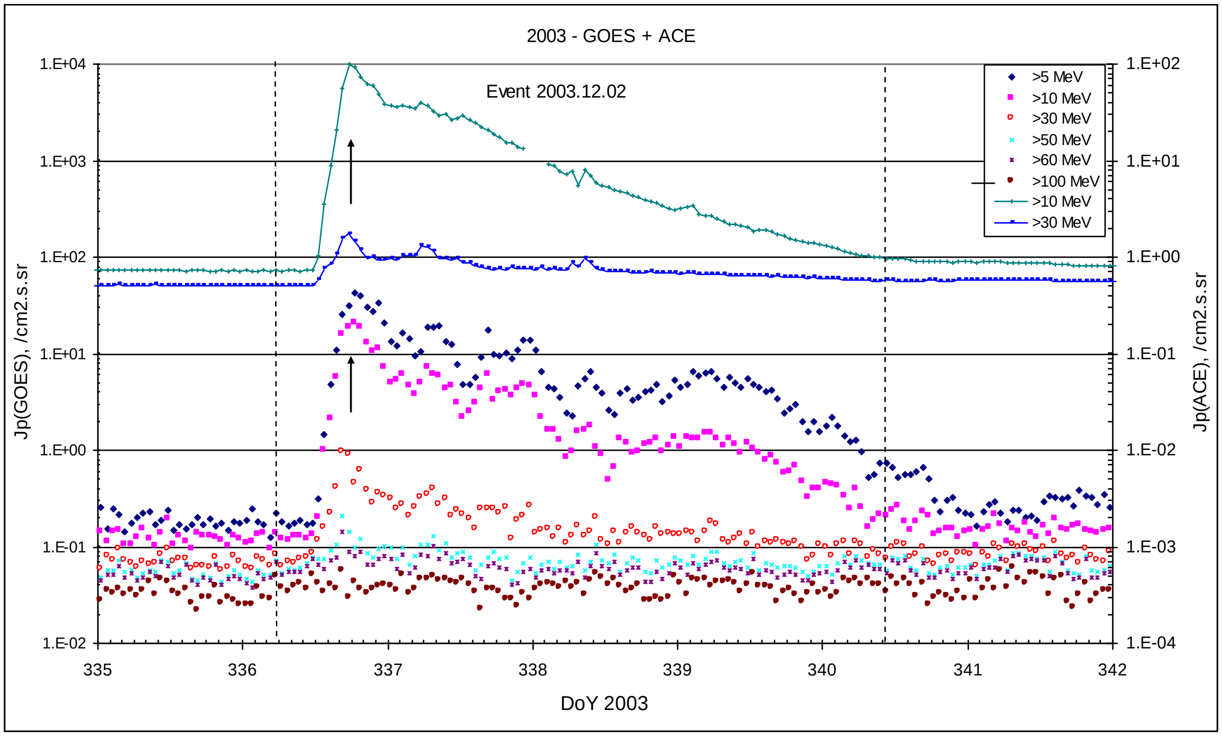
Particle event: To(Ep>10 MeV) – 02d12^h
Tmax(Ep>10 MeV) – 02d18^h, Jmax (Ep>10 MeV) – 21 /cm^2.s.sr
Duration of the event – 4.5 days
Quasimaximal energy of protons in the event – Eqm = 100 MeV

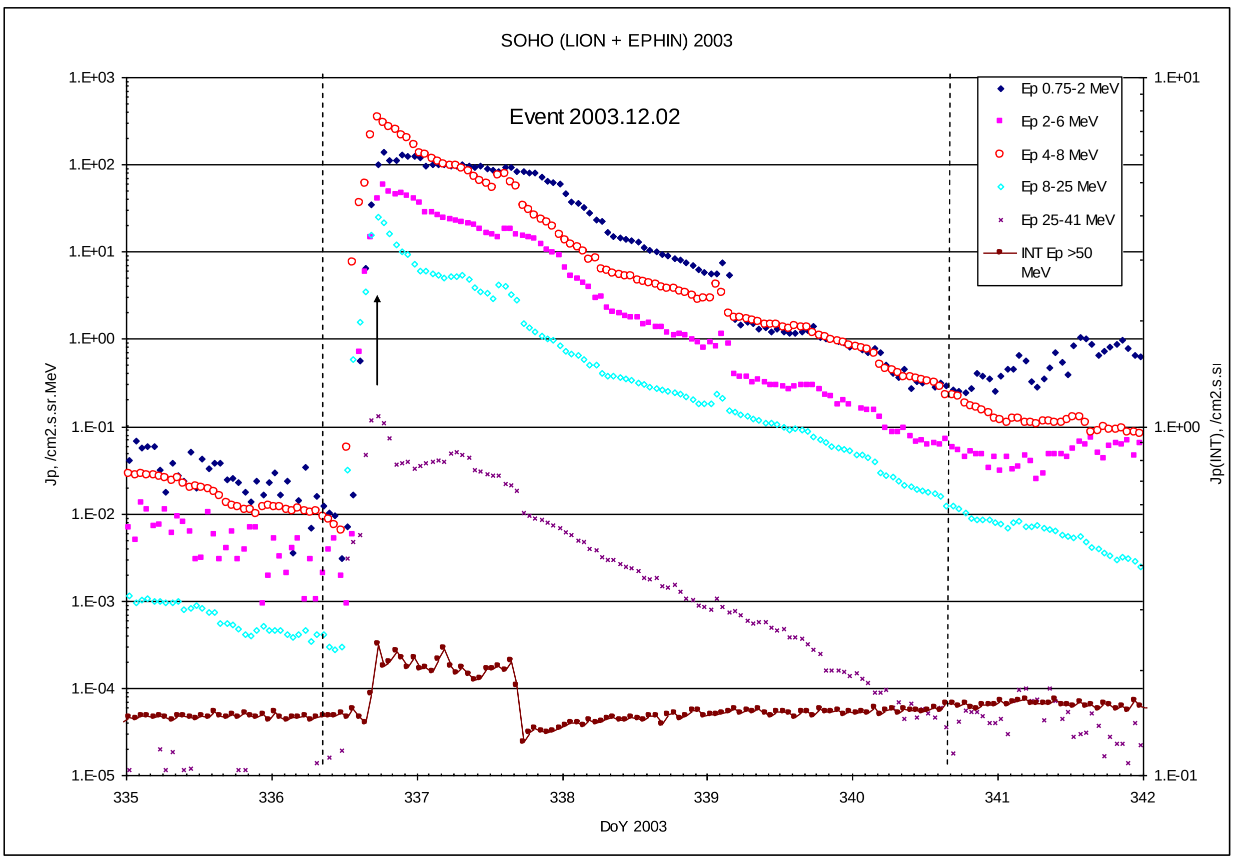
Sources: ʘ solar flare 02d09^{h}40^m, C7.2/…, s19w90* AR10508
Main X-ray burst 1-8 Å: onset – 02d09^{h}40^m, max – 02d09^{h}47^m, Φ = 0.0051 J/m^2
CME: 02d10^{h}50^m, V = 1393 km/s, Δφ = 150^o, dA = 267º
* − probable localization of the flare event

Particle fluxes and associated phenomena



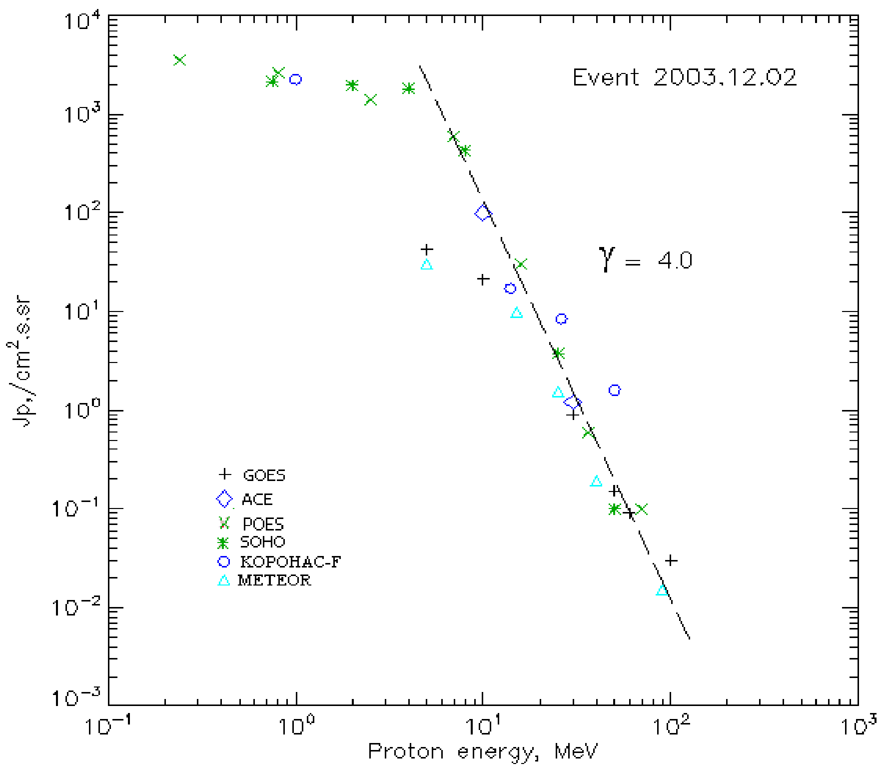
Time profiles of the proton fluxes for the event of 2003 December 02





Arrows on the profiles of the events indicate the time of the proton flux maxima, taken to build the proton spectra (see below)

Integral time-of-maximum proton spectrum



Integral fluxes of protons for the event of 2003 December 02

S/c, instruments	Ep, MeV	To	Tmax	Jmax, $(cm^2.s.sr)^{-1}$	Dura-tion	Comments
GOES-10						
EPS	>5	12^h	18^h	42.6	5d	
EPS	>10	12^h	18^h	21	4.5d	
EPS	>30	12^h	16^h	0.9	3d	
EPS	>50	10^h	16^h	0.15	2d	
EPS	>60	10^h	16^h	0.09	2d	
EPS	>100	-	16^h	0.03	-	
METEOR						
CBM	>5	13^h	17^h	30.4	3d	
CBM	>10	13^h	17^h	9.9	3d	
CBM	>25	13^h	17^h	1.56	1.5d	
CBM	>40	13^h	16^h	0.19	1d	
BP	>90	13^h	15^h	0.015	0.5d	
ChD	>600	-	-	-	-	
POES-16						
MEPED	>0.24	-	18^h	3520	5d	
MEPED	>0.8	-	17^h	2610	5d	
MEPED	>2.5	-	17^h	1420	5d	
MEPED	>6.9	-	17^h	630	4.5d	
MEPED	>16	-	17^h	30	3d	
MEPED	>36	-	17^h	0.6	2d	
MEPED	>70	-	17^h	0.1	2d	
MEPED	>140	-	-	-	-	

CORONAS F						
MKL	>1.	-	22^h	2250	5d	
MKL	>14	-	17^h	17	4.5d	
MKL	>26	-	17^h	8.4	3d	
MKL	>50	-	17^h	1.6	2d	
ACE						
SIS	>10	12^h	17^h	98.5	4d	
SIS	>30	12^h	17^h	1.2	3d	
SOHO						
EPHIN (INT)	>50	16^h	17^h	0.1	1d	

Differential fluxes of protons for the event of 2003 December 02

S/c, instruments	ΔE, MeV	To	Tmax	Jmax, $(cm^2.s.sr.MeV)^{-1}$	Dura-tion	Comments
SOHO						
LION	0.75-2	12^h	18^h	140	4.5d	
LION	2-6	12^h	18^h	58	4.5d	
EPHIN	4-8	12^h	17^h	342	4d	
EPHIN	8-25	12^h	17^h	25.1	4d	
EPHIN	25-41	12^h	17^h	0.13	4d	
EPHIN	41-53	- “ -	- “ -	- “ -	- “ -	

Electromagnetic and other phenomena that are sources and/or accompanying for the event of 2003 December 02

2003 December 02 ⊙ AR10508 To event 446

Hα	6563 Å	No Flare			s19w90		
1 – 12	keV	0940	0948	0954		C7.2	5.1E-3
12-25	keV	094524	094602	100316		412771	RHESSI
9.1	GHz	0942.9	0943.6	0945.0		1.11	
3	GHz	0943.0	0943.9	0944.9		1.72	
245	MHz	0943.0	0943.0	~0943.0		1.93	
DS I	170-270	0943		0944	GG,DC	2	
DS III	180-300	0943		0944	GG	1	
DS DCIM	2098-4500	0936		0944	G	1	
CME	WL	1050	1393 km/s	18.5 km/s^2	150º	267º	

* − probable localization of the flare event

События 2004 г.

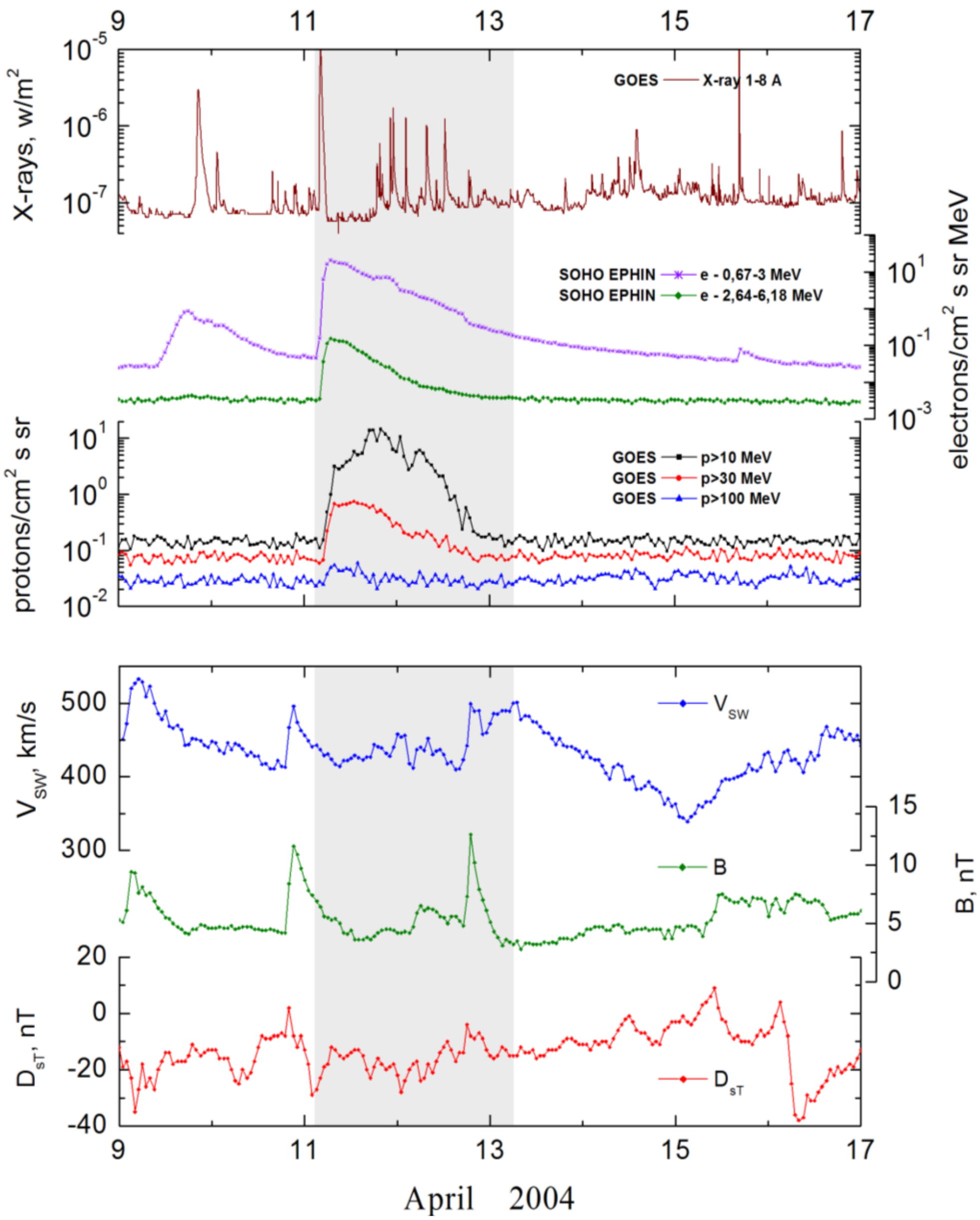
			Стр.
1.	Event 2004.04.11 – (2004-102)	№ 447	586
2.	Event 2004.07.22 – (2003-204)	№ 448	591
3.	Event 2004.07.23 – (2003-205)	№ 449	596
4.	Event 2004.07.25 – (2004-207)	№ 450	601
5.	Event 2004.08.01 – (2004-214)	№ 451	606
6.	Event 2004.09.13 – (2004-257)	№ 452	610
7.	Event 2004.09.19 – (2004-263)	№ 453	615
8.	Event 2004.11.01 – (2004-306)	№ 454	620
9.	Event: 2004.11.07 – (2004-312)	№ 455	624
10.	Event 2004.11.10 – (2004-315)	№ 456	629

Event 2004.04.11 – (2004-102) **№ 447**

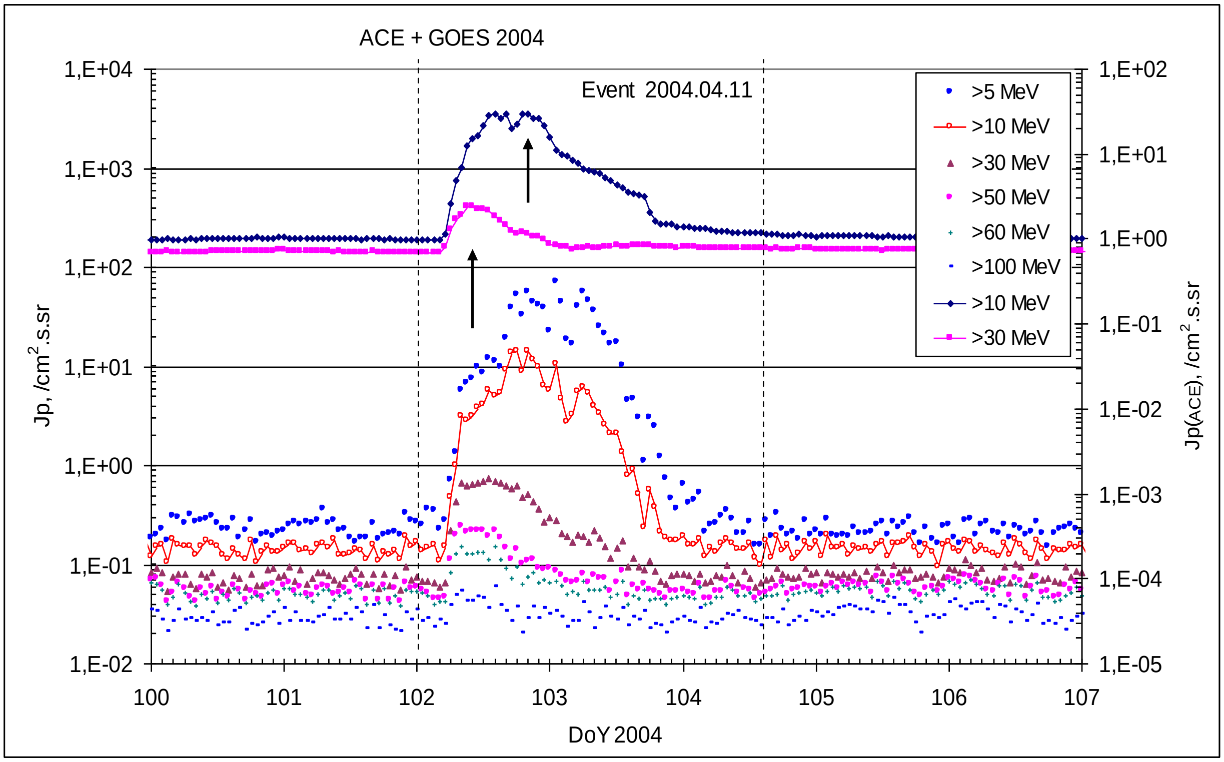
Particle event: To(Ep>10MeV) – 11d06^h
Tmax$_1$(Ep>10MeV) – 11d12^h, Jmax$_1$(Ep>10MeV) – 13 /cm^2.s.sr
Tmax$_2$(Ep>10MeV) – 11d20^h, Jmax$_2$(Ep>10MeV) – 14.5 /cm^2.s.sr
Duration of the event – 2 days
Quasimaximal energy of protons in the event – Eqm$_1$= 95 MeV
– Eqm$_2$ = 80 MeV

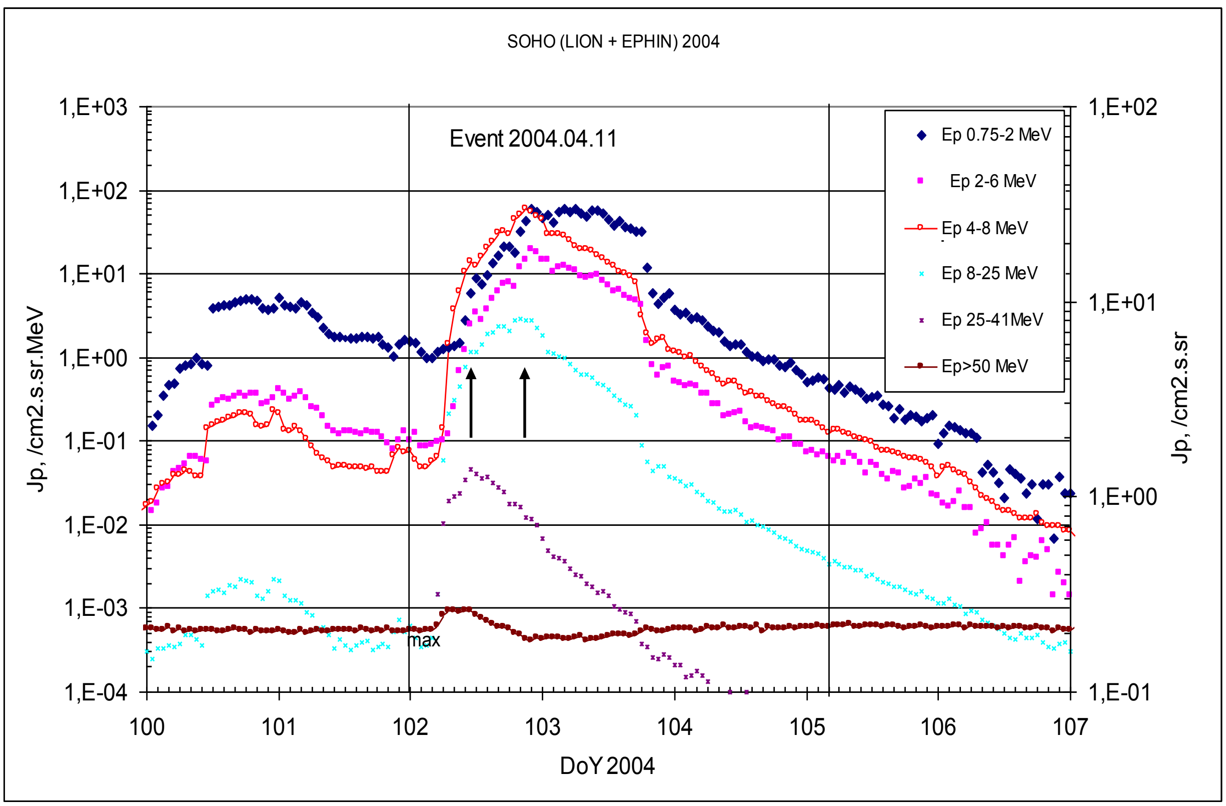
Sources: ● solar flare 11d03^{h}54^m, C9.6/1F, S14W47, AR10588
Main X-ray burst 1-8 Å: onset – 11d03^{h}54^m, max – 11d04^{h}19^m, Φ = 0.013 J/m^2
CME: 11d04^{h}30^m, V = 1645 km/s, Δφ = 314^o, dA = 237˚
Ø CME 11d11^{h}54^m, V = 1132 km/s, Δφ = 360^o, dA = 295˚ - back side event

Particle fluxes and associated phenomena



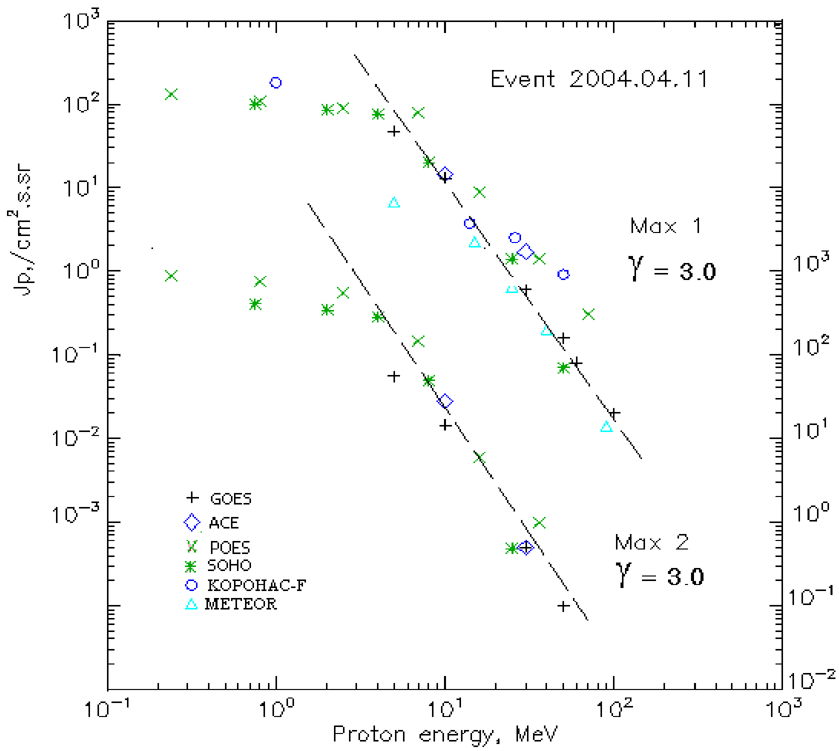
Time profiles of the proton fluxes for the event of 2004 April 11





Arrows on the profiles of the events indicate the time of the proton flux maxima, taken to build the proton spectra (see below)

Integral time-of-maximum proton spectrum



Integral fluxes of protons for the event of 2004 April 11

S/c, instruments	Ep, MeV	To	Tmax	Jmax, $(cm^2.s.sr)^{-1}$	Dura-tion	Comments
GOES-10						
EPS	>5	06^h	$19^h/20^h$	47/56.5	2d	
EPS	>10	06^h	$12^h/20^h$	13/14.5	2d	
EPS	>30	06^h	$12^h/20^h$	0.6/0.5	2d	
EPS	>50	06^h	$11^h/20^h$	0.16/0.1	1d	
EPS	>60	06^h	11^h/ -	0.08/ -	1d	
EPS	>100	06^h	10^h/ -	0.02/ -	1d	
METEOR						
CBM	>5	05^h	15^h/ -	6.65/ -	3d	
CBM	>15	05^h	13^h/ -	2.2./ -	2d	
CBM	>25	06^h	13^h/ -	0.65/ -	2d	
CBM	>40	06^h	13^h/ -	0.2/ -	1d	
BP	>90	06^h	13^h/ -	0.014/ -	1d	
ChD	>600	-	-	-	-	
POES-16						
MEPED	>0.24	06^h	$12^h/20^h$	130/880	3d	
MEPED	>0.8	06^h	$12^h/20^h$	110/770	3d	
MEPED	>2.5	06^h	$12^h/20^h$	90/550	2d	
MEPED	>6.9	06^h	$12^h/20^h$	80/150	2d	
MEPED	>16	06^h	$12^h/20^h$	9/6	1d	
MEPED	>36	06^h	$12^h/20^h$	1.4/1	1d	
MEPED	>70	-	11^h/ -	0.3/ -	-	
MEPED	>140	-	-	-	-	

CORONAS F						
MKL	>1.	-	13^h/ -	180/ -	3d	
MKL	>14	-	13^h/ -	3.7/ -	2d	
MKL	>26	-	13^h/ -	2.5/ -	2d	
MKL	>50	-	13^h/ -	0.9/ -	1d	
ACE						
SIS	>10	05^h	$10^h/20^h$	14.3/28.2	2d	
SIS	>30	05^h	$10^h/20^h$	1.7/0.5	1d	
SOHO						
EPHIN (INT)	>50	05^h	11^h/ -	0.07/ -	2d	

Differential fluxes of protons for the event of 2004 April 11

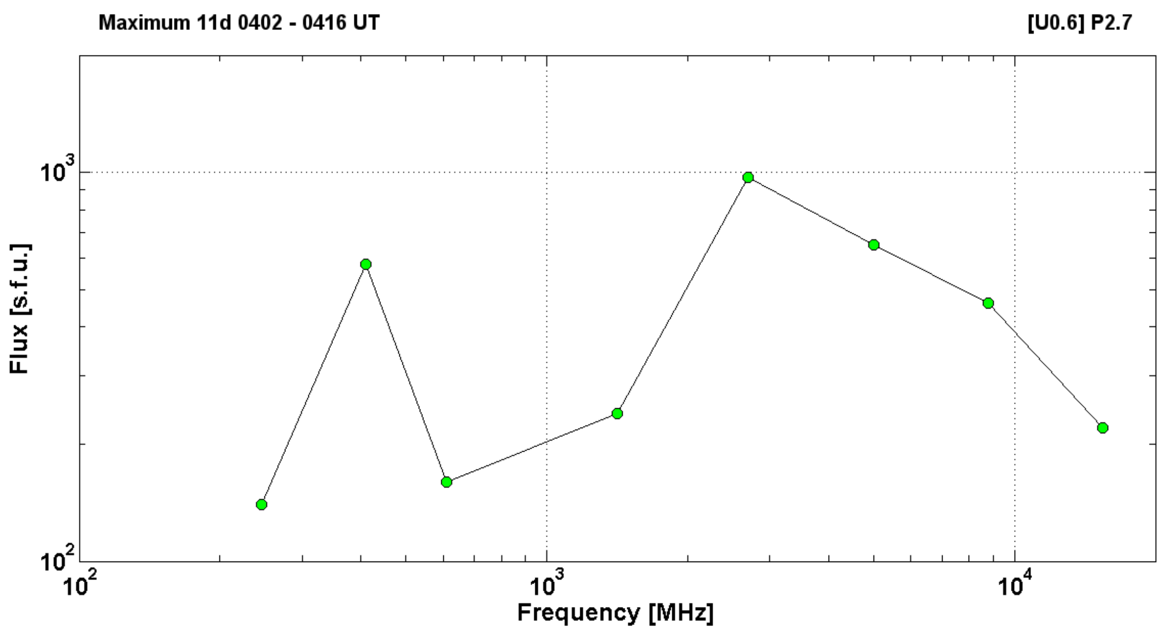
S/c, instruments	ΔE, MeV	To	Tmax	Jmax, $(cm^2.s.sr.MeV)^{-1}$	Dura-tion	Comments
SOHO						
LION	0.75-2	06^h	$12^h/22^h$	8.9/59.2	5d	
LION	2-6	06^h	$12^h/22^h$	3.3/19.2	5d	
EPHIN	4-8	05^h	$11^h/21^h$	13.8/59.1	5d	
EPHIN	8-25	05^h	$11^h/20^h$	1.1/2.9	5d	
EPHIN	25-41	05^h	$11^h/19^h$	0.047/0.017	4d	
EPHIN	41-53	- " -	- " -	- " -	- " -	

Electromagnetic and other phenomena that are sources and/or accompanying for the event of 2004 April 11

2004 April 11 ● AR10588 To event 447

Hα	6562 Å	0400	0421	0451	S14W47	1F	EF
DSF	Hα	~0307		0400	S18W50	16º	
1 – 12	keV	0354	0419	0435		C9.6	1.3E-2
50-100	keV	040632	041542	044344		937728	RHESSI
50-150	keV	0413		0418			SONG F
150-500	keV						SONG F
0.18-0.7	MeV						SONG F

15.4	GHz	0412.0	0415.0	0428.0		2.34	
8.8	GHz	0411.0	0415.0	0000.0		2.66	
5	GHz	0411.0	0416.0	0425.0		2.81	
2.7	GHz	0410.0	0415.0	0424.0	[U0.6] P2.7	2.99	
1.4	GHz	0407.0	0407.0	0000.0		2.38	
610	MHz	0400.0	0402.0	0404.0		2.20	
410	MHz	0411.0	0413.0	0415.0		2.76	
245	MHz	0408.0	0410.0	0411.0		2.15	
DS III	18-700	0358		0425	GG	3	
CME	WL	0430	1645 km/s	-77.6 km/s^2	314º	237º	

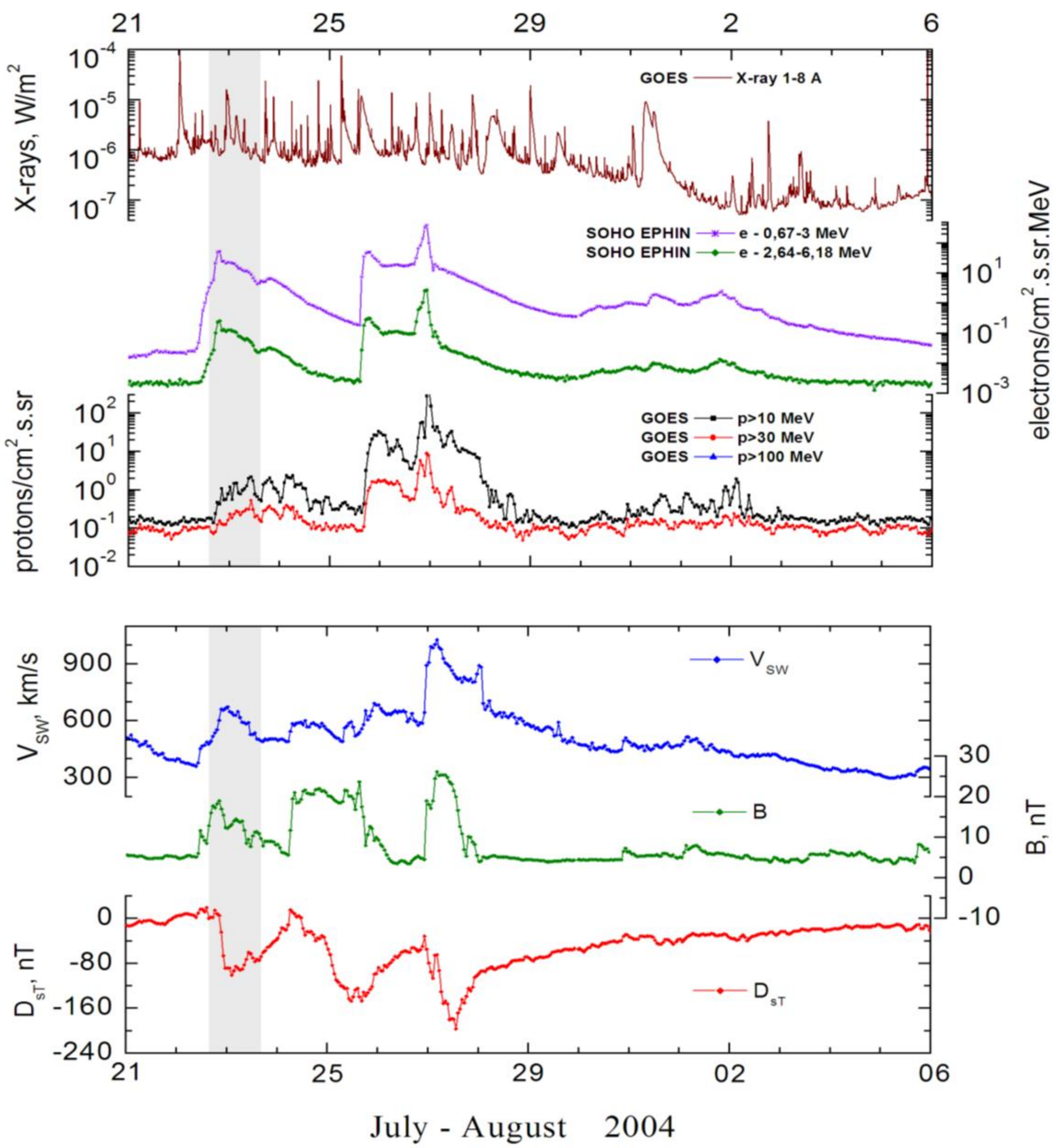


Event 2004.07.22 – (2003-204) **№ 448**

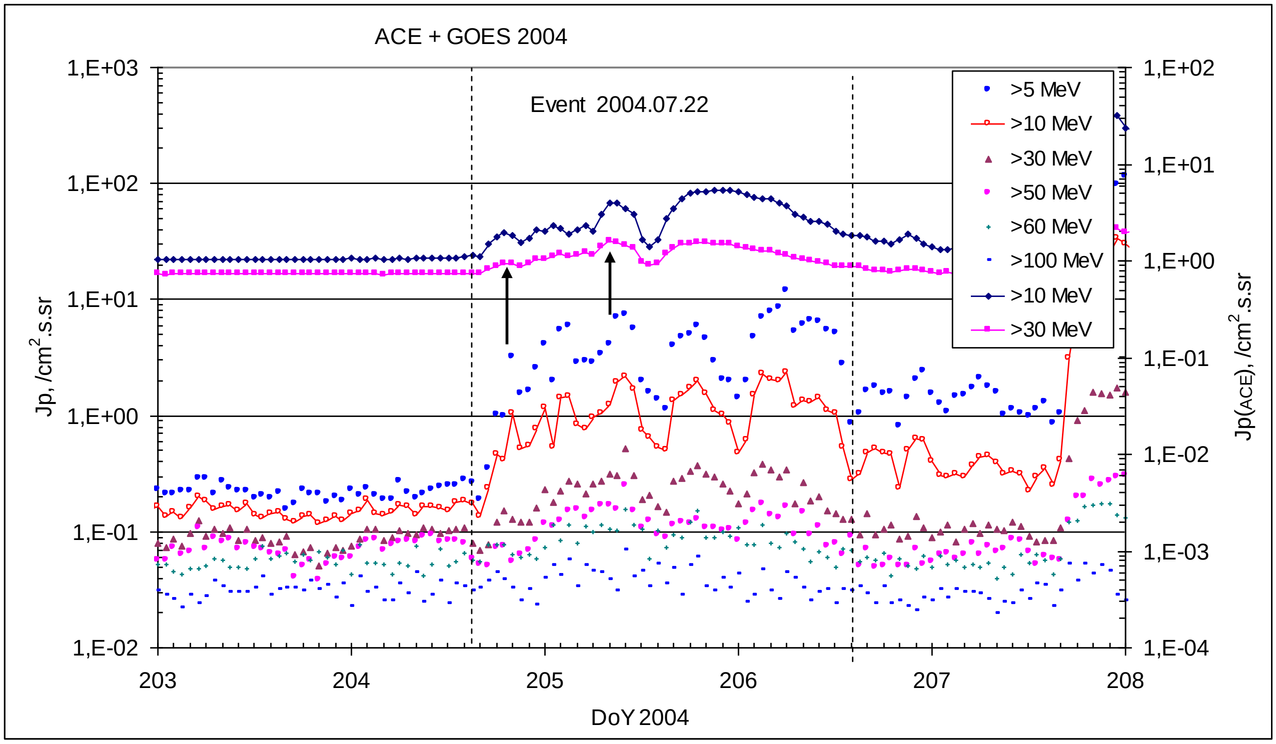
Particle event: To(Ep>10MeV) – 22d17^h
Tmax$_1$(Ep>10MeV) – 22d20^h, Jmax$_1$(Ep>10MeV) – 0.9 /cm^2.s.sr
Tmax$_2$(Ep>10MeV) – 23d10^h, Jmax$_2$(Ep>10MeV) – 2 /cm^2.s.sr
Duration of the event – 1 day
Quasimaximal energy of protons in the event – Eqm$_1$ = 70 MeV
– Eqm$_2$ = 155 MeV

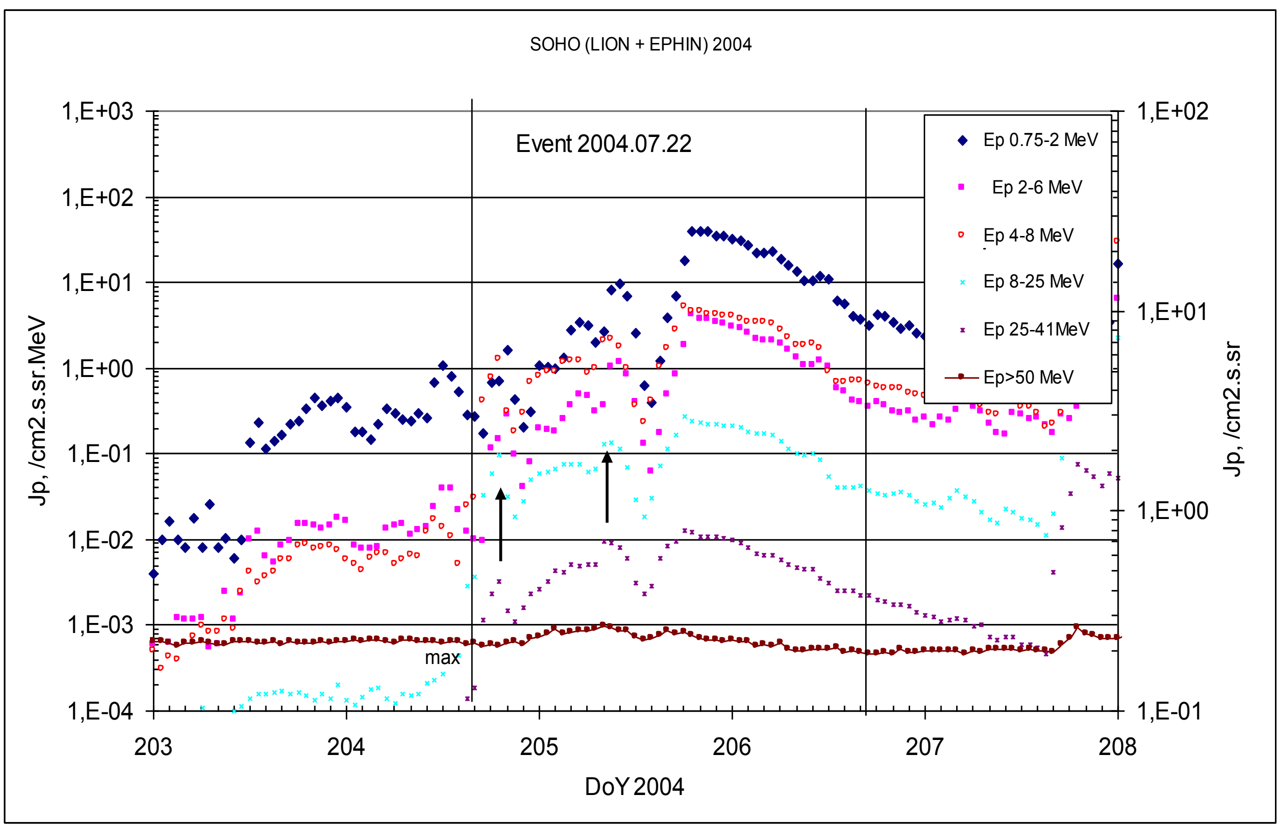
Sources: ☉ solar flare 22d00^{h}14^m, M9.1/SB, n06e25*, AR10652
Main X-ray burst 1-8 Å: onset – 22d00^{h}14^m, max – 22d00^{h}32^m, Φ = 0.079 J/m^2
CME: 22d01^{h}32^m, V = 0492 km/s, Δφ = 083^o, dA = 180°
▲SC 24d06^{h}13^m
* − probable localization of the flare event

Particle fluxes and associated phenomena



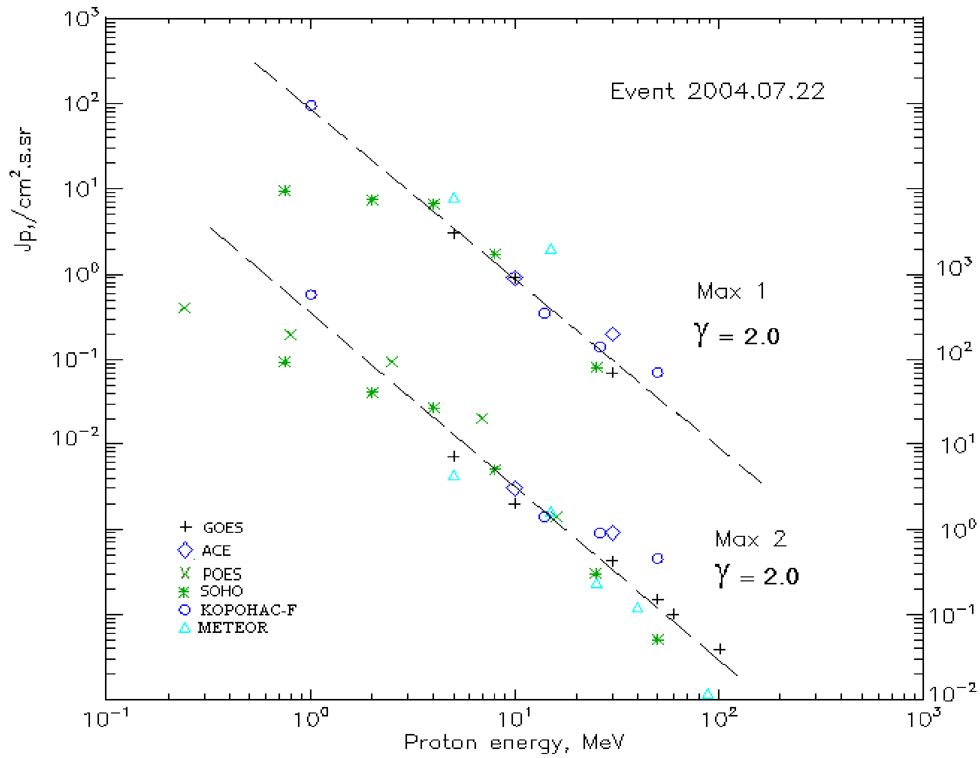
Time profiles of the proton fluxes for the event of 2004 July 22





Arrows on the profiles of the events indicate the time of the proton flux maxima, taken to build the proton spectra (see below)

Integral time-of-maximum proton spectrum



Integral fluxes of protons for the event of 2004 July 22

S/c, instruments	Ep, MeV	To	Tmax	Jmax, $(cm^2.s.sr)^{-1}$	Dura-tion	Comments
GOES-10						
EPS	>5	17^h	$20^h/23d10^h$	3/7.1	1d	
EPS	>10	17^h	$20^h/23d10^h$	0.9/2	1d	
EPS	>30	17^h	$19^h/23d10^h$	0.07/0.42	1d	
EPS	>50	17^h	- $/23d10^h$	- /0.15	1d	
EPS	>60	17^h	- $/23d10^h$	- /0.1	1d	
EPS	>100	-	- $/23d10^h$	- /0.04	-	
METEOR						
CBM	>5	11^h	$20^h/23d11^h$	8/4.3	1d	
CBM	>15	11^h	$20^h/23d09^h$	2/1.6	1d	
CBM	>25	22^h	- $/23d09^h$	- /0.23	1d	
CBM	>40	22^h	- $/23d09^h$	- /0.12	1d	
BP	>90	22^h	- $/23d09^h$	- /0.01	1d	
ChD	>600	-	-	-	-	
POES-16						
MEPED	>0.24	12^h	- $/23d10^h$	- /420	1d	
MEPED	>0.8	12^h	- $/23d10^h$	- /190	1d	
MEPED	>2.5	12^h	- $/23d10^h$	- /90	1d	
MEPED	>6.9	-	- $/23d10^h$	- /20	1d	
MEPED	>16	-	- $/23d10^h$	- /1.4	1d	
MEPED	>36	-	-	-	-	
MEPED	>70	-	-	-	-	
MEPED	>140	-	-	-	-	

CORONAS F						
MKL	>1.	-	20^h/23d10^h	95/560	1d	
MKL	>14	-	20^h/23d10^h	0.35/1.4	1d	
MKL	>26	-	20^h/23d10^h	0.14/0.9	1d	
MKL	>50	-	20^h/23d10^h	0.07/0.45	1d	
ACE						
SIS	>10	17^h	19^h/23d08^h	0.9/3	1d	
SIS	>30	17^h	20^h/23d08^h	0.2/0.9	1d	
SOHO						
EPHIN (INT)	>50	-	- /23d10^h	- /0.05	1d	

Differential fluxes of protons for the event of 2004 July 22

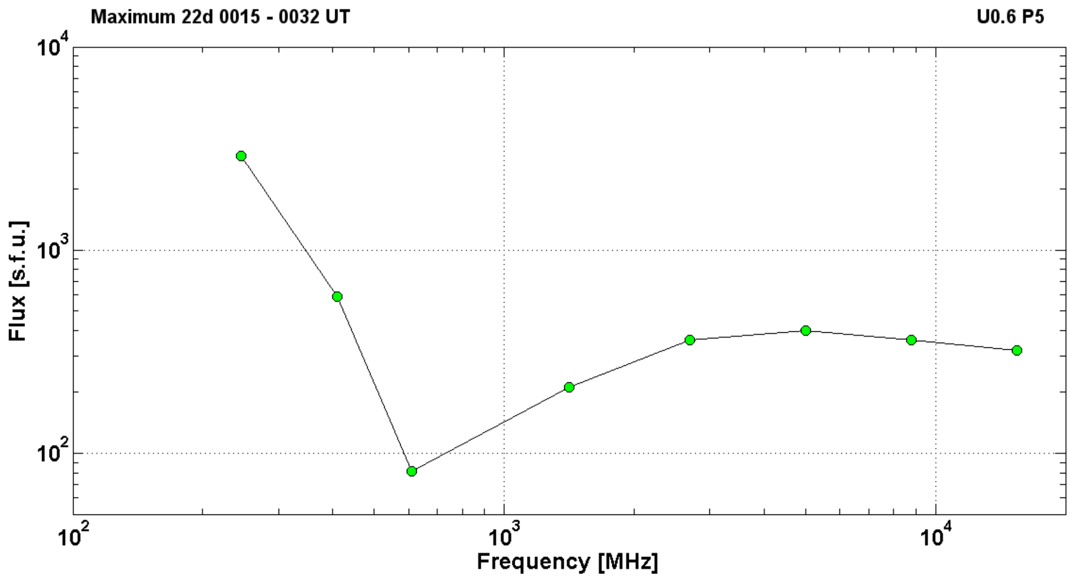
S/c, instruments	ΔE, MeV	To	Tmax	Jmax, $(cm^2.s.sr.MeV)^{-1}$	Dura-tion	Comments
SOHO						
LION	0.75-2	11^h	20^h/23d08^h	1.6/9.7	1d	
LION	2-6	11^h	20^h/23d08^h	0.26/1.2	1d	
EPHIN	4-8	15^h	19^h/23d08^h	1.26/2.1	1d	
EPHIN	8-25	15^h	19^h/23d08^h	0.096/0.14	1d	
EPHIN	25-41	15^h	19^h/23d08^h	0.003/0.009	1d	
EPHIN	41-53	- “ -	- “ -	- “ -	- “ -	

Electromagnetic and other phenomena that are sources and/or accompanying for the event of 2004 July 22

2004 July 22 ☉ AR10652 To event 448

Hα	6563 Å	No Flare Patrol			n06e25		
1 – 12	keV	0014	0032	0043		M9.1	7.9E-2
25-50	keV	235256	002958	005528		46462728	RHESSI

15.4	GHz	0017.0	0031.0	0126.0		2.51	
8.8	GHz	0018.0	0031.0	0124.0		2.56	
5	GHz	0015.0	0027.0	0109.0	U0.6 P5	2.60	
2.7	GHz	0021.0	0027.0	0109.0		2.56	
1.4	GHz	0024.0	0026.0	0031.0		2.32	
610	MHz	0032.0	0032.0	0123.0		1.91	
410	MHz	0015.0	0015.0	0016.0		2.77	
245	MHz	0030.0	0031.0	0031.0		3.46	
DS III	18-200	<0000		>0710	S,C	3	
DS III	100-1000	0015		0131	N	1	
CME	WL	0132	0492 km/s	0.3 km/s^2	083º	180º	

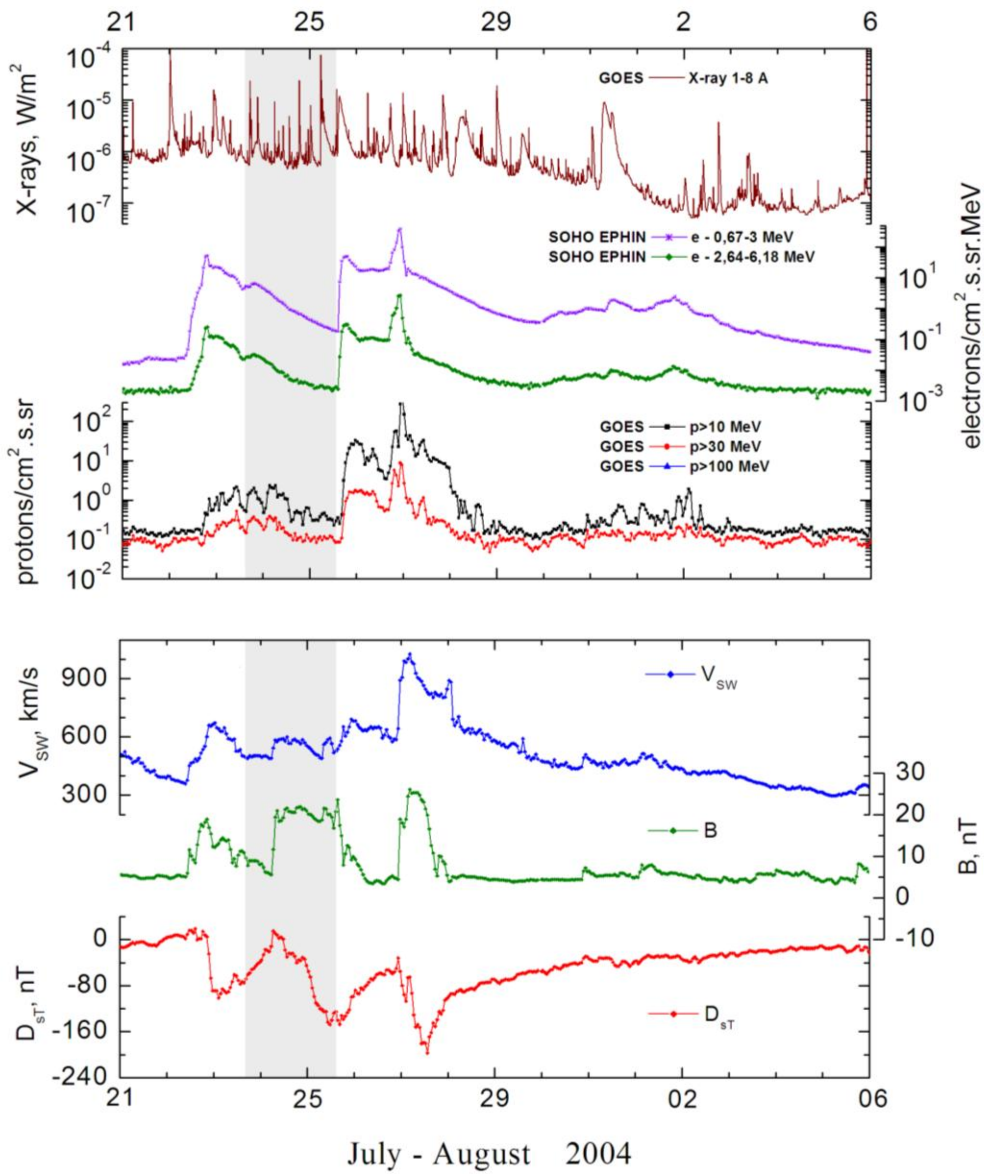


Event 2004.07.23 – (2003-205) **№ 449**

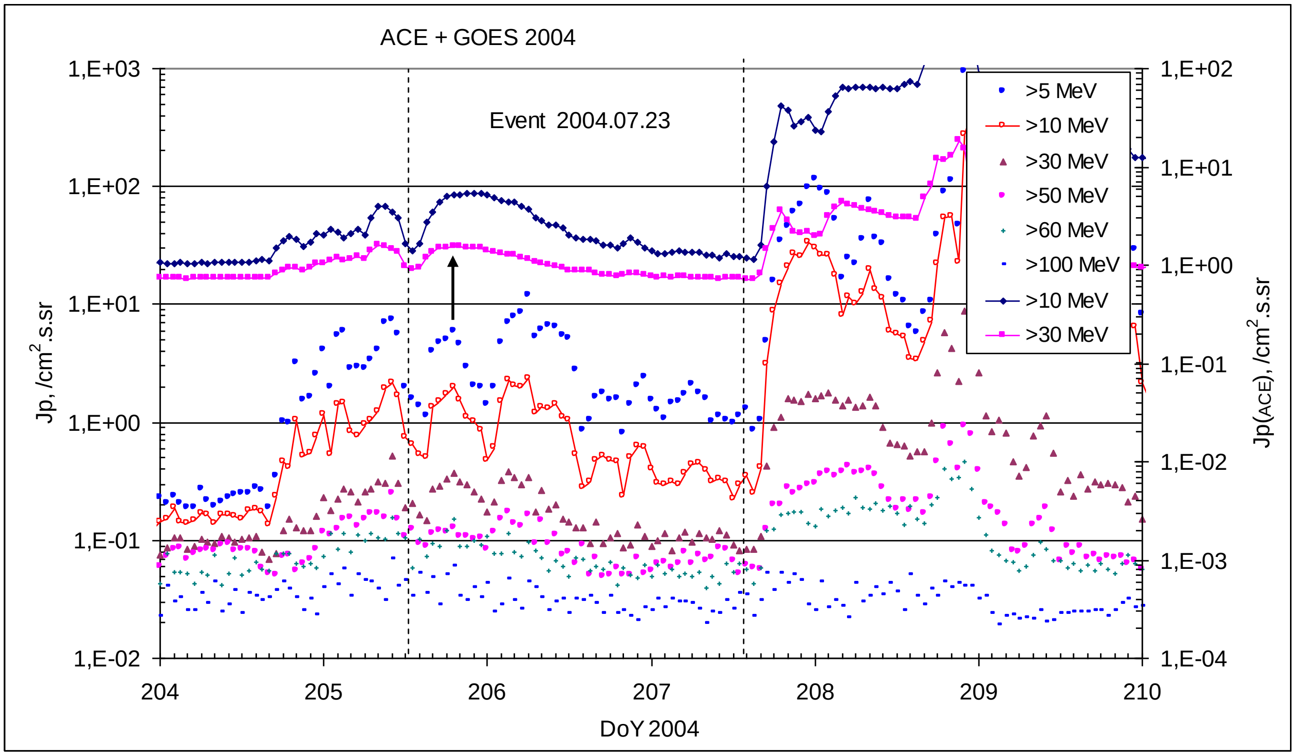
Particle event: To(Ep>10MeV) – 23d16^h
Tmax(Ep>10MeV) – 23d19^h, Jmax(Ep>10MeV) – 1.8 /cm^2.s.sr
Duration of the event – 2 days
Quasimaximal energy of protons in the event – Eqm = 75 MeV

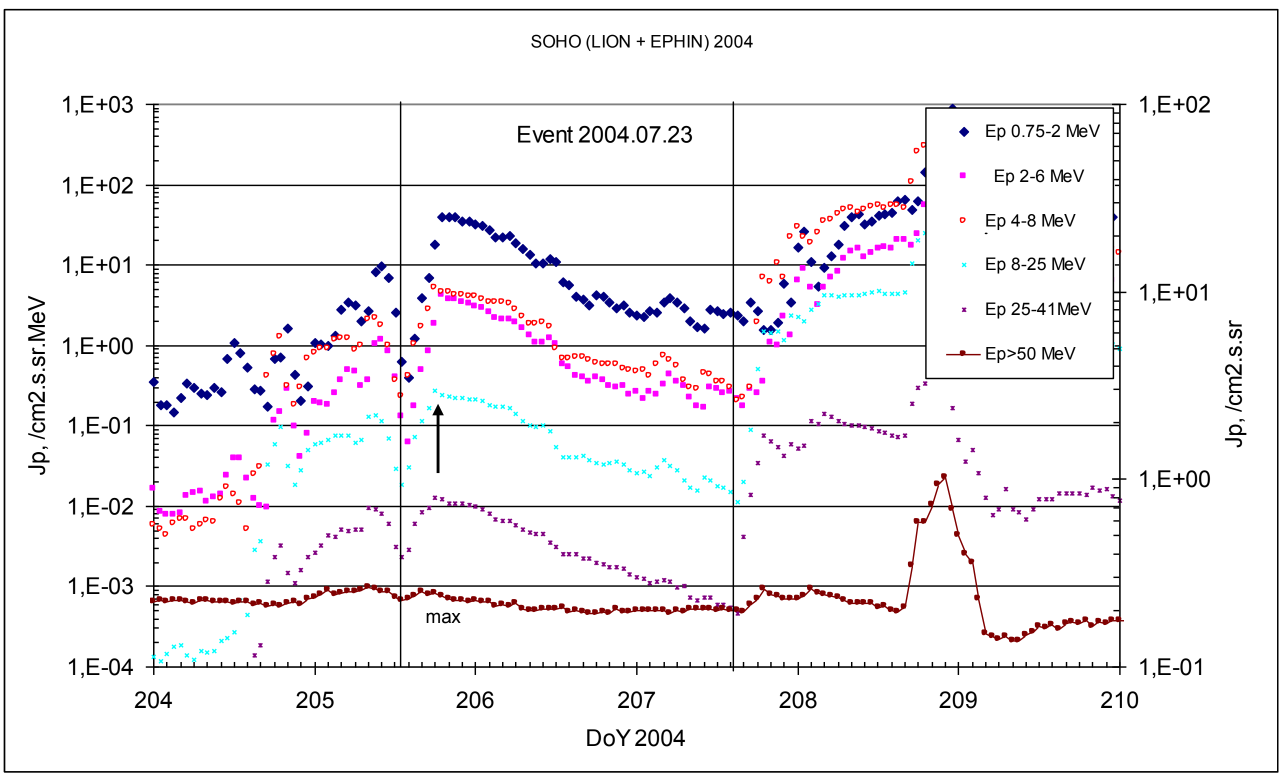
Sources: ☉ solar flare 22d22^{h}23^m, 2N/M1.6, N05E04 AR10652*
22d23^{h}10^m, 2N/M1.2, N05E04 AR10652*
Ø solar flare 23d17^{h}07^m, M2.2/SF, N03W04 AR10652
Main X-ray burst 1–8 Å: onset–22d22^{h}40^m, max–22d22^{h}58^m, Φ=0.016 Jo.m^{-2}
onset–22d23^{h}10^m, max–22d23^{h}24^m, Φ=0.023 Jo.m^{-2}
CME:22d23^{h}54^m; V = 0448 km/s; Δφ = 046^o; dA = 200˚
▲SC 24d06^{h}13^m
* – One solar flare event with two X-ray burst

Particle fluxes and associated phenomena



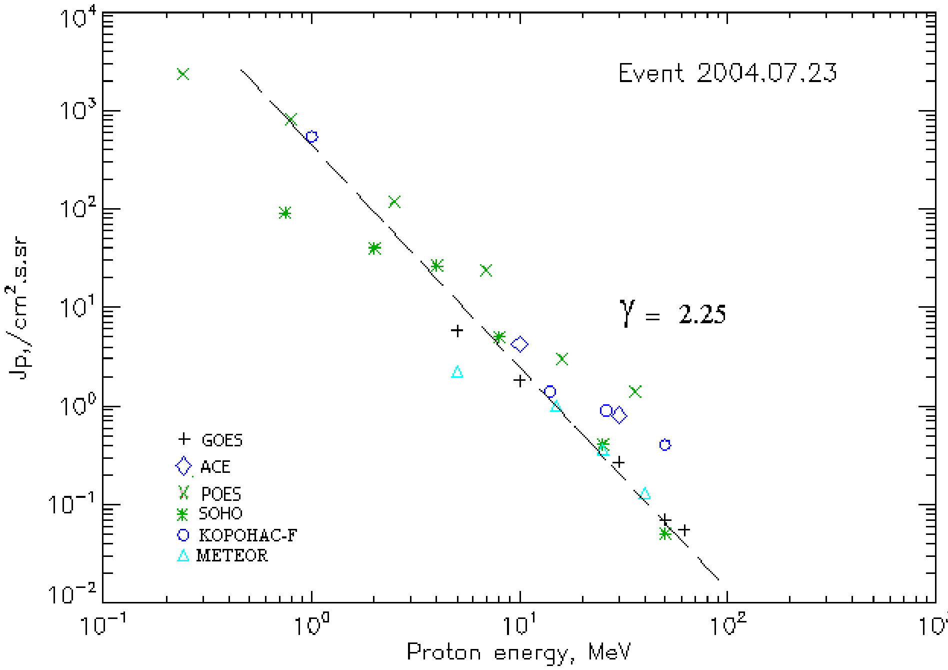
Time profiles of the proton fluxes for the event of 2004 July 23





Arrows on the profiles of the events indicate the time of the proton flux maxima, taken to build the proton spectra (see below)

Integral time-of-maximum proton spectrum



Integral fluxes of protons for the event of 2004 July 23

S/c, instruments	Ep, MeV	To	Tmax	Jmax, $(cm^2.s.sr)^{-1}$	Duration	Comments
GOES-10						
EPS	>5	16^h	19^h	5.8	2d	
EPS	>10	16^h	19^h	1.8	2d	
EPS	>30	16^h	19^h	0.27	2d	
EPS	>50	16^h	19^h	0.07	2d	
EPS	>60	16^h	19^h	0.05	2d	
EPS	>100	-	-	-	-	
METEOR						
CBM	>5	16^h	$24d01^h$	2,2	2d	
CBM	>15	16^h	$24d01^h$	1	2d	
CBM	>25	16^h	$24d01^h$	0.36	1d	
CBM	>40	16^h	$24d01^h$	0.13	1d	
BP	>90	-	-	-	-	
ChD	>600	-	-	-	-	
POES-16						
MEPED	>0.24	-	20^h	2300	2d	
MEPED	>0.8	-	20^h	800	2d	
MEPED	>2.5	-	20^h	120	2d	
MEPED	>6.9	-	20^h	24	2d	
MEPED	>16	-	20^h	3	2d	
MEPED	>36	-	20^h	1.4	2d	
MEPED	>70	-	-	-	-	
MEPED	>140	-	-	-	-	

CORONAS F						
MKL	>1.	-	20^h	540	2d	
MKL	>14	-	20^h	1.4	2d	
MKL	>26	-	20^h	0.9	1d	
MKL	>50	-	20^h	0.4	1d	
ACE						
SIS	>10	16^h	19^h	4.2	1d	
SIS	>30	16^h	19^h	0.8	1d	
SOHO						
EPHIN (INT)	>50	14^h	18^h	0.05	1d	

Differential fluxes of protons for the event of 2004 July 23

S/c, instruments	ΔE, MeV	To	Tmax	Jmax, $(cm^2.s.sr.MeV)^{-1}$	Dura-tion	Comments
SOHO						
LION	0.75-2	14^h	19^h	40	2d	
LION	2-6	14^h	19^h	4.6	2d	
EPHIN	4-8	14^h	18^h	5.3	2d	
EPHIN	8-25	14^h	18^h	0.27	2d	
EPHIN	25-41	14^h	18^h	0.013	2d	
EPHIN	41-53	- " -	- " -	- " -	- " -	

References:

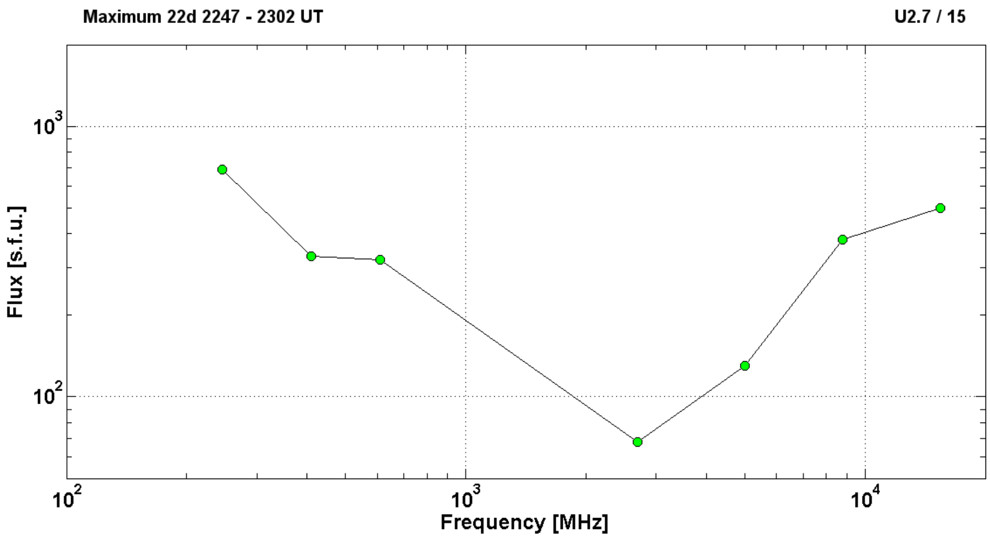
Kuwabara T., Bieber J.W., Clem J., et.al., 2006.

Electromagnetic and other phenomena that are sources and/or accompanying for the event of 2004 July 23

2004 July 22 ☉ AR10652 To event 449

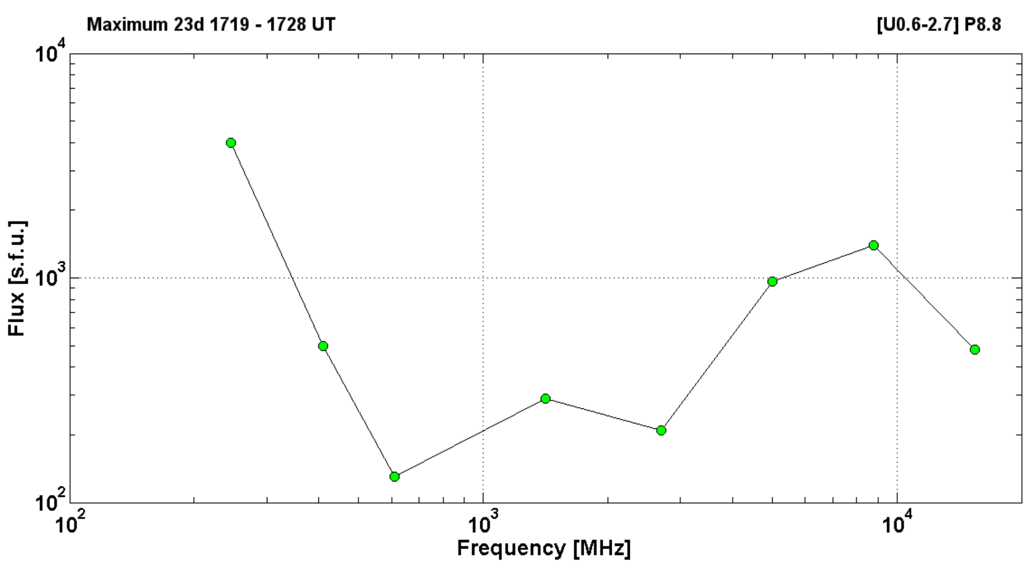
Hα	6563 Å	2223	2256	>2333	N05E04	2N*	MZ
1 – 12	keV	2240	2258	2307		M1.6	1.6E-2
1 – 12	keV	2310	2324	2343		M1.2	2.3E-2
25-50	keV	223740	225450	230600		5664912	RHESSI
25-50	keV	230600	231514	231916		3941621	
15.4	GHz	2246.0	2255.0	2317.0	U2.7 / 15	2.70	
8.8	GHz	2244.0	2255.0	2327.0		2.58	
5	GHz	2243.0	2255.0	2327.0		2.11	
2.7	GHz	2244.0	2247.0	2255.0		1.83	
610	MHz	2253.0	2254.0	2301.0		2.51	
410	MHz	2245.0	2255.0	2321.0		2.52	
245	MHz	2243.0	2302.0	2328.0		2.84	
DS III	18-880	2253		2302	GG	3	
DS CONT	25-180	2338		0919		2	
CME	WL	2354	0448 km/s	$-25.8 km/s^2$	046º	200º	

* – One solar flare event with two X-ray burst



2004 July 23 Ø AR10652 To event 449

Hα	6563 Å	<1723	~1723	>1735	N03W04	SF	F
1 – 12	keV	1707	1728	1735		M2.2	1.5E-2
12-25	keV	172652	172726	175300		2487273	RHESSI
15.4	GHz	1716.0	1720.0	0000.0		2.68	
8.8	GHz	1719.0	1720.0	0000.0	[U0.6-2.7] P8.8	3.15	
5	GHz	1717.0	1720.0	1733.0		2.98	
2.7	GHz	1718.0	1720.0	1733.0		2.32	
1.4	GHz	1719.0	1720.0	1729.0		2.46	
610	MHz	1718.0	1719.0	1721.0		2.11	
410	MHz	1718.0	1728.0	1728.0		2.70	
245	MHz	1716.0	1720.0	0000.0		3.60	
DS III	25-180	1710		1711		2	
DS III	25-180	1716		1732	N	2	
DS DCIM	100-4000	1710		1737	P,C	3	
CME	WL	1754	0569 km/s	-8.1 km/s^2	142º	256º	



Event 2004.07.25 – (2004-207) **№ 450**

Particle event: To(Ep>10MeV) – 25d17^h

Tmax$_1$(Ep>10MeV) – 25d21^h, Jmax$_1$(Ep>10MeV) – 27 /cm^2.s.sr

Tmax$_2$(Ep>10MeV) – 26d23^h, Jmax$_2$(Ep>10MeV) – 430 /cm^2.s.sr

Duration of the event – 4 days

Quasimaximal energy of protons in the event – Eqm$_1$ = 140 MeV

– Eqm$_2$ = 155 MeV

Sources: ● solar flare 25d14^{h}19^m, M1.1/1F, N08W33, AR10652

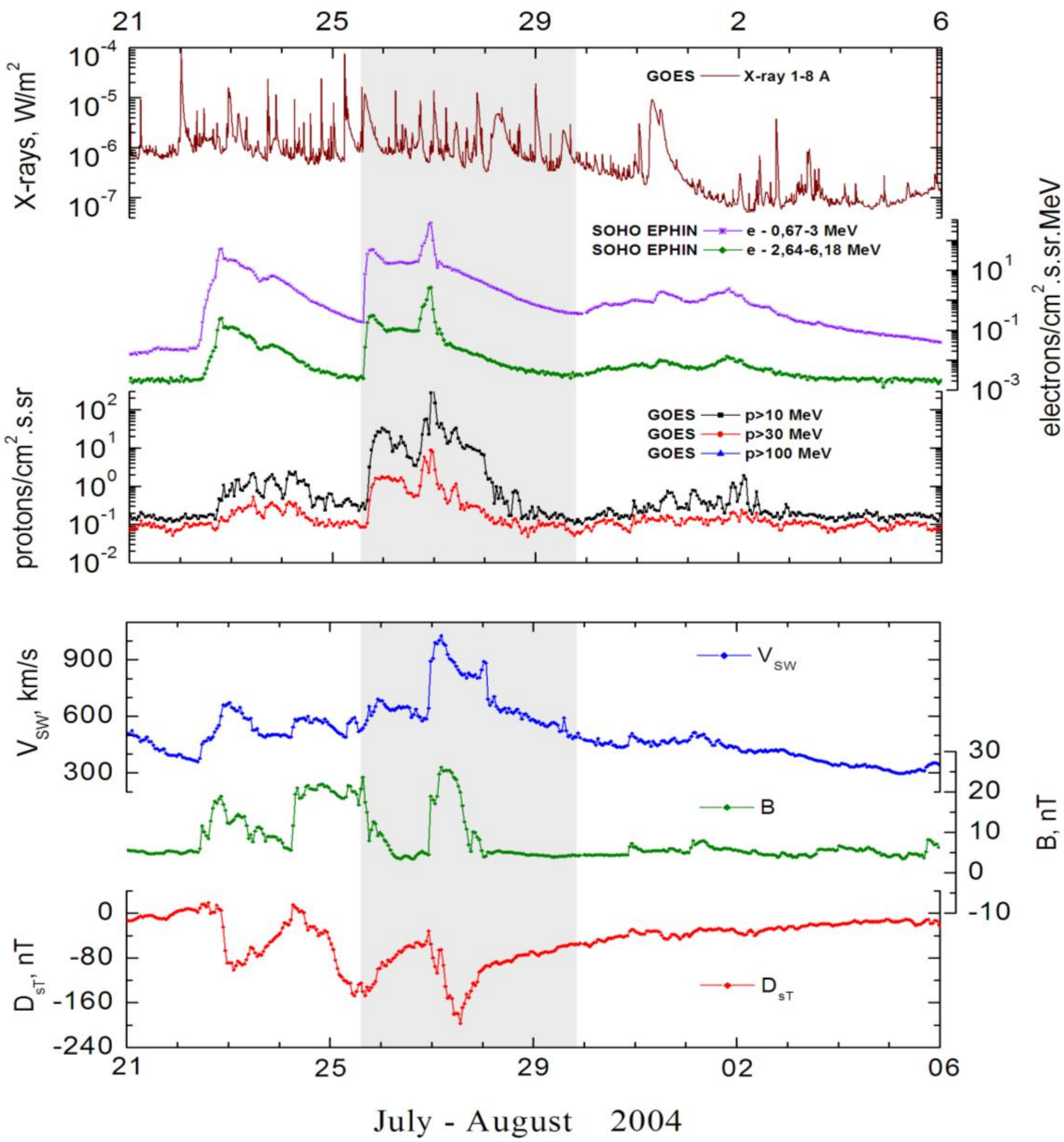
Ø solar flare 26d17^{h}23^m, M1.1/2N, N03W45, AR10652

Main X-ray burst 1-8 Å: onset – 25d14^{h}19^m, max – 25d15^{h}14^m, Φ = 0.065 J/m^2

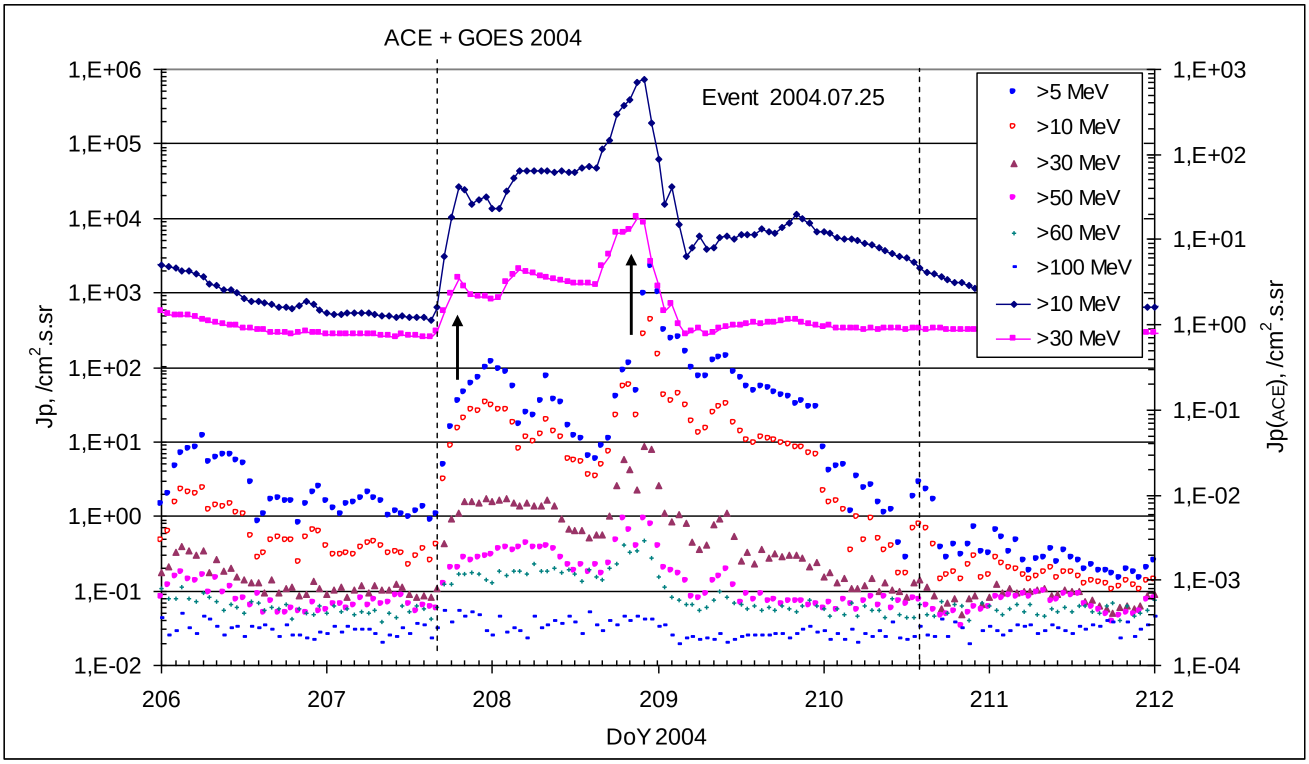
CME: 25d14^{h}54^m, V = 1333 km/s, Δφ = 360^o, dA= 204˚

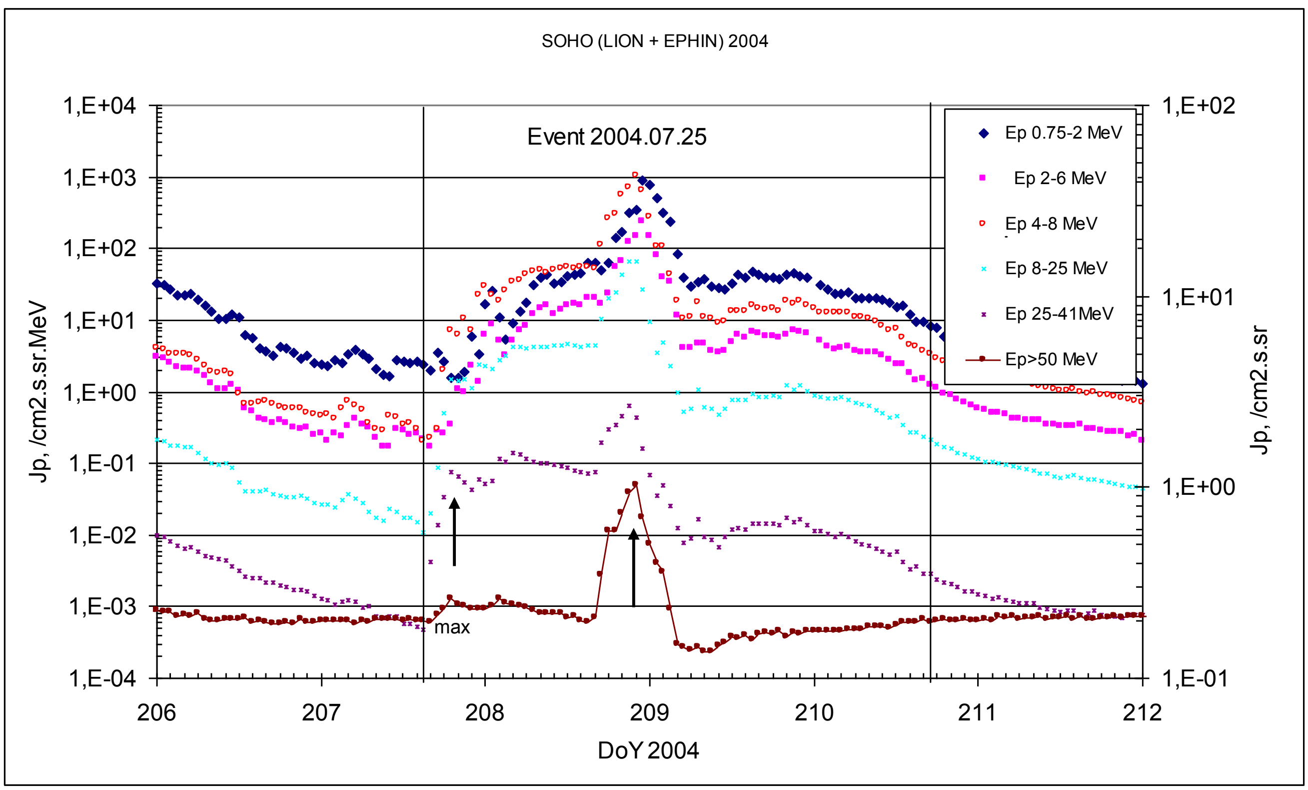
▲SC 26d22^{h}49^m;

Particle fluxes and associated phenomena



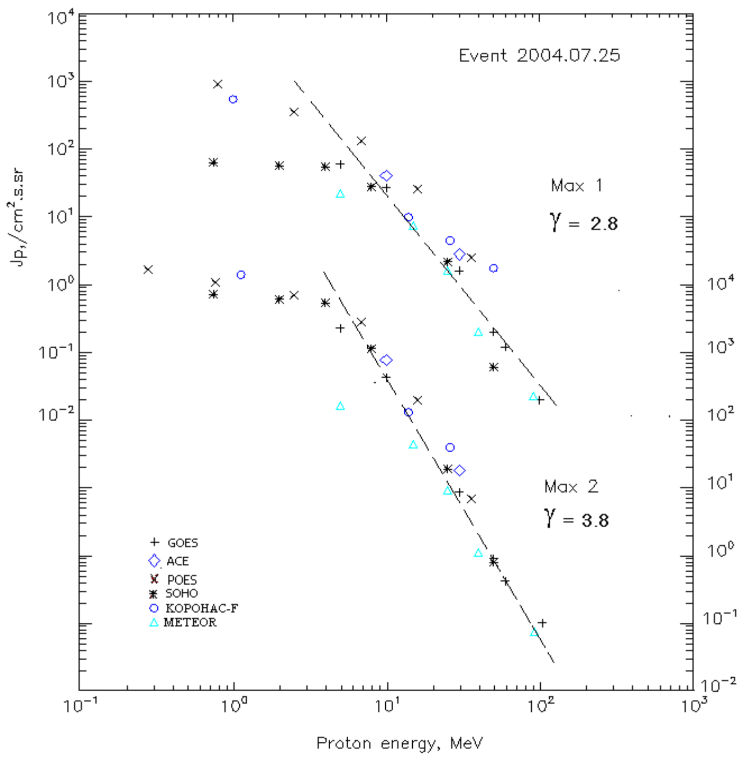
Time profiles of the proton fluxes for the event of 2004 July 25





Arrows on the profiles of the events indicate the time of the proton flux maxima, taken to build the proton spectra (see below)

Integral time-of-maximum proton spectrum



Integral fluxes of protons for the event of 2004 July 25

S/c, instruments	Ep, MeV	To	Tmax	Jmax, $(cm^2.s.sr)^{-1}$	Dura-tion	Comments
GOES-10						
EPS	>5	17^h	$21^h/26d23^h$	60/2280	4d	
EPS	>10	17^h	$21^h/26d23^h$	27/430	4d	
EPS	>30	17^h	$20^h/26d22^h$	1.6/8.7	3d	
EPS	>50	17^h	$20^h/26d22^h$	0.2/0.9	2d	
EPS	>60	17^h	$19^h/26d22^h$	0.12/0.42	2d	
EPS	>100	17^h	$19^h/26d21^h$	0.02/0.01	2d	
METEOR						
CBM	>5	17^h	21^h26d23^h	22/167	4d	
CBM	>15	17^h	21^h26d23^h	7.4/45	3.5d	
CBM	>25	17^h	$21^h/26d23^h$	1.6/9.2	2d	
CBM	>40	17^h	$21^h/26d23^h$	0.2/1.1	1.5d	
BP	>90	17^h	$22^h/26d23^h$	0.002/0.007	1.5d	
ChD	>600	-	-	-	-	
POES-16						
MEPED	>0.24	-	- /$26d23^h$	- /$1.9 \cdot 10^4$	4d	
MEPED	>0.8	-	$21^h/26d23^h$	$920/1.1 \cdot 10^4$	4d	
MEPED	>2.5	-	$21^h/26d23^h$	$350/7 \cdot 10^3$	4d	
MEPED	>6.9	-	$21^h/26d23^h$	$130/2.8 \cdot 10^3$	4d	
MEPED	>16	-	$21^h/26d23^h$	26/210	3d	
MEPED	>36	-	$21^h/26d23^h$	2.5/7	2d	
MEPED	>70	-	-	-	-	
MEPED	>140	-	-	-	-	

CORONAS F						
MKL	>1.	-	$20^h/26d24^h$	$540/1.5\cdot10^4$	4d	
MKL	>14	-	$20^h/26d23^h$	9.8//130	4d	
MKL	>26	-	$20^h/26d22^h$	4.5/40	4d	
MKL	>50	-	$20^h/26d22^h$	1.75/10	4d	
ACE						
SIS	>10	17^h	$19^h/26d22^h$	40.5/765	3d	
SIS	>30	17^h	$19^h/26d21^h$	2.8/18	2d	
SOHO						
EPHIN (INT)	>50	16^h	$19^h/26d22^h$	0.06/0.8	2d	

Differential fluxes of protons for the event of 2004 July 25

S/c, instruments	ΔE, MeV	To	Tmax	Jmax, $(cm^2.s.sr.MeV)^{-1}$	Dura-tion	Comments
SOHO						
LION	0.75-2	17^h	$22^h/26d23^h$	5.5/875	3d	
LION	2-6	17^h	$20^h/26d23^h$	0.9/240	3d	
EPHIN	4-8	17^h	$19^h/26d22^h$	6.6/1050	3d	
EPHIN	8-25	16^h	$19^h/26d21^h$	1.5/66	3d	
EPHIN	25-41	16^h	$19^h/26d21^h$	0.075/0.65	3d	
EPHIN	41-53	- “ -	- “ -	- “ -	- “ -	

References:

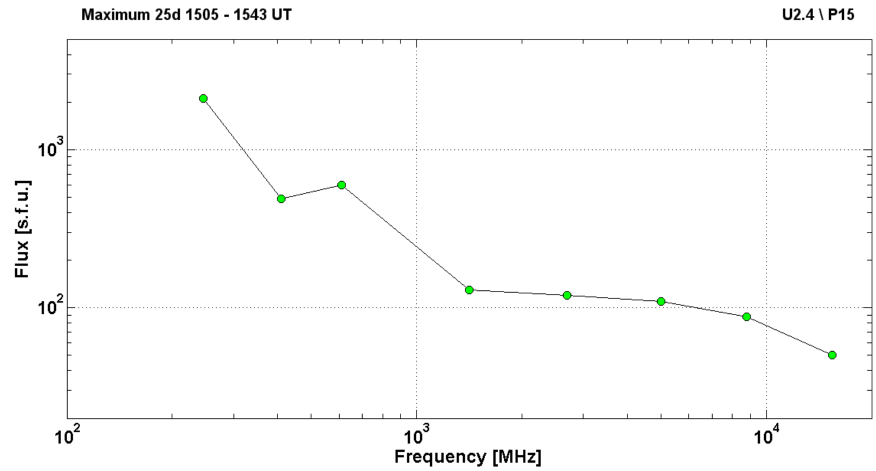
Kuwabara T., Bieber J.W., Clem J., et.al., 2006.

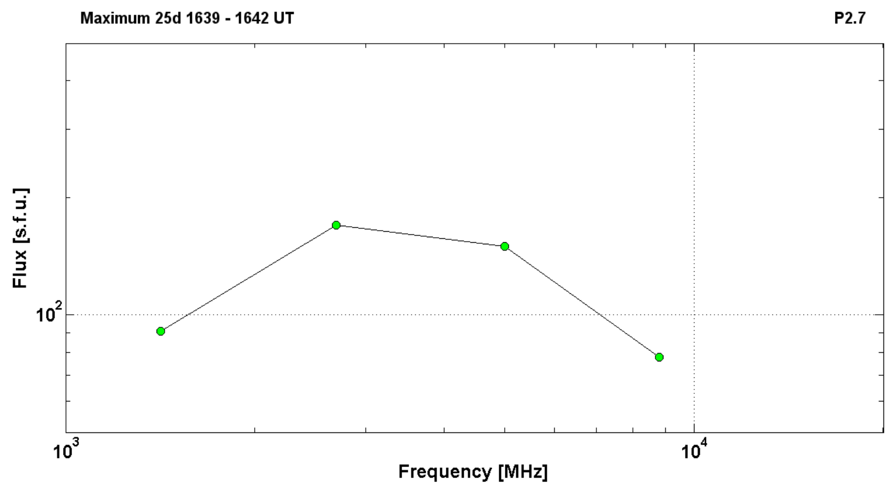
Electromagnetic and other phenomena that are sources and/or accompanying for the event of 2004 July 25

2004 July 25 ● AR10652 To event 450

Hα	6563 Å	1433	1448	1643	N08W33	1F	F
1 – 12	keV	1419	1514	1643		M1.1	6.5E-02
6-12	keV	145220	145834	150504		646080	RHESSI
6-12	keV	150504	150750	151800		589305	RHESSI
6-12	keV	163112	163138	165420		146113	RHESSI
15.4	GHz	1447.0	1521.0	1603.0		1.70	
8.8	GHz	1441.0	1519.0	1647.0		1.94	
5	GHz	1441.0	1543.0	1634.0		2.04	
2.7	GHz	1424.0	1506.0	1603.0		2.08	
1.4	GHz	1434.0	1509.0	1603.0		2.11	
610	MHz	1424.0	1521.0	1606.0		2.78	
410	MHz	1424.0	1505.0	1551.0		2.69	
245	MHz	1424.0	1520.0	1534.0		3.32	
DS II	U2.4 \ P15	1521		1526		1	
DS IV	25-81	1415		1731		2	
DS DCIM	25-180	1421		1518	GG	2	
DS DCIM	2000-4500	1434		1543	GG	2	
DS DCIM	800-2000	1503		1530	C	3	

8.8	GHz	1641.0	1641.0	~1641.0		1.89	
5	GHz	1637.0	1641.0	1646.0		2.18	
2.7	GHz	1638.0	1639.0	1646.0	P2.7	2.23	
1.4	GHz	1641.0	1642.0	1643.0		1.96	
CME	WL	1454	1333 km/s	7.0 km/s^2	360º	204º	





2004 July 26 Ø AR10652 To event 450

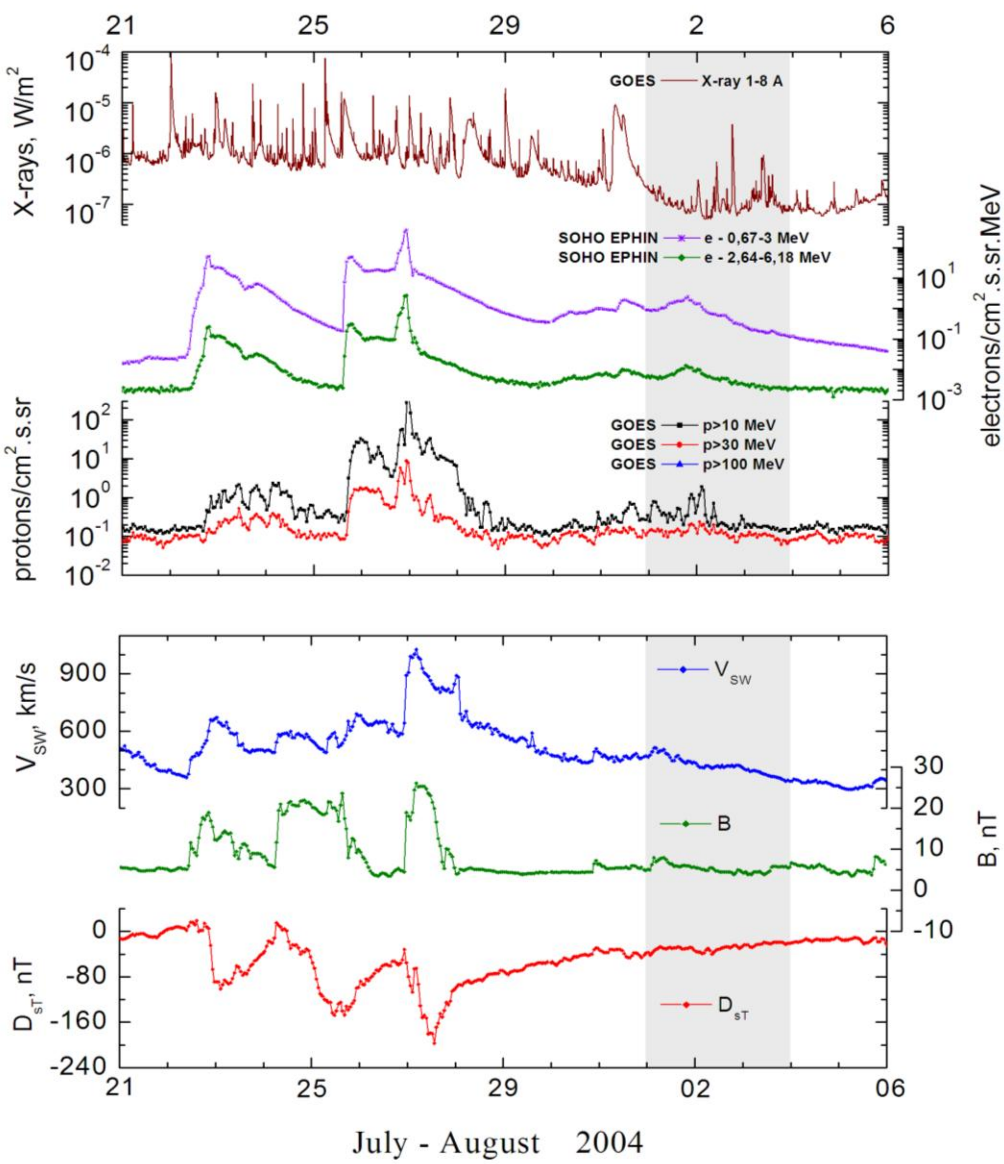
Hα	6563 Å	1726	1736	1752	N03W45	2N	EF
DSF	Hα	~1652		~1407	N16W50	12˚	
1 – 12	keV	1723	1730	1737		M1.1	6.3E-3
25-50	keV	172828	173046	173316		329366	RHESSI
15.4	GHz	1730.0	1730.0	~1730.0		1.86	
8.8	GHz	1726.0	1730.0	1731.0	U1.4 U8.8	2.28	
5	GHz	1726.0	1728.0	1731.0		2.08	
2.7	GHz	1727.0	1728.0	1729.0		1.58	
1.4	GHz	1726.0	1730.0	1730.0		1.41	
610	MHz	1725.0	1725.0	1729.0		1.60	
410	MHz	1725.0	1725.0	1729.0		2.04	
DS III	250-4000	1723		1730	GG,RS,C	3	
DS DCIM	800-2000	1725		1730	GG	1	
CME	WL	1830	0401 km/s	39.5 km/s^2	058º	221º	

Event 2004.08.01 – (2004-214) **№ 451**

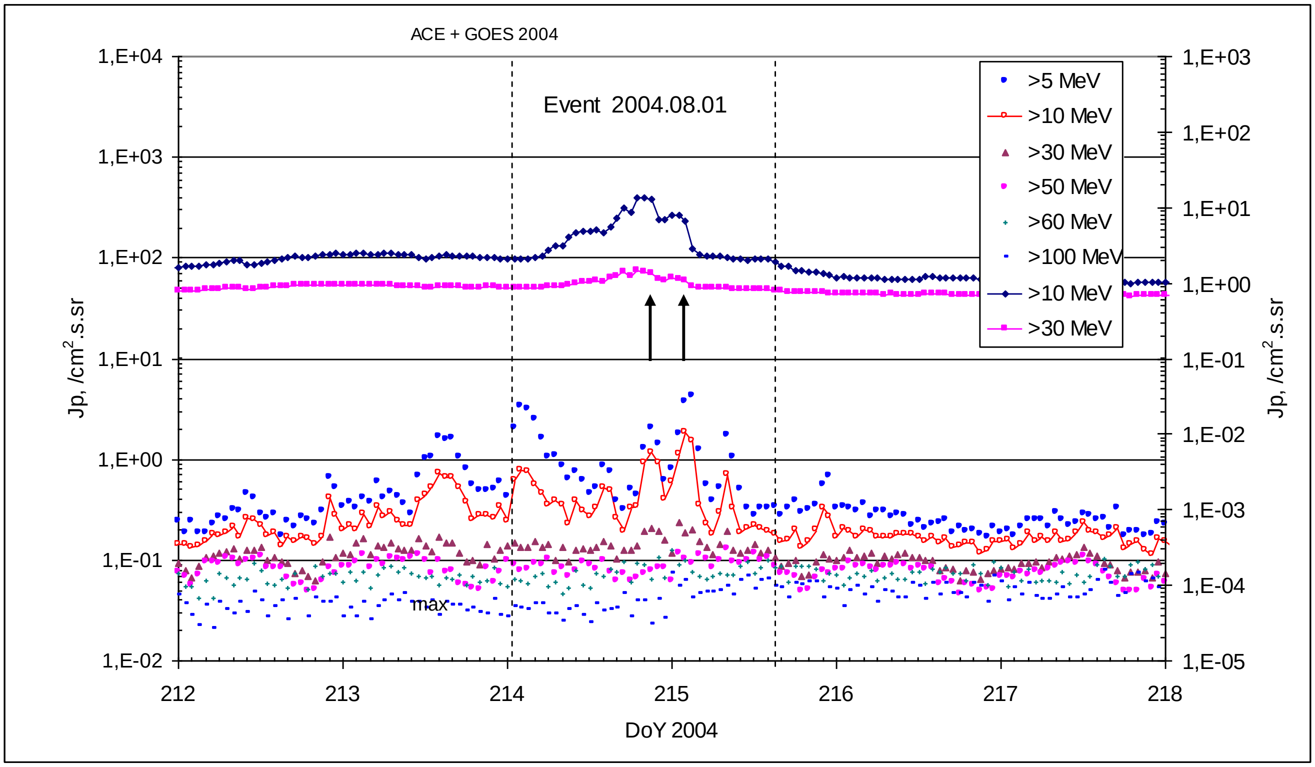
Particle event: To(Ep>10MeV) – 01d01^h
Tmax$_1$(Ep>10MeV) – 01d21^h, Jmax$_1$(Ep>10MeV) – 5.2 /cm^2.s.sr
Tmax$_2$(Ep>10MeV) – 02d02^h, Jmax$_2$(Ep>10MeV) – 4.8 /cm^2.s.sr
Duration of the event – 2 days
Quasimaximal energy of protons in the event – Eqm$_1$ = 80 MeV
– Eqm$_2$ = 75 MeV

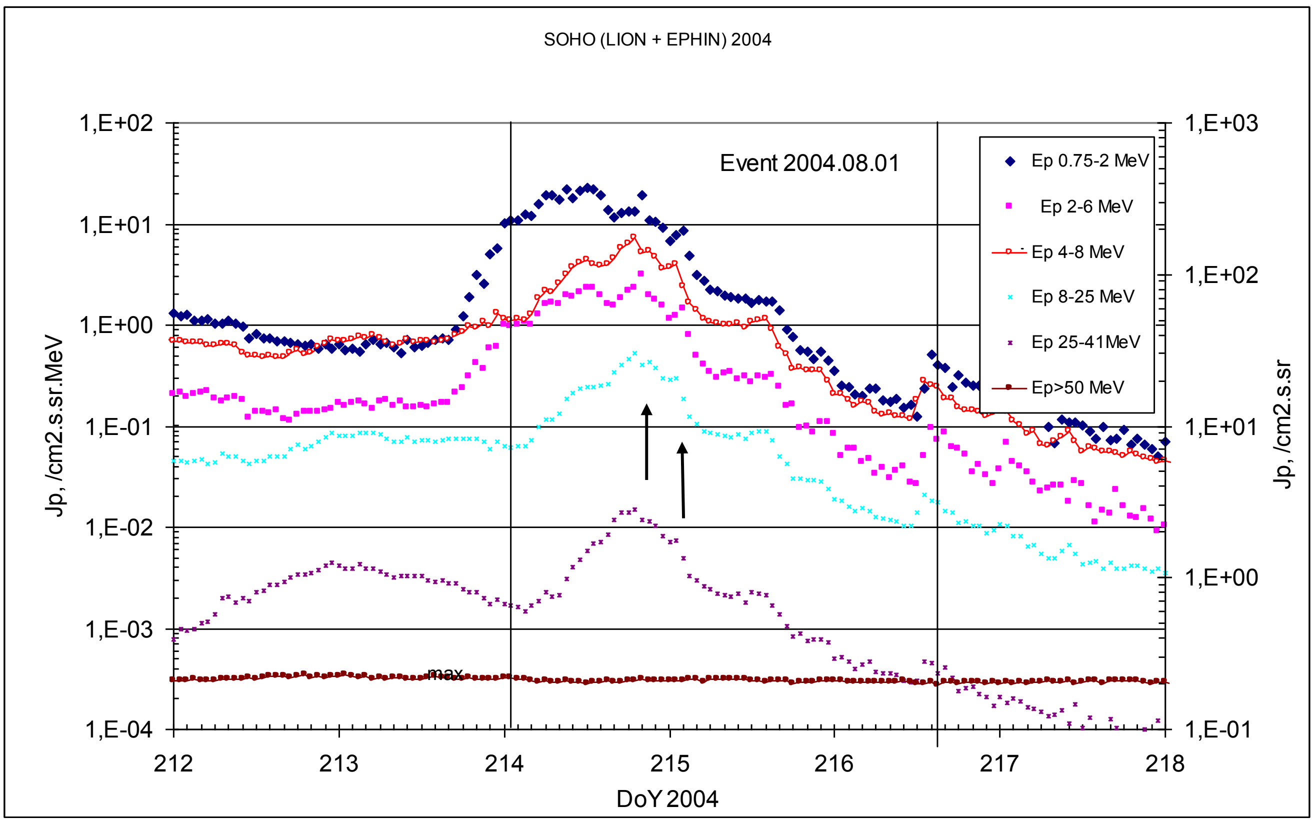
Sources: ◊ flare activity AR10652 >1,5d behind W-limb
⊡ solar flare 31d05^{h}16^m, C8.4/…, n02w90*, AR10652
Ø solar flare 31d10^{h}35^m, C5.3/…, n02w90*, AR10652
Main X-ray burst 1-8 Å: onset – 31d05^{h}16^m, max – 31d06^{h}57^m, Φ = 0.076 J/m^2
CME: 05^{h}54^m: V=1192 km/s, Δφ =259^o, dA= 287^o
* − probable localization of the flare event

Particle fluxes and associated phenomena



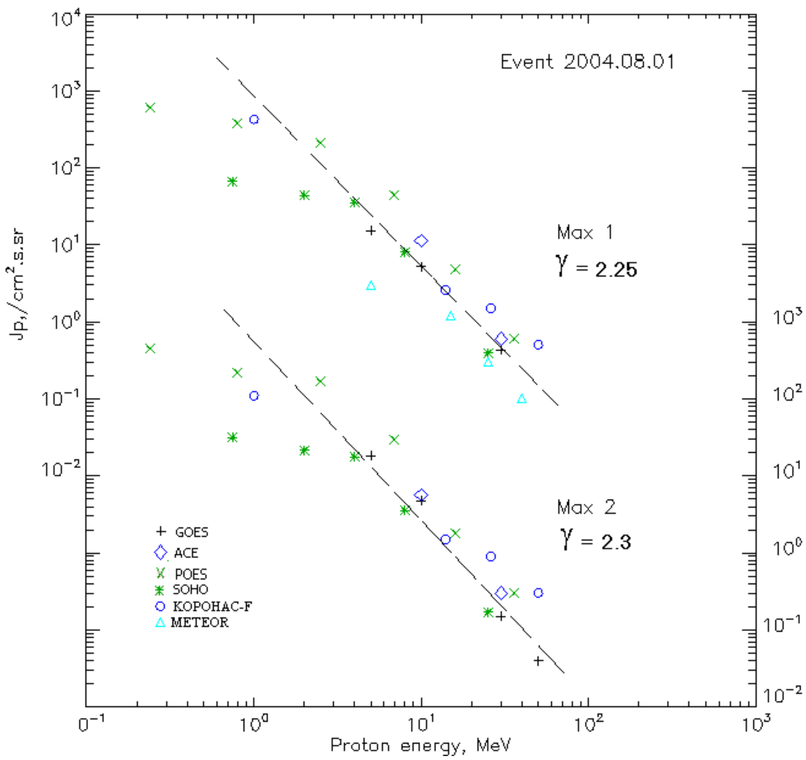
Time profiles of the proton fluxes for the event of 2004 August 01





Arrows on the profiles of the events indicate the time of the proton flux maxima, taken to build the proton spectra (see below)

Integral time-of-maximum proton spectrum



Integral fluxes of protons for the event of 2004 August 01

S/c, instruments	Ep, MeV	To	Tmax	Jmax, $(cm^2.s.sr)^{-1}$	Dura-tion	Comments
GOES-10						
EPS	>5	21^h	$21^h/02d02^h$	15.2/18.3	2d	
EPS	>10	21^h	$21^h/02d02^h$	5.2/4.8	2d	
EPS	>30	-	$22^h/02d01^h$	0.43/0.15	2d	
EPS	>50	-	$- /02d01^h$	- /0.04	2d	
EPS	>60	-	-	-	-	
EPS	>100	-	-	-	-	
METEOR						
CBM	>5	02^h	$22^h/$ -	3/ -	2d	
CBM	>15	02^h	$23^h/$ -	1.2/ -	1.5d	
CBM	>25	00^h	$22^h/$ -	0.3/ -	1d	
CBM	>40	00^h	$23^h/$ -	0.1/ -	1d	
BP	>90	-	-	-	-	
ChD	>600	-	-	-	-	
POES-16						
MEPED	>0.24	-	$22^h/02d03^h$	620/450	2d	
MEPED	>0.8	-	$22^h/02d03^h$	380/220	2d	
MEPED	>2.5	-	$22^h/02d03^h$	210/170	2d	
MEPED	>6.9	-	$22^h/02d03^h$	45/30	2d	
MEPED	>16	-	$22^h/02d03^h$	4.8/1.8	2d	
MEPED	>36	-	$22^h/02d03^h$	0.6/0.3	2d	
MEPED	>70	-	-	-	-	
MEPED	>140	-	-	-	-	

CORONAS F						
MKL	>1.	-	22^h/02d03^h	430/110	2d	
MKL	>14	-	22^h/02d03^h	2.6/1.5	2d	
MKL	>26	-	22^h/02d03^h	1.5/0.9	2d	
MKL	>50	-	22^h/02d03^h	0.5/0.3	2d	
ACE						
SIS	>10	04^h	22^h/02d01^h	11.3/5.7	2d	
SIS	>30	09^h	22^h/02d01^h	0.6/0.3	2d	
SOHO						
EPHIN (INT)	>50	-	-	-	-	

Differential fluxes of protons for the event of 2004 August 01

S/c, instruments	ΔE, MeV	To	Tmax	Jmax, $(cm^2.s.sr.MeV)^{-1}$	Dura-tion	Comments
SOHO						
LION	0.72-2	31d17^h	20^h/02d02^h	18.4/7.9	2d	
LION	2-6	31d17^h	20^h/02d02^h	3/1.3	2d	
EPHIN	4-8	04^h	19^h/02d01^h	6.8/3.5	2d	
EPHIN	8-25	04^h	19^h/02d01^h	0.45/0.2	2d	
EPHIN	25-41	04^h	19^h/02d01^h	0.014/0.006	2d	
EPHIN	41-53	- “ -	- “ -	- “ -	- “ -	

References:

Kuwabara T., Bieber J.W., Clem J., et.al., 2006.

Electromagnetic and other phenomena that are sources and/or accompanying for the event of 2004 August 01

2004 July 31 ⊡ AR10652 To event 451

Hα	6563 Å	No Flare			n02w90*		
1 – 12	keV	0516	0657	0914		C8.4	7.6E-2
6-12	keV	063024	063458	063916		362241	RHESSI
12-25	keV	063916	064334	071552		1405027	RHESSI
12-25	keV	064900	065014	071600		978017	RHESSI
6-12	keV	084648	084658	085232		44076	RHESSI
CME	WL	0554	1192 km/s	46.4 km/s^2	197º	287º	

* − probable localization of the flare event

2004 July 31 Ø AR10652 To event 451

Hα	6563 Å	No Flare			n02w90*		
1 – 12	keV	1035	1101	1149		C5.3	2.1E-2
6-12	keV	11:45:44	11:45:46	12:00:44		57313	RHESSI

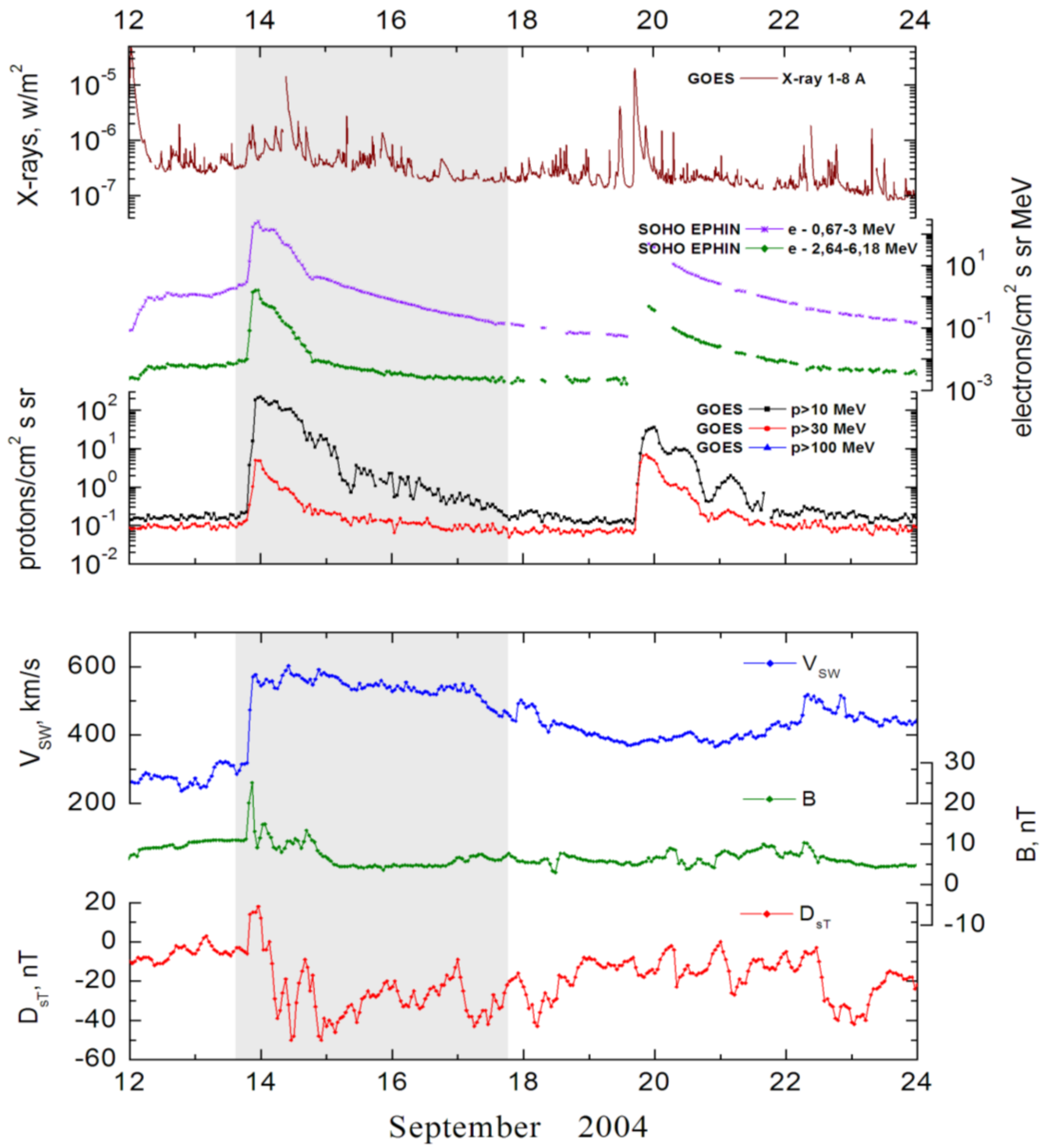
* − probable localization of the flare event

Event 2004.09.13 – (2004-257) **№ 452**

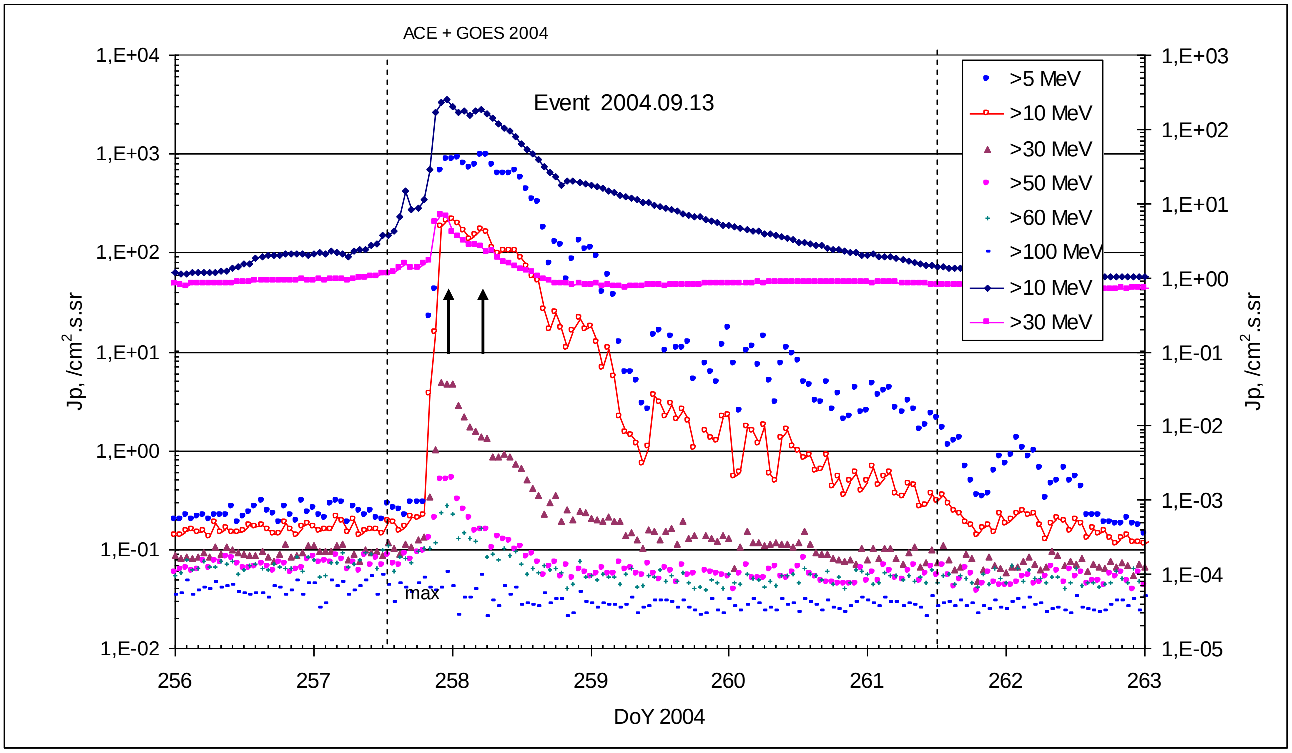
Particle event: To(Ep>10MeV) – 13d19^h
Tmax$_1$(Ep>10MeV) – 13d23^h, Jmax$_1$(Ep>10MeV) – 210 /cm^2.s.sr
Tmax$_2$(Ep>10MeV) – 14d05^h, Jmax$_2$(Ep>10MeV) – 180 /cm^2.s.sr
Duration of the event – 4 days
Quasimaximal energy of protons in the event – Eqm$_1$ = 110 MeV
– Eqm$_2$ = 90 MeV

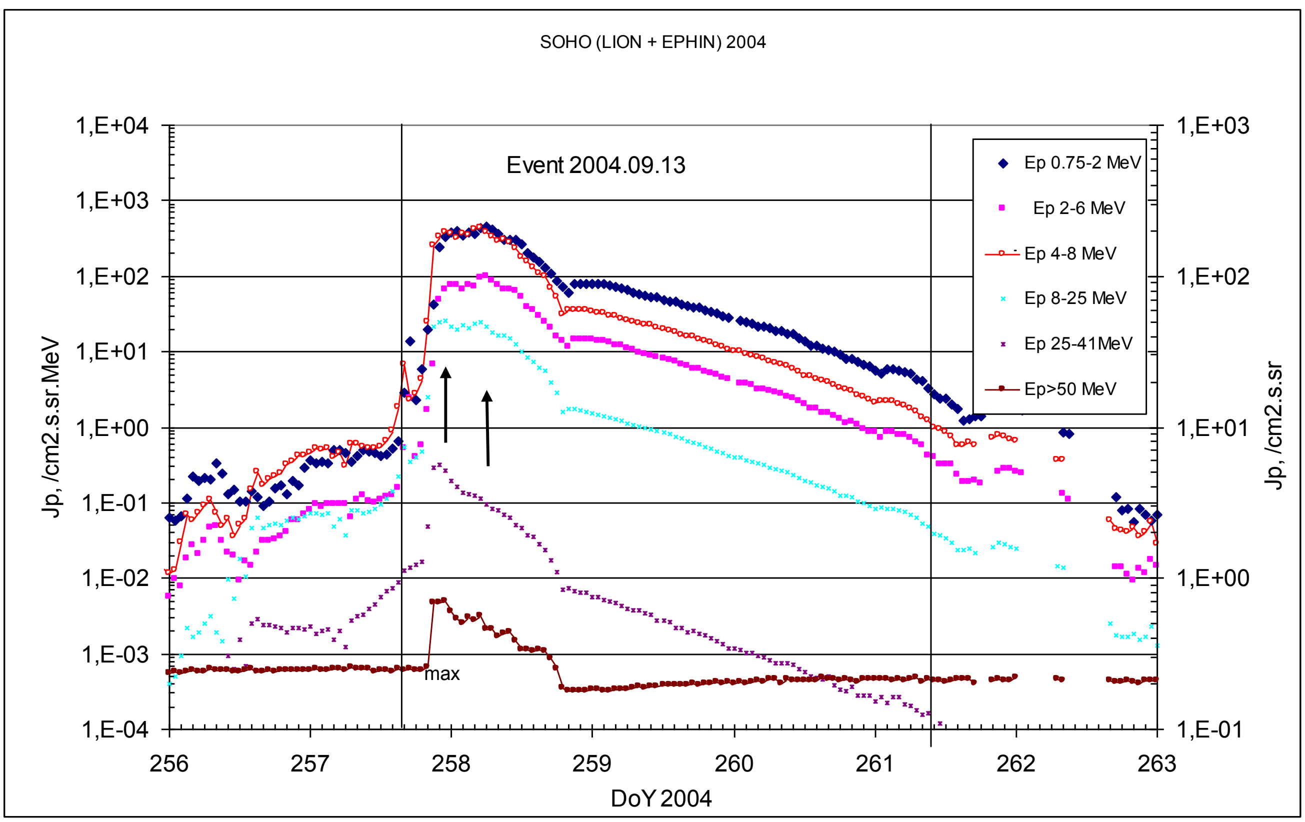
Sources: ☉solar flare 12d00^{h}04^m, M4.8/2N, N04E42, AR10672
Ø solar flare 12d01^{h}36^m, M3.2/SN, S14W61, AR10667
Main X-ray burst 1-8 Å onset – 12d00^{h}04^m, max – 12d00^{h}56^m, Φ = 0.15 J/m^2
CME: 12d00^{h}36^m, V = 1328 km/s, Δφ = 360^o, dA = 132°
▲SC 13d20^{h}03^m;

Particle fluxes and associated phenomena



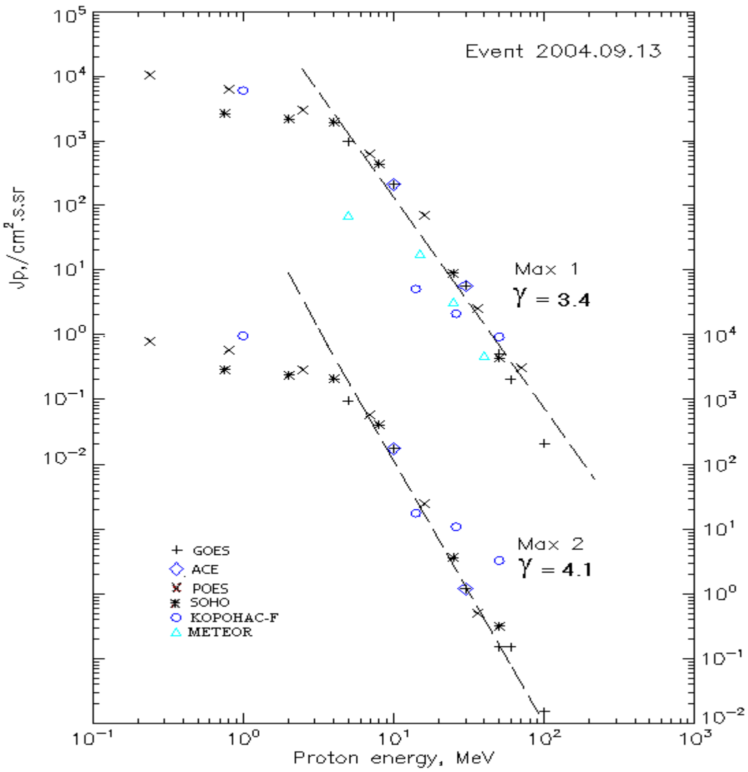
Time profiles of the proton fluxes for the event of 2004 September 13





Arrows on the profiles of the events indicate the time of the proton flux maxima, taken to build the proton spectra (see below)

Integral time-of-maximum proton spectrum



Integral fluxes of protons for the event of 2004 September 13

S/c, instruments	Ep, MeV	To	Tmax	Jmax, $(cm^2.s.sr)^{-1}$	Dura-tion	Comments
GOES-10						
EPS	>5	19^h	$23^h/14d06^h$	970/990	5d	
EPS	>10	19^h	$23^h/14d05^h$	210/180	4d	
EPS	>30	19^h	$22^h/14d06^h$	5.6/1.2	3d	
EPS	>50	19^h	$22^h/14d05^h$	0.5/0.15	1d	
EPS	>60	19^h	$23^h/14d05^h$	0.2/0.1	1d	
EPS	>100	-	$23^h/14d05^h$	0.02/0.015	-	
METEOR						
CBM	>5	18^h	$14d01^h$/ -	70/ -	3d	
CBM	>15	18^h	23^h/ -	18/ -	2d	
CBM	>25	18^h	23^h/ -	3.2/ -	1d	
CBM	>40	22^h	22^h/ -	0.46/ -	1d	
BP	>90	-	-	-	-	
ChD	>600	-	-	-	-	
POES-16						
MEPED	>0.24	-	$24^h/14d08^h$	$1\cdot10^5/8.4\cdot10^3$	-	
MEPED	>0.8	-	$24^h/14d08^h$	$6.2\cdot10^3/6.1\cdot10^3$	-	
MEPED	>2.5	-	$24^h/14d08^h$	$3\cdot10^3/3\cdot10^3$	-	
MEPED	>6.9	-	$24^h/14d08^h$	620/610	-	
MEPED	>16	-	$24^h/14d08^h$	70/25	-	
MEPED	>36	-	$24^h/14d07^h$	2.5/0.5	-	
MEPED	>70	-	24^h/ -	0.3/ -	-	
MEPED	>140	-	-	-	-	

CORONAS F						
MKL	>1.	-	$22^h/14d05^h$	$600/1\cdot10^4$	-	
MKL	>14	-	$22^h/14d05^h$	5/18	-	
MKL	>26	-	$22^h/14d05^h$	2.1/11	-	
MKL	>50	-	$22^h/14d05^h$	0.9/3.3	-	
ACE						
SIS	>10	19^h	$23^h/14d05^h$	210/180	4d	
SIS	>30	19^h	$22^h/14d06^h$	5.6/1.2	3d	
SOHO						
EPHIN (INT)	>50	20^h	$21^h/14d05^h$	0.43/0.32	1d	

Differential fluxes of protons for the event of 2004 September 13

S/c, instruments	ΔE, MeV	To	Tmax	Jmax, $(cm^2.s.sr.MeV)^{-1}$	Dura-tion	Comments
SOHO						
LION	0.72-2	19^h	$14d01^h/14d06^h$	390/447	4d	
LION	2-6	19^h	$14d00^h/14d06^h$	75/98	4d	
EPHIN	4-8	19^h	$23^h/14d05^h$	376/443	4d	
EPHIN	8-25	19^h	$23^h/14d05^h$	25.3/24.4	4d	
EPHIN	25-41	19^h	$22^h/14d04^h$	0.3/0.12	4d	

References:

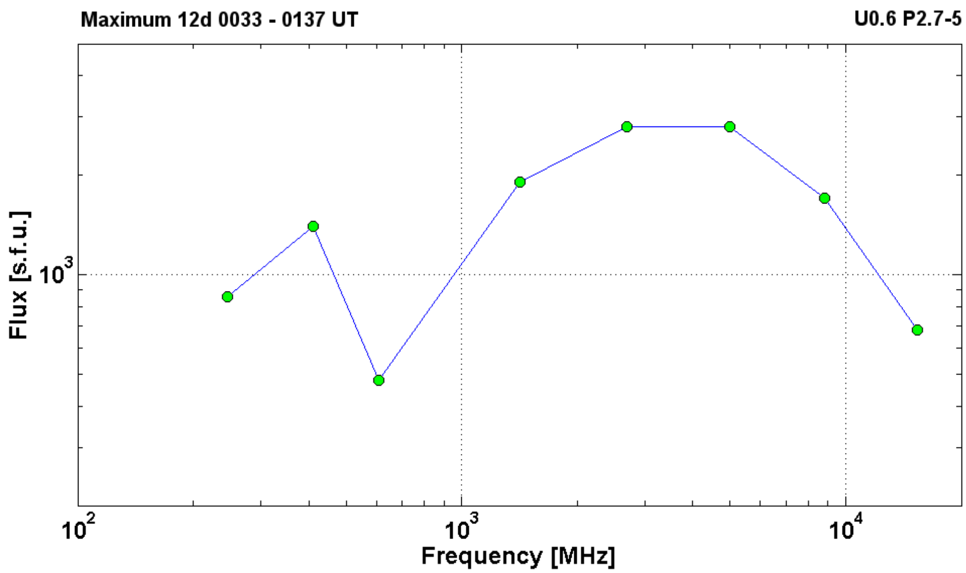
Kuwabara T., Bieber J.W., Clem J., et.al., 2006.

Electromagnetic and other phenomena that are sources and/or accompanying for the event of 2004 September 13

2004 September 12 ☉ AR10672 To event 452

Hα	6563 Å	0008	0035	0201	N04E42	2N	FHUZ
1 – 12	keV	0004	0056	0133		M4.8	1.5E-1
50-100	keV	000216	003934	010448		12612176	RHESSI
15.4	GHz	0032.0	0119.0	0000.0		2.83	
8.8	GHz	0029.0	0121.0	0256.0		3.23	
5	GHz	0023.0	0119.0	0246.0	U0.6 P2.7-5	3.45	
2.7	GHz	0026.0	0121.0	0246.0		3.45	
1.4	GHz	0024.0	0116.0	0000.0		3.28	
610	MHz	0026.0	0033.0	0205.0		2.68	
410	MHz	0028.0	0137.0	0200.0		3.15	
245	MHz	0135.0	0137.0	0140.0		2.93	

DS II	30-57	0023		0029	F,N	3	
DS II	60-110	0023		0029	S,H	3	
DS II	20-90	0029		0049	S,H	3	
DS II	30-90	0141		0150	F,N	3	
DS II	57-180	0141		0150	S,H	3	
DS IV	30-850	0013		0130		2	
DS IV	28-180	0026		0200		2	
DS III	30-130	0023		0038	GG	2	
DS III	20-180	0041		0111	GG	2	
DS III	75-440	0135		0140	G	1	
DS III	20-90	0149		0150	G	3	
DS UNCLF	50-85	0043		0047		2	
CME	WL	0036	1328 km/s	22.5 km/s^2	360º	132º	



2004 September 12 Ø AR10667 To event 452

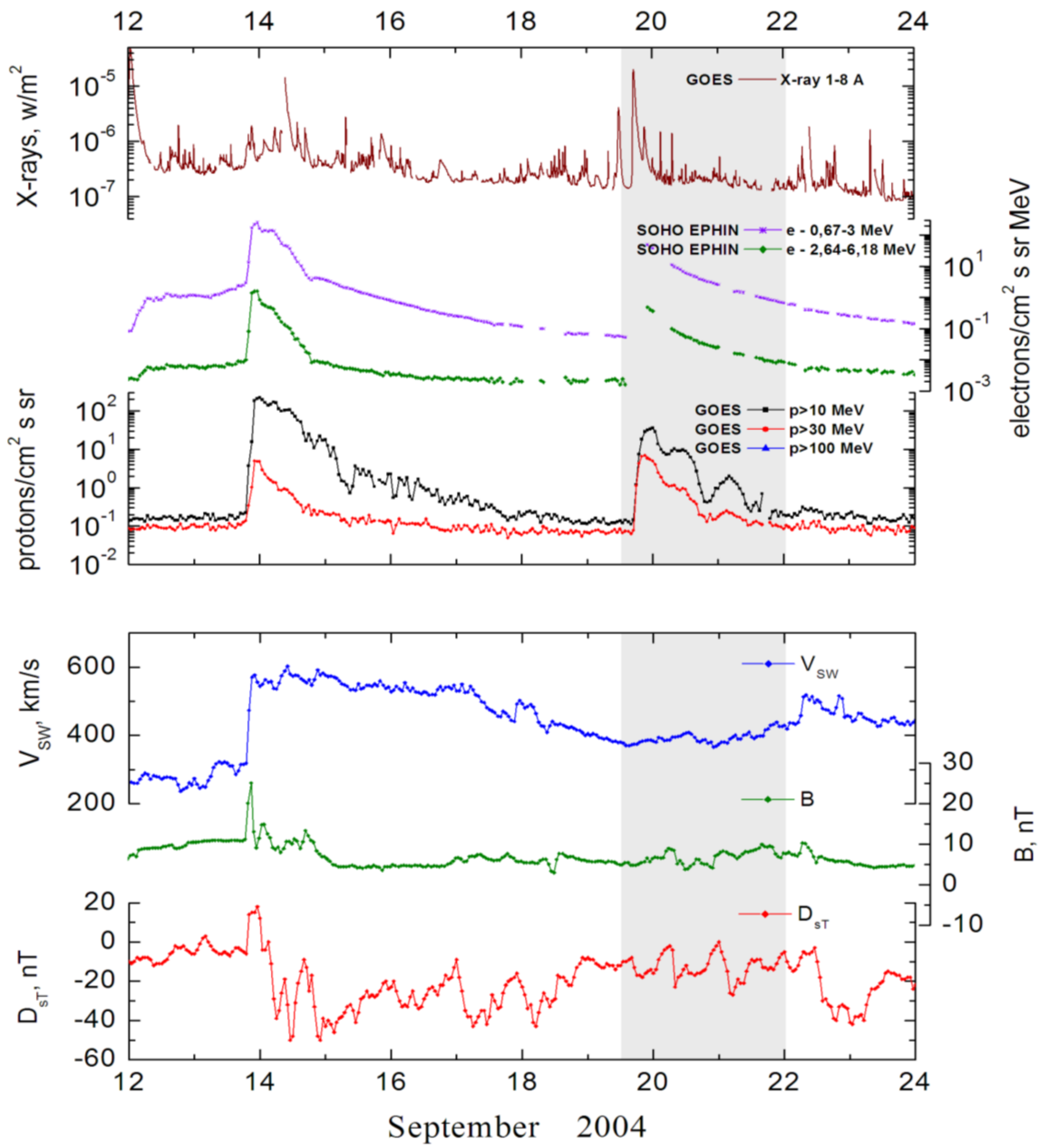
Hα	6563 Å	0137	0138	0145	S14W61	SN	
1 – 12	keV	0136	0139	0141		M3.2	8.2E-3
12-25	keV	013740	013858	014008		343715	RHESSI
410	MHz	0028.0	0137.0	0200.0		3.15	
245	MHz	0135.0	0137.0	0140.0		2.93	
DS III	75-440	0135		0140	G	1	
DS III	20-90	0149		0150	G	3	

Event 2004.09.19 – (2004-263) **№ 453**

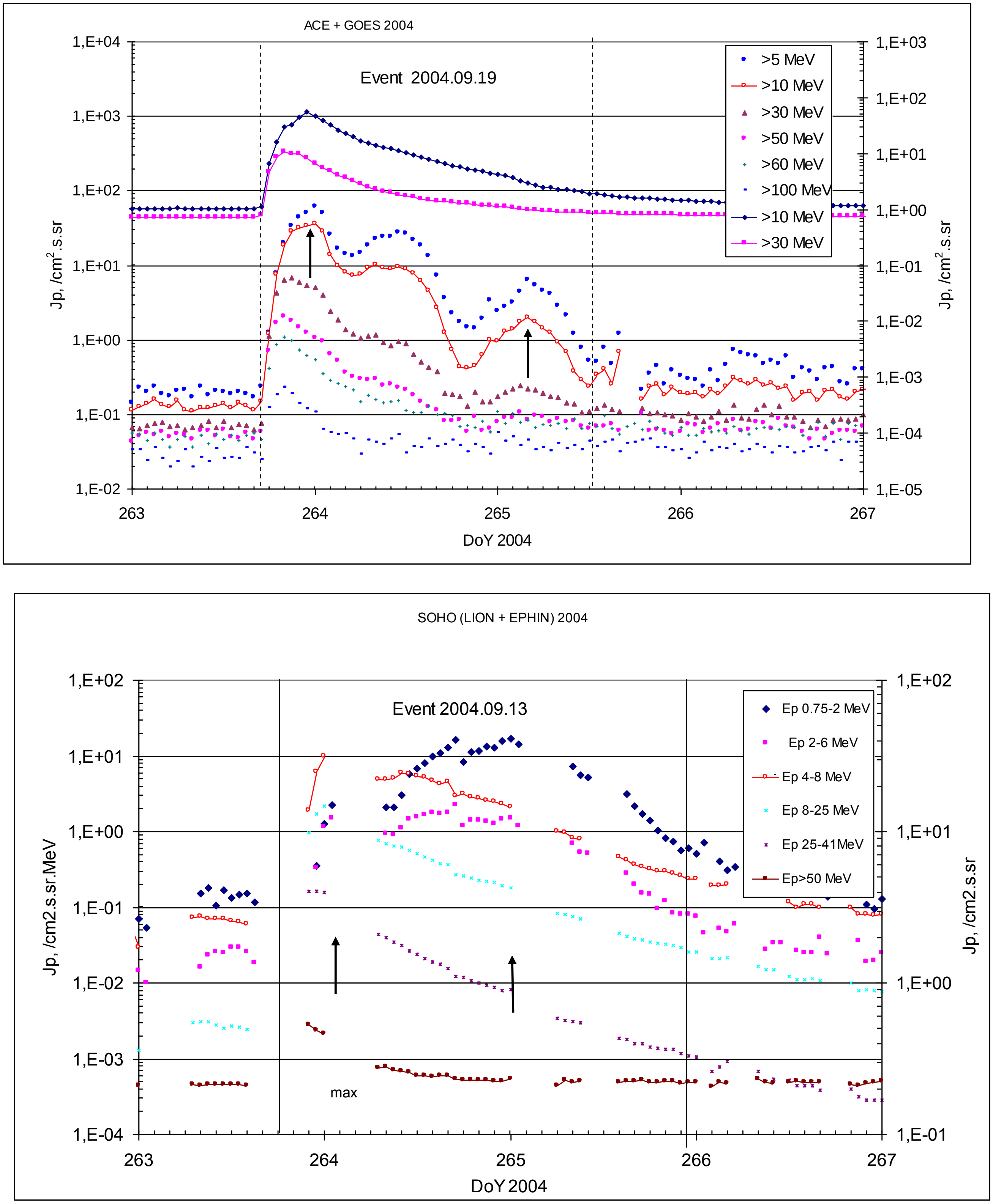
Particle event: To(Ep>10MeV) – 19d18^{h}
Tmax$_1$(Ep>10MeV) – 20d01^{h}, Jmax$_1$(Ep>10MeV) – 46 /cm^2.s.sr
Tmax$_2$(Ep>10MeV) – 21d02^{h}, Jmax$_2$(Ep>10MeV) – 10 /cm^2.s.sr
Duration of the event – 2 days
Quasimaximal energy of protons in the event – Eqm$_1$ = 390 MeV
– Eqm$_2$ = 100 MeV

Sources: ● solar flare 19d16^{h}46^{m}, M1.9/…, n03w60* AR10672
Main X-ray burst 1–8 Å: onset – 19d16^{h}46^{m}, max – 19d17^{h}12^{m}, Φ = 0.039 J/m^2
CME: gap
* − probable localization of the flare event

Particle fluxes and associated phenomena

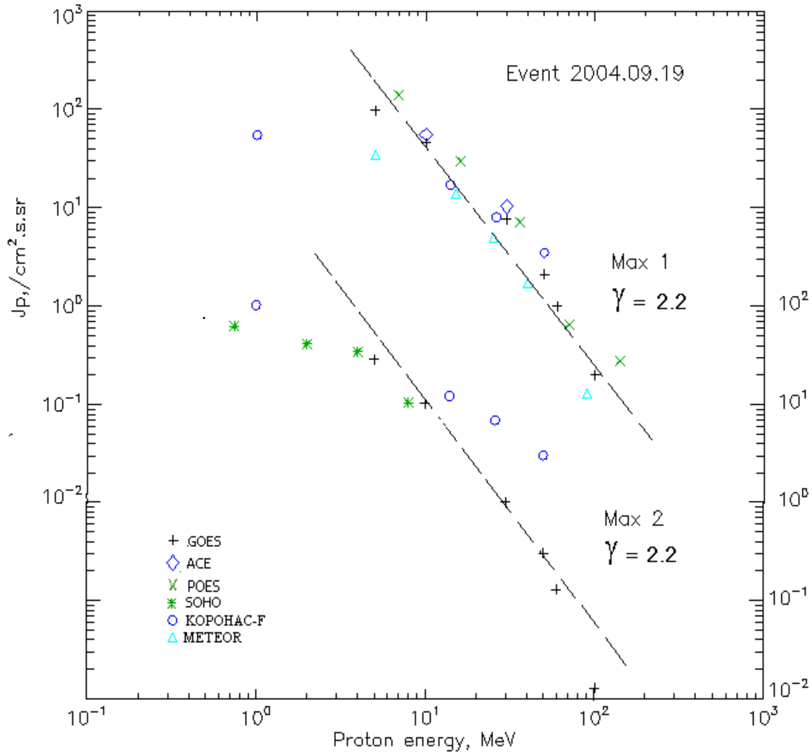


Time profiles of the proton fluxes for the event of 2004 September 19



Arrows on the profiles of the events indicate the time of the proton flux maxima, taken to build the proton spectra (see below)

Integral time-of-maximum proton spectrum



Integral fluxes of protons for the event of 2004 September 19

S/c, instruments	Ep, MeV	To	Tmax	Jmax, $(cm^2.s.sr)^{-1}$	Dura -tion	Comments
GOES-10						
EPS	>5	18^h	$20d01^h/20d11^h$	98/28	2d	
EPS	>10	18^h	$20d01^h/20d08^h$	46/10	2d	
EPS	>30	18^h	$21^h/20d08^h$	7.7/1	2d	
EPS	>50	18^h	$20^h/20d08^h$	2.1/0.3	1d	
EPS	>60	18^h	$20^h/20d07^h$	1.0/0.13	1d	
EPS	>100	18^h	$20^h/20d08^h$	0.2/0.01	1d	
METEOR						
CBM	>5	17^h	20^h/ -	35/ -	3d	
CBM	>15	17^h	20^h/ -	14/ -	2d	
CBM	>25	17^h	20^h/ -	4.9/ -	2d	
CBM	>40	17^h	20^h/ -	1.7/ -	1d	
BP	>90	17^h	20^h/ -	0.13/ -	1d	
ChD	>600	-	-	-	-	
POES-16						
MEPED	>0.24	-	-	-	-	
MEPED	>0.8	-	-	-	-	
MEPED	>2.5	-	-	-	-	
MEPED	>6.9	-	22^h/ -	140/ -	2d	
MEPED	>16	-	22^h/ -	30/ -	2d	
MEPED	>36	-	20^h/ -	7.2/ -	1d	
MEPED	>70	-	20^h/ -	0.65/ -	1d	
MEPED	>140	-	20^h/ -	0.28/ -	1d	

CORONAS F						
MKL	>1.	-	$21^h/20d08^h$	55/110	2d	
MKL	>14	-	$21^h/20d08^h$	17/12	1d	
MKL	>26	-	$21^h/20d08^h$	8/6.8	1d	
MKL	>50	-	$21^h/20d08^h$	3.5/3	1d	
ACE						
SIS	>10	17^h	23^h/ -	55.2/ -	2d	
SIS	>30	17^h	20^h/ -	10.3/ -	1d	
SOHO						
EPHIN (INT)	>50	17^h	- /$20d11^h$	-	1d	

Differential fluxes of protons for the event of 2004 September 19

S/c, instruments	ΔE, MeV	To	Tmax	Jmax, $(cm^2.s.sr.MeV)^{-1}$	Dura -tion	Comments
SOHO						
LION	0.75-2	17^h	- /$20d17^h$	- /16.5	3d	
LION	2-6	17^h	- /$20d17^h$	- /2.2	3d	
EPHIN	4-8	17^h	- /$20d10^h$	- /5.9	3d	
EPHIN	8-25	17^h	- /$20d10^h$	- /0.6	3d	
EPHIN	25-41	17^h	-	-	-	
EPHIN	41-53	- " -	- " -	- " -	- " -	

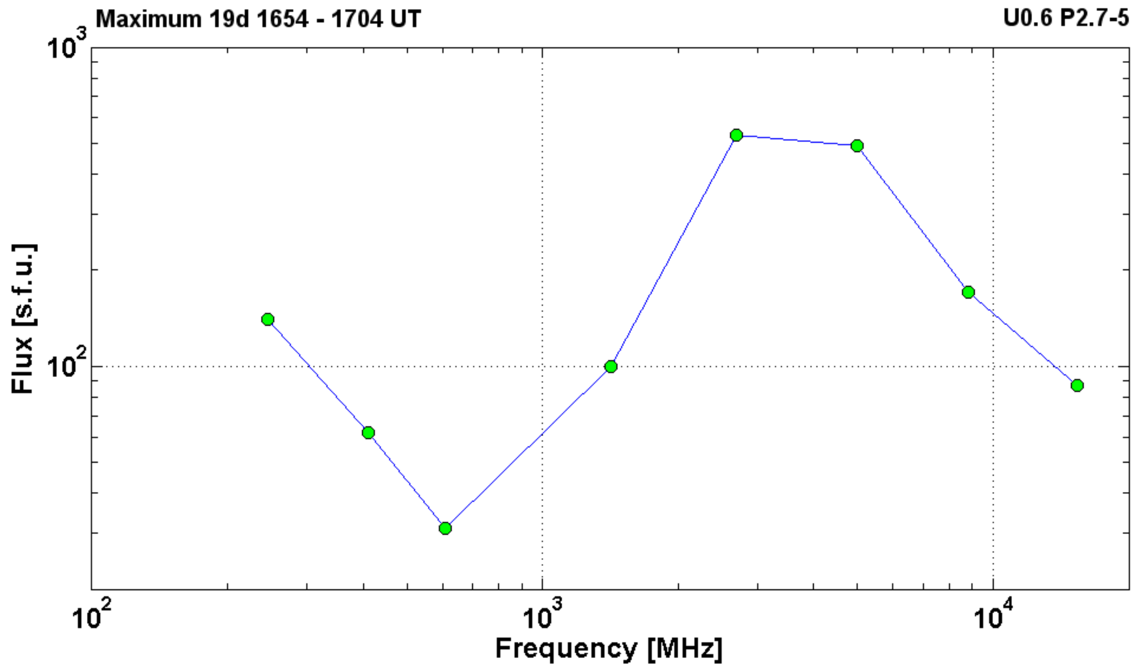
Electromagnetic and other phenomena that are sources and/or accompanying for the event of 2004 September 19

2004 September 19 ⊙ AR1010672 To event 453

Hα	6563 Å	No Flare Patrol			n03w60*		
1 – 12	keV	1646	1712	1739		M1.9	3.9E-2
50-100	keV	16:43:16	17:01:22	17:02:52		71699552	RHESSI

15.4	GHz	1656.0	1658.0	1713.0		1.94	
8.8	GHz	1655.0	1657.0	0000.0		2.23	
5	GHz	1651.0	1657.0	0000.0	U0.6 P2.7-5	2.69	
2.7	GHz	1649.0	1657.0	0000.0		2.72	
1.4	GHz	1650.0	1654.0	0000.0		2.00	
610	MHz	1652.0	1655.0	1655.0		1.49	
410	MHz	1655.0	1656.0	1656.0		1.79	
245	MHz	1701.0	1704.0	1706.0		2.15	
DS II	25-180	1656		1713		3	
DS IV	25-76	1716		1734		1	
DS III	42-180	1650		1653		1	
CME	WL						gap

* − probable localization of the flare event

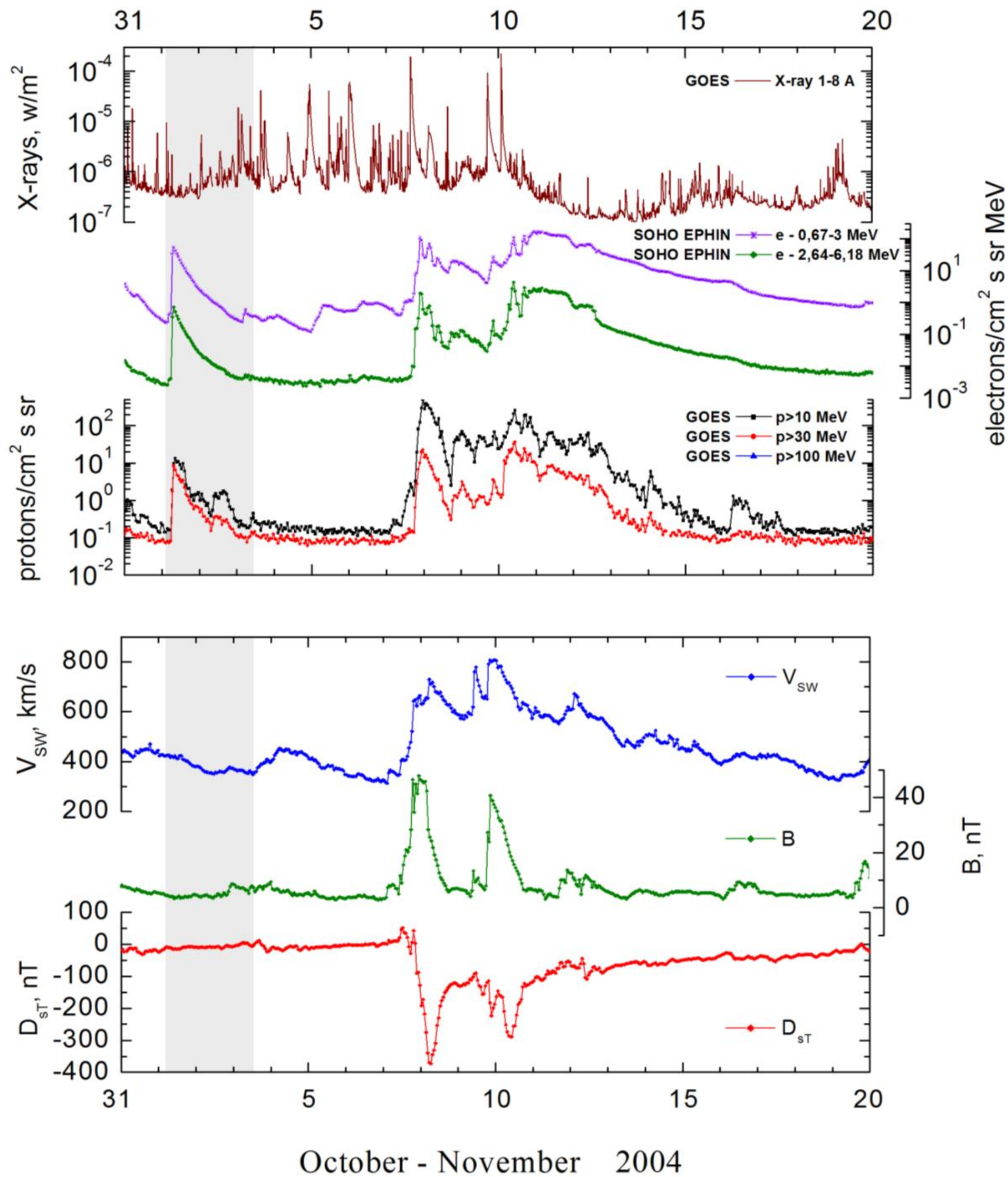


Event 2004.11.01 – (2004-306) **№ 454**

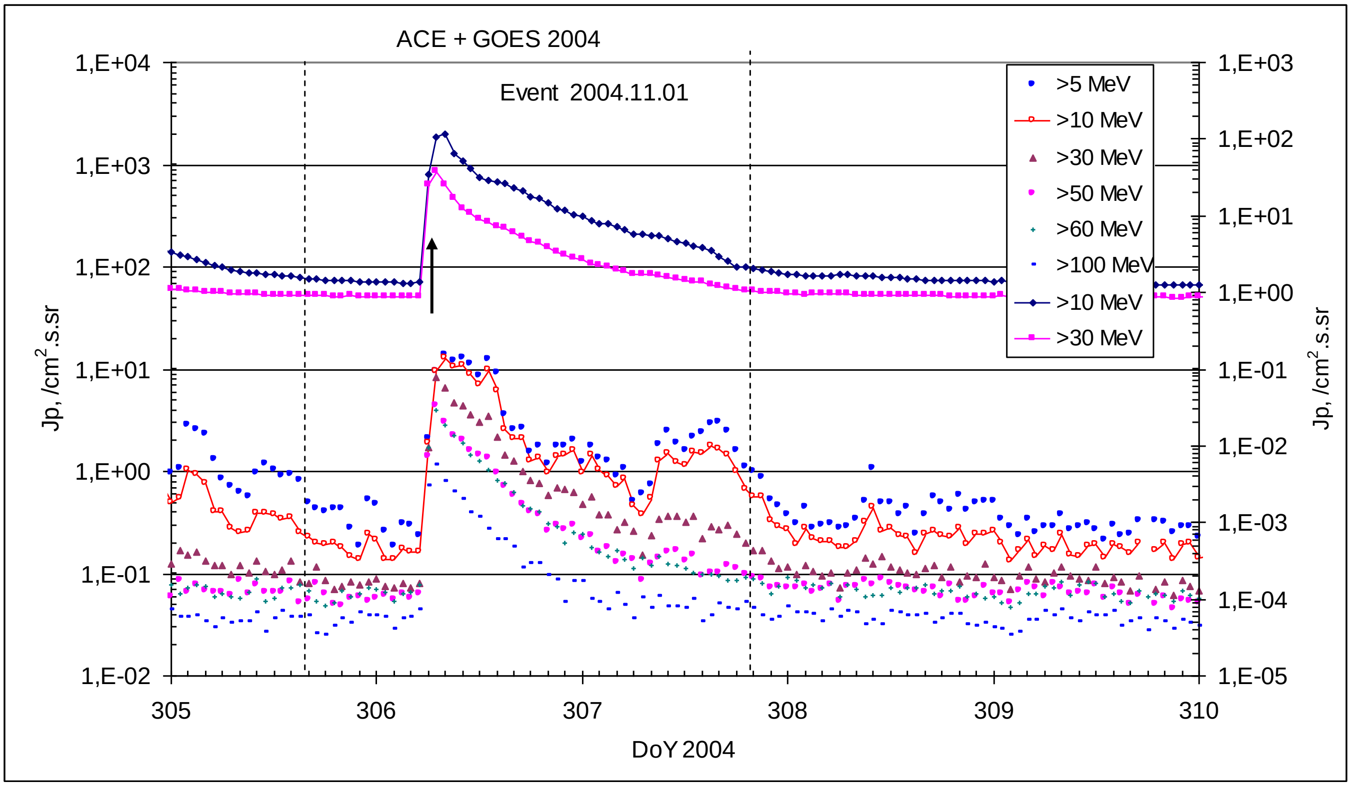
Particle event: To(Ep>10MeV) – 01d06^h
Tmax (Ep>10MeV) – 01d08^h, Jmax (Ep>10MeV) – 54 /cm^2.s.sr
Duration of the event – 2 days
Quasimaximal energy of protons in the event – Eqm = 410 MeV

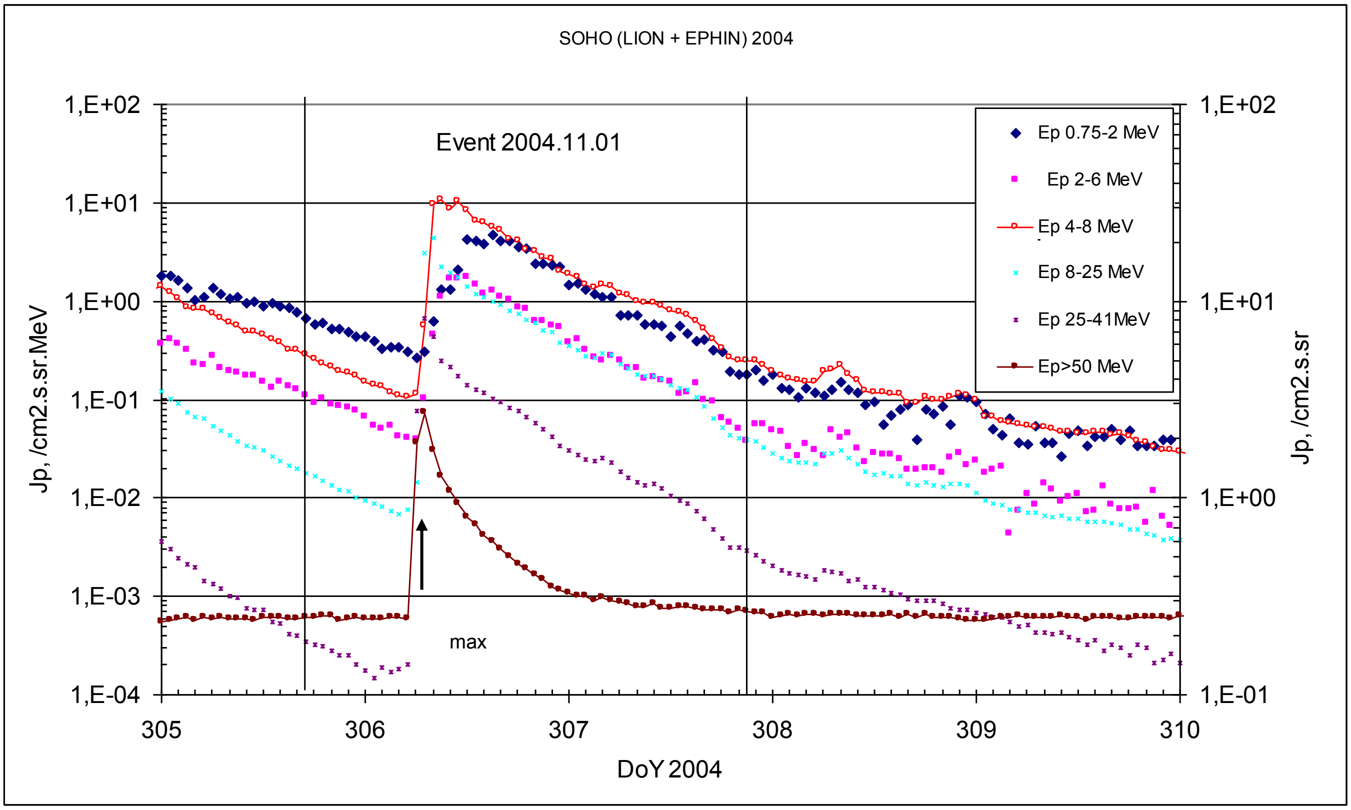
Sources: ● solar flare 01d03^{h}04^m, M1.1/1F, N15W41, AR10691
Main X-ray burst 1-8 Å: onset – 01d03^{h}04^m, max – 01d03^{h}22^m, Φ = 0.0052 J/m^2
CME: 01d03^{h}54^m, V = 0459 km/s, Δφ = 192^o, dA = 285°

Particle fluxes and associated phenomena



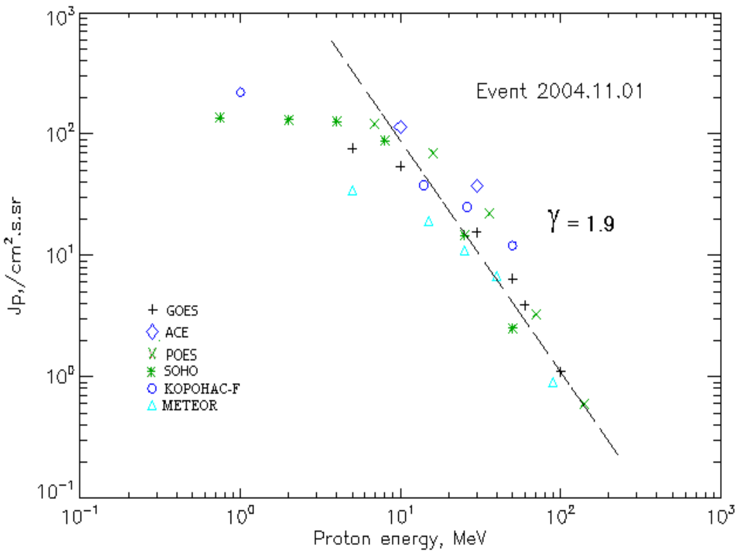
Time profiles of the proton fluxes for the event of 2004 November 01





Arrows on the profiles of the events indicate the time of the proton flux maxima, taken to build the proton spectra (see below)

Integral time-of-maximum proton spectrum



Integral fluxes of protons for the event of 2004 November 01

S/c, instruments	Ep, MeV	To	Tmax	Jmax, $(cm^2.s.sr)^{-1}$	Dura-tion	Comments
GOES 10						
EPS	>5	06^h	08^h	76	2d	
EPS	>10	06^h	08^h	54	2d	
EPS	>30	06^h	07^h	15.5	2d	
EPS	>50	06^h	07^h	6.4	2d	
EPS	>60	06^h	07^h	3.9	1d	
EPS	>100	06^h	07^h	1.1	1d	
METEOR						
CBM	>5	06^h	08^h	34	3d	
CBM	>15	06^h	08^h	19	3d	
CBM	>25	06^h	07^h	11	2d	
CBM	>40	06^h	07^h	6.7	2d	
BP	>90	06^h	07^h	0.9	1d	
POES 16						
MEPED	>0.8	06^h	-	-	2d	
MEPED	>2.5	06^h	-	-	2d	
MEPED	>6.9	06^h	07^h	120	2d	
MEPED	>16	06^h	07^h	70	2d	
MEPED	>36	06^h	07^h	22	2d	
MEPED	>70	06^h	07^h	3.3	1d	
MEPED	>140	06^h	07^h	0.6	1d	
CORONAS F						
MKL	>1.	06^h	08^h	220	2d	
MKL	>14	06^h	08^h	38	2d	
MKL	>26	06^h	08^h	25	2d	
MKL	>50	06^h	08^h	12	1d	
ACE						
SIS	>10	06^h	07^h	114	2d	
SIS	>30	06^h	07^h	37.6	2d	

SOHO						
EPHIN (INT)	>50	06^h	07^h	2.5	1d	

Differential fluxes of protons for the event of 2004 November 01

S/c, instruments	ΔE, MeV	To	Tmax	Jmax, (cm^2.s.sr.MeV)$^{-1}$	Dura-tion	Comments
SOHO						
LION	0.75-2	07^h	12^h	4.3	3d	
LION	2-6	07^h	10^h	1.7	3d	
EPHIN	4-8	06^h	08^h	9.7	2d	
EPHIN	8-25	06^h	08^h	4.3	2d	
EPHIN	25-41	06^h	08^h	0.43	2d	

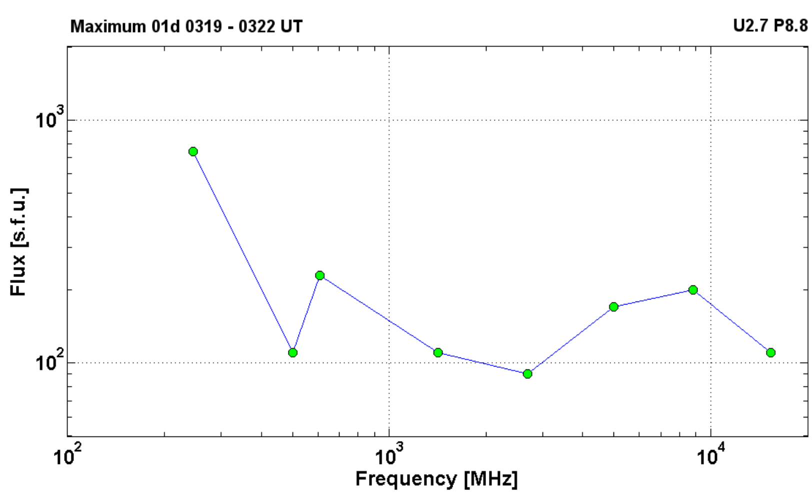
References:

Veselovskij I.S., I.N. Myagkova, O.S. Yakovchuk, 2012.

Electromagnetic and other phenomena that are sources and/or accompanying for the event of 2004 November 01

2004 November 01 ● AR10691 To event 454

Hα	6563 Å	0319	0320	0336	N15W41	1F	
1 – 12	keV	0304	0322	0326		M1.1	5.2E-3
50-100	keV	031724	032054	034328		2310280	RHESSI
15.4	GHz	0319.0	0319.0	~0319.0		2.04	
8.8	GHz	0319.0	0319.0	~0319.0	U2.7 P8.8	2.30	
5	GHz	0318.0	0319.0	0319.0		2.23	
2.7	GHz	0319.0	0319.0	~0319.0		1.95	
1.4	GHz	0319.0	0319.0	~0319.0		2.04	
610	MHz	0318.0	0319.0	0320.0		2.36	
500	MHz	0318.0	0319.0	0321.0		2.04	
245	MHz	<0319.0	~0322.0	>0326.0		2.87	
DS II	30-220	0321		0331		3	
DS III	23-260	0308		0309	G	1	
DS III	25-180	0312		0320		2	
DS III	25-1200	0317		0320	G	3	
CME	WL	0354	0459 km/s	-6.6 km/s^2	192º	285º	

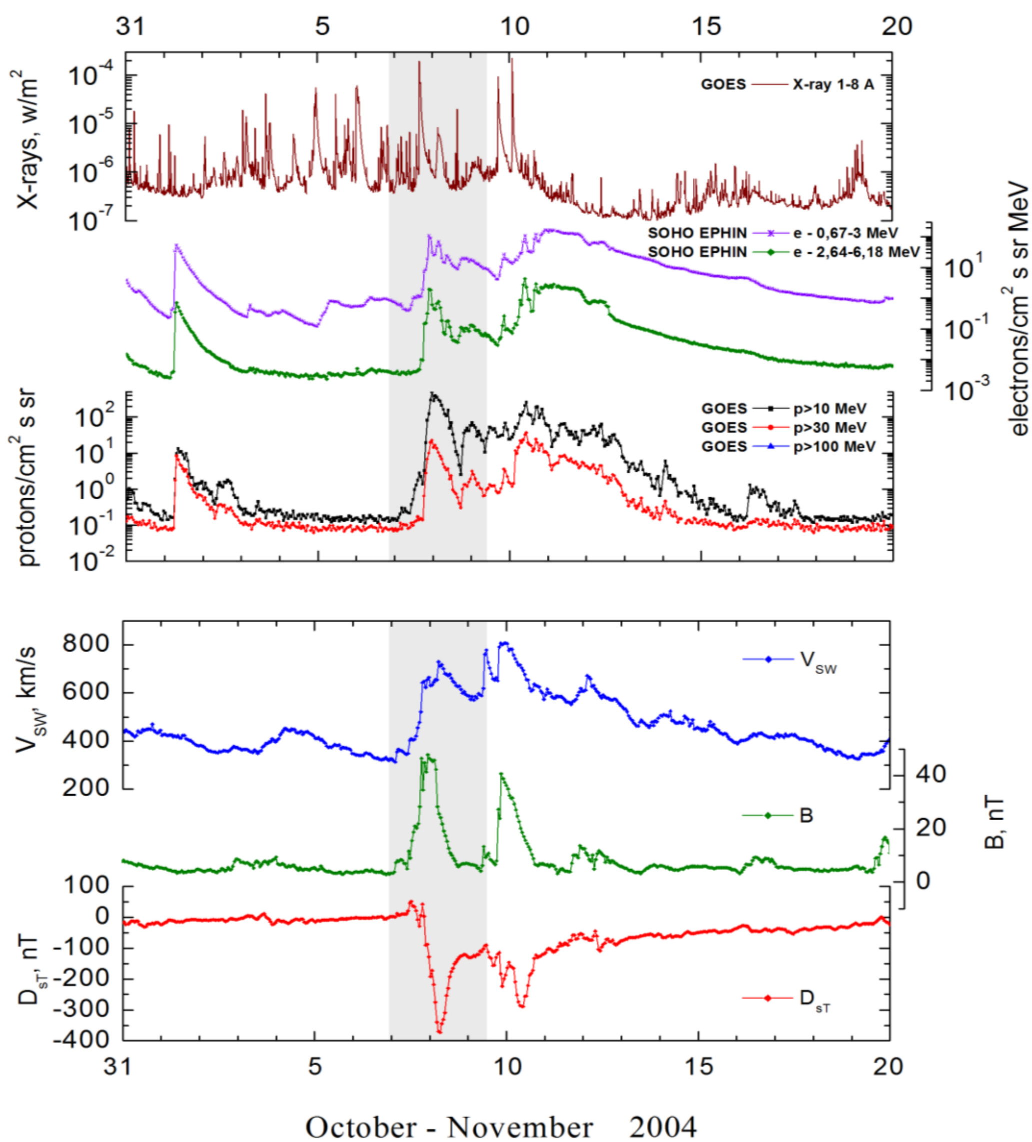


Event: 2004.11.07 – (2004-312) **№ 455**

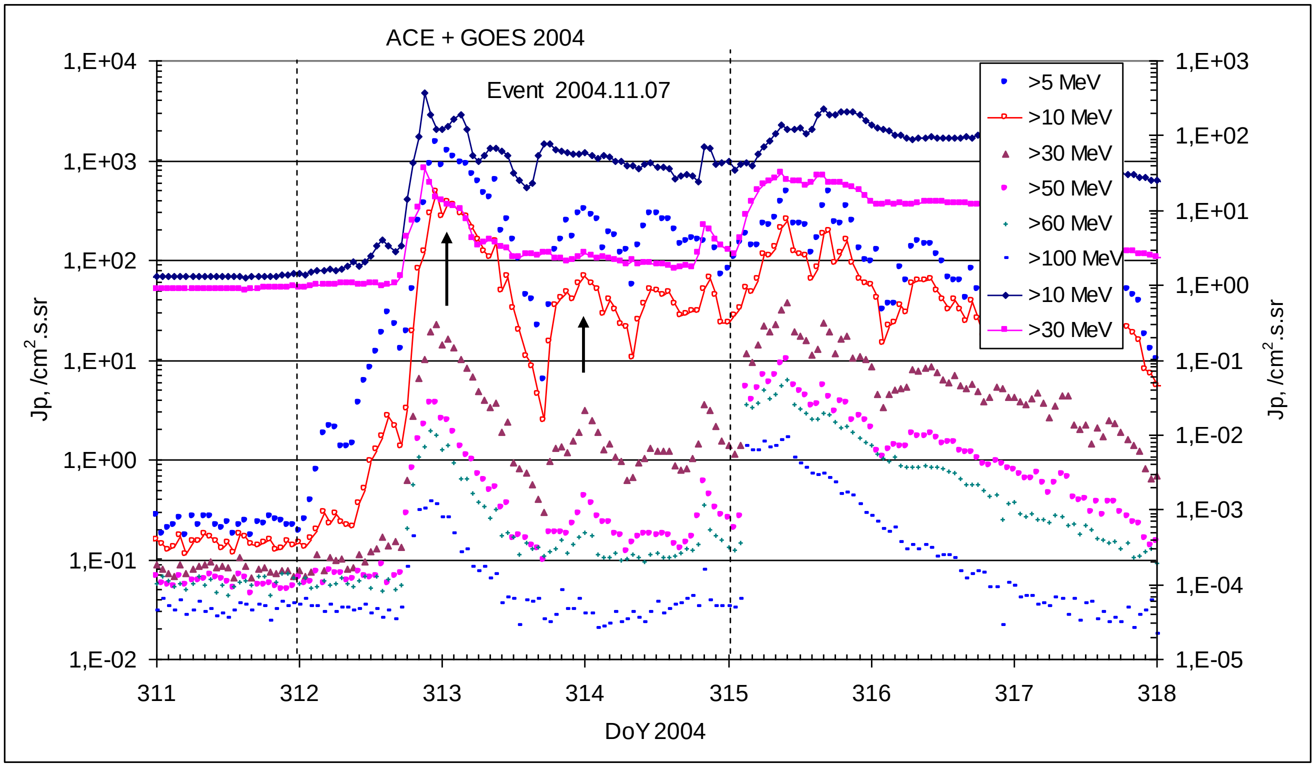
Particle event: To(Ep>10MeV) – 07d01^h
Tmax$_1$(Ep>10MeV) – 07d23^h, Jmax$_1$(Ep>10MeV) – 490 /cm^2.s.sr
Tmax$_2$(Ep>10MeV) – 09d00^h, Jmax$_2$(Ep>10MeV) – 70 /cm^2.s.sr
Duration of the event – 2 days
Quasimaximal energy of protons in the event – Eqm$_1$ = 330 MeV
– Eqm$_2$ = 100 MeV

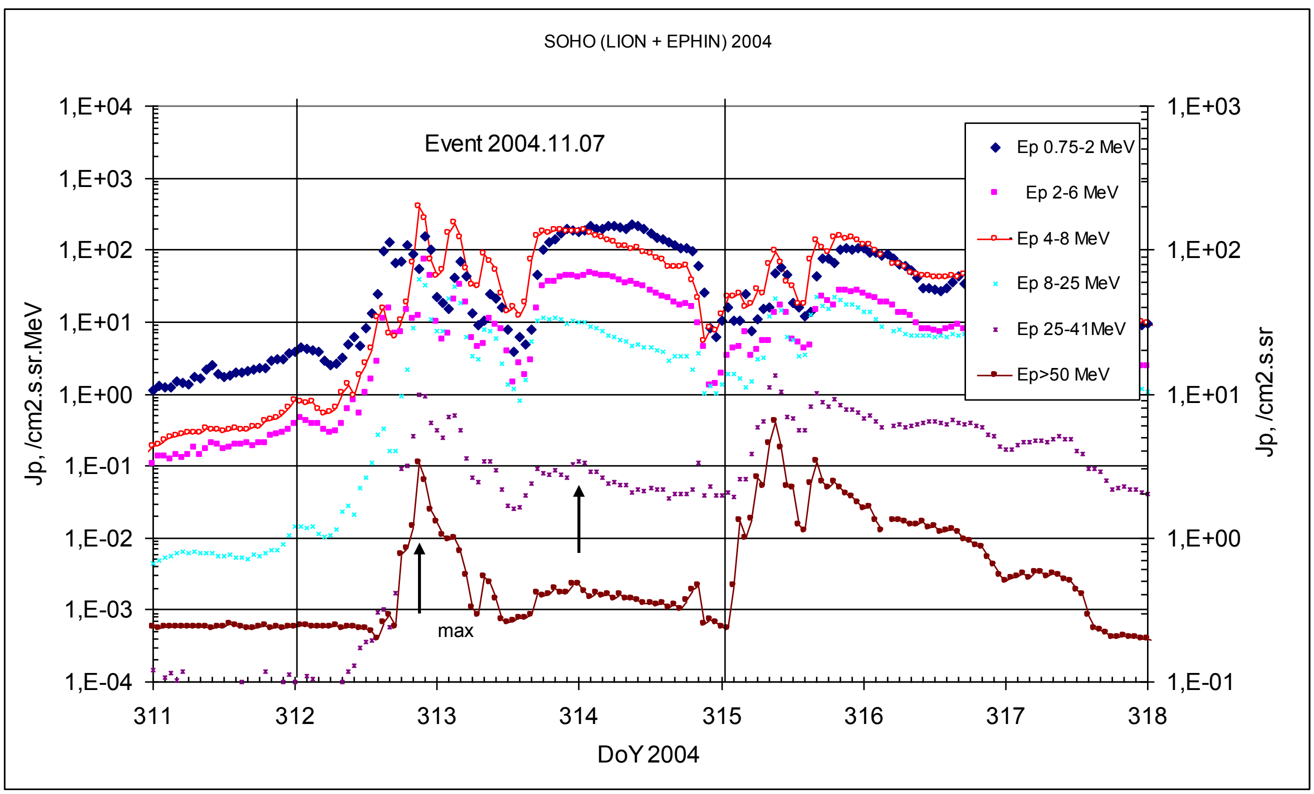
Sources: ● solar flare 07d15^{h}42^m, X2.0/…, n10w15*, AR10696
Ø solar flare 08d15^{h}43^m, M2.3/1N, N08W35, AR10696
Main X-ray burst 1–8 Å: onset – 07d15^{h}42^m, max – 07d16^{h}06^m, Φ = 0.2 J/m^2
CME: 07d16^{h}54^m, V = 1759 km/s, Δφ = 360^o, dA = 000°
▲SC 07d02^{h}57^m; ▲07d10^{h}52^m; ▲07d18^{h}27^m; ▲09d09^{h}30^m;
* − probable localization of the flare event

Particle fluxes and associated phenomena



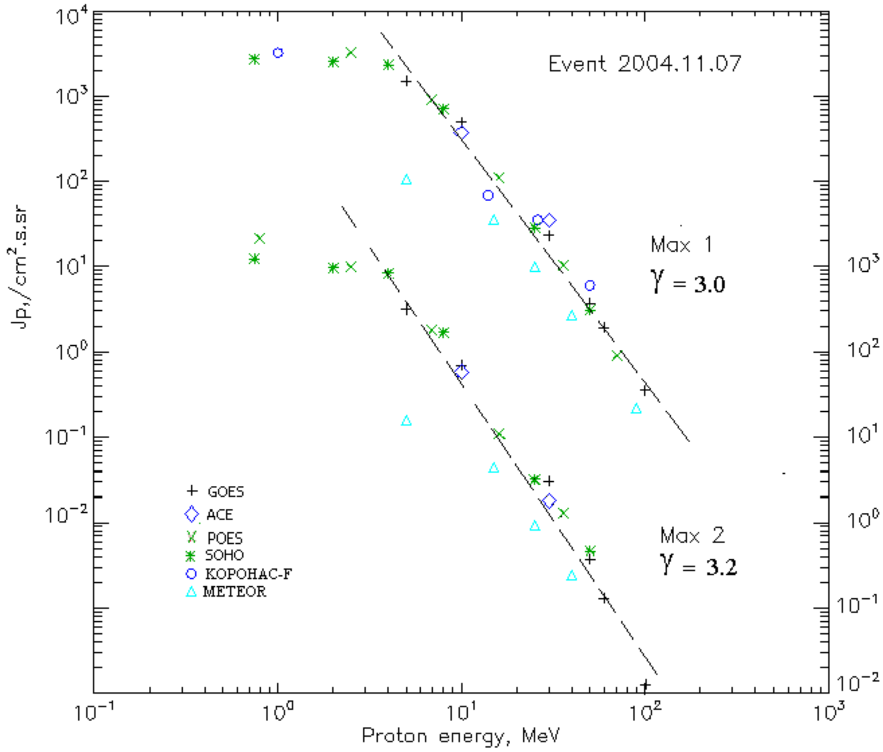
Time profiles of the proton fluxes for the event of 2004 November 07





Arrows on the profiles of the events indicate the time of the proton flux maxima, taken to build the proton spectra (see below)

Integral time-of-maximum proton spectrum



Integral fluxes of protons for the event of 2004 November 07

S/c, instruments	Ep, MeV	To	Tmax	Jmax, $(cm^2.s.sr)^{-1}$	Dura-tion	Comments
GOES-10						
EPS	>5	01^h	$23^h/09d00^h$	$1.5\cdot10^3/320$	2d	
EPS	>10	01^h	$23^h/09d00^h$	490/70	2d	
EPS	>30	01^h	$23^h/09d00^h$	23/3.1	2d	
EPS	>50	01^h	$23^h/09d00^h$	3.7/0.37	2d	
EPS	>60	01^h	$22^h/09d00^h$	1.9/0.13	2d	
EPS	>100	-	$22^h/08d23^h$	0.35/0.01	2d	
METEOR						
CBM	>5	18^h	$08d03^h/08d22^h$	107/16	2d	
CBM	>15	18^h	$08d03^h/08d22^h$	35/4.4	2d	
CBM	>25	18^h	$23^h/08d23^h$	10/0.95	2d	
CBM	>40	18^h	$23^h/08d23^h$	2.7/0.24	2d	
BP	>90	18^h	$08d00^h$/ -	0.22/ -	2d	
ChD	>600	-				
POES-16						
MEPED	>0.24	-	-	-	-	
MEPED	>0.8	-	- /$08d23^h$	- /$2.2\cdot10^3$	2d	
MEPED	>2.5	-	$24^h/08d23^h$	$3.3\cdot10^3/1\cdot10^3$	2d	
MEPED	>6.9	-	$24^h/08d23^h$	920/180	2d	
MEPED	>16	-	$22^h/08d23^h$	110/11	2d	
MEPED	>36	-	$22^h/08d23^h$	10.5/1.3	2d	
MEPED	>70	-	22^h/ -	0.9/ -	2d	
MEPED	>140	-	-	-	-	

CORONAS F						
MKL	>1.	-	08d01^h/ -	$3.2 \cdot 10^3$/ -	2d	
MKL	>14	-	08d01^h/ -	68/ -	2d	
MKL	>26	-	08d01^h/ -	35/ -	2d	
MKL	>50	-	08d01^h/ -	6/ -	2d	
ACE						
SIS	>10	17^h	21^h/09d00^h	375/60	2d	
SIS	>30	17^h	21^h/09d00^h	35/1.8	2d	
SOHO						
EPHIN (INT)	>50	17^h	21^h/09d00^h	3.1/0.46	2d	

Differential fluxes of protons for the event of 2004 November 07

S/c, instruments	ΔE, MeV	To	Tmax	Jmax, $(cm^2.s.sr.MeV)^{-1}$	Dura-tion	Comments
SOHO						
LION	0.75-2	08^h	22^h/09d00^h	155/213	2d	
LION	2-6	08^h	22^h/09d00^h	74.2/47.3	2d	
EPHIN	4-8	08^h	21^h/09d00^h	400/168	2d	
EPHIN	8-25	08^h	21^h/09d00^h	40/10	2d	
EPHIN	25-41	08^h	21^h/09d00^h	0.9/0.1	2d	
EPHIN	41-53	- “ -	- “ -	- “ -	- “ -	

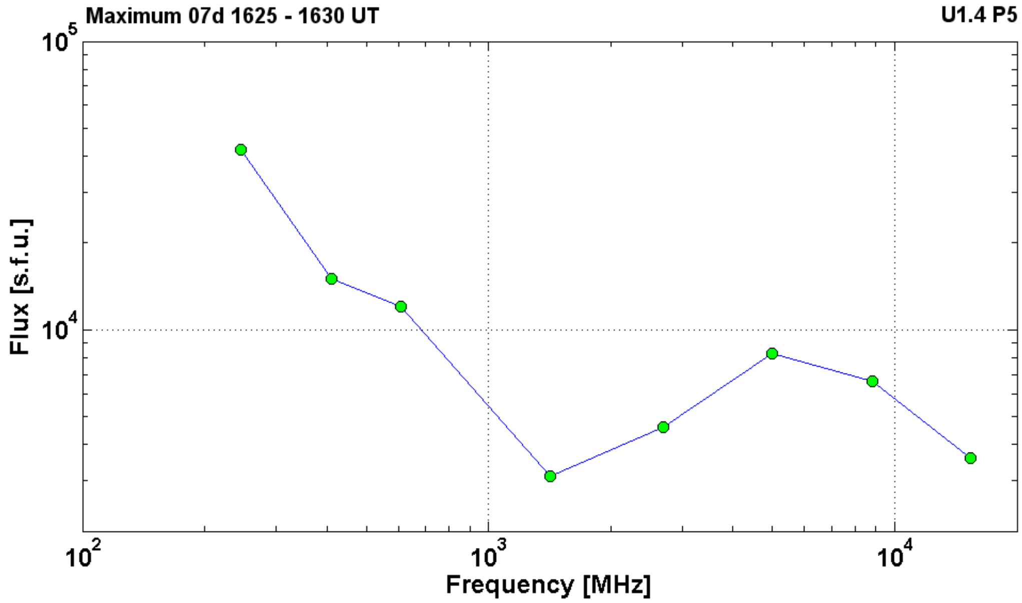
References:

Kuwabara T., Bieber J.W., Clem J., et.al., 2006.
Veselovskij I.S., I.N. Myagkova, O.S. Yakovchuk, 2012.

Electromagnetic and other phenomena that are sources and/or accompanying for the event of 2004 November.07

2004 November 07 ● AR10696 To event 455

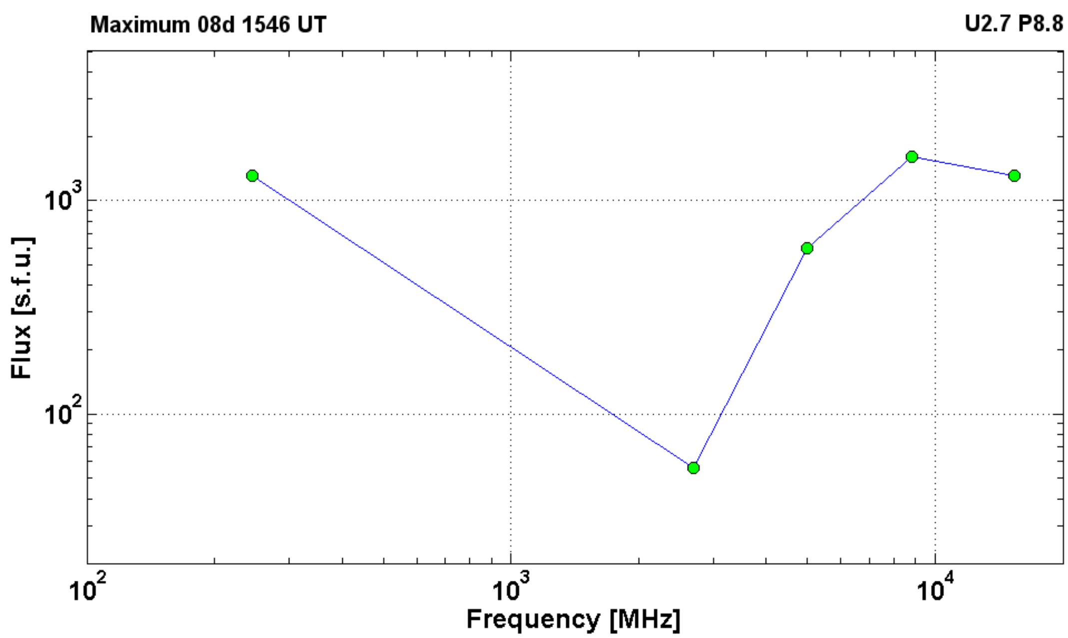
Hα	6563 Å	No Flare			n10w15		
1 – 12	keV	1542	1606	1615		X2.0	2.0E-1
12-25	keV	160500	160818	162248		12506936	RHESSI
100-300	keV	162248	162902	163220		3415495	RHESSI
50-150	keV	1620		1627			SONG F
0,18-0,7	MeV						SONG F
15.4	GHz	1552.0	1627.0	0000.0		3.56	
8.8	GHz	1550.0	1627.0	1715.0		3.82	
5	GHz	1552.0	1627.0	0000.0	U1.4 P5	3.92	
2.7	GHz	1555.0	1630.0	0000.0		3.66	
1.4	GHz	1557.0	1625.0	0000.0		3.49	
610	MHz	1602.0	1626.0	1729.0		4.08	
410	MHz	1602.0	1625.0	0000.0		4.18	
245	MHz	1600.0	1625.0	1815.0		4.62	
DS II	25-180	1559		1616		1	
DS IV	25-180	1603		2106		1	
CME	WL	1654	1759 km/s	$-19.7 km/s^2$	360º	000º	



2004 November 08 Ø AR10696 To event 455

Hα	6563 Å	1546	1546	1556	N08W35	1N	F
1 – 12	keV	1543	1549	1552		M2.3	6.7E-3
15.4	GHz	1545.0	1546.0	1546.0		3.11	
8.8	GHz	1545.0	1546.0	1546.0	U2.7 P8.8	3.20	
5	GHz	1545.0	1546.0	1547.0		2.78	
2.7	GHz	1546.0	1546.0	~1546.0		1.75	
245	MHz	1546.0	1546.0	~1546.0		3.11	
DS V	25-180	1545		1547		2	
CME	WL						gap

RHESSI - gap



Event 2004.11.10 – (2004-315) **№ 456**

Particle event: To(Ep>10MeV) – 10d02^h

Tmax$_1$(Ep>10MeV) – 10d10^h, Jmax$_1$(Ep>10MeV) – 264 /cm^2.s.sr

Tmax$_2$(Ep>10MeV) – 10d16^h, Jmax$_2$(Ep>10MeV) – 193 /cm^2.s.sr

Tmax$_3$(Ep>10MeV) – 12d09^h, Jmax$_3$(Ep>10MeV) – 75 /cm^2.s.sr

Duration of the event – 6 days

Quasimaximal energy of protons in the event – Eqm$_1$ = 485 MeV

– Eqm$_2$ = 430 MeV

– Eqm$_3$ = 110 MeV

Sources: ● solar flare 09d16^{h}59^m, M8.9/2N, N07W51, AR10969

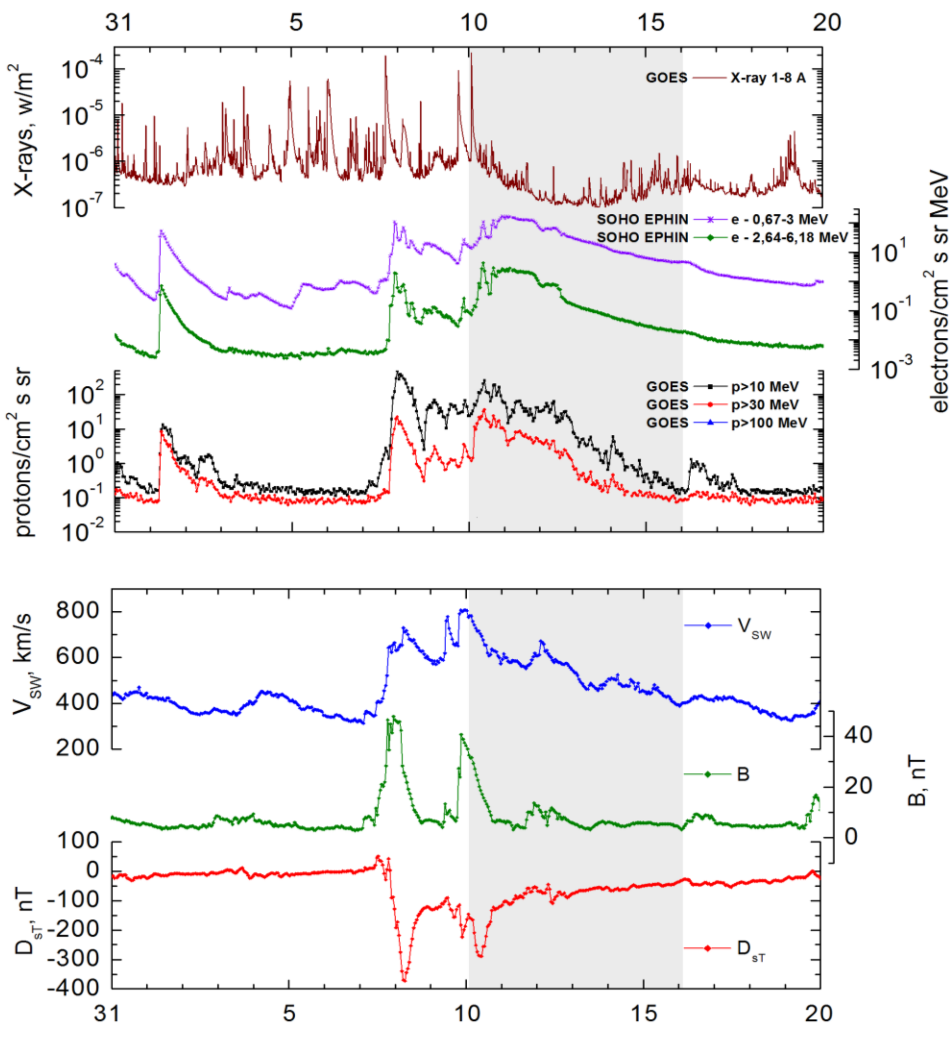
Ø solar flare 10d01^{h}59^m, X2.5/3B, N09W49, AR10969

Main X-ray burst 1–8 Å: onset – 09d16^{h}59^m, max – 09d17^{h}19^m, Φ = 0.094 J/m^2

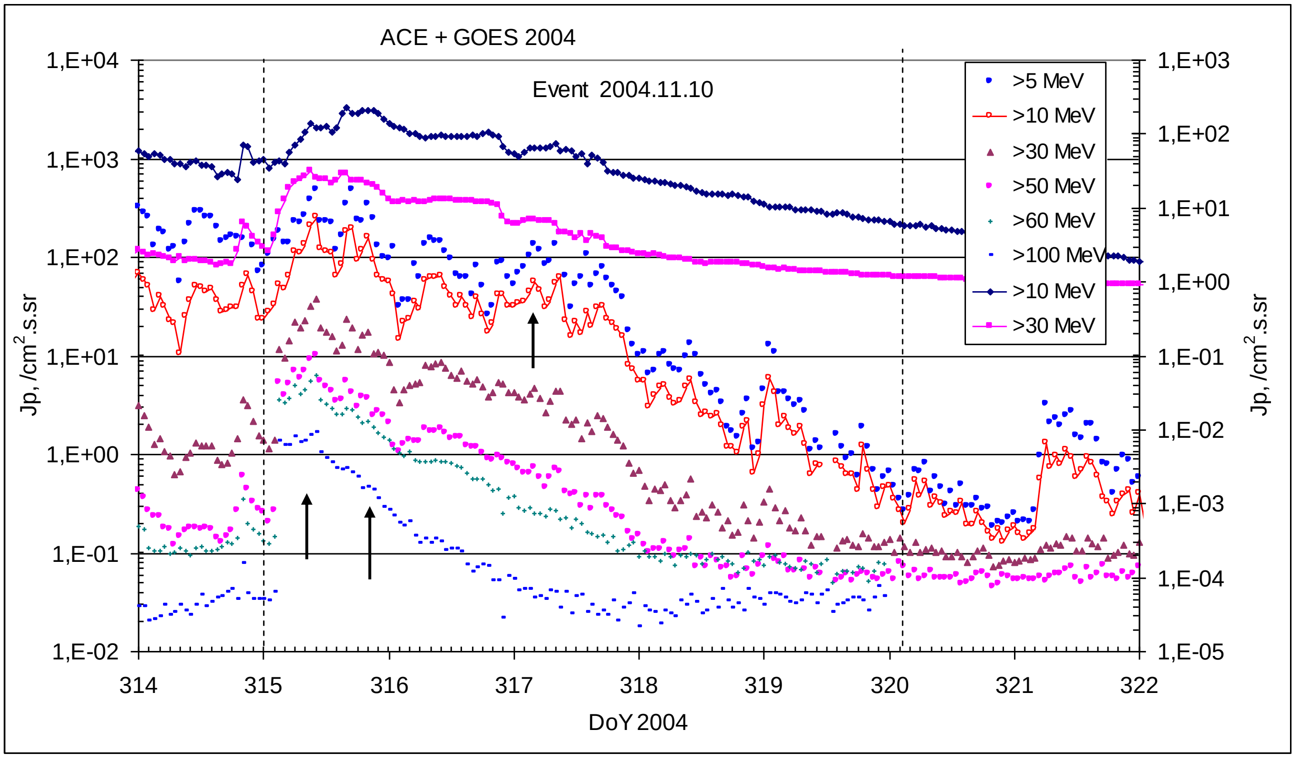
CME: 09d17^{h}26^m, V = 2000 km/s, Δφ = 360^o, dA = 299°;

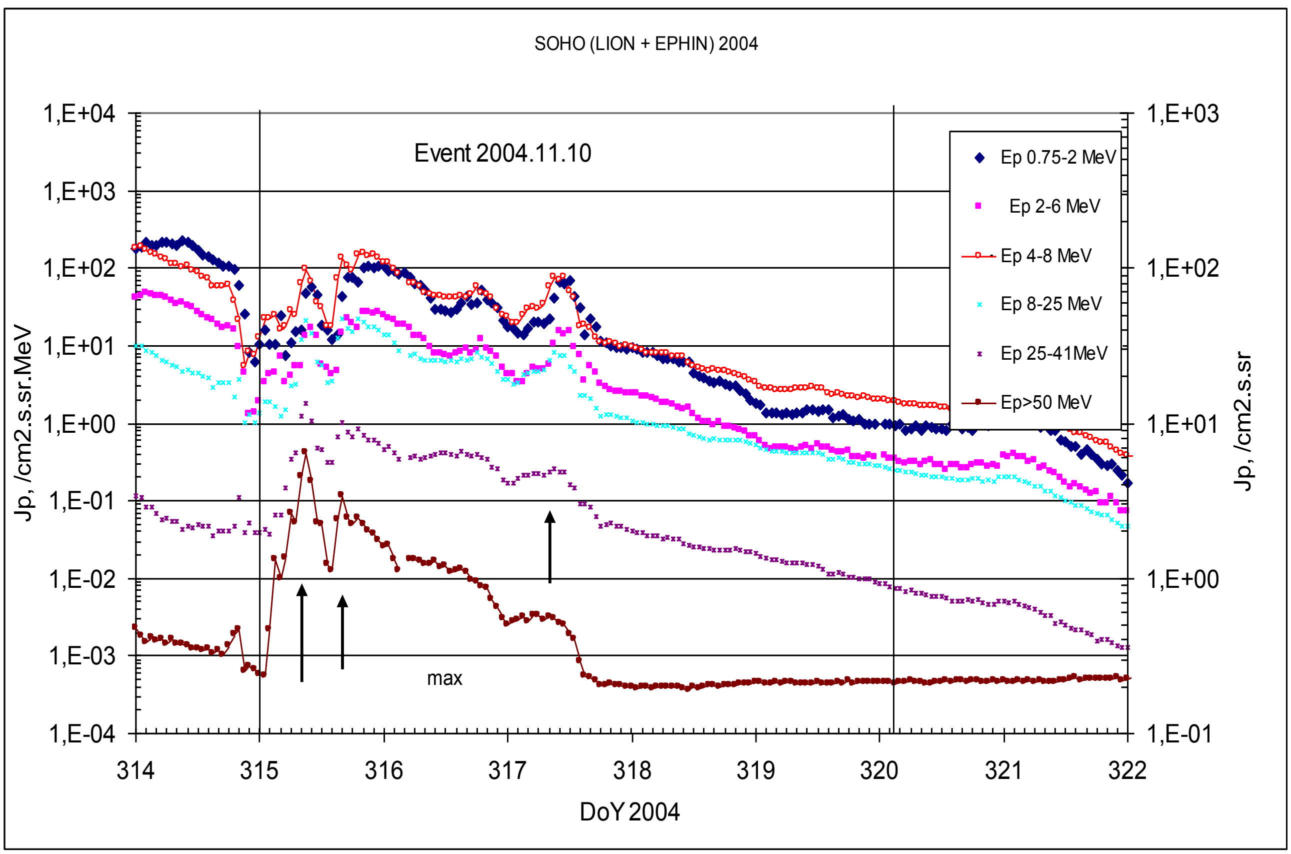
▲ SC 11d17^{h}10^m;

Particle fluxes and associated phenomena



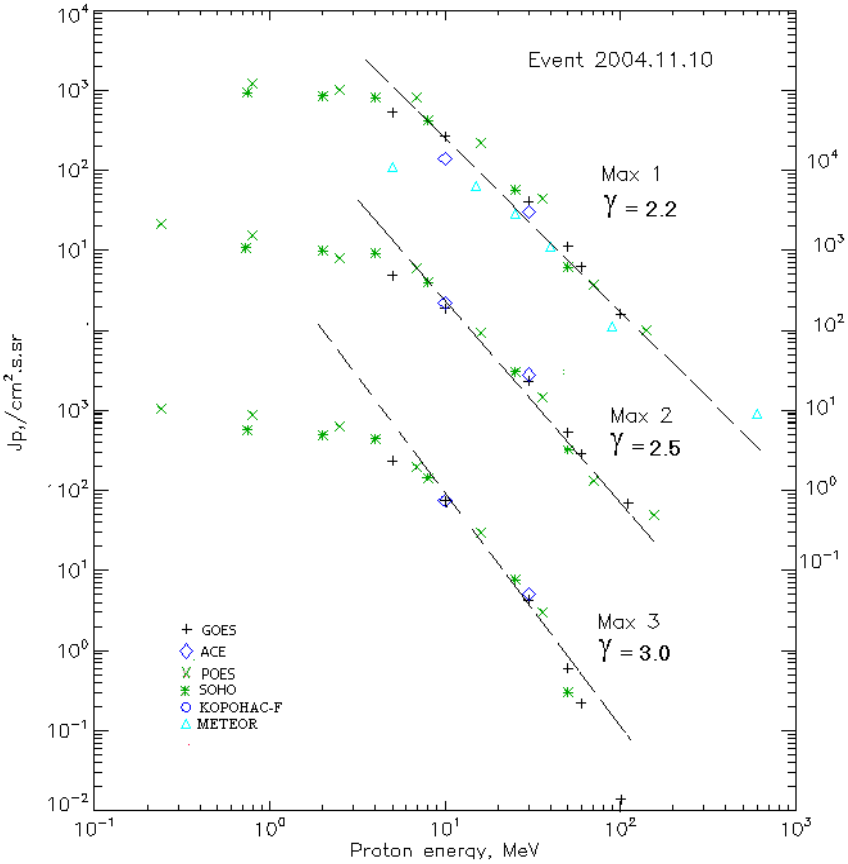
Time profiles of the proton fluxes for the event of 2004 November 10





Arrows on the profiles of the events indicate the time of the proton flux maxima, taken to build the proton spectra (see below)

Integral time-of-maximum proton spectrum



Integral fluxes of protons for the event of 2004 November 10

S/c, instruments	Ep, MeV	To	Tmax	Jmax, $(cm^2.s.sr)^{-1}$	Dura-tion	Comments
GOES-10						
EPS	>5	02^h	$10^h/17^h/12d09^h$	531/492/236	6d	
EPS	>10	02^h	$10^h/16^h/12d09^h$	264/193/75	6d	
EPS	>30	02^h	$10^h/16^h/12d08^h$	40.4/23.7/4.3	4d	
EPS	>50	02^h	$10^h/16^h/12d08^h$	11.1/5.4/0.6	3d	
EPS	>60	02^h	$10^h/16^h/12d08^h$	6.3/2.8/0.22	3d	
EPS	>100	02^h	$10^h/16^h/12d08^h$	1.6/0.7/0.01	3d	
METEOR						
CBM	>5	03^h	11^h/ - / -	108/ - / -	9d	
CBM	>15	03^h	11^h/ - / -	64/ - / -	7d	
CBM	>25	03^h	11^h/ - / -	29/ - / -	5d	
CBM	>40	03^h	11^h/ - / -	11/ - / -	3d	
BP	>90	03^h	11^h/ - / -	1.1/ - / -	2d	
ChD	>600	03^h	11^h/ - / -	0.09/ - / -	1d	
POES-16						
MEPED	>0.24	-	$11^h/23^h/12d10^h$	- $/2.2\cdot10^3/1\cdot10^3$	-	
MEPED	>0.8	-	$11^h/21^h/12d10^h$	$1.2\cdot10^3/2.3\cdot10^3/890$	-	
MEPED	>2.5	-	$11^h/19^h/12d10^h$	$1\cdot10^3/820/620$	-	
MEPED	>6.9	-	$11^h/17^h/12d10^h$	810/610/230	-	
MEPED	>16	-	$11^h/17^h/12d10^h$	220/95/30	-	

MEPED	>36	-	$11^h/17^h/12d10^h$	45/15/3	-	
MEPED	>70	-	$11^h/17^h/12d10^h$	3.7/1.3/ -	-	
MEPED	>140	-	$11^h/17^h/12d10^h$	1/0.5/ -	-	
ACE						
SIS	>10	02^h	$10^h/16^h/12d09^h$	139/222/75	7d	
SIS	>30	02^h	$10^h/16^h/12d09^h$	30/28.4/5.1	4d	
SOHO						
EPHIN (INT)	>50	02^h	$09^h/16^h/12d09^h$	6.1/3.2/0.3	3d	

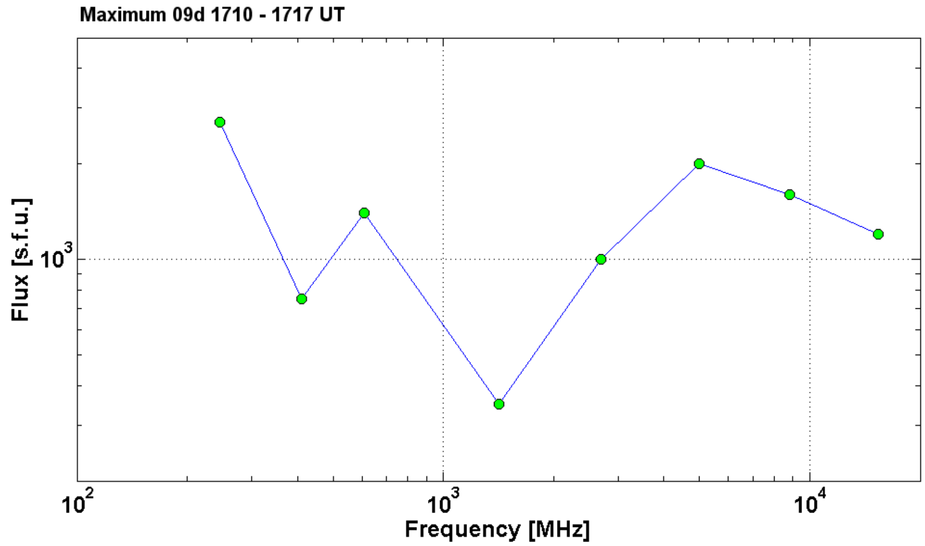
Differential fluxes of protons for the event of 2004 November 10

S/c, instruments	ΔE, MeV	To	Tmax	Jmax, $(cm^2.s.sr.MeV)^{-1}$	Dura-tion	Comments
SOHO						
LION	0.75-2	02^h	$10^h/17^h/12d09^h$	57.8/75.4/65.4	9d	
LION	2-6	02^h	$10^h/16^h/12d09^h$	16.5/22.1/14.8	9d	
EPHIN	4-8	02^h	$09^h/16^h/12d09^h$	96.3/134/75.6	9d	
EPHIN	8-25	02^h	$09^h/16^h/12d09^h$	21.5/21.9/8.0	9d	
EPHIN	25-41	02^h	$09^h/16^h/12d09^h$	1.8/1.0/0.26	9d	
EPHIN	41-53	- “ -	- “ -	- “ -	- “ -	

Electromagnetic and other phenomena that are sources and/or accompanying for the event of 2004 November 10

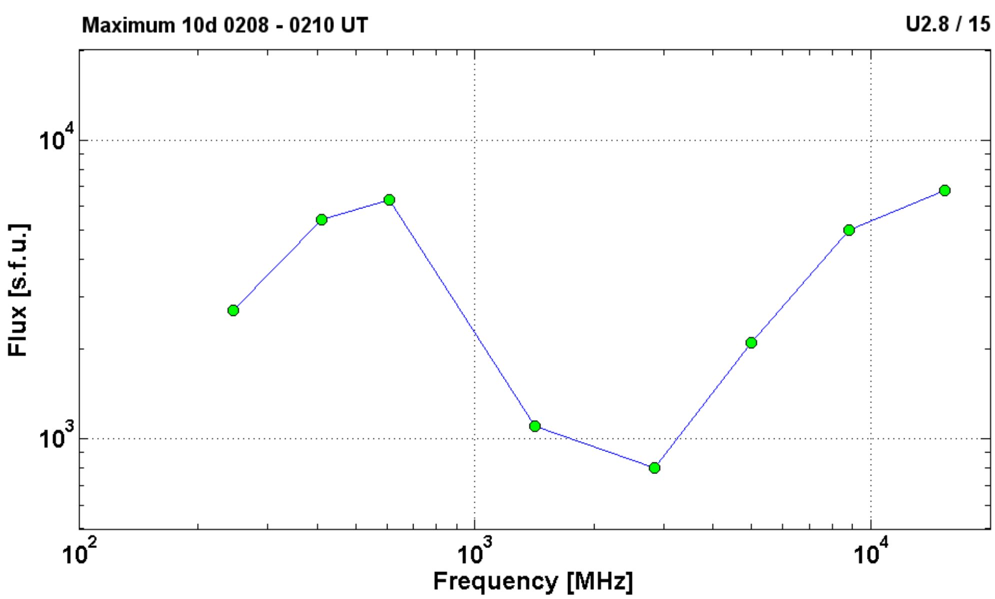
2004 November 9 ● AR10696 To event 456

Hα	6563 Å	1705	1711	1829	N07W51	2N	UZ
DSF	6563 Å	1639		1731	S19W45	23°	
1 – 12	keV	1659	1719	1732		M8.9	9.4E-2
25-50	keV	174028	174110	175528		805713	RHESSI
15.4	GHz	1709.0	1711.0	1753.0		3.08	
8.8	GHz	1701.0	1710.0	0000.0		3.20	
5	GHz	1701.0	1715.0	0000.0		3.30	
2.7	GHz	1701.0	1717.0	0000.0		3.00	
1.4	GHz	1701.0	1713.0	0000.0		2.54	
610	MHz	1702.0	1716.0	0000.0		3.15	
410	MHz	1703.0	1713.0	0000.0		2.88	
245	MHz	1706.0	1714.0	1858.0		3.43	
DS II	25-56	1718		1721		1	
DS II	25-41	1724		1727		3	
DS IV	25-180	1706		2104		3	
DS III	25-150	1659		1702		1	
DS III	25-180	1711		1717		2	
410	MHz	1703.0	1747.0	0000.0		3.26	
CME	WL	1726	2000 km/s	-65.1 km/s^2	360º	299º	



2004 November 10 ● AR10696 To event 456

Hα	6563 Å	0204	0210	0315	N09W49	3B	EF
1 – 12	keV	0159	0213	0220		X2.5	1.6E-1
50-100	keV	020056	021058	024024		75870032	RHESSI
2.8	GHz	0200.0	0210.3	0238.0		2.90	
1.4	GHz	0205.0	0210.0	0236.0		3.04	
610	MHz	0207.0	0208.0	0000.0		3.80	
410	MHz	0207.0	0210.0	0236.0		3.73	
245	MHz	0207.0	0209.0	0236.0		3.43	
DS II	25-180	0207		0240		3	
DS IV	130-1200	0206		0237		2	
DS IV	18-180	0247		0410	F,S	3	
DS III	18-1300	0208		0210	G	3	
DS III	25-180	0208		0230	N	3	
CME	WL	0226	3387 km/s	-108.0 km/s^2	360º	302º	



События 2005 г.

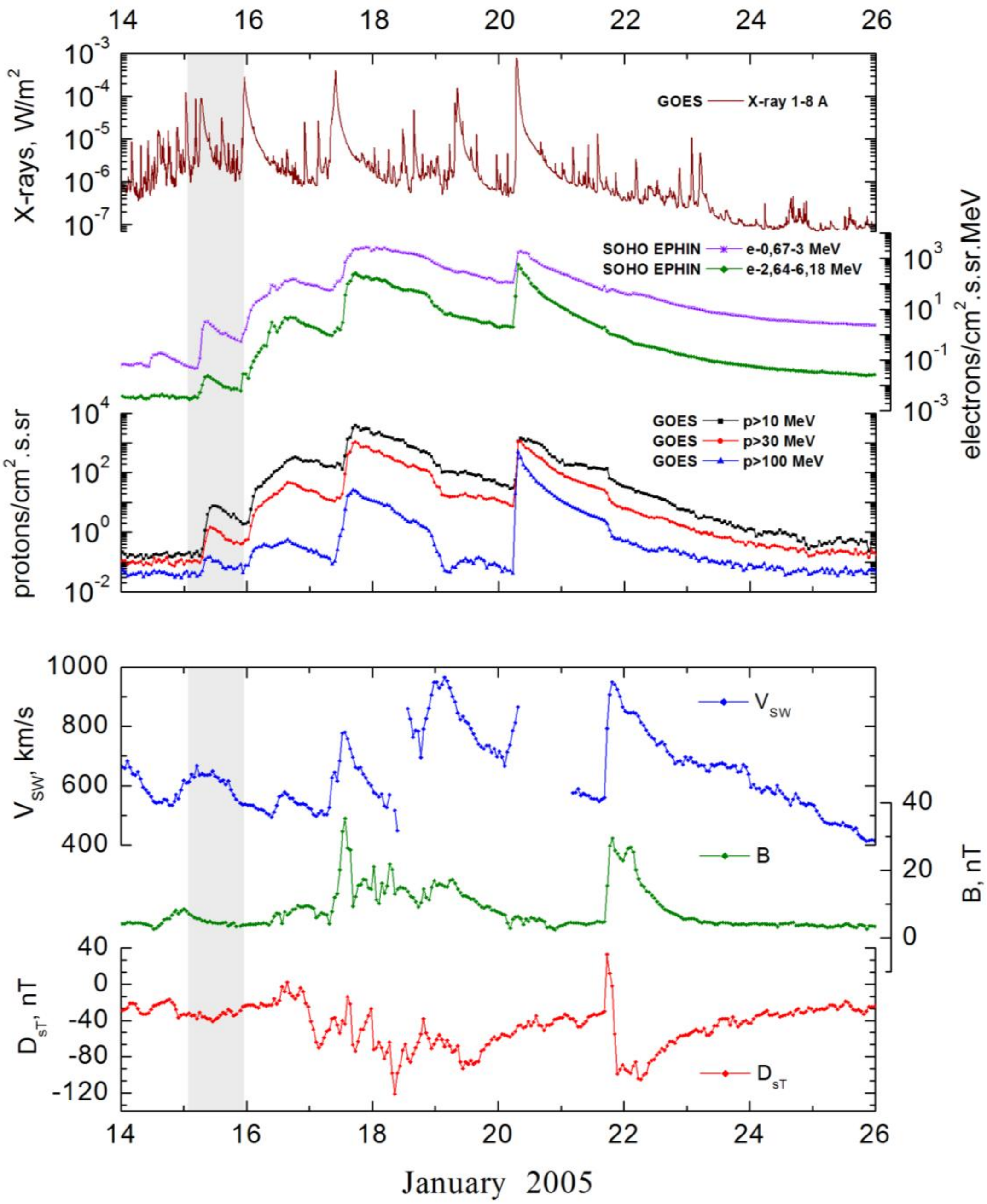
			Стр.
1.	Event 2005.01.15 – (2005-015)	№ 457	 635
2.	Event 2005.01.16 – (2005-016)	№ 458	 640
3.	Event 2005.01.17 – (2005-017) – GLE-68	№ 459	 645
4.	Event 2005.01.20 – (2005-020) - GLE-69	№ 460	 650
5.	Event 2005.05.13 – (2005-133)	№ 461	 655
6.	Event 2005.06.16– (2005-167)	№ 462	 660
7.	Event 2005.07.10 – (2005-191)	№ 463	 664
8.	Event 2005.07.13 – (2005-194)	№ 464	 668
9.	Event 2005.07.14 – (2005-195)	№ 465	 672
10.	Event 2005.07.17 – (2005-198)	№ 466	 678
11.	Event 2005.07.25 – (2005-206)	№ 467	 682
12.	Event 2005.07.31 – (2005-212)	№ 468	 688
13.	Event 2005.08.22 – (2005-234)	№ 469	 693
14.	Event 2005.08.22a – (2005-234a)	№ 470	 698
15.	Event 2005.09.07 – (2005-250)	№ 471	 703
16.	Event 2005.09.14 – (2005-257)	№ 472	 710

Event 2005.01.15 – (2005-015) **№ 457**

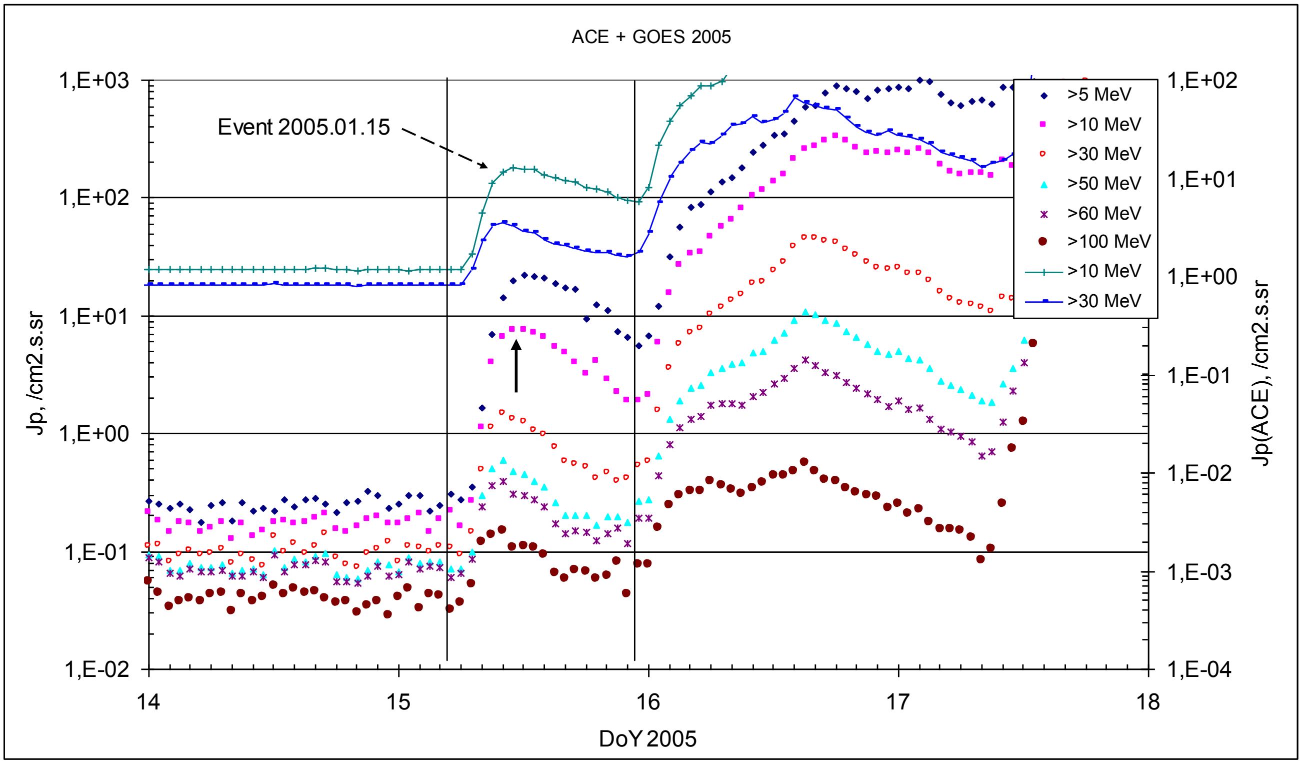
Particle event: To(Ep>10MeV) – 15d07^h
Tmax(Ep>10MeV) – 15d11^h, Jmax (Ep>10MeV) – 7.4 /cm^2.s.sr
Duration of the event – 1 day
Quasimaximal energy of protons in the event – Eqm = 300 MeV

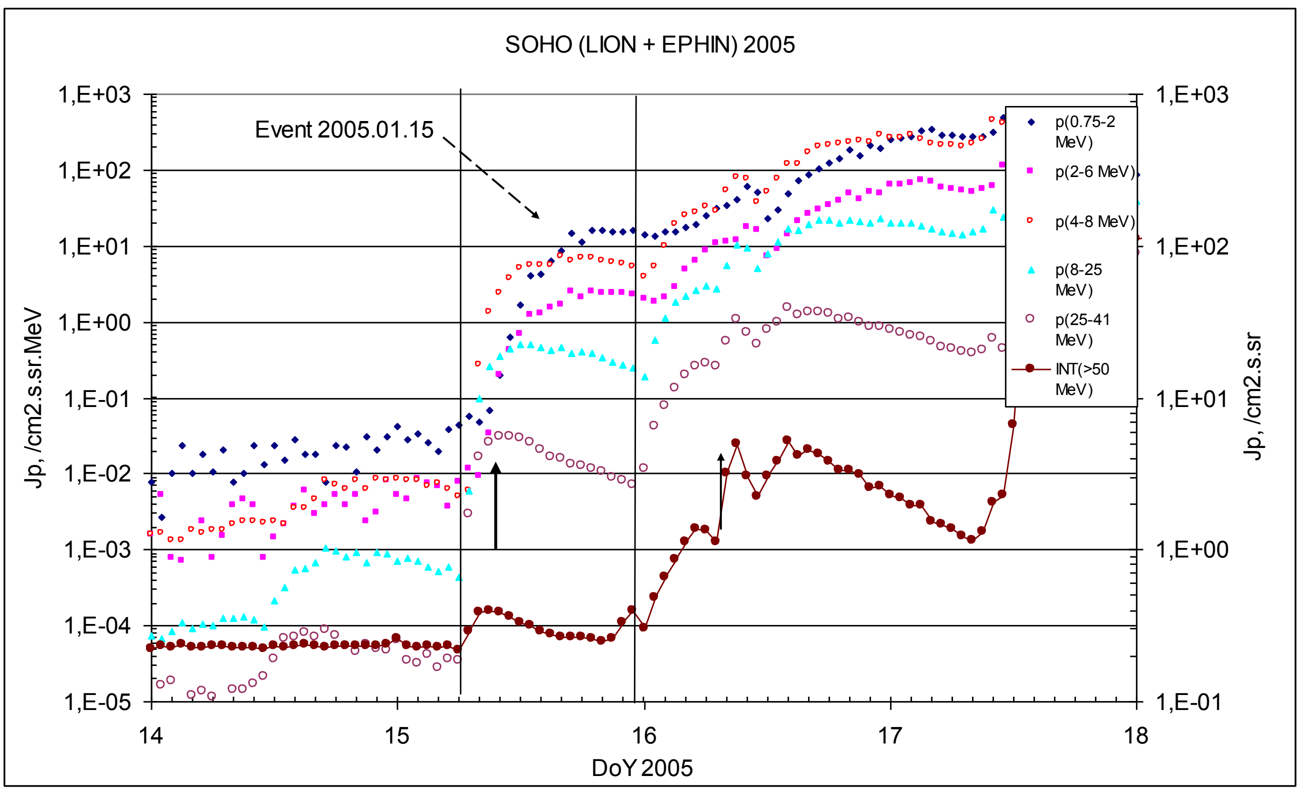
Sources: ● solar flare 15d05^{h}54^m, M8.6/SF, N11E06, AR10720
Main burst X-ray: 1-8 Å: onset – 15d05^{h}54^m, max – 15d06^{h}38^m, Φ = 0.29 J/m^2
CME: 15d06^{h}30^m, V = 2049 km/s, Δφ = 360^o, dA= 359˚;

Particle fluxes and associated phenomena



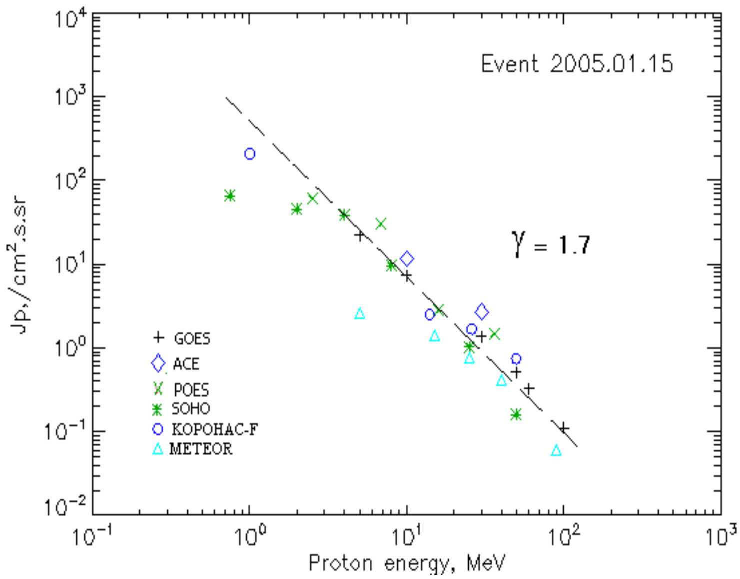
Time profiles of the proton fluxes for the event of 2005 January 15





Arrows on the profiles of the events indicate the time of the proton flux maxima, taken to build the proton spectra (see below)

Integral time-of-maximum proton spectrum



Integral fluxes of protons for the event of 2005 January 15

S/c, instruments	Ep, MeV	To	Tmax	Jmax, $(cm^2.s.sr)^{-1}$	Dura-tion	Comments
GOES-10						
EPS	>5	07^h	12^h	22	1d	
EPS	>10	07^h	11^h	7.4	1d	
EPS	>30	07^h	10^h	1.37	1d	
EPS	>50	07^h	10^h	0.51	1d	
EPS	>60	07^h	10^h	0.33	1d	
EPS	>100	07^h	10^h	0.11	1d	
METEOR						
CBM	>5	07^h	11^h	2.57	1d	
CBM	>15	07^h	11^h	1.4	1d	
CBM	>25	07^h	11^h	0.77	1d	
CBM	>40	07^h	11^h	0.41	1d	
BP	>90	07^h	09^h	0.06	1d	
ChD	>600	-	-	-	-	
POES-16						
MEPED	>0.24	-	-	-	-	
MEPED	>0.8	-	-	-	-	
MEPED	>2.5	-	11^h	95	1d	
MEPED	>6.9	-	11^h	60	1d	
MEPED	>16	-	10^h	2.8	1d	
MEPED	>36	-	10^h	1.5	1d	
MEPED	>70	-	-	-	-	
MEPED	>140	-	-	-	-	
CORONAS F						
MKL	>1.	-	18^h	210	1d	
MKL	>14	-	14^h	2.5	1d	
MKL	>26	-	13^h	1.7	1d	
MKL	>50	-	12^h	0.75	1d	

ACE						
SIS	>10	07^h	11^h	11.6	1d	
SIS	>30	07^h	10^h	2.7	1d	
SOHO						
EPHIN (INT)	>50	07^h	9^h	0.16	1d	

Differential fluxes of protons for the event of 2005 January 15

S/c, instruments	ΔE, MeV	To	Tmax	Jmax, $(cm^2.s.sr.MeV)^{-1}$	Dura-tion	Comments
SOHO						
LION	0.75-2	08^h	19^h	16	1d	
LION	2-6	08^h	17^h	2.5	1d	
EPHIN	4-8	09^h	16^h	7.2	1d	
EPHIN	8-25	07^h	12^h	0.5	1d	
EPHIN	25-41	07^h	11^h	0.031	1d	
EPHIN	41-53	- “ -	- “ -	- “ -	- “ -	

References:

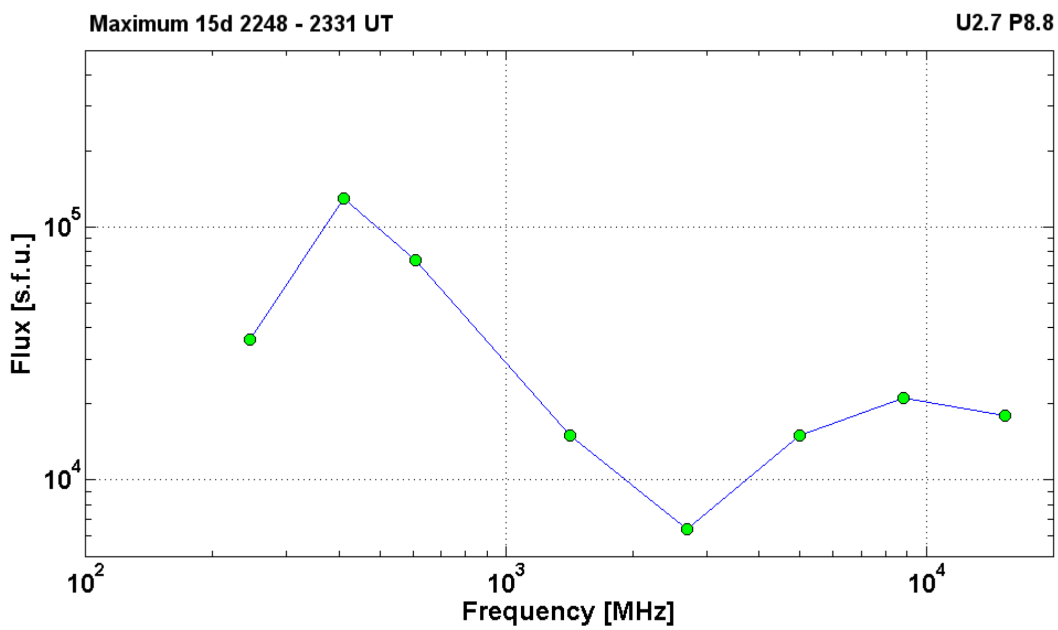
Kuwabara T., J.W. Bieber, J. Clem, et.al., 2006.

Electromagnetic and other phenomena that are sources and/or accompanying for the event of 2005 January 15

2005 January 15 ● AR10720 To event 457

Hα	6563 Å	0556	0559	0817	N12E05	SF	UZ
1 – 12	keV	0554	0638	0717		M8.6	2.9E-1
12-25	keV	053608	053810	054124		18610	RHESSI
12-25	keV	062656	062758	063804		4957986	RHESSI
50-100	keV	063804	064022	065740		6039624	RHESSI
25-50	keV	065740	065822	072352		3280681	RHESSI
50-150	keV	0624		0632			SONG F
80-225	keV						SONG F

15.4	GHz	2211.0	2248.0	0037.0		4.26	
8.8	GHz	2230.0	2248.0	0057.0	U2.7 P8.8	4.32	
5	GHz	2207.0	2250.0	0124.0		4.18	
2.7	GHz	2224.0	2306.0	0102.0		3.81	
1.4	GHz	2227.0	2307.0	0043.0		4.18	
610	MHz	2230.0	2331.0	0045.0		4.87	
410	MHz	2230.0	2329.0	0109.0		5.11	
245	MHz	2236.0	2329.0	0047.0		4.56	
DS II		2224		2258	25-410	3	
DS IV		2233		>2400	18-1600	3	
DS III	GG	2235		2251	18-260	3	
DS III	N	2300		>2400	20-200	3	
DS III	S,C	<0000		0401	18-200	3	
DS UNCLF		2253		2300	20-45	3	
CME		0630	2049 km/s	-30.7 km/s^2	360º	359º	

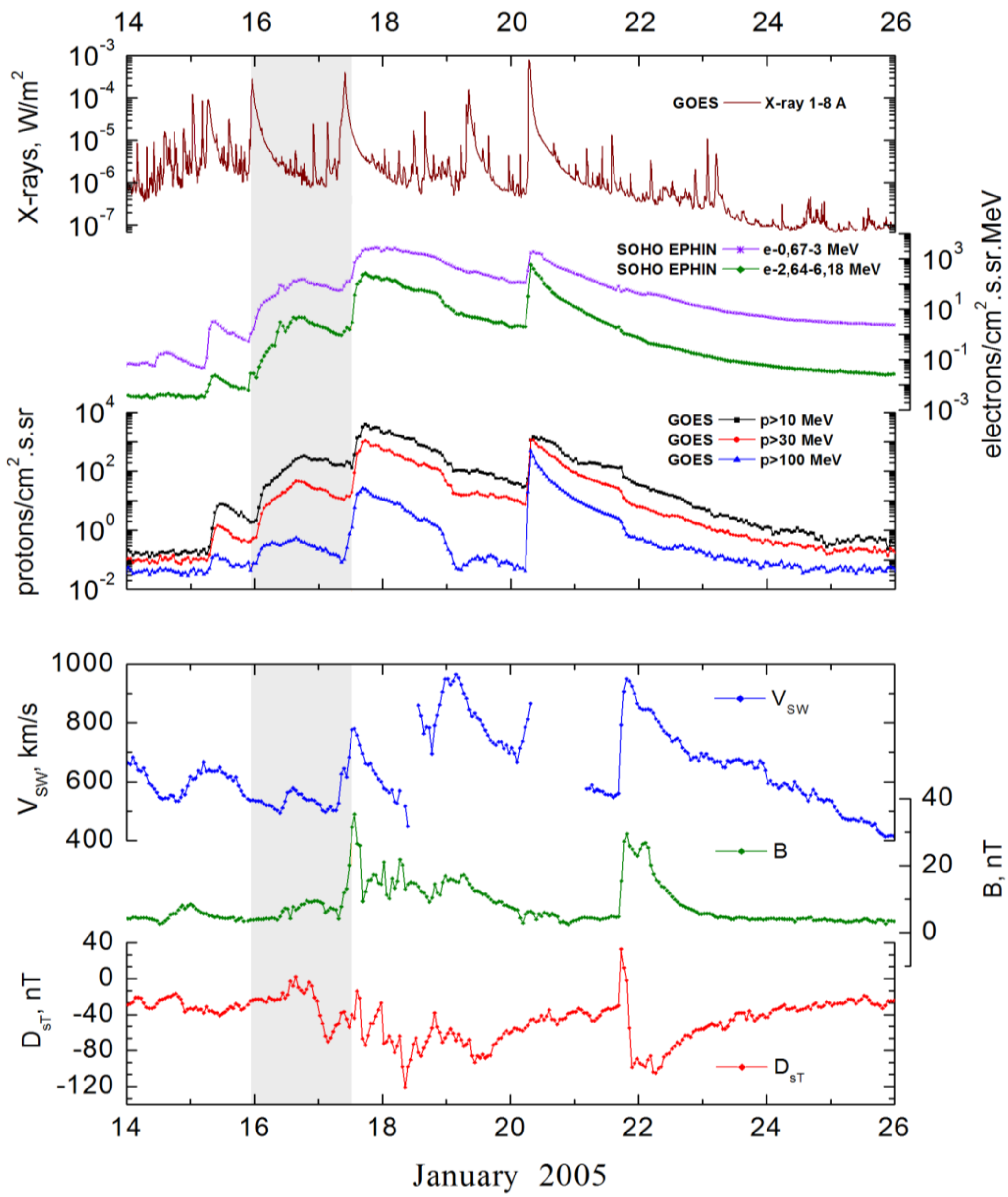


Event 2005.01.16 – (2005-016) **№ 458**

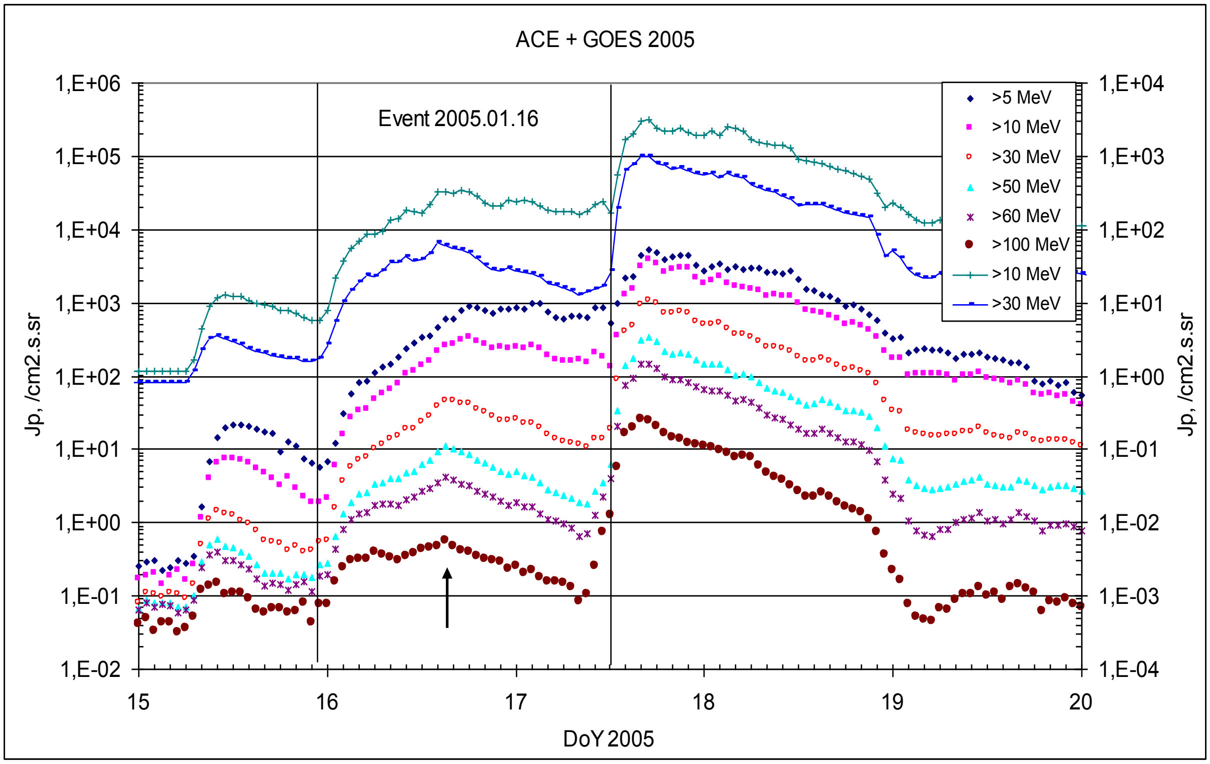
Particle event: To(Ep>10MeV) – 16d00^h
Tmax(Ep>10MeV) – 16d18^h, Jmax (Ep>10MeV) – 330 /cm^2.s.sr
Duration of the event – 1 day
Quasimaximal energy of protons in the event – Eqm = 330 MeV

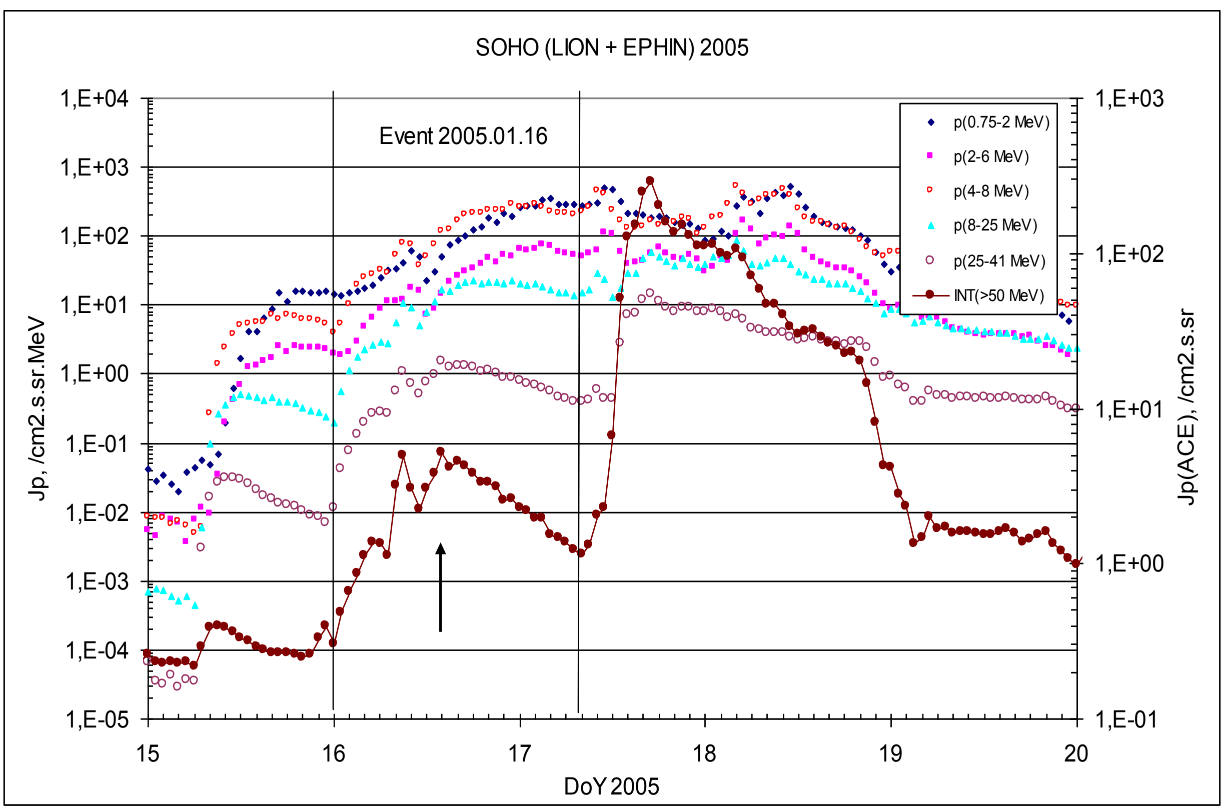
Sources: ● solar flare 15d21^{h}54^m, 3B/X2.6, N14W08*, AR10720
3B/M1.0, N14W08*, AR10720
Main X-ray burst 1–8 Ǻ: onset – 15d22^{h}25^m, max – 15d23^{h}02^m, Φ = 0.63 J/m^2
CME: 15d23^{h}06^m, V = 2861 km/s, Δφ = 360^o, dA = 323˚;
*– One flare event with two X-ray bursts

Particle fluxes and associated phenomena



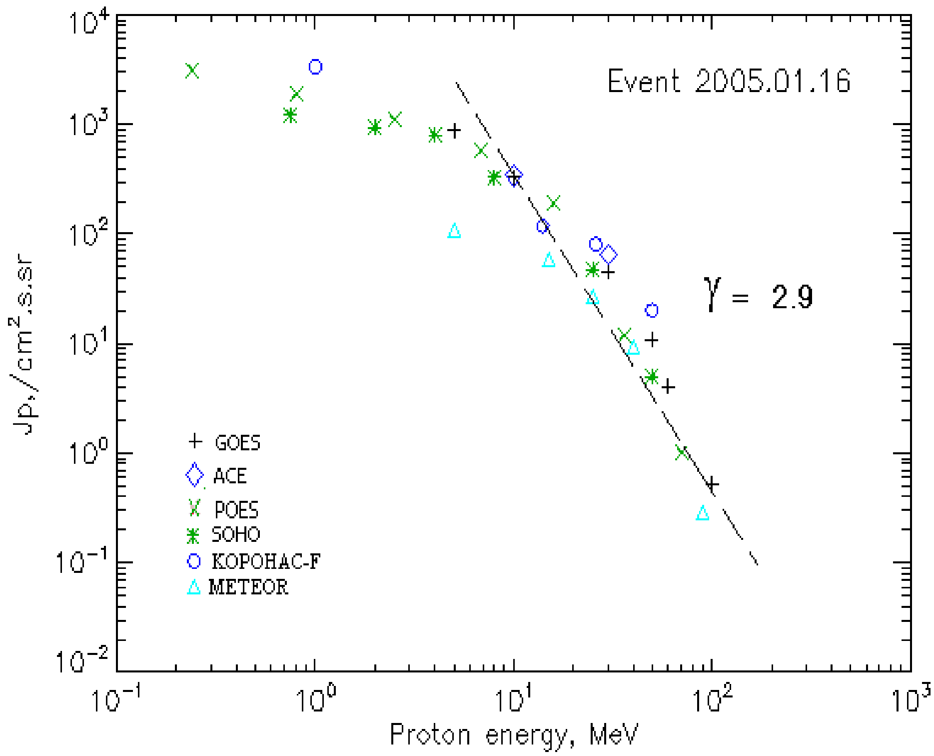
Time profiles of the proton fluxes for the event of 2005 January 16





Arrows on the profiles of the events indicate the time of the proton flux maxima, taken to build the proton spectra (see below)

Integral time-of-maximum proton spectrum



Integral fluxes of protons for the event of 2005 January 16

S/c, instruments	Ep, MeV	To	Tmax	Jmax, $(cm^2.s.sr)^{-1}$	Dura-tion	Comments
GOES-10						
EPS	>5	00^h	18^h	890	1.5d	
EPS	>10	00^h	18^h	330	1.5d	
EPS	>30	00^h	15^h	45.5	1.5d	
EPS	>50	00^h	15^h	10.8	1.5d	
EPS	>60	00^h	15^h	4.1	1.5d	
EPS	>100	00^h	15^h	0.52	1.5d	
METEOR						
CBM	>5	00^h	16^h	107	1.5d	
CBM	>15	00^h	16^h	59	1.5d	
CBM	>25	00^h	16^h	27	1.5d	
CBM	>40	00^h	16^h	9,4	1.5d	
BP	>90	00^h	16^h	0,29	1.5d	
ChD	>600	-	-	-	-	
POES-16						
MEPED	>0.24	00^h	18^h	3150	1.5d	
MEPED	>0.8	00^h	18^h	3000	1.5d	
MEPED	>2.5	00^h	16^h	1100	1.5d	
MEPED	>6.9	00^h	16^h	580	1.5d	
MEPED	>16	00^h	16^h	190	1.5d	
MEPED	>36	00^h	16^h	12	1.5d	
MEPED	>70	00^h	13^h	1	1.5d	
MEPED	>140	00^h	-	-	-	

CORONAS F						
MKL	>1	-	18^h	3400	1.5d	
MKL	>14	-	17^h	120	1.5d	
MKL	>26	-	17^h	80	1.5d	
MKL	>50	-	17^h	20	1.5d	
ACE						
SIS	>10	00^h	17^h	342	1.5d	
SIS	>30	15d 23^h	14^h	65	1.5d	
SOHO						
EPHIN (INT)	>50	07^h	14^h	5.0	1.5d	

Differential fluxes of protons for the event of 2005 January 16

S/c, instruments	ΔE, MeV	To	Tmax	Jmax, $(cm^2.s.sr.MeV)^{-1}$	Dura-tion	Comments
SOHO						
LION	0.75-2	03^h	20^h	231	1.5d	
LION	2-6	03^h	20^h	48	1.5d	
EPHIN	4-8	02^h	14^h	116	1.5d	
EPHIN	8-25	01^h	14^h	16.7	1.5d	
EPHIN	25-41	01^h	14^h	1.5	1.5d	
EPHIN	41-53	- “ -	- “ -	- “ -	- “ -	

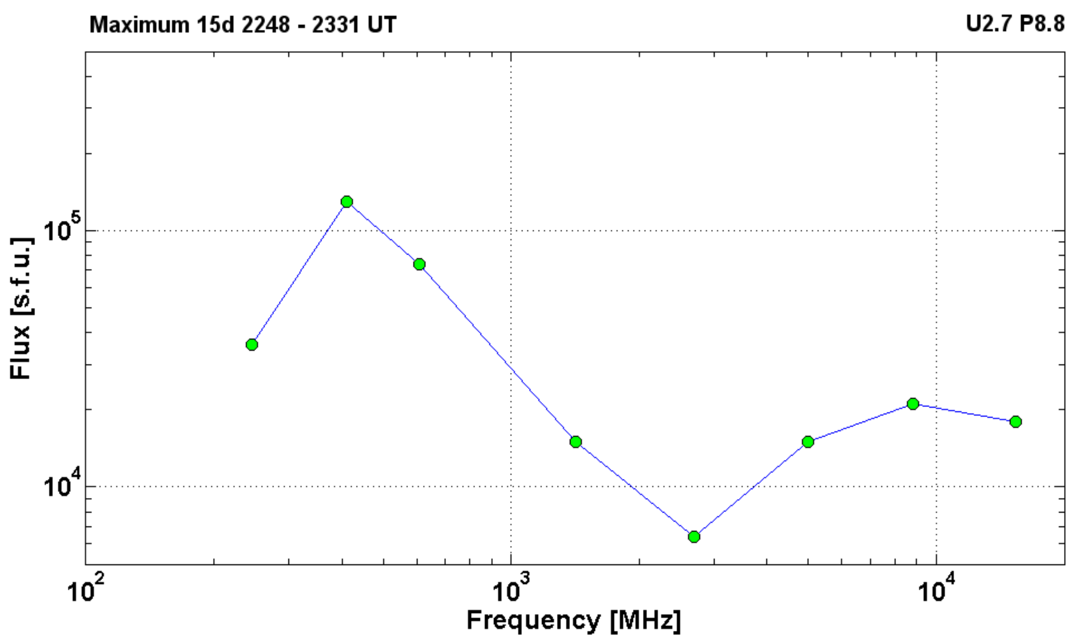
Electromagnetic and other phenomena that are sources and/or accompanying for the event of 2005 January 16

2005 January 15 ● AR10720 To event 458

Hα	6563 Å	2154	2249	>0009	N14W08	3B	UZ
1 – 12	keV	2201	2208	2216		M1.0*	6.9E-03
1 – 12	keV	2225	2302	2331		X2.6*	6.3E-01
12-25	keV	221504	221506	222032		78718	RHESSI
300-800	keV	222032	224958	230256		44250936	RHESSI
100-300	keV	230256	230626	231740		22362556	RHESSI
12-25	keV	234832	234930	000308		5883697	RHESSI
50-150	keV	2238		2255			SONG F
225-750	keV	225-750					SONG F

15.4	GHz	2211.0	2248.0	0037.0		4.26	
8.8	GHz	2230.0	2248.0	0057.0	U2.7 P8.8	4.32	
5	GHz	2207.0	2250.0	0124.0		4.18	
2.7	GHz	2224.0	2306.0	0102.0		3.81	
1.4	GHz	2227.0	2307.0	0043.0		4.18	
610	MHz	2230.0	2331.0	0045.0		4.87	
410	MHz	2230.0	2329.0	0109.0		5.11	
245	MHz	2236.0	2329.0	0047.0		4.56	
DS II	25-410	2224		2258		3	
DS IV	18-1600	2233		>2400		3	
DS III	18-260	2235		2251	GG	3	
DS III	20-200	2300		>2400	N	3	
DS III	18-200	<0000		0401	S,C	3	
DS UNCLF		2253		2300		3	
CME	WL	2306	2861 km/s	-127.4km/s^2	360º	323º	

*– One flare event with two X-ray bursts

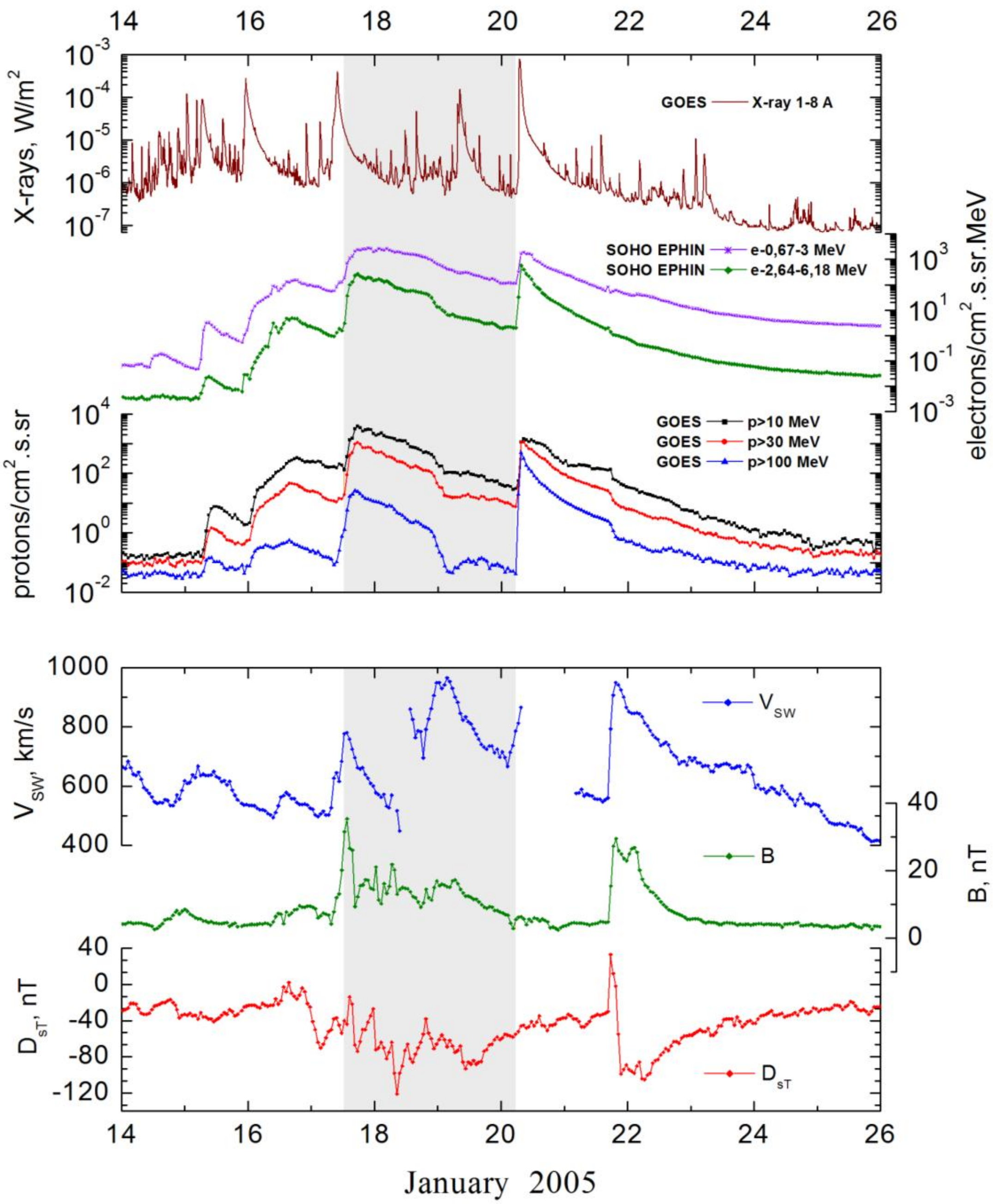


Event 2005.01.17 – (2005-017) – GLE-68 **№ 459**

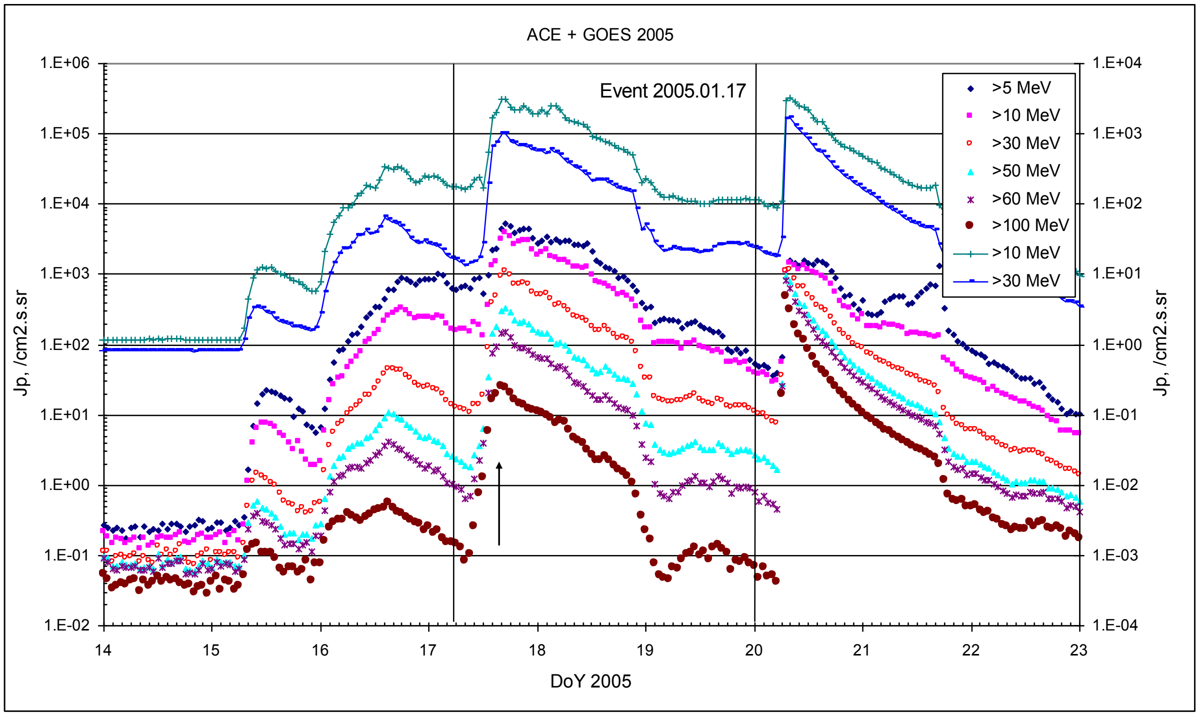
Particle event: To(Ep>10MeV) – 17d13^h
Tmax(Ep>10MeV) – 17d17^h, Jmax (Ep>10MeV) – $3.8\cdot10^3$ /cm^2.s.sr
Duration of the event – 2 days
Quasimaximal energy of protons in the event – Eqm = 750 MeV

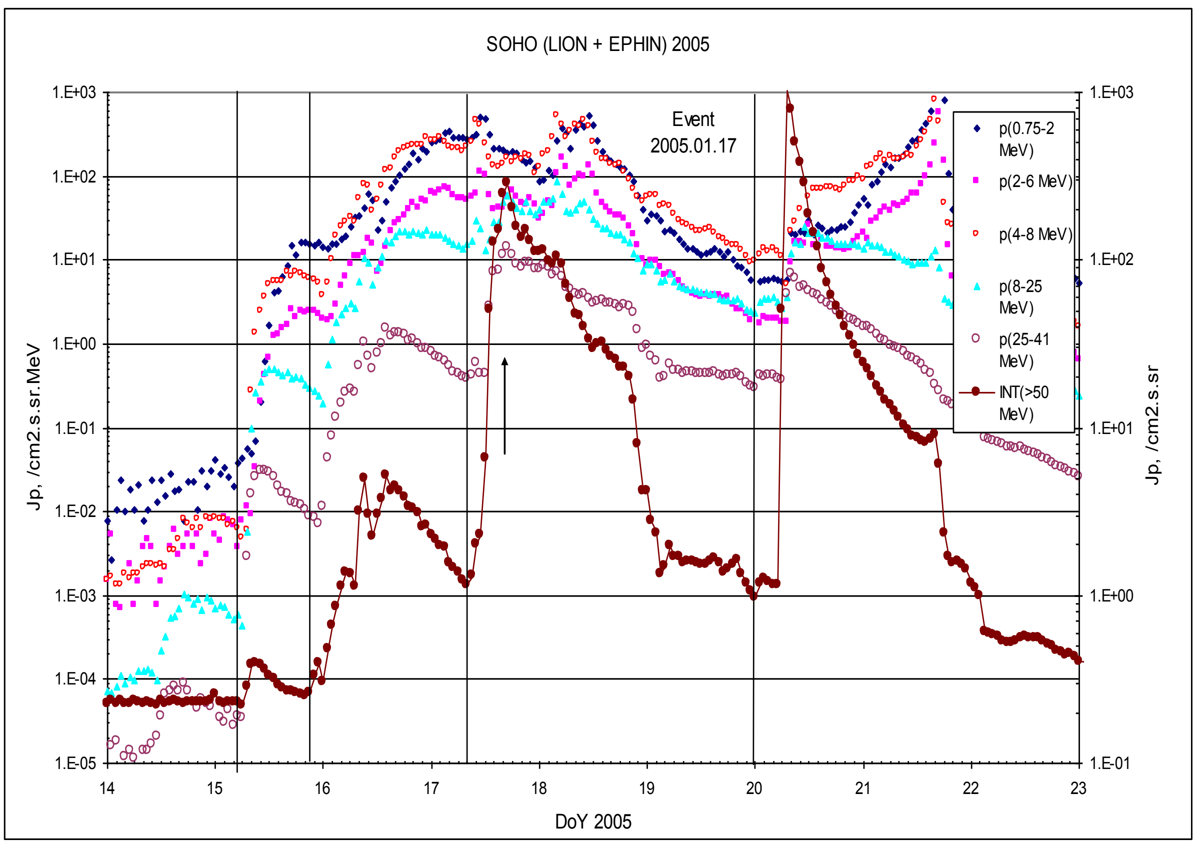
Sources: ● solar flare 17d06^{h}09^m, X3.8/3N, N14W24, AR10720
Main X-ray burst 1-8 Å onset – 17d06^{h}59^m, max – 17d09^{h}52^m, Φ = 0.84 J/m^2
CME: 17d09^{h}30^m, V = 2094 km/s, Δφ = 360^o, dA = 334˚
CME: 17d09^{h}54^m, V = 2547 km/s, Δφ = 360^o, dA = 309˚

Particle fluxes and associated phenomena



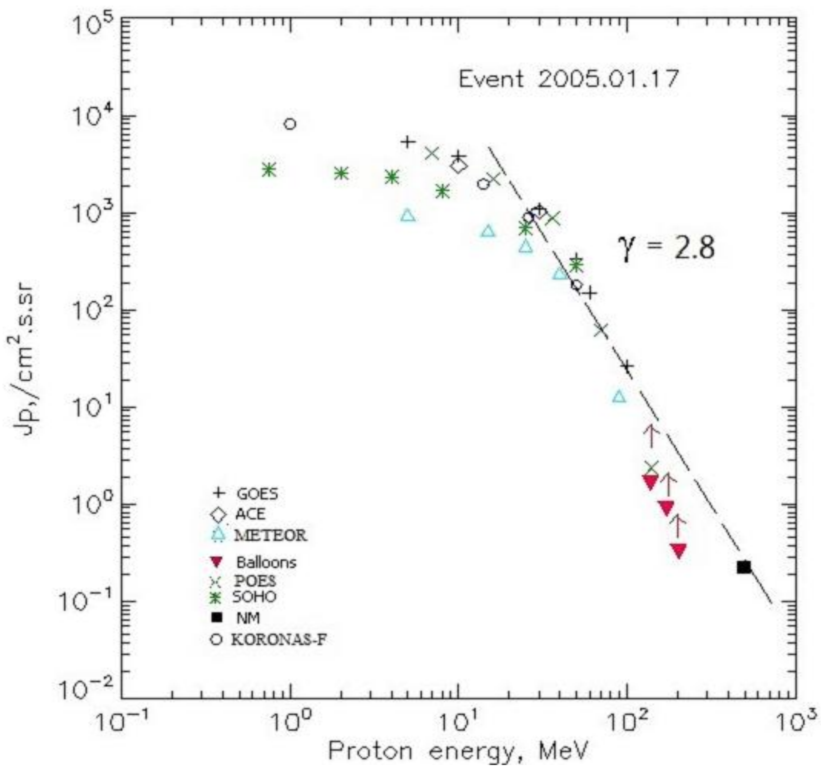
Time profiles of the proton fluxes for the event of 2005 January 17





Arrows on the profiles of the events indicate the time of the proton flux maxima, taken to build the proton spectra (see below)

Integral time-of-maximum proton spectrum



Integral fluxes of protons for the event of 2005 January 17

S/c, instruments	Ep, MeV	To	Tmax	Jmax, $(cm^2.s.sr)^{-1}$	Dura-tion	Comments
GOES 10						
EPS	>5	13^h	17^h	5310	2d	
EPS	>10	13^h	17^h	3820	2d	
EPS	>30	12^h	17^h	1090	2d	
EPS	>50	12^h	17^h	330	2d	
EPS	>60	09^h	17^h	150	2d	
EPS	>100	09^h	16^h	26	2d	
METEOR						
CBM	>5	10^h	22^h	950	2d	
CBM	>15	10^h	20^h	660	2d	
CBM	>25	10^h	18^h	460	2d	
CBM	>40	10^h	18^h	240	2d	
BP	>90	10^h	17^h	13	2d	
ChD	>600	-	-	-	-	
POES 16						
MEPED	>0.24	-	-	-	-	
MEPED	>0.8	-	-	-	-	
MEPED	>2.5	-	-	-	-	
MEPED	>6.9	-	16^h	4060	2d	
MEPED	>16	-	16^h	2210	2d	
MEPED	>36	-	16^h	880	2d	
MEPED	>70	-	15^h	62	2d	
MEPED	>140	-	15^h	2.35	2d	

CORONAS F						
MKL	>1	-	20^h	8150	2d	
MKL	>14	-	19^h	1950	2d	
MKL	>26	-	18^h	890	2d	
MKL	>50	-	17^h	180	2d	
ACE						
SIS	>10	13^h	16^h	3040	2d	
SIS	>30	11	16^h	1020	2d	
SOHO						
EPHIN (INT)	>50	09^h	17^h	288	2d	
BALLOONS						
Mi	>138		$18d06^h$	1.6		After
Mi	>172		$18d06^h$	0.87		maximum
Mi	>203		$18d06^h$	0.32		- “ -
NM						
Network	>500	-	16^h	0.235	-	

Differential fluxes of protons for the event of 2005 January 17

S/c, instruments	ΔE, MeV	To	Tmax	Jmax, $(cm^2.s.sr.MeV)^{-1}$	Dura-tion	Comments
SOHO						
LION	0.75-2	11^h	18^h	196	2d	
LION	2-6	11^h	18^h	67.2	2d	
EPHIN	4-8	10^h	17^h	163	2d	
EPHIN	8-25	10^h	17^h	57.7	2d	
EPHIN	25-41	10^h	17^h	14.4	2d	

References:

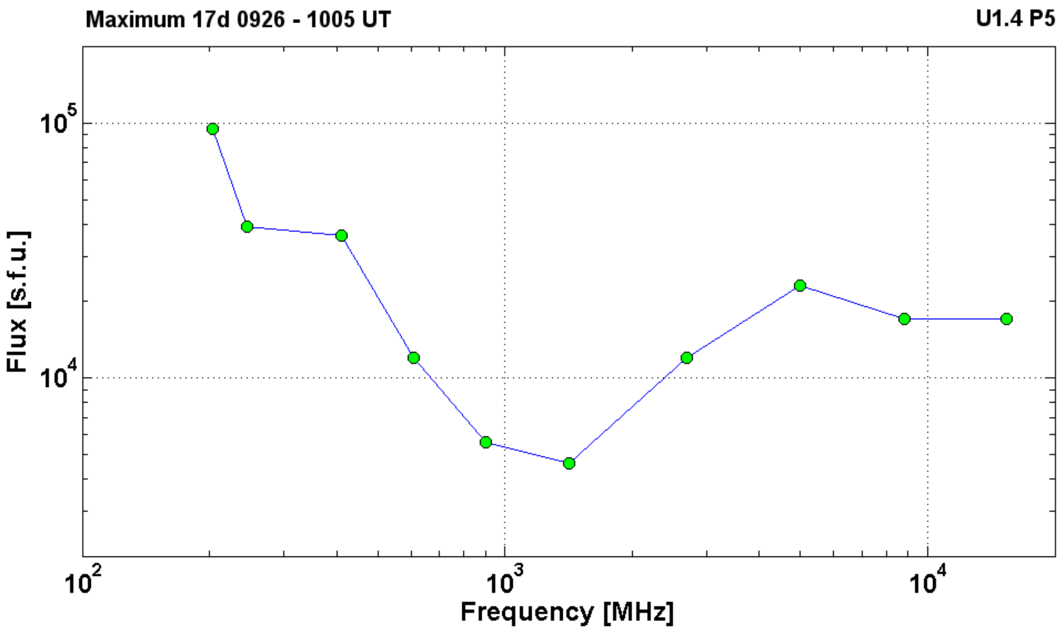
Miroshnichenko L.I. and J. Perez-Peraza, 2008.
Lario D., R.B. Decker, and A. Aran, 2008.
Lario D, A. Aran, R.B. Decker, 2009.
Veselovskij I.S., I.N. Myagkova, O.S. Yakovchuk, 2012.

Electromagnetic and other phenomena that are sources and/or accompanying for the event of 2005 January 17

2005 January 17 ● AR10720 To event 459

Hα	6563 Å	<0906	0951	1157	N14W24	3N	FU
1 – 12	keV	0659	0952	1007		X3.8	8.4E-1
25-50	keV	065956	070258	070920		264551	RHESSI
12-25	keV	070920	071334	072628		718159	RHESSI
50-100	keV	080232	080510	081028		22362556	RHESSI
12-25	keV	234832	234930	000308		7958930	RHESSI
100-300	keV	093536	094942	103852		53152512	RHESSI
50-150	keV	0952		1000			SONG F
150-500	keV						SONG F
500-1300	keV						SONG F
2-6	MeV						SONG F

15.4	GHz	0744.0	0943.0	1207.0		4.23	
8.8	GHz	0755.0	0926.0	1102.0		4.23	
5	GHz	0756.0	0929.0	1207.0	U1.4 P5	4.36	
2.7	GHz	0804.0	0931.0	1207.0		4.08	
1.4	GHz	0853.0	0931.0	1102.0		3.66	
900	MHz	0839.0	0926.7	>1054.0		3.75	
610	MHz	<0845.0	0926.0	>1209.0		4.08	
410	MHz	0812.0	0957.0	1207.0		4.56	
245	MHz	0755.0	1005.0	1207.0		4.59	
204	MHz	0943.1	0943.9	0945.7		4.98	
DS II	26-95	0916		0924		2	
DS II	25-65	0944		0947		3	
DS IV	100-4000	0837		1120	P,S,C	3	
DS IV	25-180	0900		1524		2	
DS I	45-270	<0650		>1200	S,C	2	
DS III	25-270	0923		0934	GG,P	2	
DS III	25-180	0941		0946		3	
DS CONT	25-180	0657		0900		1	
DS CONT	25-270	~0840		>1200	P	2	
DS DCIM	800-2000	0841		1132	GG	3	
CME	WL	0930	2094 km/s	-118.8 km/s^2	360º	334º	
CME	WL	0954	2547 km/s	-159.1 km/s^2	360º	309º	

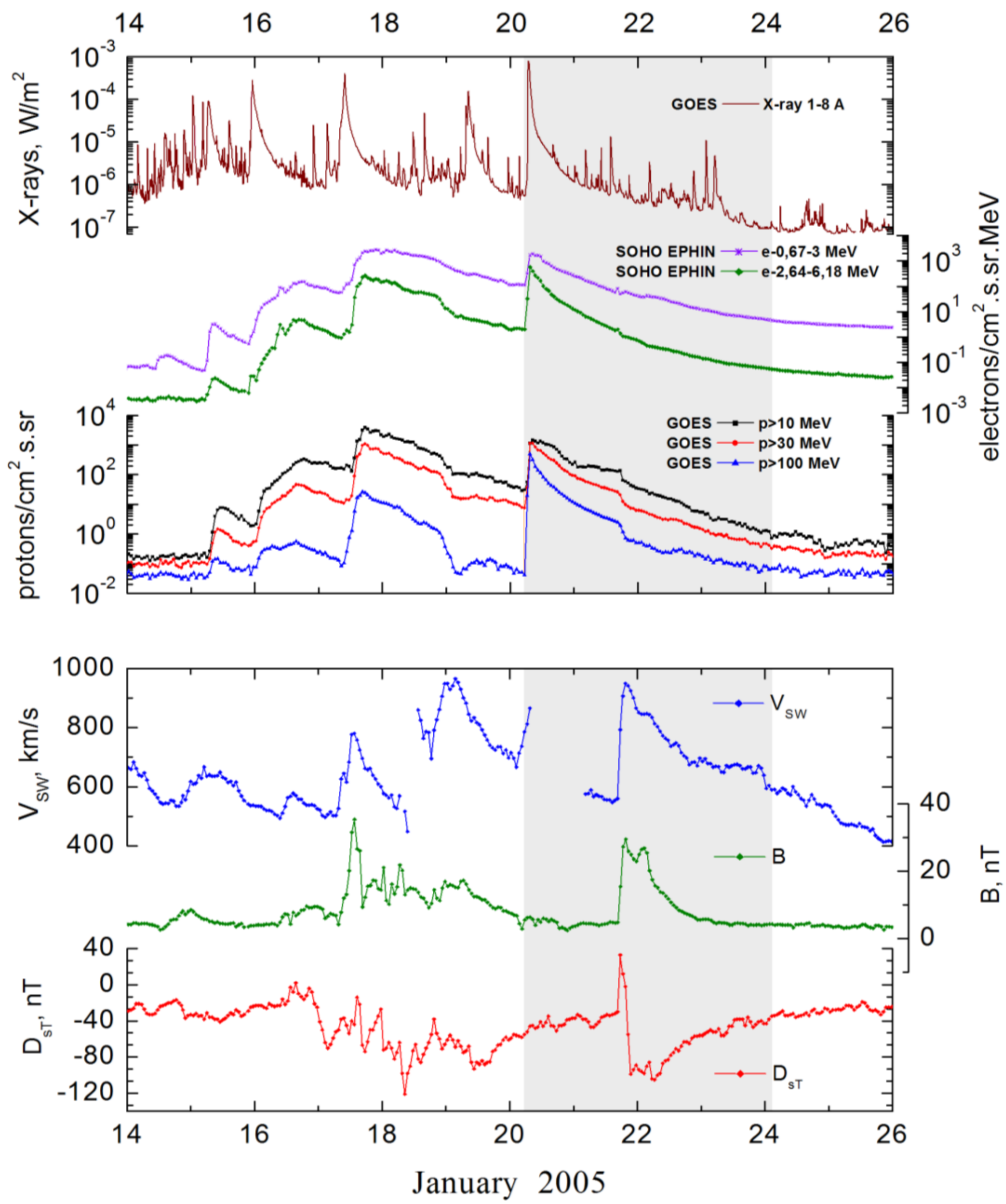


Event 2005.01.20 – (2005-020) - GLE-69 **№ 460**

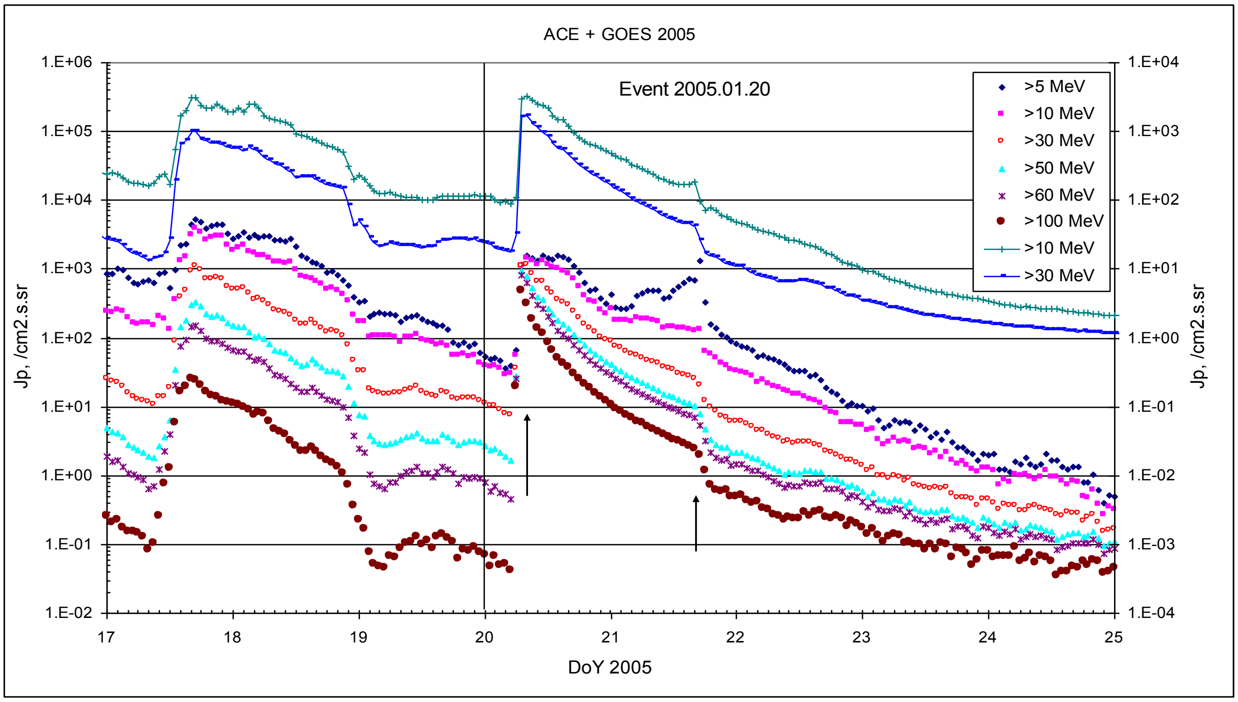
Particle event: To(Ep>10MeV) – 20d06^h
Tmax$_1$(Ep>10MeV) – 20d10^h, Jmax$_1$ (Ep>10MeV) – $1.1 \cdot 10^3$ /cm^2.s.sr
Tmax$_2$(Ep>10MeV) – 21d17^h, Jmax$_2$ (Ep>10MeV) – 134 /cm^2.s.sr
Duration of the event – 4 days
Quasimaximal energy of protons in the event – Eqm$_1$ = 3840 MeV
– Eqm$_2$ = 1520 MeV

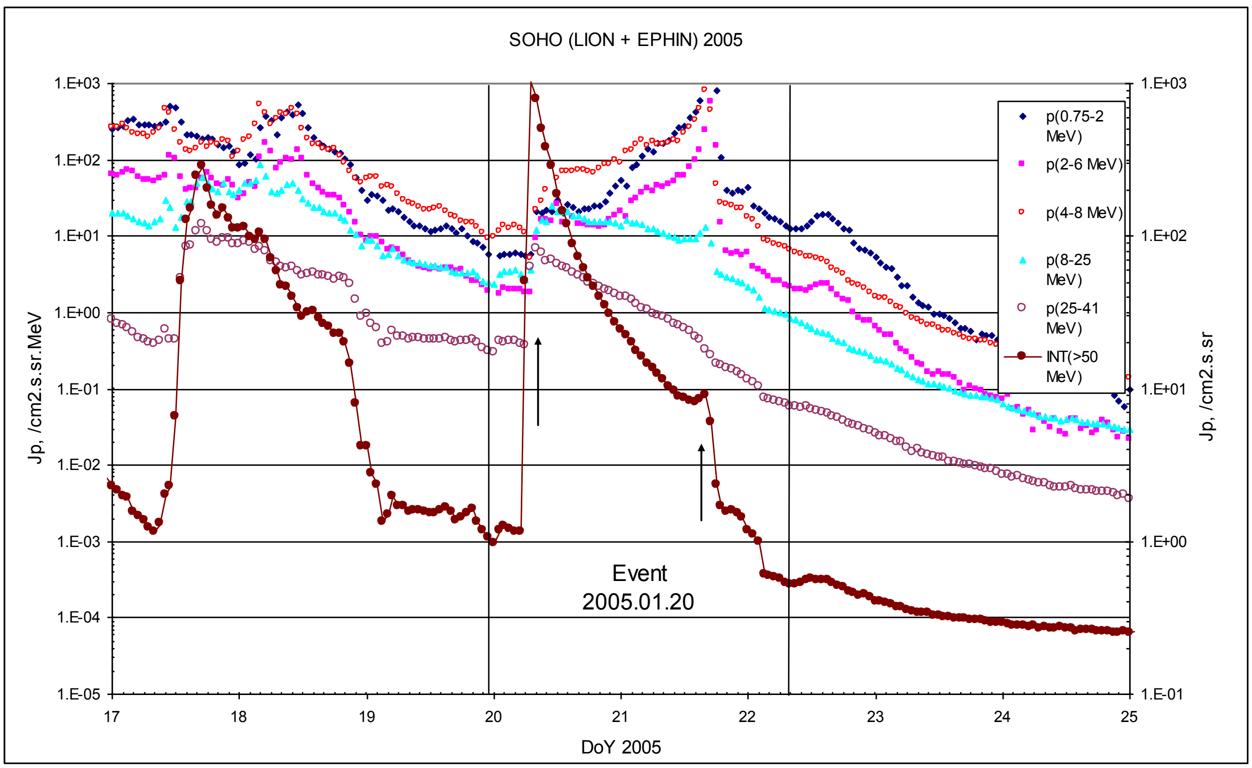
Sources: ● solar flare 20d06^{h}36^m, X7.1/2B, N12W58, AR10720
Main X-ray burst 1-8 Å: onset – 20d06^{h}36^m, max – 20d07^{h}01^m, Φ = 1.3 J/m^2
CME: 20d06^{h}54^m, V = 882 km/s, Δφ = 360^o, dA = 288°
▲SC 21d17^{h}11^m

Particle fluxes and associated phenomena



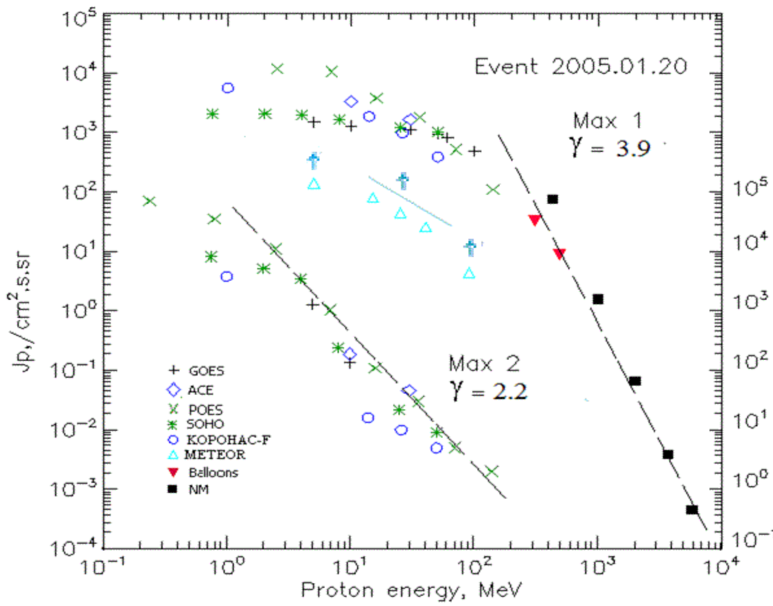
Time profiles of the proton fluxes for the event of 2005 January 20





Arrows on the profiles of the events indicate the time of the proton flux maxima, taken to build the proton spectra (see below)

Integral time-of-maximum proton spectrum



Integral fluxes of protons for the event of 2005 January 20

S/c, instruments	Ep, MeV	To	Tmax	Jmax, $(cm^2.s.sr)^{-1}$	Dura -tion	Comments
GOES 10						
EPS	>5	06^h	$12^h/21d17^h$	1490/1300	4d	
EPS	>10	06^h	$10^h/21d17^h$	1310/134	4d	
EPS	>30	06^h	08^h/ -	1130/ -	4d	
EPS	>50	06^h	07^h/ -	940/ -	4d	
EPS	>60	06^h	07^h/ -	820/ -	4d	
EPS	>100	06^h	07^h/ -	490/ -	4d	
METEOR						
CBM	>5	>03^h	<$21d05^h$	>140/ -	5d	
CBM	>15	>03^h	<$21d04^h$	>81/ -	5d	
CBM	>25	>03^h	<$21d04^h$	>45/ -	5d	
CBM	>40	>03^h	<$21d04^h$	>26/ -	3d	
BP	>90	>03^h	<$21d04^h$	>4.4/ -	2d	
ChD	>600	-	-	-	-	
POES 16						
MEPED	>0.24	-	- /$21d18^h$	- /70800	4d	
MEPED	>0.8	-	- /$21d18^h$	- /35000	4d	
MEPED	>2.5	-	$07^h/21d18^h$	11920/11000	4d	
MEPED	>6.9	-	$07^h/21d18^h$	10610/1050	4d	
MEPED	>16	-	$08^h/21d17^h$	3830/110	4d	
MEPED	>36	-	$08^h/21d17^h$	1810/30	4d	
MEPED	>70	-	$08^h/21d17^h$	520/5	4d	
MEPED	>140	-	$08^h/21d17^h$	110/2	4d	
CORONAS F						
MKL	>1	-	$9^h/21d17^h$	5570/3800	4d	
MKL	>14	-	$9^h/21d17^h$	1850/16	4d	
MKL	>26	-	$9^h/21d17^h$	985/10	4d	
MKL	>50	-	$9^h/21d17^h$	385/5	4d	

ACE						
SIS	>10	06^h	$08^h/21d16^h$	3310/188	4d	
SIS	>30	06^h	$08^h/21d16^h$	1660/45.6	4d	
SOHO						
EPHIN (INT)	>50	06^h	$07^h/21d16^h$	1030/9	3d	
BALLOONS						
Mu	>306		07^h45^m/ -	32.7/ -		
Mu	>482		07^h45^m/ -	8.7/ -		
Mu	>912		07^h45^m/ -	1.15/ -		
NM						
Network	>433	-	07^h30^m/ -	73.6/ -	-	
Network	>1000	-	07^h30^m/ -	1.57/ -	-	
Network	>2000	-	07^h30^m/ -	0.065/ -	-	
Network	>3700	-	07^h30^m/ -	0.0038/ -	-	
Network	>5800	-	07^h30^m/ -	0.00044/ -	-	

Differential fluxes of protons for the event of 2005 January 20

S/c, instruments	ΔE, MeV	To	Tmax	Jmax, $(cm^2.s.sr.MeV)^{-1}$	Dura -tion	Comments
SOHO						
LION	0.75-2	08^h	$12^h/21d17^h$	30/2430	5d	
LION	2-6	08^h	$12^h/21d17^h$	26/580	5d	
EPHIN	4-8	08^h	$11^h/21d16^h$	79/800	4d	
EPHIN	8-25	08^h	$11^h/21d16^h$	24.6/13	4d	
EPHIN	25-41	07^h	$08^h/21d15^h$	6.9/0.45	4d	

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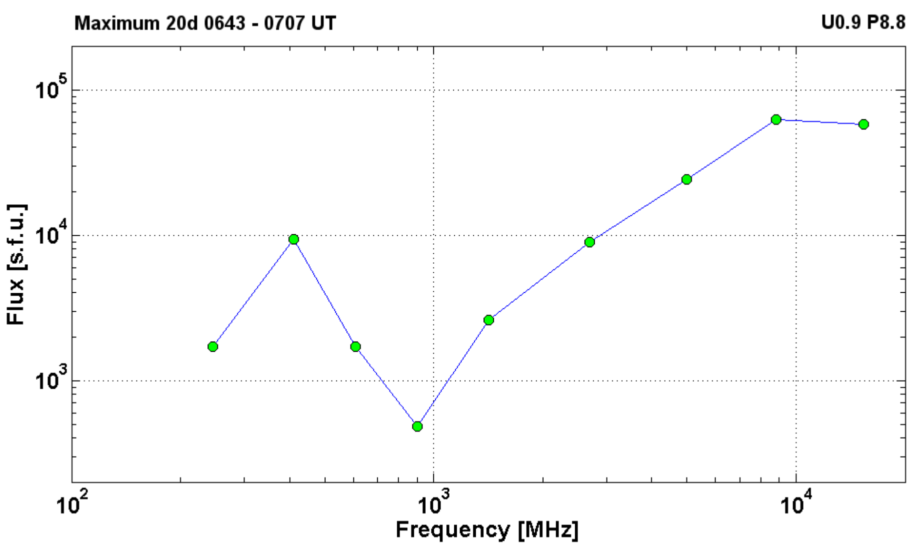
Bieber, J.W., J. Clem, P. Evenson et al., 2013.

Electromagnetic and other phenomena that are sources and/or accompanying for the event of 2005 January 20

2005 January 20 ● AR10720 To event 460

Hα	6563 Å	0641	0646	0854	N12W58	2B	UZ
1 – 12	keV	0636	0701	0726		X7.1	1.3E00
300-800	keV	062036	065110	072716		318884832	RHESSI
25-50	keV	075452	075534	084840		11856082	RHESSI
50-150	keV	0944		0956			SONG F
150-500	keV						SONG F
500-1300	keV						SONG F
90-150	MeV						SONG F
15.4	GHz	0642.0	0649.0	0822.0		4.76	
8.8	GHz	0635.0	0647.0	0806.0	U0.9 P8.8	4.79	
5	GHz	0638.0	0649.0	0844.0		4.38	
2.7	GHz	0639.0	0657.0	0840.0		3.95	
1.4	GHz	0639.0	0644.0	0752.0		3.41	
900	MHz	~0703.9	~0703.9	>0727.0		2.68	
610	MHz	0640.0	0643.0	0000.0		3.23	
410	MHz	0639.0	0643.0	0000.0		3.97	
245	MHz	0639.0	0707.0	0832.0		3.23	
DS II	SH	0644		~0700	S,H	3	
DS IV	FS	0636		>0800	F,S	2	
DS IV		0643		0728		3	
DS IV		0643		1055		2	
DS I	N,C	0755		~0950	N,C	2	
DS III	GG	0645		0701	GG	3	
DS III	G	0729		0738	G	3	
DS CONT	DC	0655		0657	DC	2	
DS CONT	DC	0702		0710	DC	2	
DS DCIM	S,C	0830		0856	S,C	2	
DS UNCLF	RS	0755		0755	RS	2	
CME	WL	0654	0882 km/s	16.0km/s^2	360º	288º	

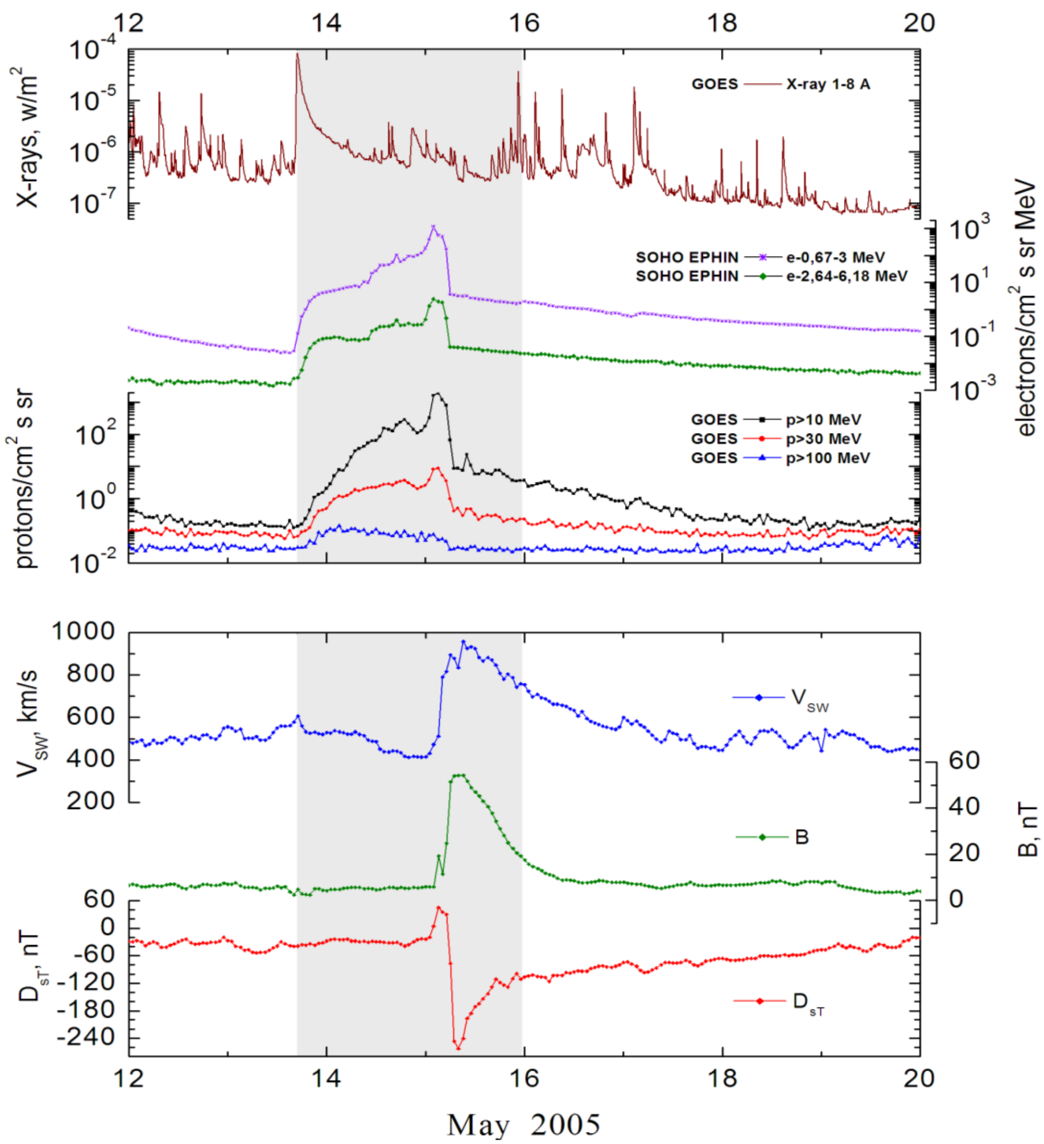


Event 2005.05.13 – (2005-133) **№ 461**

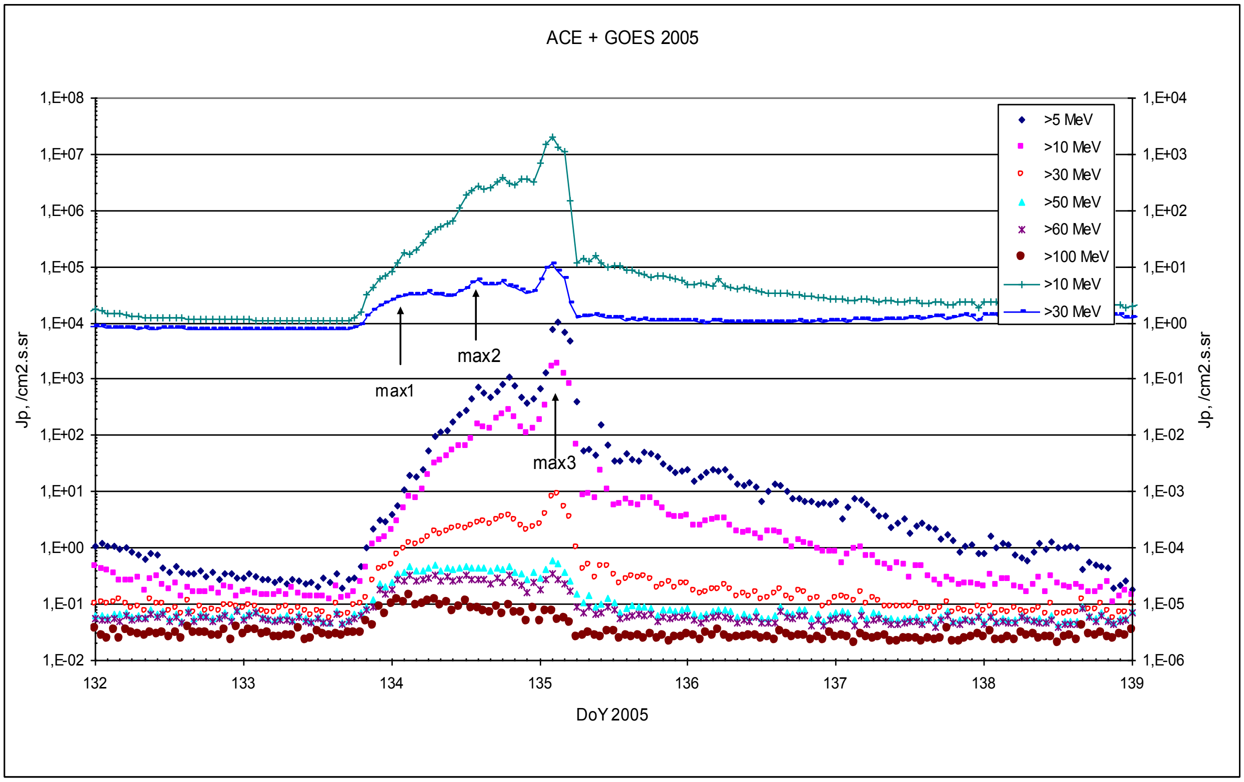
Particle event: To(Ep>10MeV) – 13d19^h
Tmax$_1$(Ep>10MeV) – 14d03^h, Jmax$_1$(Ep>10MeV) – 7.7 /cm^2.s.sr
Tmax$_2$(Ep>10MeV) – 14d14^h, Jmax$_2$(Ep>10MeV) – 155 /cm^2.s.sr
Tmax$_3$(Ep>10MeV) – 15d03^h, Jmax$_3$(Ep>10MeV) – 1.9·10^3 /cm^2.s.sr
Duration of the event –2 days
Quasimaximal energy of protons in the event – Eqm$_1$ = 300 MeV
– Eqm$_2$ = 85 MeV
– Eqm$_3$ = 85 MeV

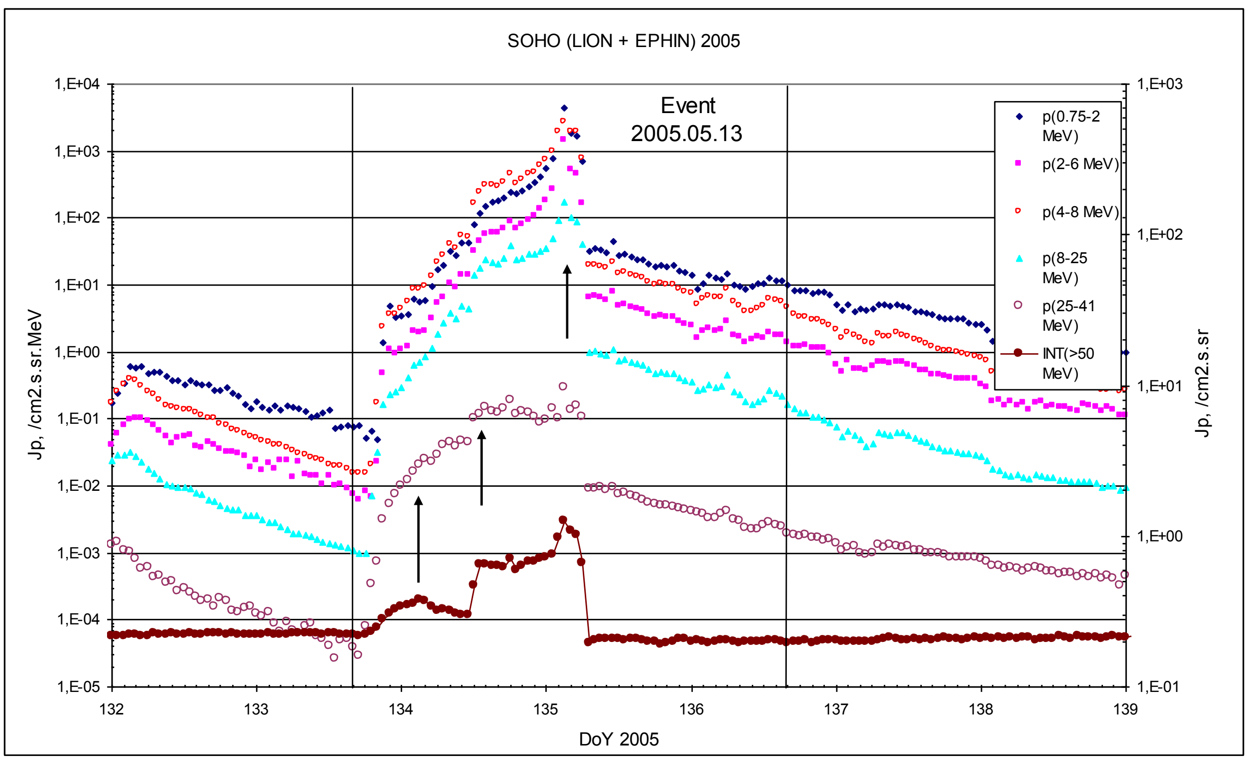
Sources: ● solar flare 13d16^{h}13^m, M8.0/2B, N12E12, AR10759
Main X-ray burst 1-8 Å: onset – 13d16^{h}13^m, max – 13d16^{h}57^m, Φ = 0.18 J/m^2
CME: 13d17^{h}12^m, V = 1689 km/s, Δφ = 360^o, dA = 002°;
▲SC 15d02^{h}38^m;

Particle fluxes and associated phenomena



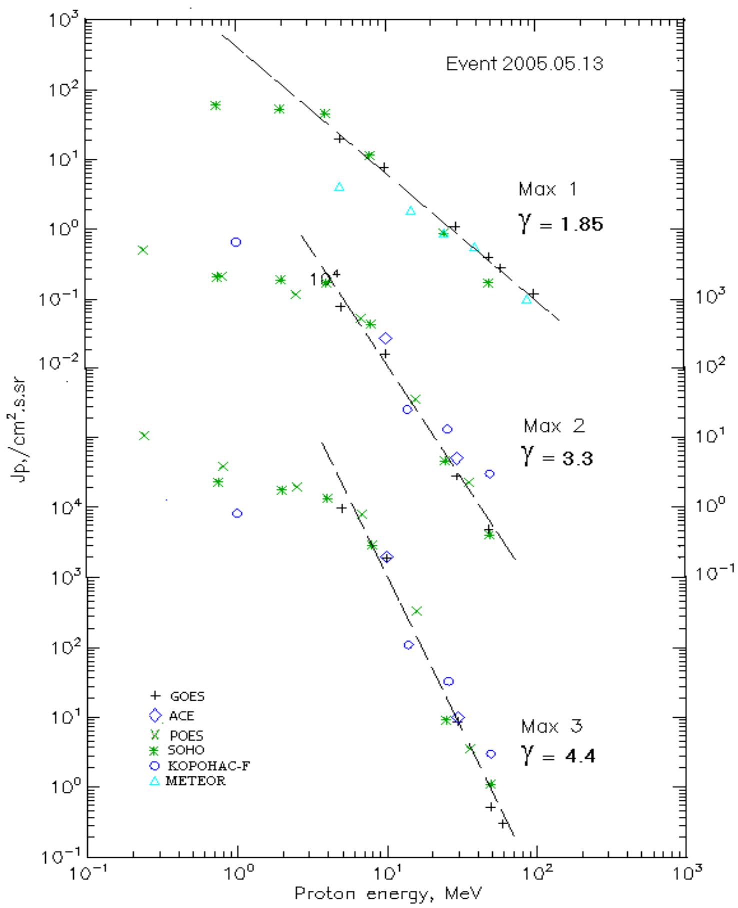
Time profiles of the proton fluxes for the event of 2005 May 13





Arrows on the profiles of the events indicate the time of the proton flux maxima, taken to build the proton spectra (see below)

Integral time-of-maximum proton spectrum



Integral fluxes of protons for the event of 2005 May 13

S/c, instruments	Ep, MeV	To	Tmax	Jmax, $(cm^2.s.sr)^{-1}$	Dura -tion	Comments
GOES-10						
EPS	>5	19^h	$14d03^h/14d14^h/15d03^h$	$19.7/740/1\cdot10^4$	2d	
EPS	>10	19^h	$14d03^h/14d14^h/15d03^h$	$7.7/155/1.9\cdot10^3$	2d	
EPS	>30	20^h	$14d03^h/14d15^h/15d03^h$	1.1/2.8/8.7	2d	
EPS	>50	20^h	$14d03^h$ $/14d15^h/15d02^h$	0.4/0.4/0.52	2d	
EPS	>60	20^h	$14d03^h$/ - $/15d02^h$	0.28/ - /0.3	2d	
EPS	>100	20^h	$14d03^h$/ - / -	0.12/ - / -	2d	
METEOR						
CBM	>5	19^h	14d03 ^{h}/ - / -	4,2/ - / -	1d	
CBM	>15	19^h	14d03 ^{h}/ - / -	1,9/ - / -	1d	
CBM	>25	19^h	14d03 ^{h}/ - / -	0,9/ - / -	1d	
CBM	>40	19^h	14d01 ^{h}/ - / -	0,56/ - / -	1d	
BP	>90	19^h	14d01 ^{h}/ - / -	0,1/ - / -	1d	
ChD	>600	-	-	-	-	
POES-16						
MEPED	>0.24	-	- $/14d14^h/15d03^h$	- /4900/110000	2d	
MEPED	>0.8	-	- $/14d14^h/15d03^h$	- /2000/40000	2d	
MEPED	>2.5	-	- $/14d14^h/15d03^h$	- /1100/20000	2d	
MEPED	>6.9	-	- $/14d14^h/15d03^h$	- /500/8000	2d	

MEPED	>16	-	- /14d14^h/15d03^h	- /35/330	2d	
MEPED	>36	-	- /14d14^h/15d03^h	- /2.3/3.5	2d	
MEPED	>70	-	- /14d14^h/ -	- /-/ -	2d	
MEPED	>140	-	- /14d14^h/ -	- /-/ -	2d	
CORONAS F						
MKL	>1.	-	- /14d14^h/15d02^h	-/6300/8300	2d	
MKL	>14	-	- /14d14^h/15d02^h	-/25///110	2d	
MKL	>26	-	- /14d14^h/15d02^h	-/13/33	2d	
MKL	>50	-	- /14d14^h/15d02^h	-/3/3//	2d	
ACE						
SIS	>10	19^h	- /14d14^h/15d02^h	- /262/2·10^3	3d	
SIS	>30	19^h	- /14d14^h/15d02^h	- /5/10	2d	
SOHO						
EPHIN (INT)	>50	21^h	14d04^h/14d13^h/15d03^h	0.17/0.4/1.1	1d	

Differential fluxes of protons for the event of 2005 May 13

S/c, instruments	ΔE, MeV	To	Tmax	Jmax, (cm^2.s.sr.MeV)$^{-1}$	Dura -tion	Comments
SOHO						
LION	0.75-2	21^h	14d02 ^{h}/14d14^h/15d03^h	6.2/148/4.3·10^3	4d	
LION	2-6	18^h	14d02 ^{h}/14d14^h/15d03^h	2.4/57/1.5·10^3	4d	
EPHIN	4-8	21^h	14d02 ^{h}/14d14^h/15d03^h	8.5/304/2.7·10^3	4d	
EPHIN	8-25	20^h	14d02 ^{h}/14d14^h//15d03^h	0.62/24.1/173	4d	
EPHIN	25-41	18^h	14d02 ^{h}/14d14^h/15d03^h	0.025/0.15/0.29	4d	
EPHIN	41-53	- “ -	- “ -	- “ -	- “ -	

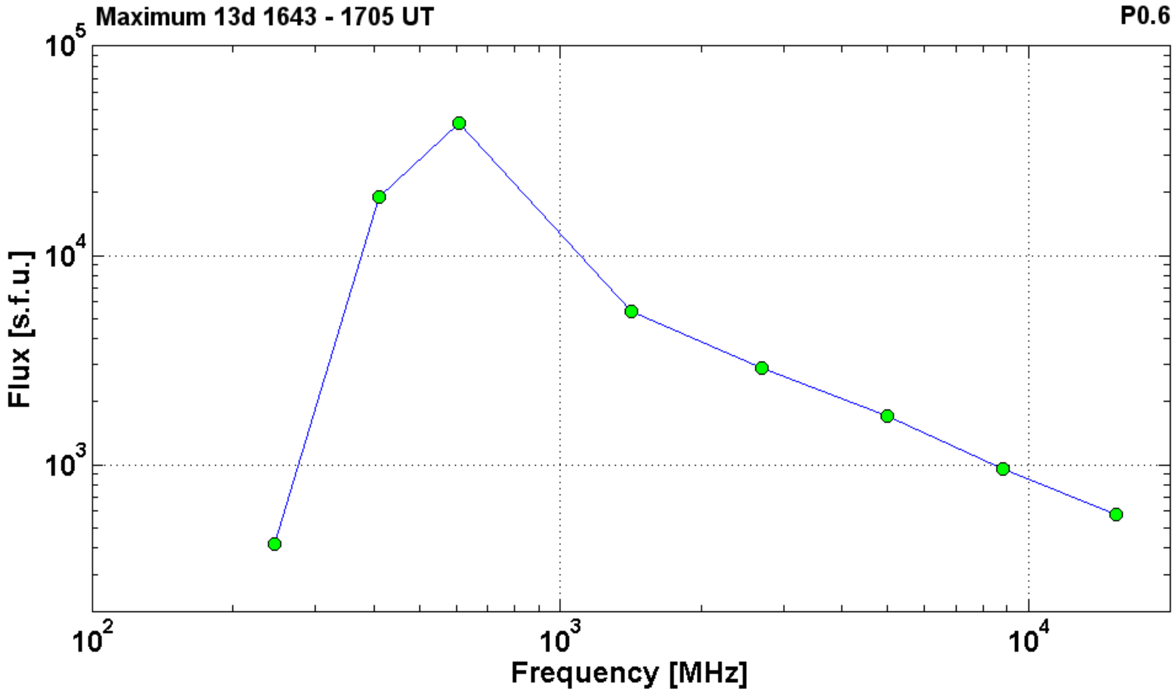
Electromagnetic and other phenomena that are sources and/or accompanying for the event of 2005 May.13

2005 May 13 ● AR10759 To event 461

Hα	6563 Å	1631	1641	1946	N12E12	2B	MZ
1 – 12	keV	1613	1657	1758		M8.0	1.8E-1
50-100	keV	163628	165458	171420		46101460	RHESSI

Список 2005 г.

15.4	GHz	1640.0	1645.0	0000.0		2.76	
8.8	GHz	1639.0	1645.0	0000.0		2.98	
5	GHz	1634.0	1643.0	1735.0		3.23	
2.7	GHz	1633.0	1703.0	0000.0		3.46	
1.4	GHz	1633.0	1705.0	0000.0		3.73	
610	MHz	1633.0	1705.0	0000.0	P0.6	4.63	
410	MHz	1634.0	1657.0	1713.0		4.28	
245	MHz	1633.0	1648.0	0000.0		2.62	
DS II	40-350	1638		1650	F,S,H	2	
DS II	25-81	1641		1652		3	
DS IV	40-600	1633		~1828	F,S	3	
DS IV	30-180	1645		2057		3	
DS III	25-153	1641		1641		1	
DS DCIM	800-2000	1628		~1723	GG,F,S	3	
DS DCIM	2000-4500	1632		1639	G	2	
CME	WL	1712	1689 km/s	–	360º	002º	

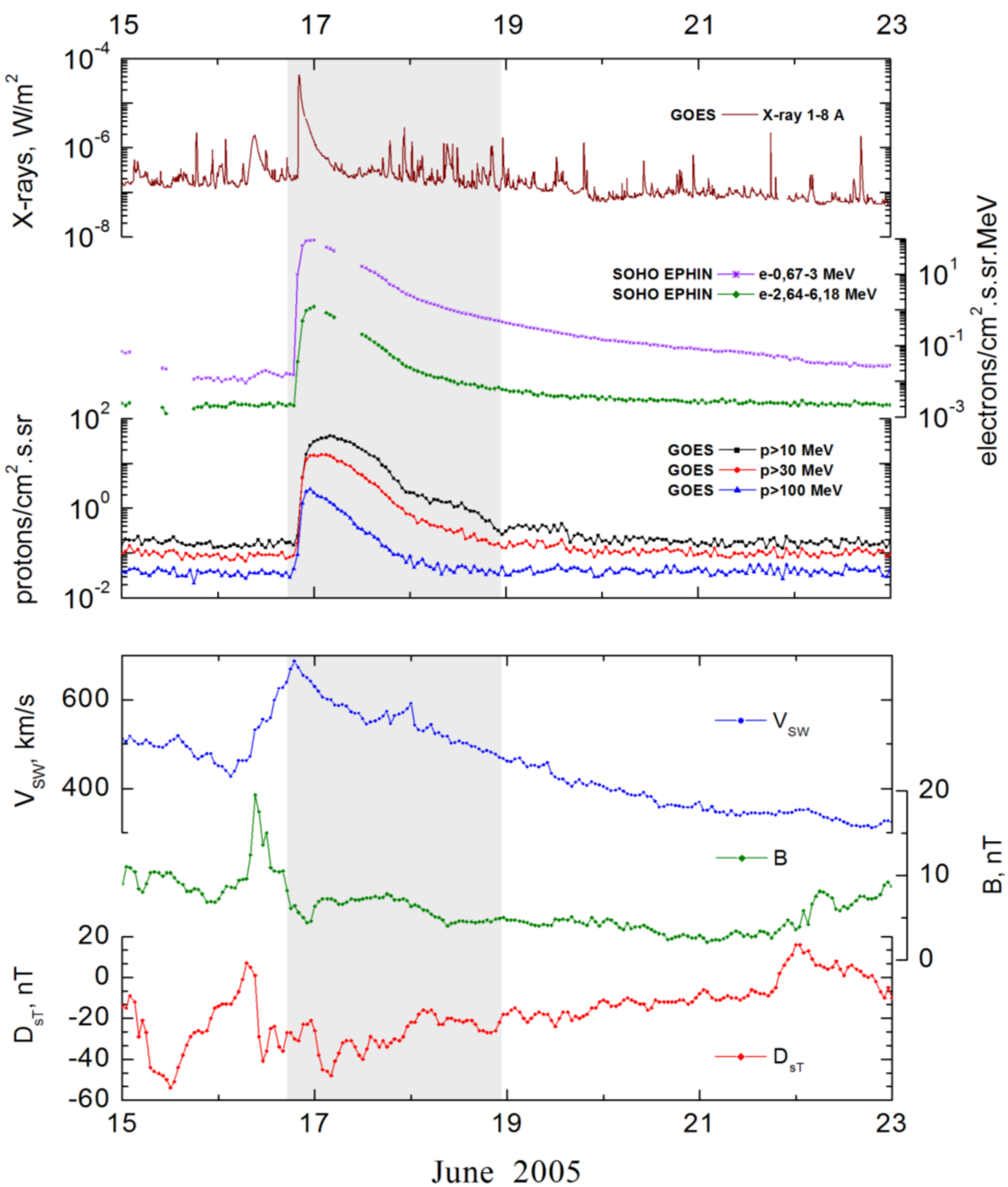


Event 2005.06.16– (2005-167) **№ 462**

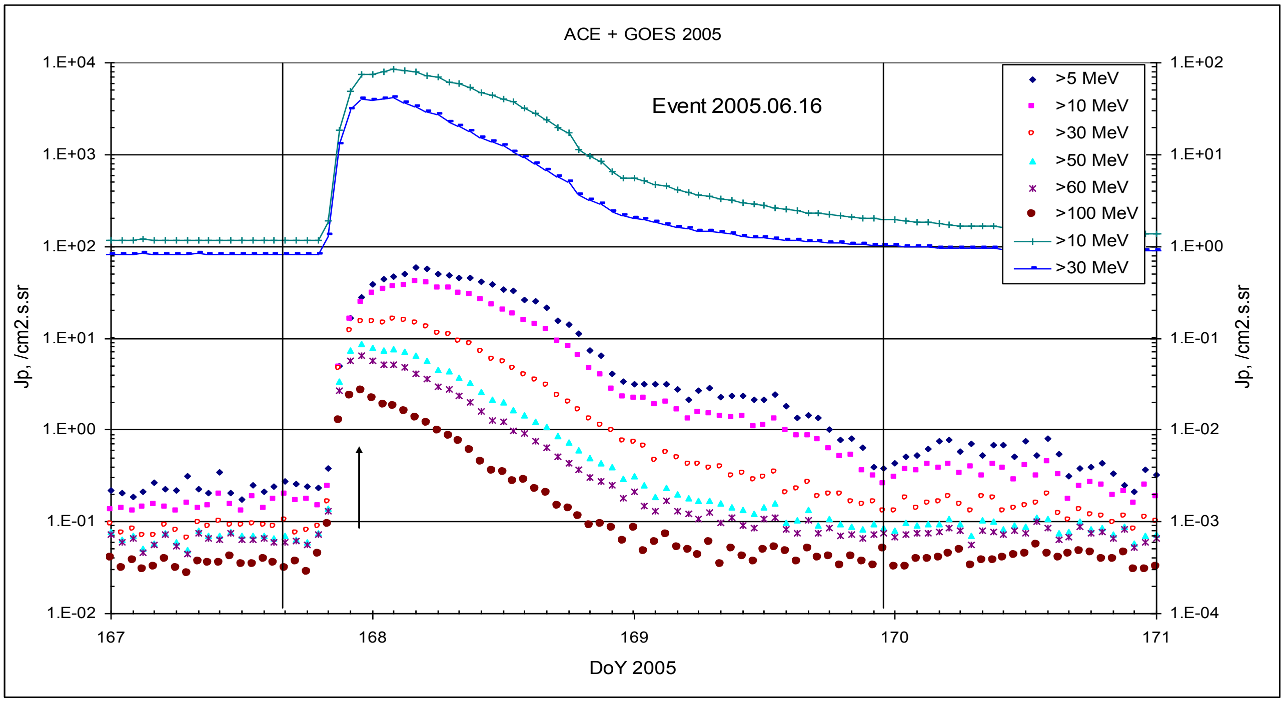
Particle event: To(Ep>10MeV) – 16d20^h
Tmax(Ep>10MeV) – 17d04^h, Jmax (Ep>10MeV) – 41 /cm^2.s.sr
Duration of the event – 2 days
Quasimaximal energy of protons in the event – Eqm = 510 MeV

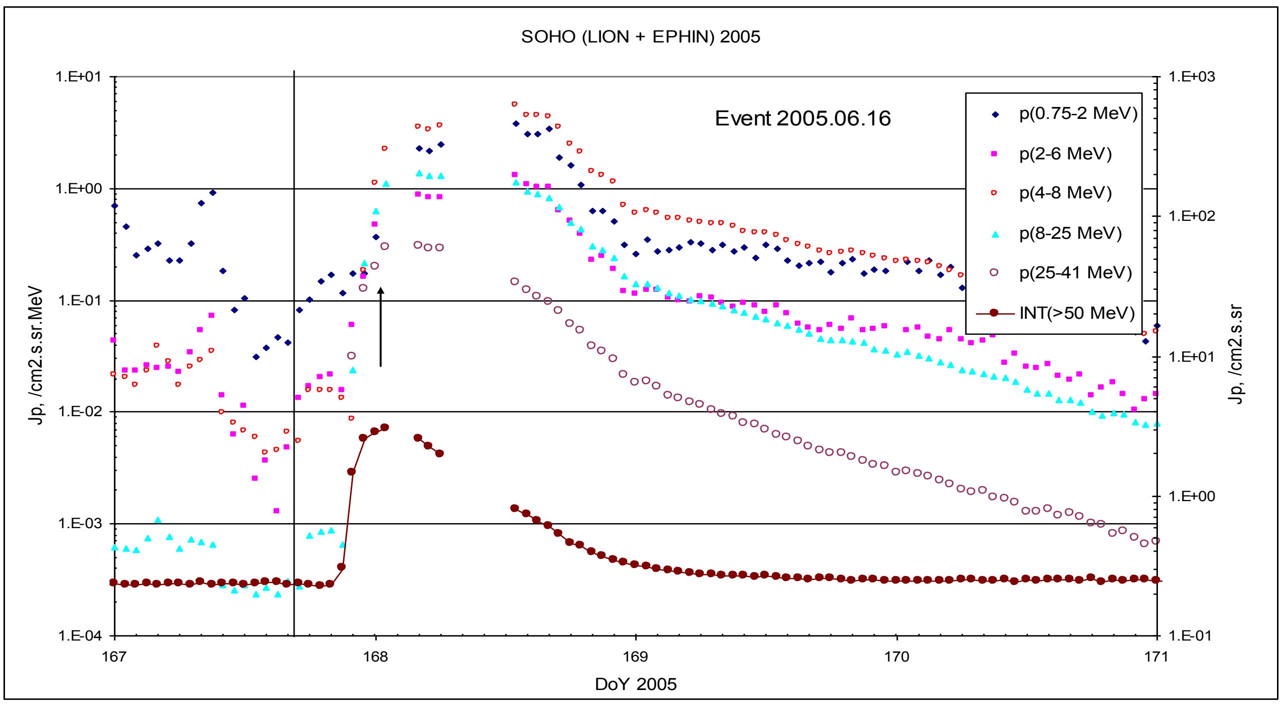
Sources: ■ solar flare 16d20^{h}01^m, M4.0/SF, N09W87, AR10775
Main X-ray burst 1-8 Å: onset – 16d20^{h}01^m, max – 16d20^{h}22^m, Φ = 0.062 J/m^2
CME: gap

Particle fluxes and associated phenomena



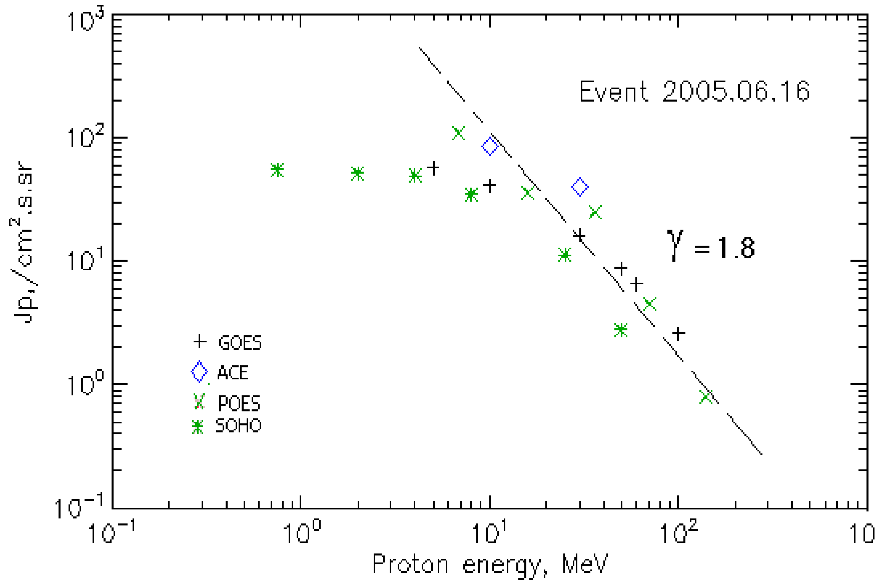
Time profiles of the proton fluxes for the event of 2005 June 16





Arrows on the profiles of the events indicate the time of the proton flux maxima, taken to build the proton spectra (see below)

Integral time-of-maximum proton spectrum



Integral fluxes of protons for the event of 2005 June 16

S/c, instruments	Ep, MeV	To	Tmax	Jmax, $(cm^2.s.sr)^{-1}$	Dura-tion	Comments
GOES-10						
EPS	>5	20^h	$17d04^h$	57	2d	
EPS	>10	20^h	$17d04^h$	41	2d	
EPS	>30	20^h	$17d02^h$	16	2d	
EPS	>50	20^h	23^h	8.7	2d	
EPS	>60	20^h	23^h	6.5	2d	
EPS	>100	20^h	23^h	2.6	2d	
POES-16						
MEPED	>0.24	20^h	-	-	-	
MEPED	>0.8	20^h	-	-	-	
MEPED	>2.5	20^h	-	-	-	
MEPED	>6.9	20^h	23^h	110	2d	
MEPED	>16	20^h	23^h	36	2d	
MEPED	>36	20^h	23^h	25	2d	
MEPED	>70	20^h	23^h	4.5	2d	
MEPED	>140	20^h	23^h	0.8	2d	
ACE						
SIS	>10	20^h	$17d02^h$	84.5	2d	
SIS	>30	20^h	$17d02^h$	40	1d	
SOHO						
EPHIN (INT)	>50	21^h	$17d01^h$	2.8	1d	

Differential fluxes of protons for the event of 2005 June 16

S/c, instruments	ΔE, MeV	To	Tmax	Jmax, $(cm^2.s.sr.MeV)^{-1}$	Dura-tion	Comments
SOHO						
LION	0.75-2	22^h	$17d04^h$	2.3	3d	
LION	2-6	22^h	$17d04^h$	0.9	3d	

EPHIN	4-8	23^h	$17d04^h$	3.5	3d	
EPHIN	8-25	22^h	$17d04^h$	1.4	2d	
EPHIN	25-41	22^h	$17d01^h$	0.3	2d	
EPHIN	41-53	- " -	- " -	- " -	- " -	

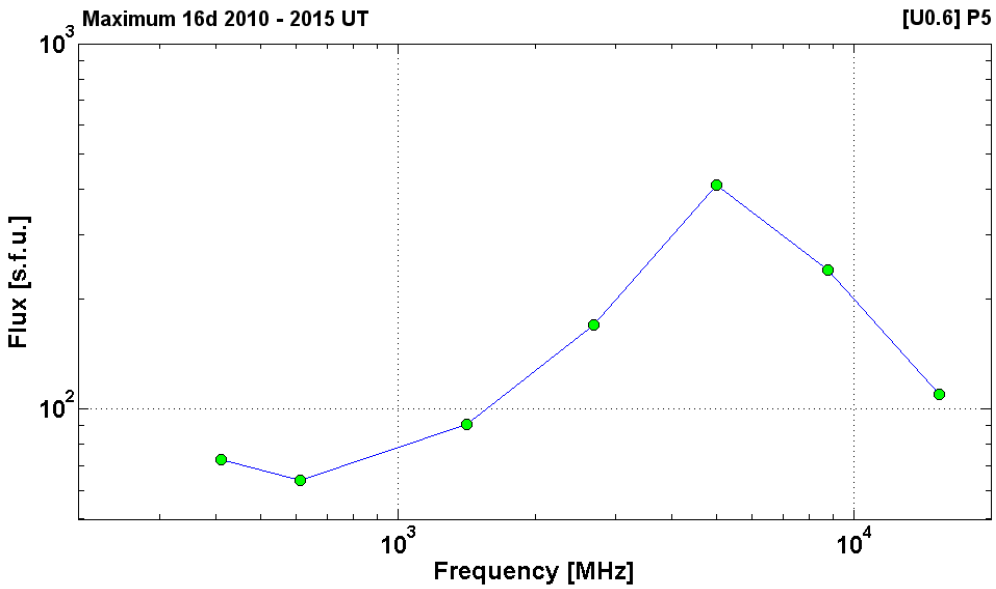
References:

Mu J., J.S. Wang, H.J. Zhao et al., 2010.
Veselovskij I.S., I.N. Myagkova, O.S. Yakovchuk, 2012.

Electromagnetic and other phenomena that are sources and/or accompanying for the event of 2005 June 16

2005 June 16 ■ AR10775 To event 462

Hα	6563 Å	2009	~2010	2016	N09W87	SF	EF
1 – 12	keV	2001	2022	2042		M4.0	6.2E-2
50-150	keV	2007		2012			SONG F
80-225	keV						SONG F
15.4	GHz	2010.0	2011.0	0000.0		2.04	
8.8	GHz	2008.0	2010.0	0000.0		2.38	
5	GHz	2007.0	2010.0	0000.0		2.61	
2.7	GHz	2008.0	2011.0	0000.0		2.23	
1.4	GHz	2007.0	2010.0	0000.0		1.96	
610	MHz	2008.0	2012.0	2012.0		1.81	
410	MHz	2010.0	2015.0	2015.0	[U0.6] P5	1.86	
DS II	30-180	2010		2016		3	
DS IV	25-110	2017		2026		2	
DS III	25-100	2002		2002	B	1	
DS III	25-40	2027		2028	B	2	
CME	WL						gap

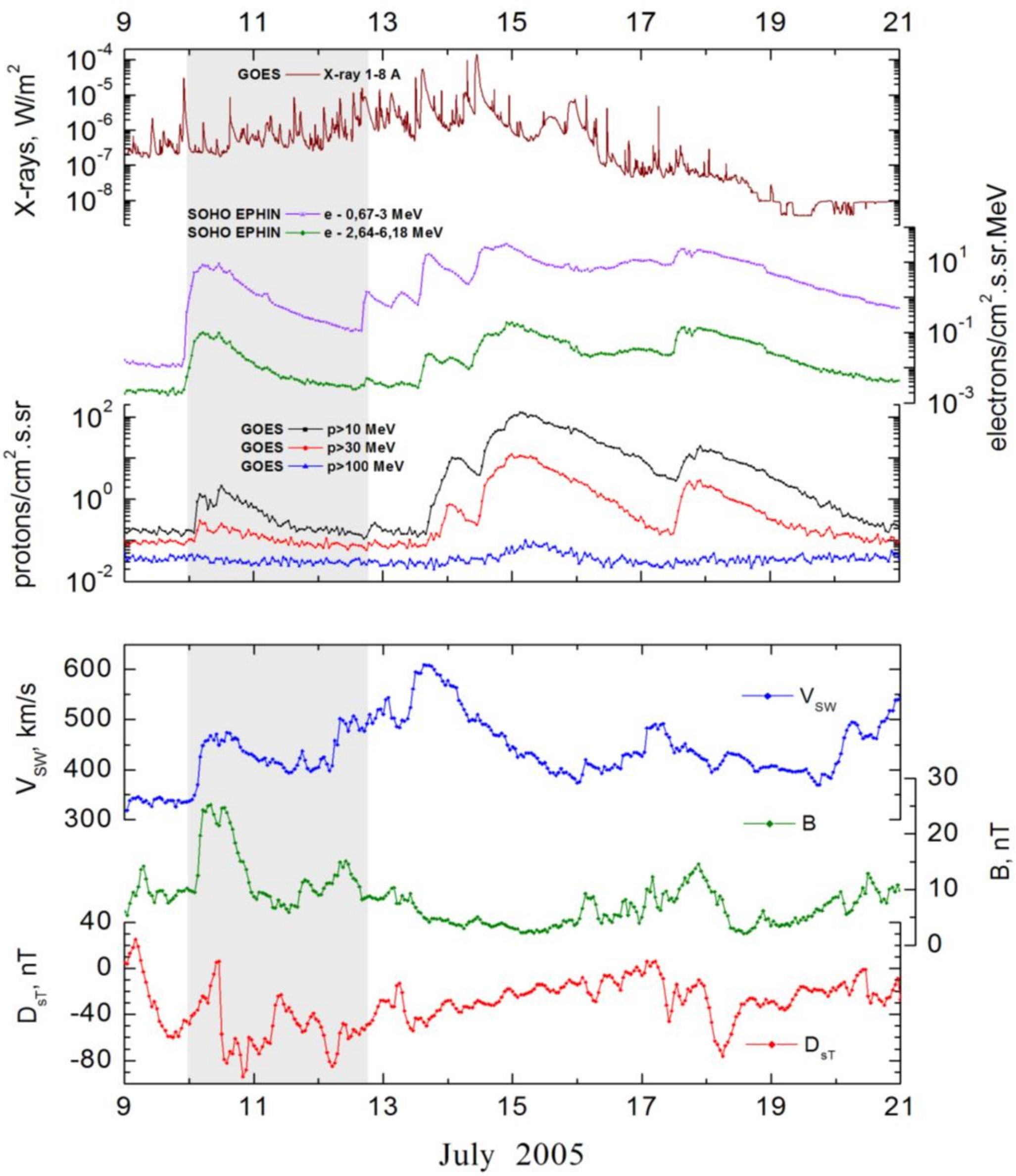


Event 2005.07.10 – (2005-191) **№ 463**

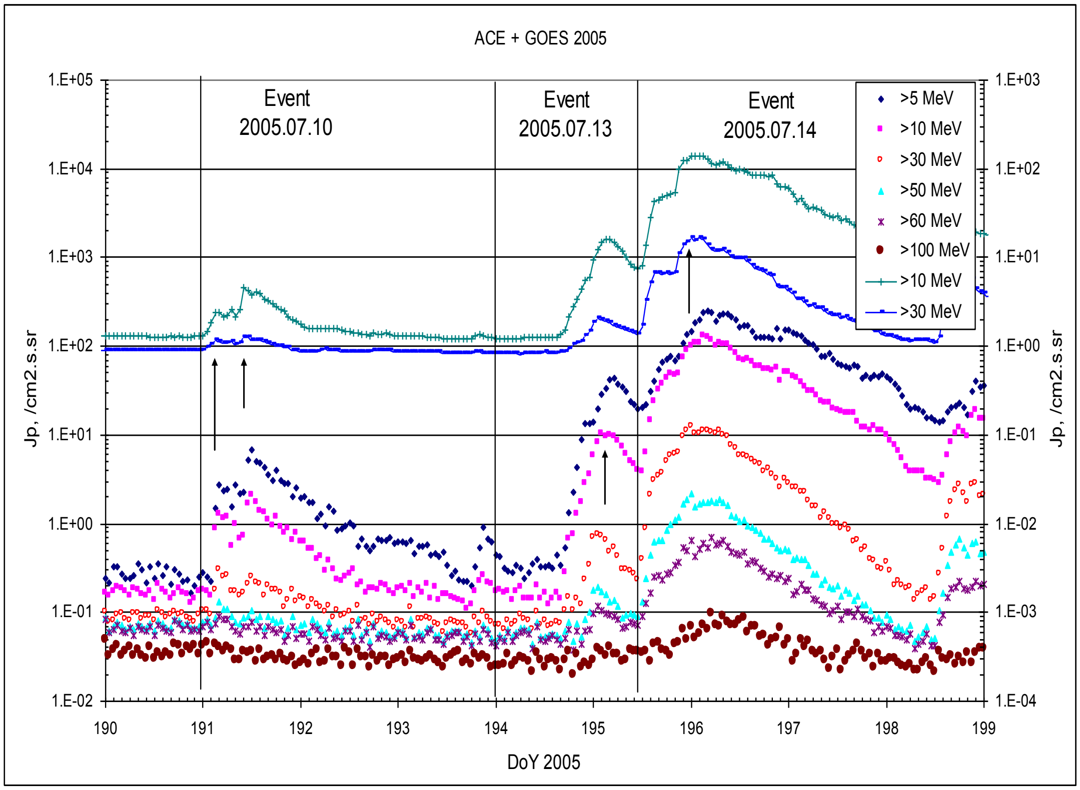
Particle event: To(Ep>10MeV) – 10d03^h
Tmax$_1$(Ep>10MeV) – 10d05^h, Jmax$_1$(Ep>10MeV) – 1.1 /cm^2.s.sr
Tmax$_2$(Ep>10MeV) – 10d12^h, Jmax$_2$(Ep>10MeV) – 1.9 /cm^2.s.sr
Duration of the event – 2.5 days
Quasimaximal energy of protons in the event – Eqm$_1$ = 75 MeV
– Eqm$_2$ = 70 MeV

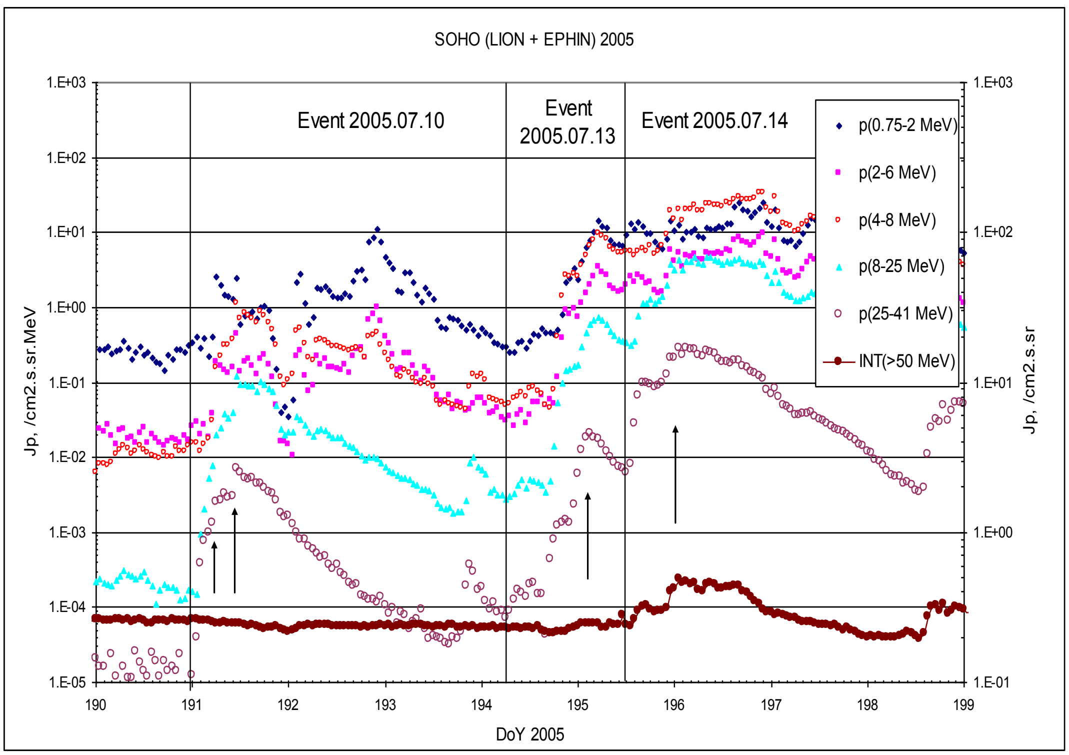
Sources: ● solar flare 09d21^{h}47^m, M2.8/1N, N11W27, AR10786
Main X-ray burst 1-8 Å: onset – 09d21^{h}47^m, max – 09d22^{h}06^m, Φ = 0.029 J/m^2
CME: 09d22^{h}30^m, V = 1540 km/s, Δφ = 360^o, dA = 328°;
▲SC 10d03^{h}37^m;

Particle fluxes and associated phenomena



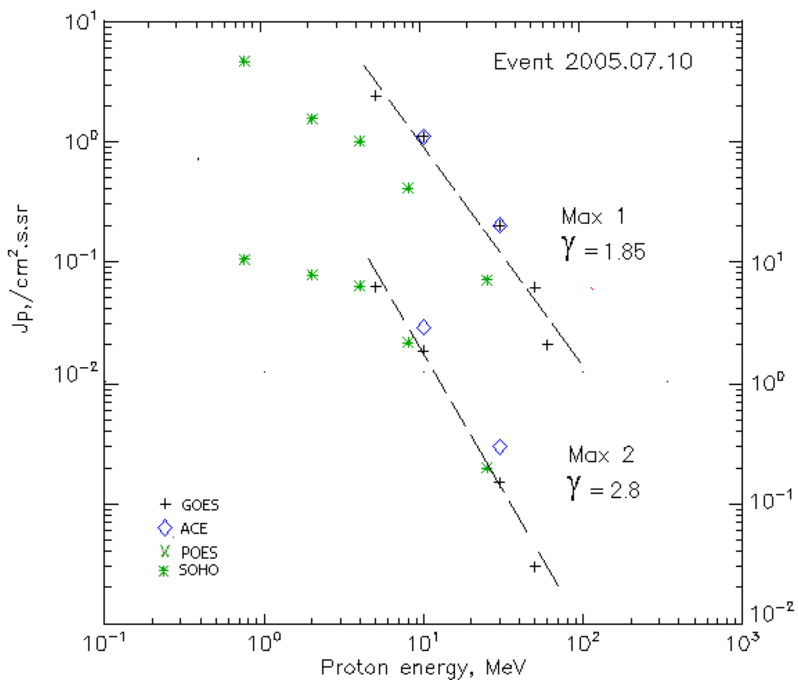
Time profiles of the proton fluxes for the event of 2005 July 10





Arrows on the profiles of the events indicate the time of the proton flux maxima, taken to build the proton spectra (see below)

Integral time-of-maximum proton spectrum



Integral fluxes of protons for the event of 2005 July 10

S/c, instruments	Ep, MeV	To	Tmax	Jmax, $(cm^2.s.sr)^{-1}$	Dura-tion	Comments
GOES-10						
EPS	>5	03^h	$05^h/12^h$	2.4/6.5	2.5d	
EPS	>10	03^h	$05^h/12^h$	1.1/1.9	2.5d	
EPS	>30	03^h	$04^h/12^h$	0.2/0.15	2.5d	
EPS	>50	-	$04^h/12^h$	0.06/0.03	2d	
EPS	>60	-	$04^h/12^h$	0.02/0.01	2d	
EPS	>100	-	-	-	-	
ACE						
SIS	>10	01^h	$05^h/11^h$	1.1/3	1d	
SIS	>30	02^h	$05^h/12^h$	0.2/0.3	1d	
SOHO						
EPHIN (INT)	>50	-	-	-	-	

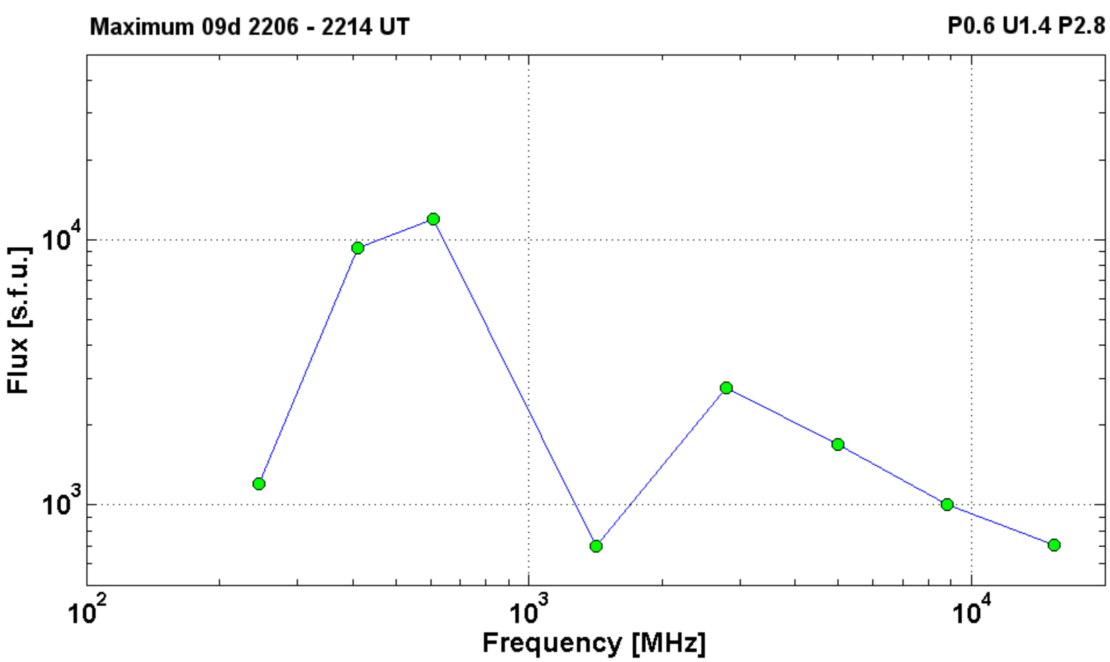
Differential fluxes of protons for the event of 2005 July 10

S/c, instruments	ΔE, MeV	To	Tmax	Jmax, $(cm^2.s.sr.MeV)^{-1}$	Dura-tion	Comments
SOHO						
LION	0.75-2	05^h	$06^h/11^h$	2.5/2.4	2.5d	
LION	2-6	05^h	$06^h/11^h$	0.18/0.5	2.5d	
EPHIN	4-8	04^h	$- /11^h$	- /1.1	2.5d	
EPHIN	8-25	02^h	$- /11^h$	- /0.12	2.5d	
EPHIN	25-41	01^h	$- /11^h$	- /0.31	2.5d	
EPHIN	41-53	- “ -	- “ -	- “ -	- “ -	

Electromagnetic and other phenomena that are sources and/or accompanying for the event of 2005 July 10

2005 July 09 ● AR10786 To event 463

Hα	6563 Å	2156	2204	2238	N11W27	1N	FU
1 – 12	keV	2147	2206	2219		M2.8	2.9E-2
15.4	GHz	2158.0	2207.0	0000.0		2.85	
8.8	GHz	2155.0	2206.0	0000.0		3.00	
5	GHz	2152.0	2206.0	0000.0		3.23	
2.8	GHz	2147.0	2209.0	2209.0	P0.6 U1.4 P2.8	3.44	
1.4	GHz	2156.0	2208.0	2217.0		2.85	
610	MHz	2149.0	2214.0	2220.0		4.08	
410	MHz	2150.0	2208.0	2217.0		3.97	
245	MHz	2153.0	2208.0	2218.0		3.08	
DS II	23-90	2159		2205	S,H	3	
DS II	20-180	2203		2217	S,H	2	
DS IV	25-2000	2152		2223		2	
DS IV	20-180	2155		>2400	F,S	2	
DS III	20-80	2203		2209	GG	3	
DS UNCLF	130-180	2211		2215		2	
CME	WL	2230	1540 km/s	-168.5 km/s	360˚	328˚	

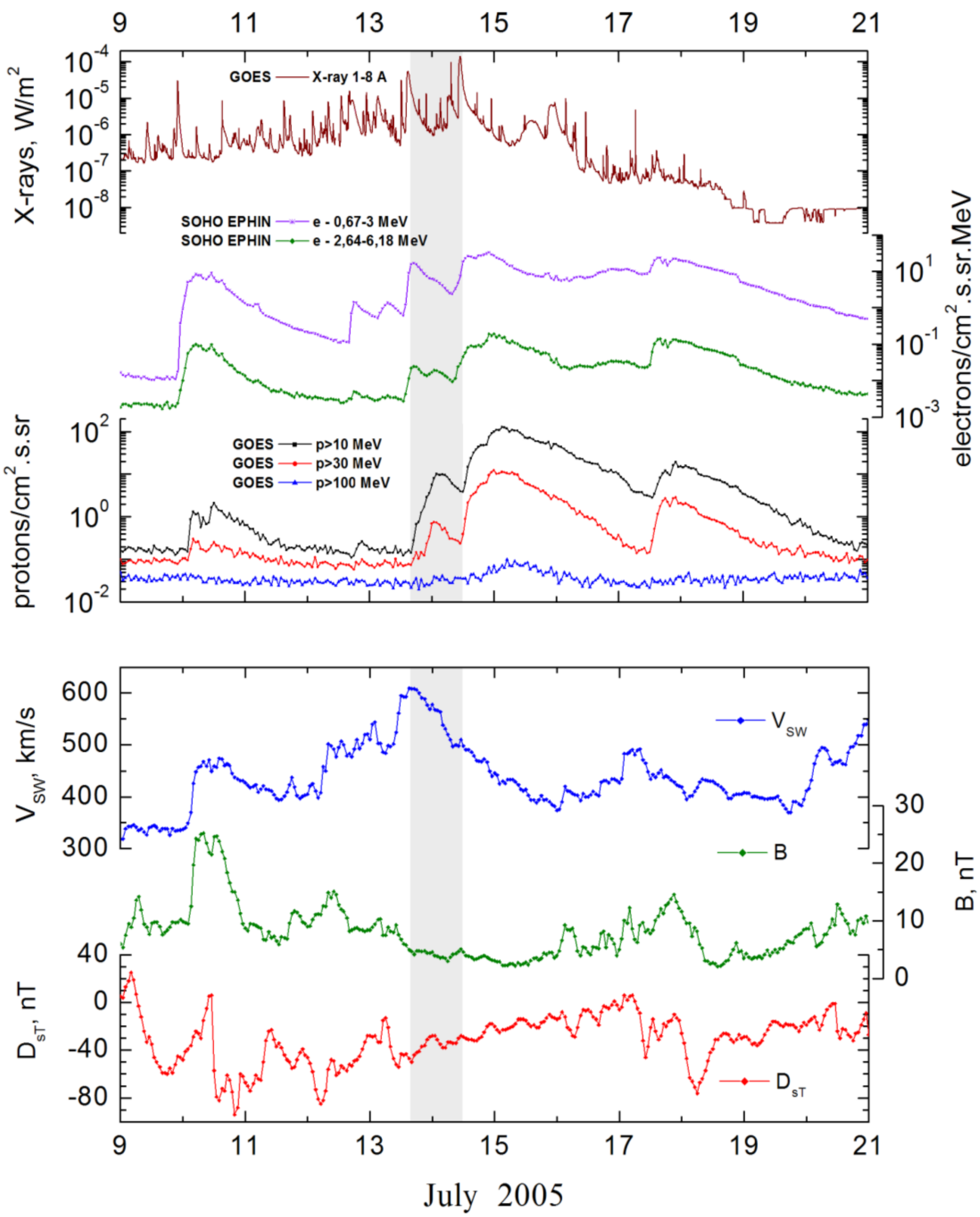


Event 2005.07.13 – (2005-194) **№ 464**

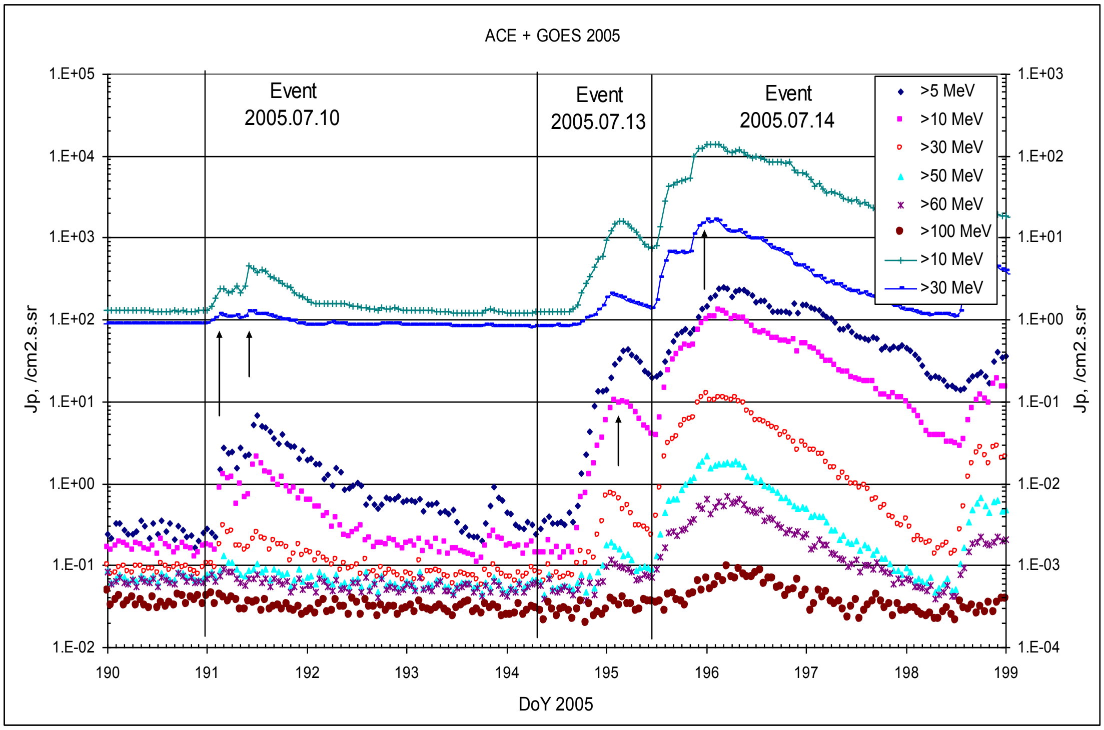
Particle event: To(Ep>10MeV) – 13d17^h
Tmax(Ep>10MeV) – 15d04^h, Jmax (Ep>10MeV) – 9.7 /cm^2.s.sr
Duration of the event –1 day
Quasimaximal energy of protons in the event – Eqm = 115 MeV

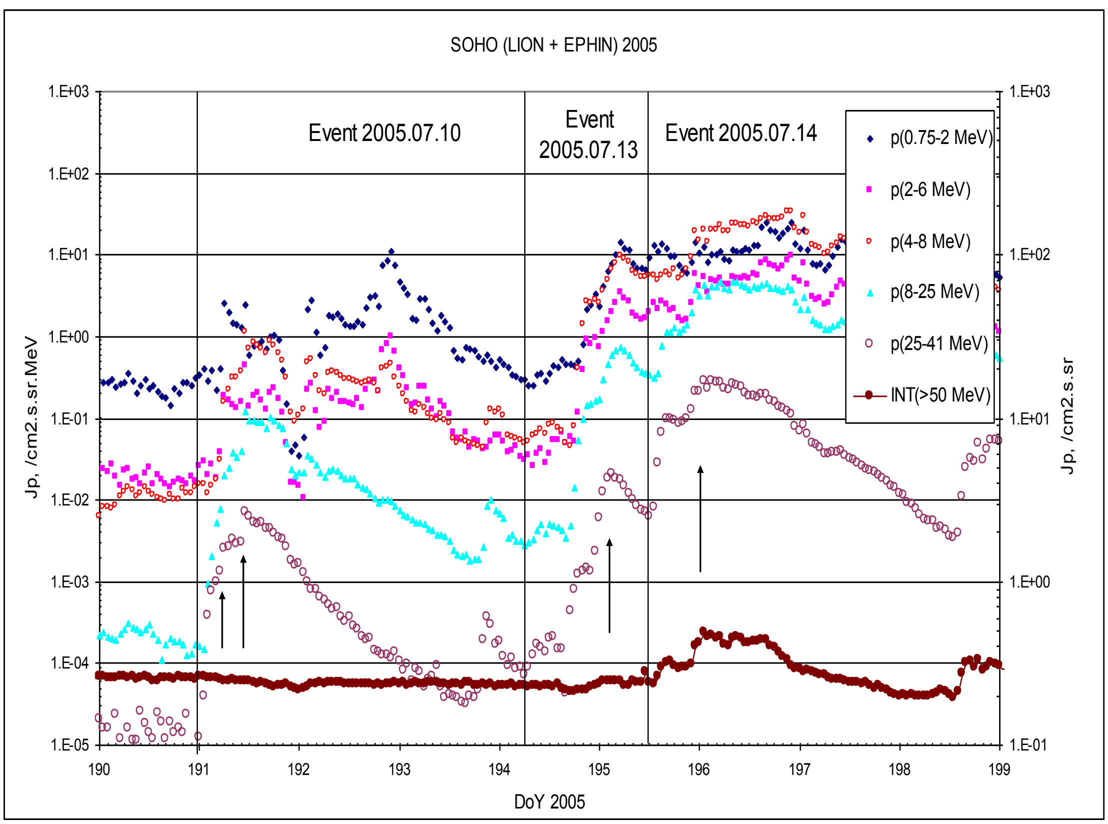
Sources: ● solar flare 13d14^{h}01^m, M5.0/SF, N10W80, AR10786
Main X-ray burst 1-8 Å: onset – 13d14^{h}01^m, max – 13d14^{h}49^m, Φ = 0.2 J/m^2
CME: 13d14^{h}30^m, V = 1423 km/s, Δφ = 360^o, dA = 303˚;

Particle fluxes and associated phenomena



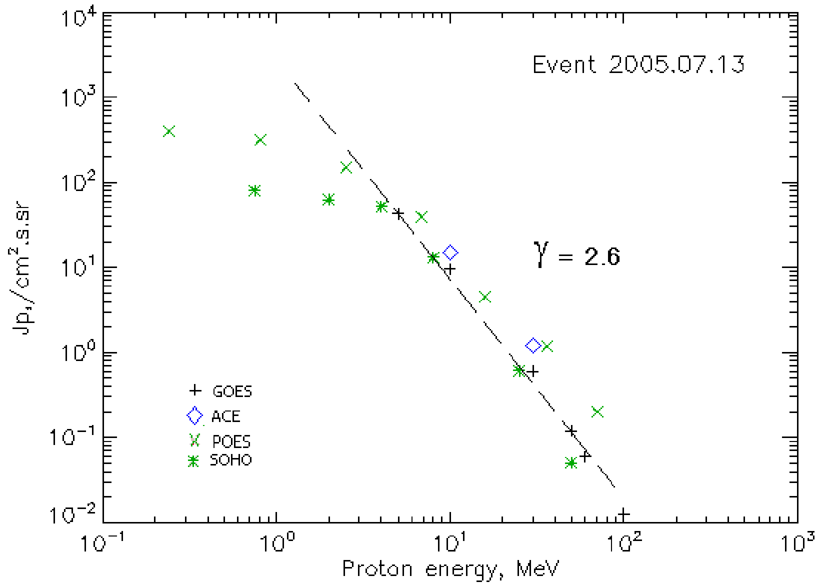
Time profiles of the proton fluxes for the event of 2005 July 13





Arrows on the profiles of the events indicate the time of the proton flux maxima, taken to build the proton spectra (see below)

Integral time-of-maximum proton spectrum



Integral fluxes of protons for the event of 2005 July 13

S/c, instruments	Ep, MeV	To	Tmax	Jmax, $(cm^2.s.sr)^{-1}$	Dura-tion	Comments
GOES-10						
EPS	>5	17^h	$14d05^h$	43	1d	
EPS	>10	17^h	$14d04^h$	9.7	1d	
EPS	>30	17^h	$14d02^h$	0.6	1d	
EPS	>50	17^h	$14d01^h$	0.12	1d	
EPS	>60	17^h	$14d01^h$	0.06	1d	
EPS	>100	17^h	$14d01^h$	0.01	1d	
POES-16						
MEPED	>0.24	-	$14d02^h$	400	1d	
MEPED	>0.8	-	$14d02^h$	320	1d	
MEPED	>2.5	-	$14d02^h$	150	1d	
MEPED	>6.9	-	$14d02^h$	40	1d	
MEPED	>16	-	$14d02^h$	4.5	1d	
MEPED	>36	-	$14d02^h$	1.2	1d	
MEPED	>70	-	$14d02^h$	0.2	1d	
MEPED	>140	-	$14d02^h$	-	-	
ACE						
SIS	>10	17^h	$14d04^h$	15	1d	
SIS	>30	18^h	$14d05^h$	1.2	1d	
SOHO						
EPHIN (INT)	>50	17^h	$14d02^h$	0.05	1d	

Differential fluxes of protons for the event of 2005 July 13

S/c, instruments	ΔE, MeV	To	Tmax	Jmax, $(cm^2.s.sr.MeV)^{-1}$	Dura-tion	Comments
SOHO						
LION	0.75-2	21^h	$14d05^h$	14.5	1d	
LION	2-6	17^h	$14d05^h$	3.4	1d	

EPHIN	4-8	17^h	$14d05^h$	9.8	1d	
EPHIN	8-25	17^h	$14d03^h$	0.74	1d	
EPHIN	25-41	17^h	$14d02^h$	0.02	1d	
EPHIN	41-53	- " -	- " -	- " -	- " -	

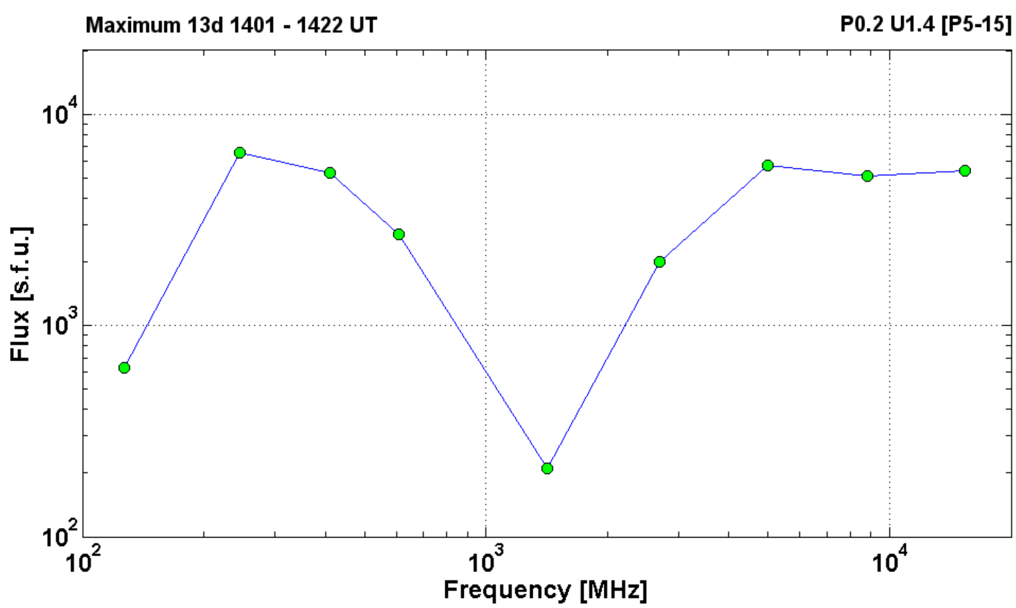
References:

Malandraki O.E., N. Agueda, A. Papaioannou et al., 2012.

Electromagnetic and other phenomena that are sources and/or accompanying for the event of 2005 July 13

2005 July 13 • AR10786 To event 464

Hα	6563 Å	1422	1437	1458	N10W80	SF	F
1 – 12	keV	1401	1449	1538		M5.0	2.0E-1
100-300	keV	141300	143522	144404		20887532	RHESSI
12-25	keV	144404	151422	151740		490896	RHESSI
15.4	GHz	1401.0	1417.0	1505.0	P0.2 U1.4 [P5-15]	3.73	
8.8	GHz	1401.0	1417.0	0000.0		3.71	
5	GHz	1358.0	1418.0	1447.0		3.76	
2.7	GHz	1401.0	1419.0	1443.0		3.30	
1.4	GHz	1358.0	1420.0	1440.0		2.32	
610	MHz	1345.0	1401.0	1412.0		3.43	
410	MHz	1351.0	1403.0	1421.0		3.72	
245	MHz	1357.0	~1403.0	1422.0		3.82	
127	MHz	1411.6	1422.3	1424.6		2.80	
DS III	30-180	1406		1411		2	
DS V	25-180	1401		1409		2	
CME	WL	1430	1423 km/s	-14.1 km/s	360˚	303˚	

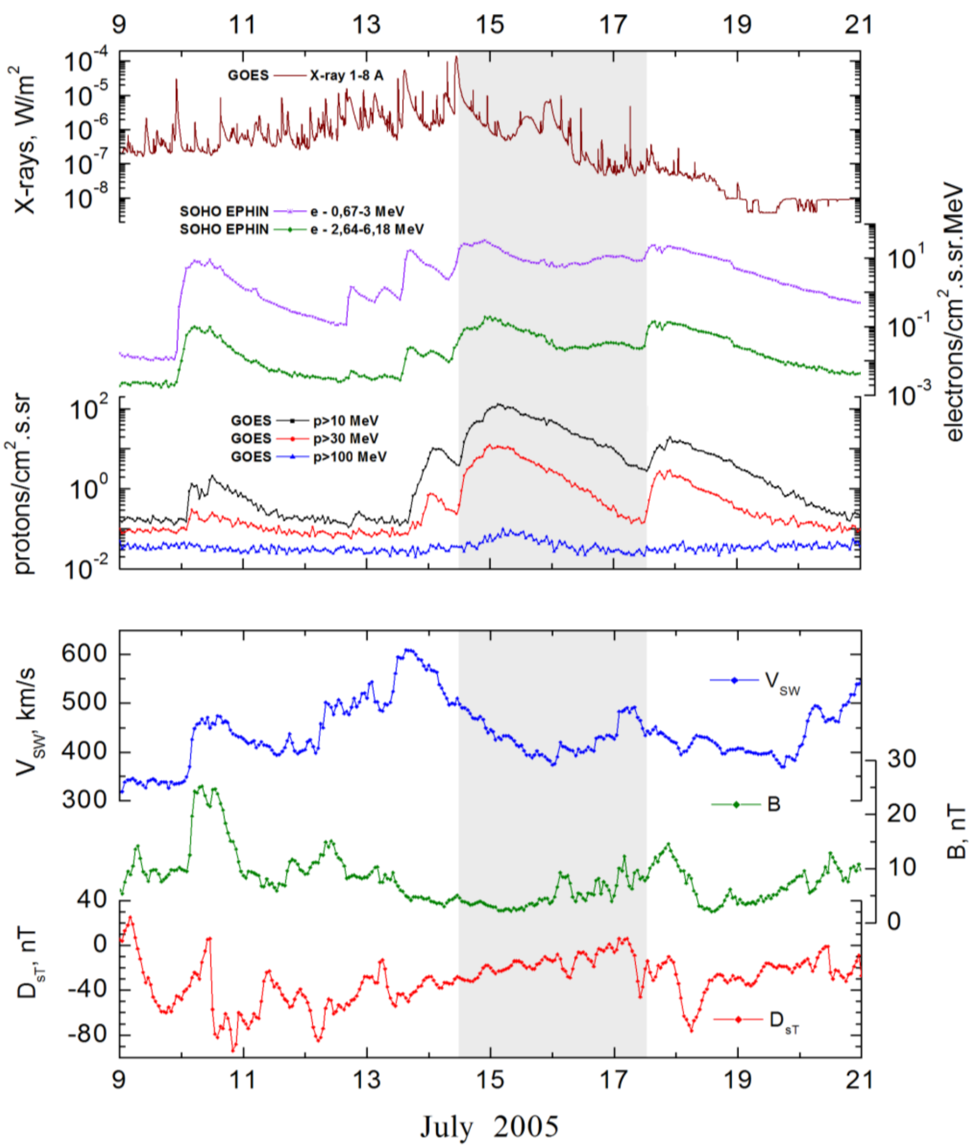


Event 2005.07.14 – (2005-195) **№ 465**

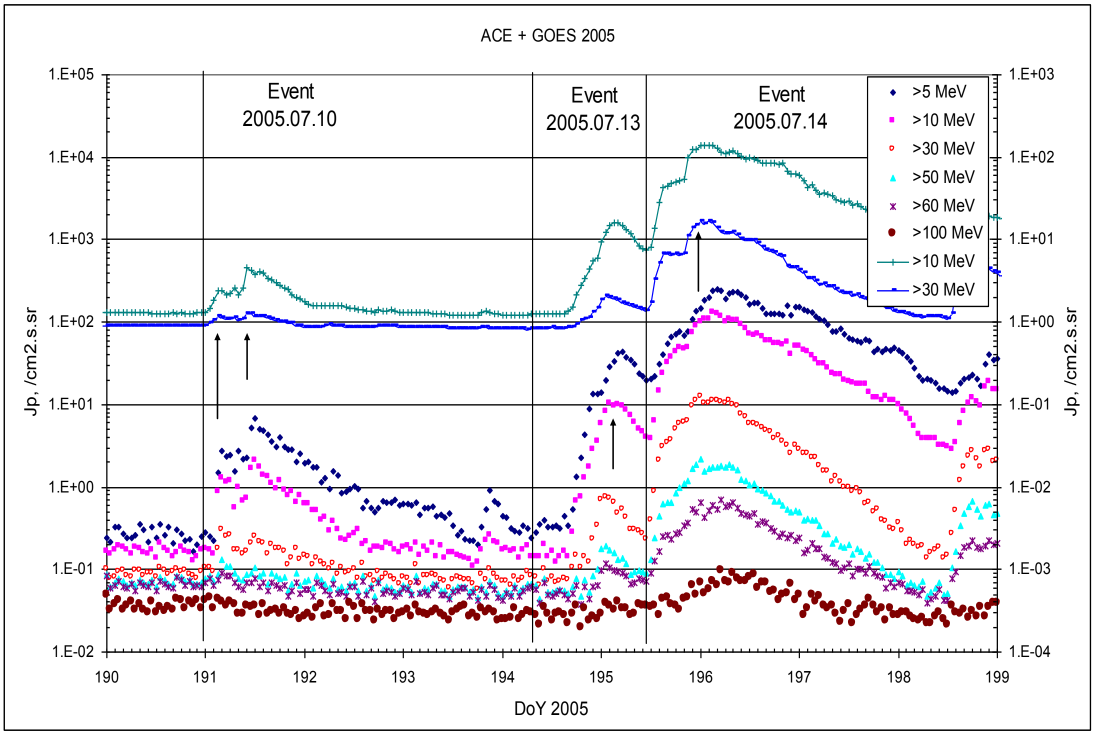
Particle event: To(Ep>10MeV) – 14d14^h
Tmax(Ep>10MeV) – 15d03^h, Jmax (Ep>10MeV) – 130 /cm^2.s.sr
Duration of the event – 3 days
Quasimaximal energy of protons in the event – Eqm = 185 MeV

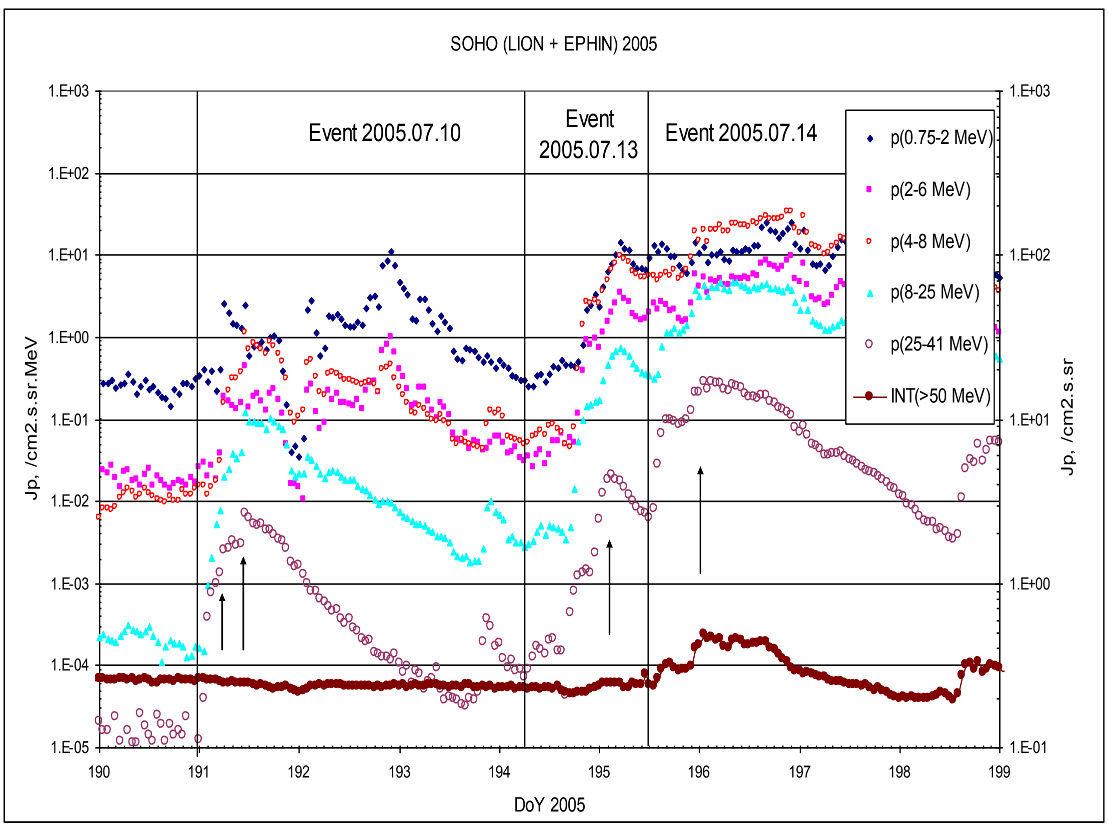
Sources: ■ solar flare 14d10^{h}16^m, X1.2/…, n11w90*, AR10786
Ø solar flare 14d05^{h}57^m, M9.1/1N, N11W73, AR10786
Ø solar flare 14d22^{h}50^m, M1.1/…, N09W90, AR10786
Main X-ray burst 1-8 Å: onset – 14d10^{h}16^m, max – 14d10^{h}55^m, Φ = 0.39 J/m^2
CME: 14d10^{h}54^m, V = 2115 km/s, Δφ =360^o, dA = 296°;
▲SC 17d01^{h}34^m;
* − probable localization of the flare event

Particle fluxes and associated phenomena



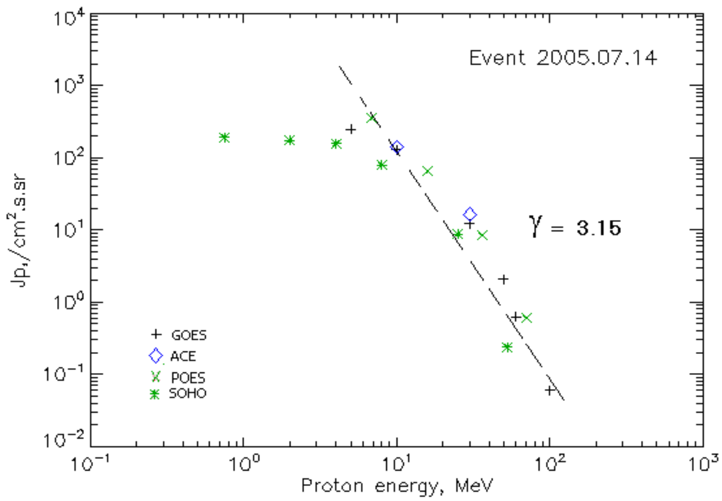
Time profiles of the proton fluxes for the event of 2005 July 14





Arrows on the profiles of the events indicate the time of the proton flux maxima, taken to build the proton spectra (see below)

Integral time-of-maximum proton spectrum



Integral fluxes of protons for the event of 2005 July 14

S/c, instruments	Ep, MeV	To	Tmax	Jmax, $(cm^2.s.sr)^{-1}$	Dura-tion	Comments
GOES-10						
EPS	>5	14^h	$15d04^h$	250	3d	
EPS	>10	14^h	$15d03^h$	130	3d	
EPS	>30	14^h	$15d00^h$	12.3	3d	
EPS	>50	14^h	$15d05^h$	2.08	3d	
EPS	>60	14^h	$15d05^h$	0.63	3d	
EPS	>100	-.	$15d05^h$	0.06	3d	
POES-16						
MEPED	>0.24	-	-	-	-	
MEPED	>0.8	-	-	-	-	
MEPED	>2.5	-	-	-	-	
MEPED	>6.9	-	$15d00^h$	350	3d	
MEPED	>16	-	$15d05^h$	65	3d	
MEPED	>36	-	$15d05^h$	8.4	3d	
MEPED	>70	-	$15d05^h$	0.6	3d	
ACE						
SIS	>10	13^h	$15d01^h$	141	3d	
SIS	>30	12^h	$15d02^h$	16.4	3d	
SOHO						
EPHIN (INT)	>50	14^h	$15d01^h$	0.26	2d	

Differential fluxes of protons for the event of 2005 July 14

S/c, instruments	ΔE, MeV	To	Tmax	Jmax, $(cm^2.s.sr.MeV)^{-1}$	Dura-tion	Comments
SOHO						
LION	0.75-2	15^h	$15d02^h$	14.4	3d	
LION	2-6	15^h	$15d01^h$	5.4	3d	
EPHIN	4-8	15^h	$15d04^h$	20	3d	
EPHIN	8-25	15^h	$15d04^h$	4.1	3d	
EPHIN	25-41	15^h	$15d03^h$	0.3	3d	
EPHIN	41-53	- “ -	- “ -	- “ -	- “ -	

References:

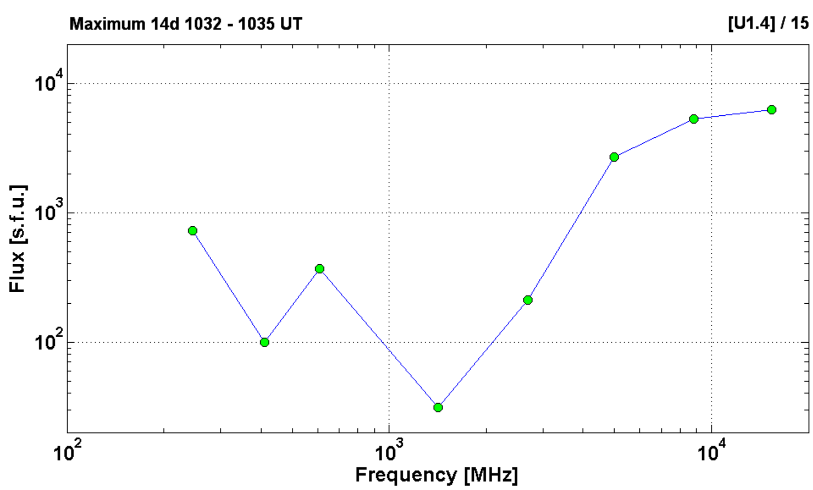
Chernetsky VA., M.A. Livshits, L.K. Kashapova et al., 2009.

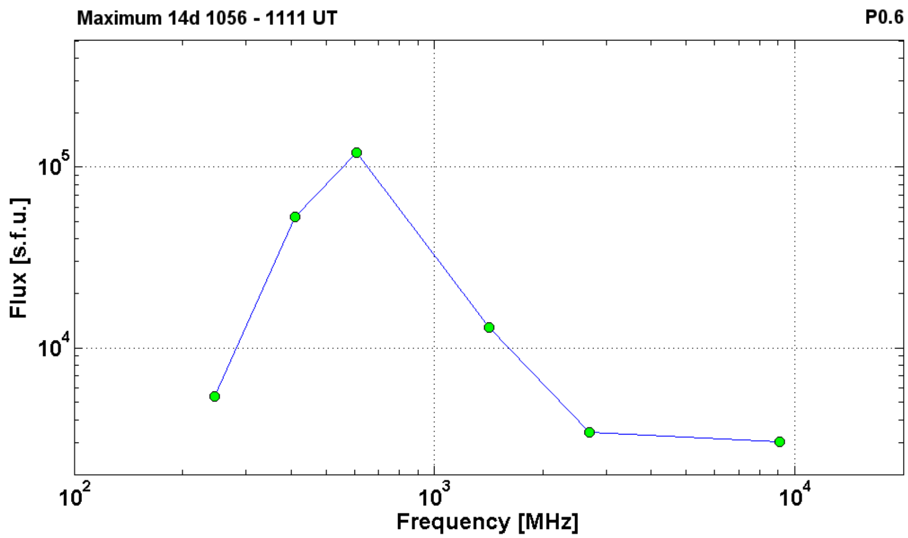
Electromagnetic and other phenomena that are sources and/or accompanying for the event of 2005 July 14

2005 July 14 ■ AR10786 To event 465

Hα	6563 Å	No Flare Patrol			n13w80		
1 – 12	keV	1016	1055	1129		X1.2	3.9E-1
25-50	keV	101508	102742	112956		4398593	RHESSI
25-50	keV	105952	110402	112548		14154225	RHESSI
15.4	GHz	1019.0	1034.0	1144.0	[U1.4]/15	3.79	
8.8	GHz	1020.0	1034.0	1145.0		3.72	
5	GHz	1020.0	1035.0	1143.0		3.43	
2.7	GHz	1021.0	1033.0	0000.0		2.32	
1.4	GHz	1029.0	1033.0	0000.0		1.49	
610	MHz	1033.0	1033.0	0000.0		2.57	
410	MHz	1025.0	1032.0	0000.0		2.00	
245	MHz	1026.0	1032.0	0000.0		2.86	
DS IV	200-4000	1023		1212	P,C	3	
DS IV	25-180	1025		1146		2	
DS III	25-47	1019		1019		1	
DS DCIM	2000-4500	1018		1128	GG	3	
DS DCIM	800-2000	1021		1149	GG,S,P	3	
9.1	GHz	1018.7	1056.3			3.48	
2.7	GHz	1021.0	1059.0	1136.0		3.53	
1.4	GHz	1029.0	1107.0	0000.0		4.11	
610	MHz	1047.0	1110.0	0000.0	P0.6	5.08	
410	MHz	1025.0	1111.0	1222.0		4.72	
245	MHz	1026.0	1111.0	1211.0		3.73	
CME	WL	1054	2115 km/s	198.0km/s^2	360º	296º	

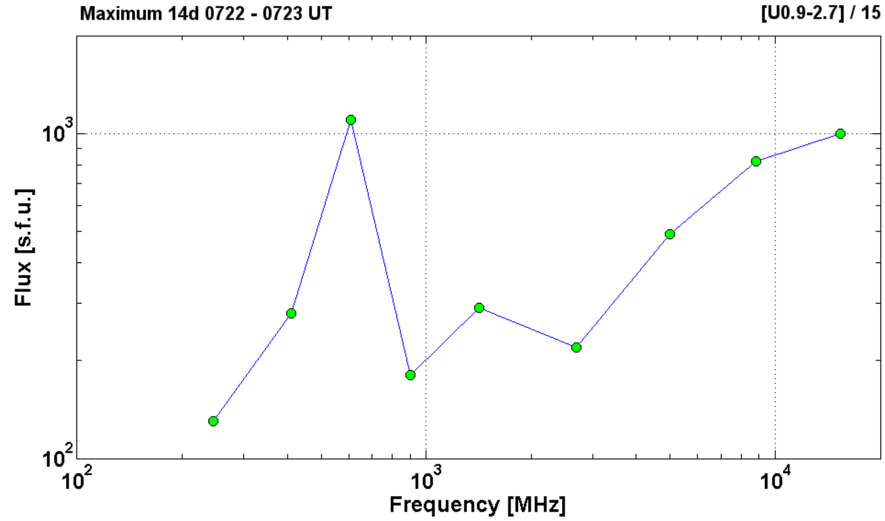
* − probable localization of the flare event





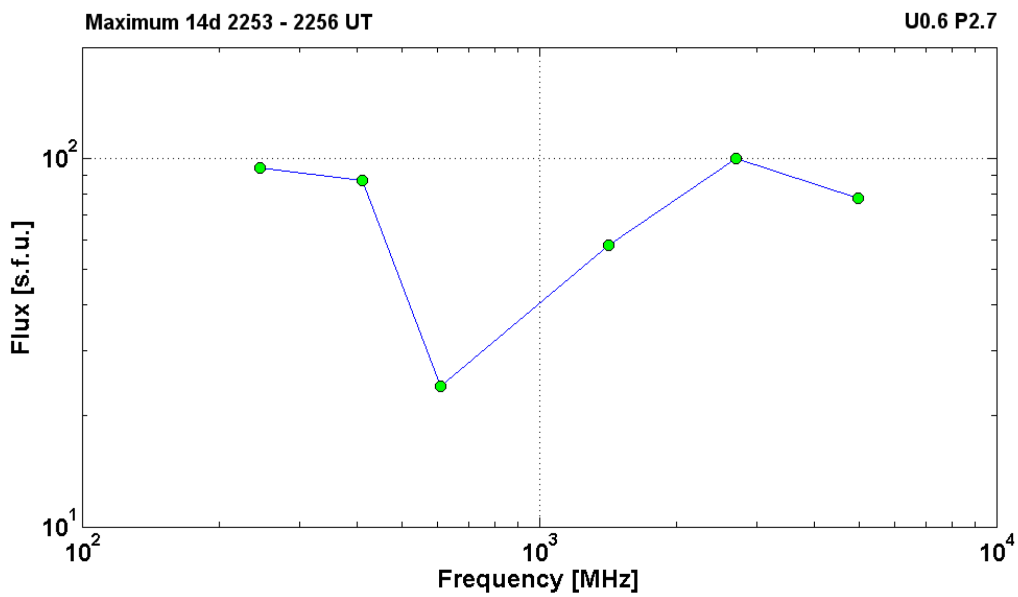
2005 July 14 Ø AR10758 To event 465

Hα	6563 Å	0723	0724	0732	N11W73	1N	FM
1 – 12	keV	0557	0725	0743		M9.1	8.4E-2
12-25	keV	061224	061926	070720		1402202	RHESSI
6-12	keV	070720	070926	071348		63166	RHESSI
6-12	keV	071348	071550	071644		25014	RHESSI
50-150	keV	0723		0724			SONG F
2-6	MeV						SONG F
15.4	GHz	0722.0	0723.0	0723.0	[U0.9-2.7]/15	3.00	
8.8	GHz	0722.0	0723.0	0723.0		2.91	
5	GHz	0722.0	0723.0	0723.0		2.69	
2.7	GHz	0722.0	0723.0	0723.0		2.34	
1.4	GHz	0722.0	0723.0	0723.0		2.46	
900	MHz	0722.3	0722.8	0730.9		2.26	
610	MHz	0723.0	0723.0	~0723.0		3.04	
410	MHz	0722.0	0722.0	0724.0		2.45	
245	MHz	0722.0	0723.0	0724.0		2.11	
DS III	25-700	0722		0727	G	3	
DS III	25-600	0729		0738	G	1	
DS V	25-180	0722		0726		2	
DS DCIM	200-4000	0722		0737	P,C	3	
DS DCIM	800-2000	0735		0737	G	2	
CME	WL	0754	0752 km/s	-2.6 km/s^2	103º	237º	



2005 July 14 Ø AR10758 To event 465

Hα	6563 Å	No Flare Patrol			n13w89		
1 – 12	keV	2250	2257	2309		M1.1	4.8E-3
12-25	keV	225104	225822	230920		652561	RHESSI
5	GHz	2254.0	2254.0	2255.0		1.89	
2.7	GHz	2254.0	2255.0	2255.0	U0.6 P2.7	2.00	
1.4	GHz	2254.0	2255.0	2255.0		1.76	
610	MHz	<2253.0	2253.0	>2253.0		1.38	
410	MHz	<2253.0	2253.0	>2253.0		1.94	
245	MHz	2256.0	2256.0	2257.0		1.97	
DS III	18-180	2253		2307	GG	3	
CME	WL	2330	0724 km/s	0.2 km^2/s	033º	270º	

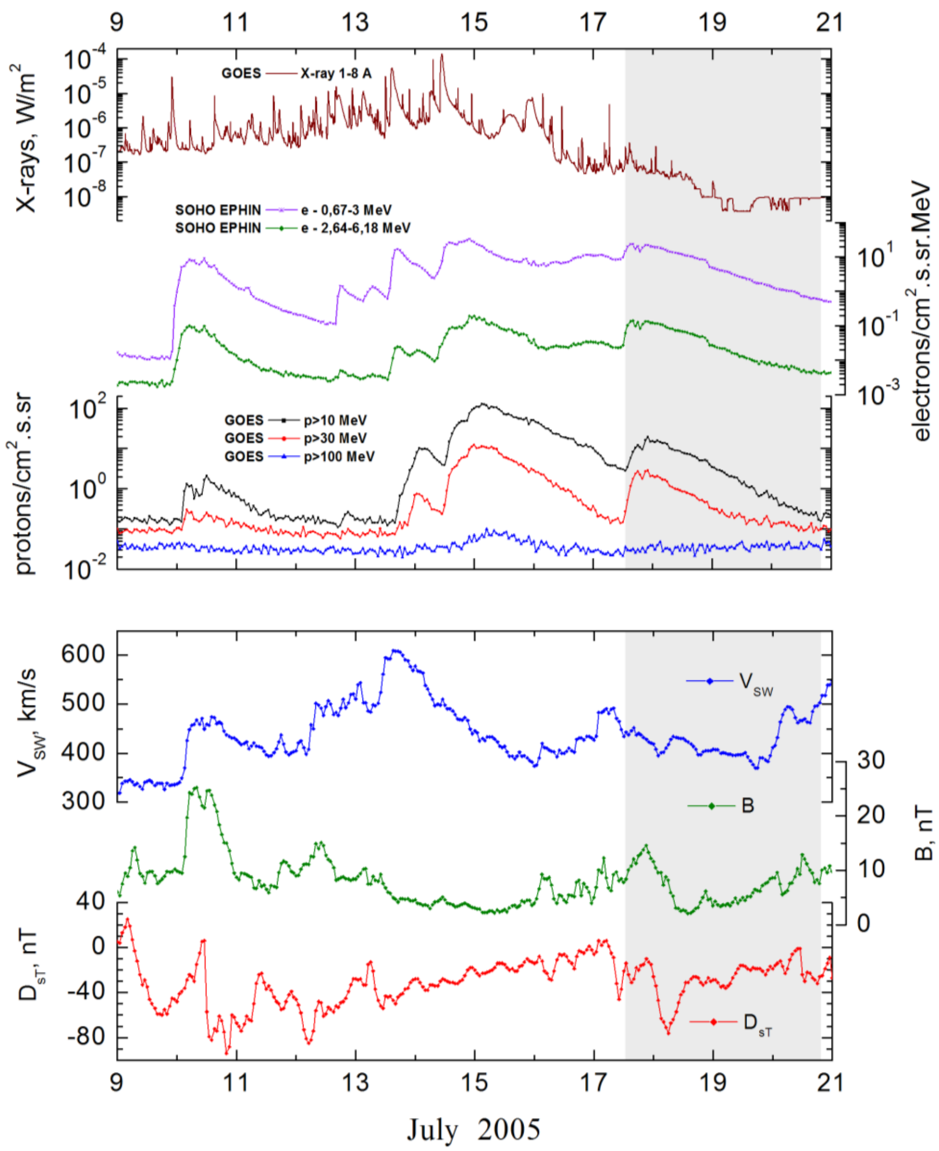


Event 2005.07.17 – (2005-198) **№ 466**

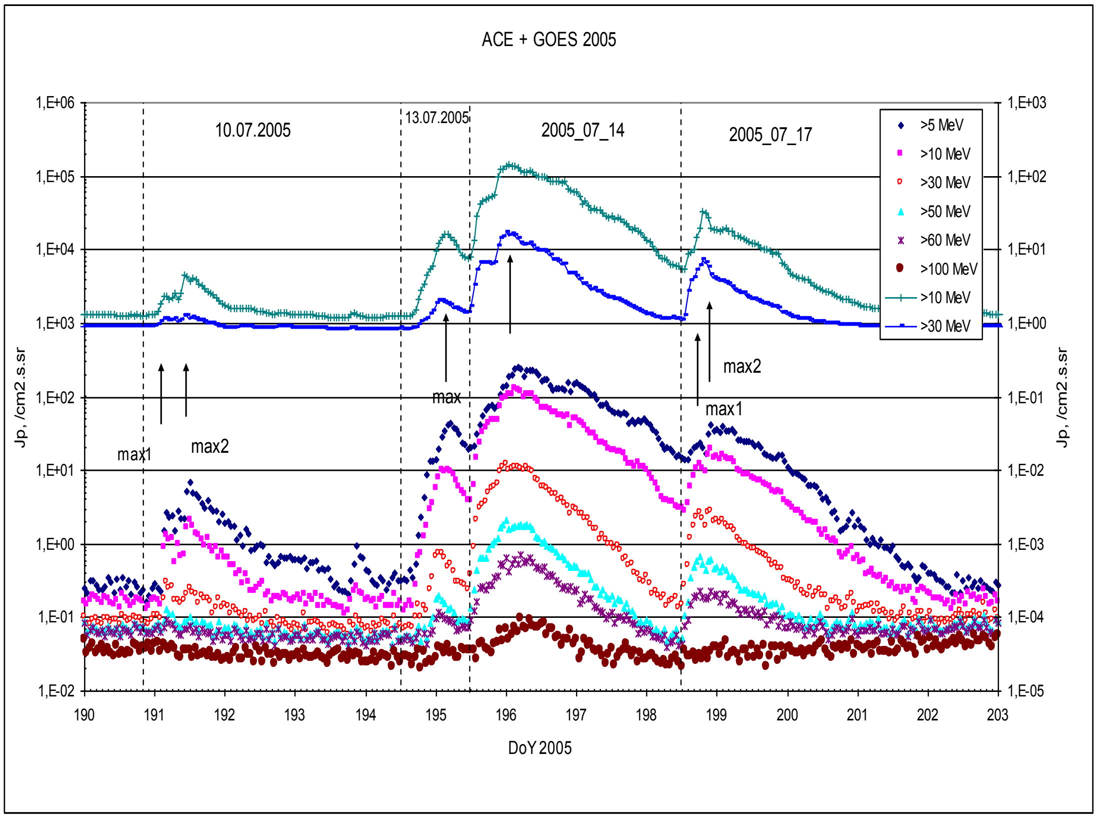
Particle event: To(Ep>10MeV) – 17d14^h
Tmax$_1$(Ep>10MeV) – 17d18^h, Jmax$_1$(Ep>10MeV) – 12 /cm^2.s.sr
Tmax$_2$(Ep>10MeV) – 17d22^h, Jmax$_2$(Ep>10MeV) – 19 /cm^2.s.sr
Duration of the event – 3 days
Quasimaximal energy of protons in the event – Eqm$_1$ = 85 MeV
– Eqm$_2$ = 85 MeV

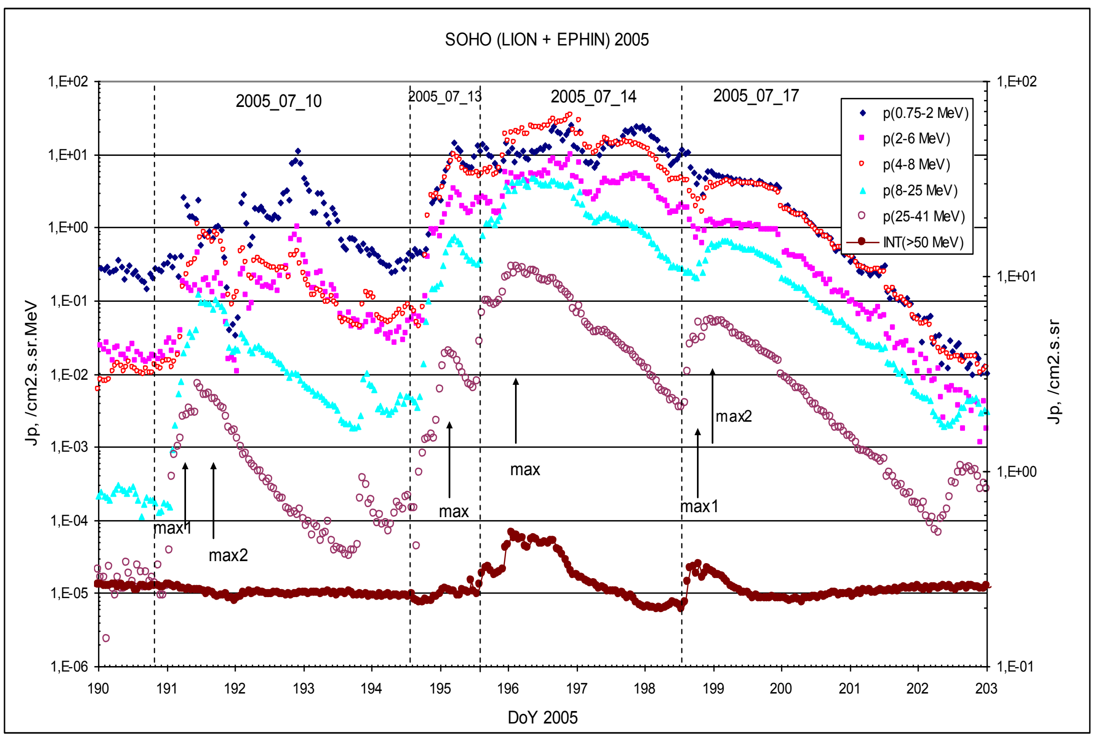
Sources: ⊡ solar flare 17d10^{h}25^m, B1.1/…, N13W9, AR10786 - 3d behind W limb;
Main X-ray burst 1-8 Å: onset – 17d10^{h}25^m, max – 17d10^{h}32^m, Φ = 0.00013 J/m^2
CME: 17d11^{h}30^m, V = 1527 km/s, Δφ = 360^o, dA=316°;

Particle fluxes and associated phenomena



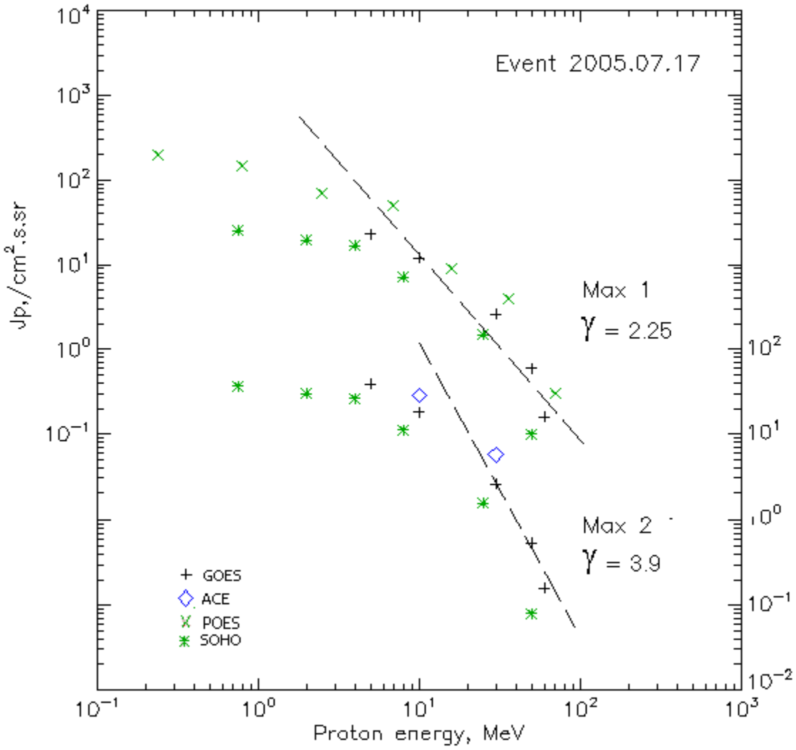
Time profiles of the proton fluxes for the event of 2005 July 17





Arrows on the profiles of the events indicate the time of the proton flux maxima, taken to build the proton spectra (see below)

Integral time-of-maximum proton spectrum



Integral fluxes of protons for the event of 2005 July 17

S/c, instruments	Ep, MeV	To	Tmax	Jmax, $(cm^2.s.sr)^{-1}$	Dura-tion	Comments
GOES-10						
EPS	>5	14^h	$18^h/22^h$	23/41	3d	
EPS	>10	14^h	$18^h/22^h$	12/19	3d	
EPS	>30	13^h	$18^h/22^h$	2.6/2.7	3d	
EPS	>50	13^h	$18^h/22^h$	0.6/0.54	2d	
EPS	>60	13^h	$18^h/22^h$	0.16/0.16	2d	
EPS	>100	-	-	-	-	
POES-16						
MEPED	>0.24	-	18^h/-	230/ -	3d	
MEPED	>0.8	-	18^h/-	150/ -	3d	
MEPED	>2.5	-	18^h/-	70/ -	3d	
MEPED	>6.9	-	18^h/-	50/ -	3d	
MEPED	>16	-	18^h/-	9/ -	3d	
MEPED	>36	-	18^h/-	4/ -	2d	
MEPED	>70	-	18^h/-	0.3/ -	2d	
MEPED	>140	-	-	-	-	
ACE						
SIS	>10	14^h	- /21^h	- /30	2.5d	
SIS	>30	13^h	- /20^h	- /6	2d	
SOHO						
EPHIN (INT)	>50	15^h	$19^h/22^h$	0.1/0.08	1d	

Differential fluxes of protons for the event of 2005 July 17

S/c, instruments	ΔE, MeV	To	Tmax	Jmax, $(cm^2.s.sr.MeV)^{-1}$	Dura-tion	Comments
SOHO						
LION	0.75-2	12^h	$19^h/23^h$	4.9/5.85	4d	
LION	2-6	12^h	$19^h/23^h$	0.9/1.3	4d	
EPHIN	4-8	12^h	$19^h/23^h$	2.4/4	3d	
EPHIN	8-25	15^h	$19^h/23^h$	0.33/0.6	3d	
EPHIN	25-41	15^h	$19^h/23^h$	0.05/0.054	3d	
EPHIN	41-53	- “ -	- “ -	- “ -	- “ -	

Electromagnetic and other phenomena that are sources and/or accompanying for the event of 2005 July 17

2005 July 17 ⊙ AR10786 To event 466

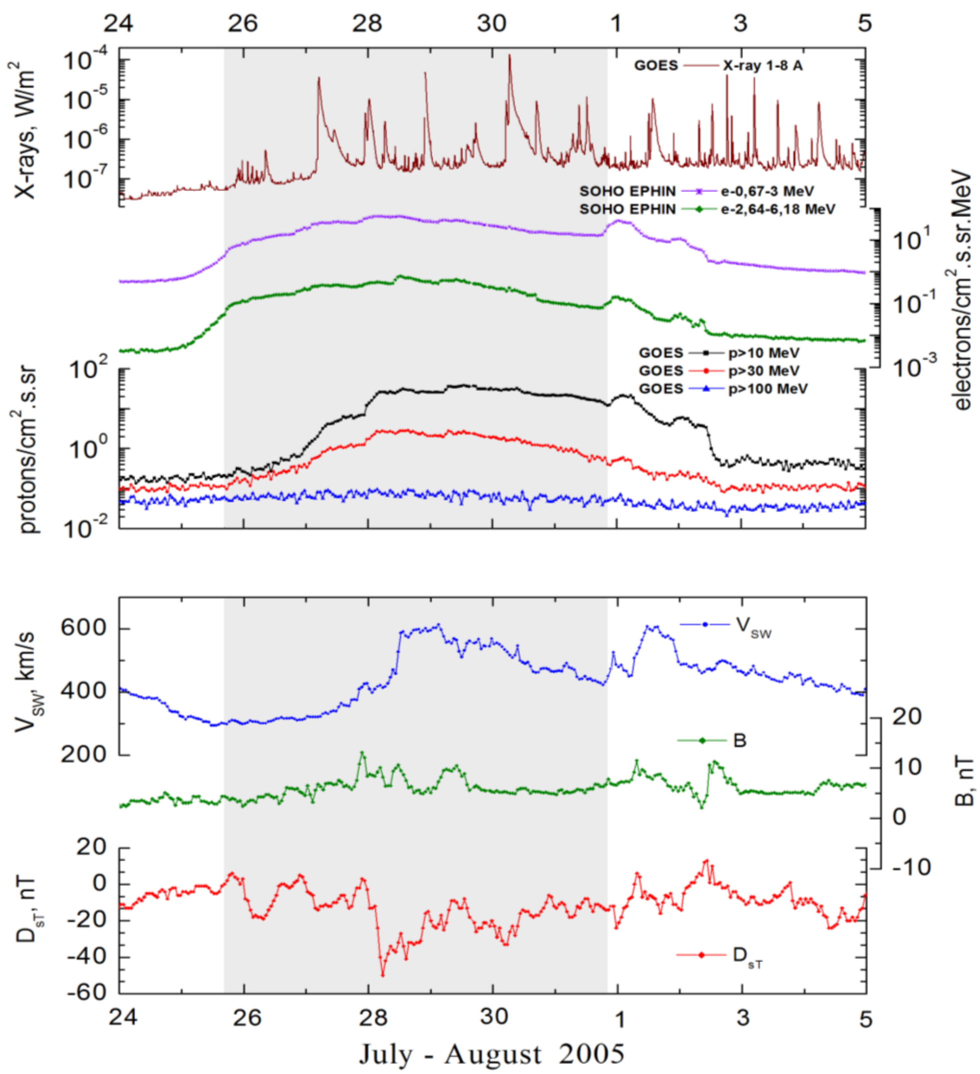
Hα	6563 Å	No Flare			n13w90		
1 – 12	keV	1025	1032	1045		B1.1	1.3E-4
6-12	keV	102652	102758	103008		23160	RHESSI
CME	WL	1130	1527 km/s	59.2 km/s^2	360º	316º	

Event 2005.07.25 – (2005-206) **№ 467**

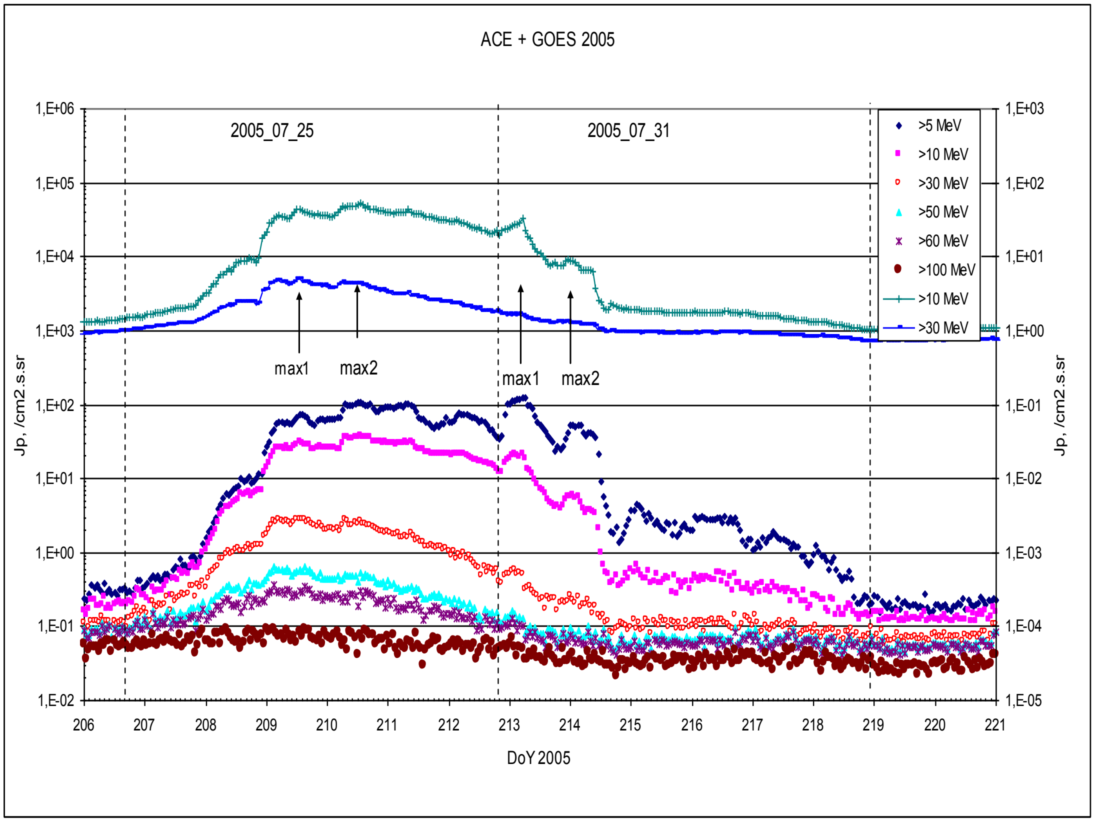
Particle event: To(Ep>10MeV) – 25d21^h
$Tmax_1$(Ep>10MeV) – 28d14^h, $Jmax_1$(Ep>10MeV) – 30 /cm^2.s.sr
$Tmax_2$(Ep>10MeV) – 29d14^h, $Jmax_2$(Ep>10MeV) – 36 /cm^2.s.sr
Duration of the event – 6 days
Quasimaximal energy of protons in the event – Eqm_1 = 85 MeV
– Eqm_2 = 85 MeV

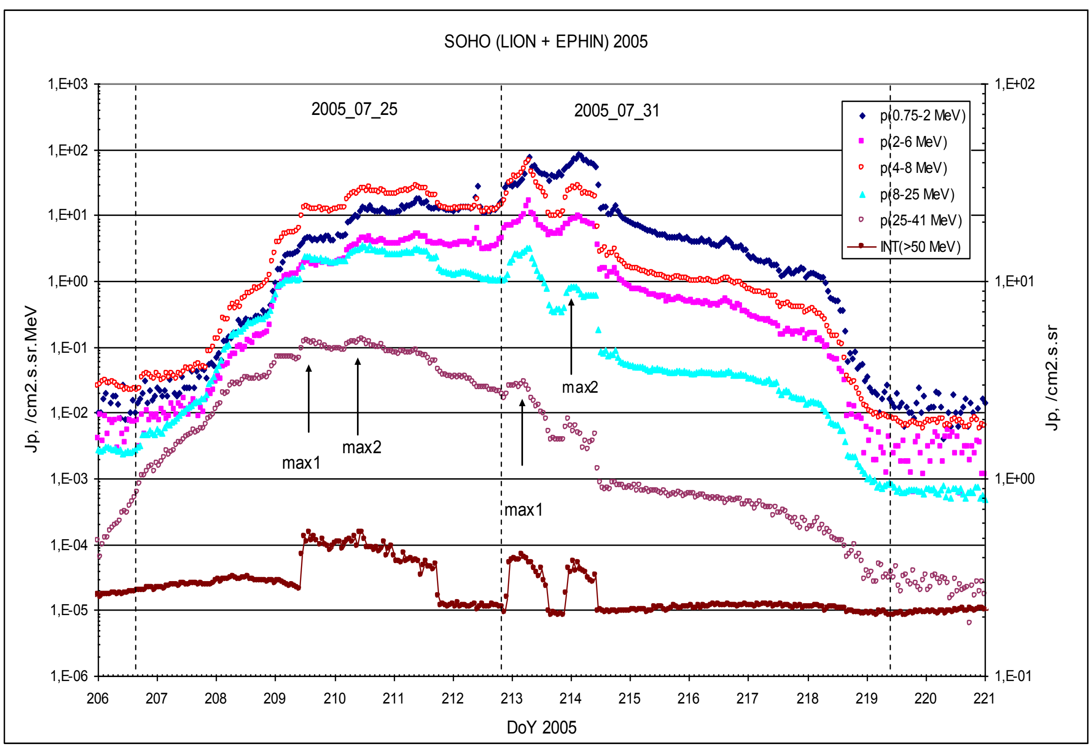
Sun source: □ solar flare 27d04^h 33^m, M3.7/..., n10w90* AR10792, 1d behind E-limb;
Ø solar flare 28d21^h 39^m, M4.8/..., N09E82 AR10792
Main X-ray burst 1-8 Å: onset – 26d04^{h}33^m, max – 26d05^{h}02^m, Φ = 0.0002 J/m^2
CME: 26d04^{h}54^m, V=1458 km/s, Δφ = 360^o, dA = 90˚.
▲SC 27d19^{h}39^m;
* − probable localization of the flare even

Particle fluxes and associated phenomena



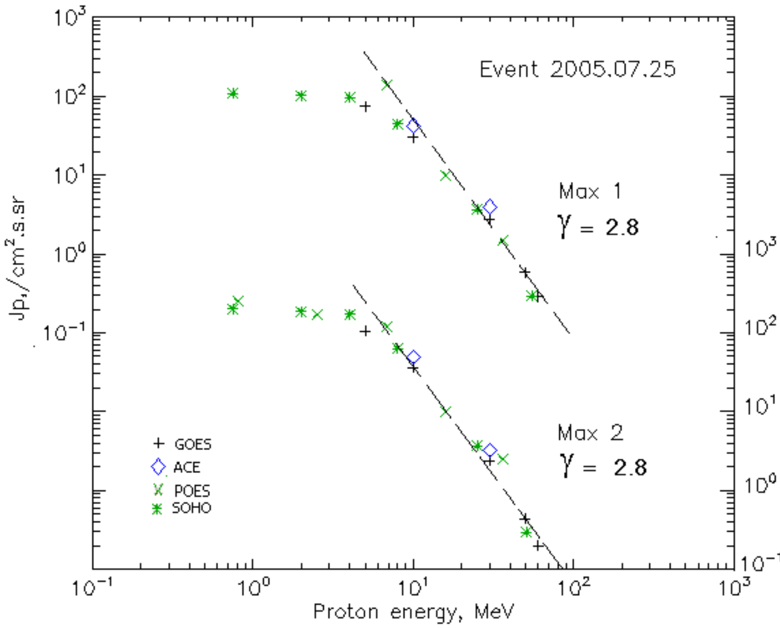
Time profiles of the proton fluxes for the event of 2005 July 25





Arrows on the profiles of the events indicate the time of the proton flux maxima, taken to build the proton spectra (see below)

Integral time-of-maximum proton spectrum



Integral fluxes of protons for the event of 2005 July 25

S/c, instruments	Ep, MeV	To	Tmax	Jmax, $(cm^2.s.sr)^{-1}$	Duration	Comments
GOES 10						
EPS	>5	21^h	$28d14^h/29d14^h$	73.5/104	6d	
EPS	>10	21^h	$28d14^h/29d14^h$	30/36	6d	
EPS	>30	21^h	$28d14^h/29d14^h$	2.7/2.4	6d	
EPS	>50	21^h	$28d14^h/29d13^h$	0.5/0.44	6d	
EPS	>60	21^h	$28d15^h/29d13^h$	0.25/0.2	6d	
EPS	>100	-	-	-	-	
POES 16						
MEPED	>0.24	-	-	-	-	
MEPED	>0.8	-	- /$29d12^h$	- /250	6d	
MEPED	>2.5	-	- /$29d12^h$	- /170	6d	
MEPED	>6.9	-	$28d16^h/29d12^h$	140/120	6d	
MEPED	>16	-	$28d16^h/29d12^h$	10/10	6d	
MEPED	>36	-	$28d16^h/29d12^h$	1.5/2.5	5d	
MEPED	>70	-	-	-	-	
MEPED	>140	-	-	-	-	
ACE						
SIS	>10	21^h	$28d13^h/29d14^h$	42.3/48.4	6d	
SIS	>30	21^h	$28d13^h/29d06^h$	4/3.2	6d	
SOHO						
EPHIN (INT)	>50	$24d00^h$	$28d14^h/29d10^h$	0.33/0.32	3d	

Differential fluxes of protons for the event of 2005 July 25

S/c, instruments	ΔE, MeV	To	Tmax	Jmax, $(cm^2.s.sr.MeV)^{-1}$	Dura-tion	Comments
SOHO						
LION	0.75-2	21^h	$28d14^h/29d14^h$	4.8/14.5	6d	
LION	2-6	21^h	$28d14^h/29d14^h$	2/4.6	6d	
EPHIN	4-8	21^h	$28d14^h/29d14^h$	13.1/26.7	6d	
EPHIN	8-25	21^h	$28d14^h/29d13^h$	2.4/3.45	6d	
EPHIN	25-41	$24d00^h$	$28d14^h/29d13^h$	0.12/0.12	6d	
EPHIN	41-53	- " -	- " -	- " -	- " -	

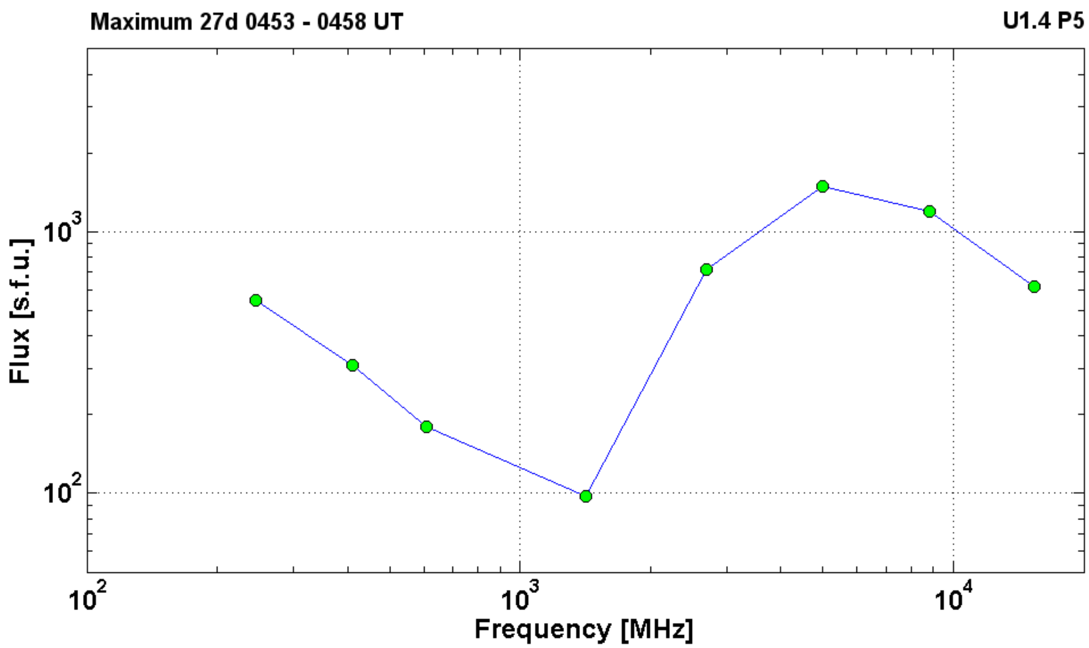
Electromagnetic and other phenomena that are sources and/or accompanying for the event of 2005 July 25

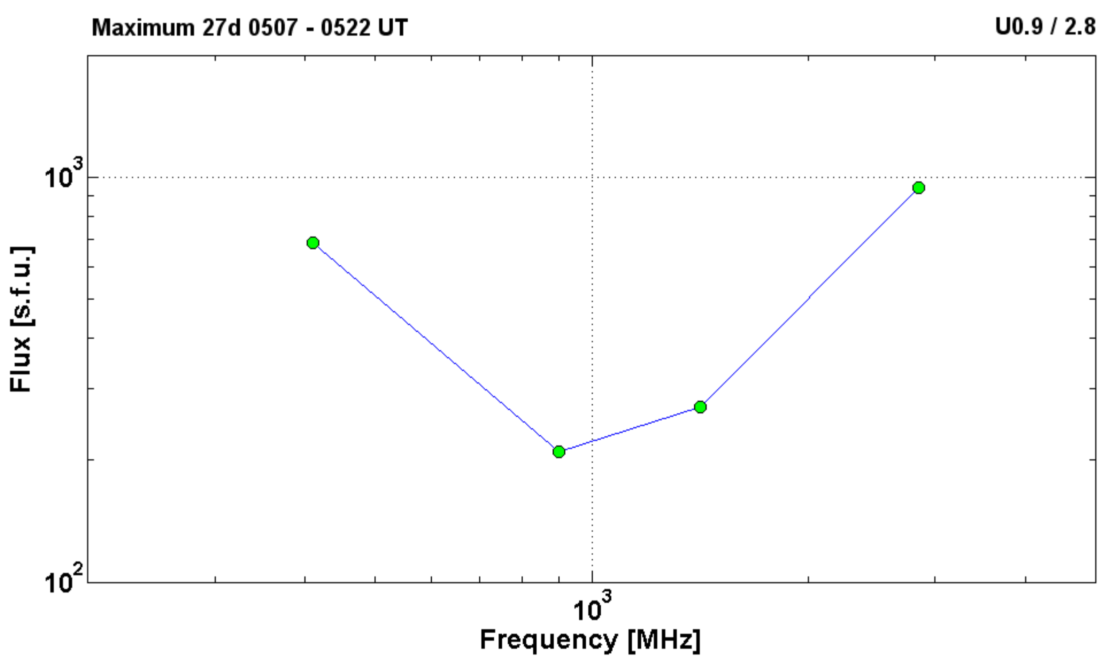
2005 July 27 Ø AR10792 To event 467

Hα	6563 Å	No Flare			n10e90*		
EPL	6563 Å	0439		0511	N11E90		
1 – 12	keV	0433	0502	0530		M3.7	7.9E-2
50-100	keV	04:49:56	04:57:34	05:42:12		200402302	RHESSI
12-25	keV	14:44:04	15:14:22	15:17:40		490896	RHESSI
15.4	GHz	0450.0	0457.0	0530.0		2.79	
8.8	GHz	0447.0	0456.0	0535.0		3.08	
5	GHz	0447.0	0457.0	0457.0	U1.4 P5	3.18	
2.7	GHz	0445.0	0457.0	0457.0		2.86	
1.4	GHz	0445.0	0457.0	0457.0		1.99	
610	MHz	0444.0	0454.0	0512.0		2.26	
410	MHz	0450.0	0453.0	0506.0		2.49	
245	MHz	0445.0	0458.0	0503.0		2.74	
DS II	20-130	0443		0503	S,H	3	
DS IV	25-180	0446		0524		1	
DS IV	200-4000	0452		0523	P	3	
DS III	20-180	0445		0535	S,C	1	
DS UNCLF	40-60	0454		0458		2	

2.8	GHz	0430.0	0507.3	0610.0	U0.9 / 2.8	2.97	
1.4	GHz	0444.0	0507.0	0531.0		2.43	
900	MHz	0439.3	0508.5			2.32	
410	MHz	0444.0	0522.0	0535.0		2.84	
DS DCIM	800-2000	0510		0542	G	2	
CME	WL	0454	1787km/s	-75.4 km/s	360˚	084˚	

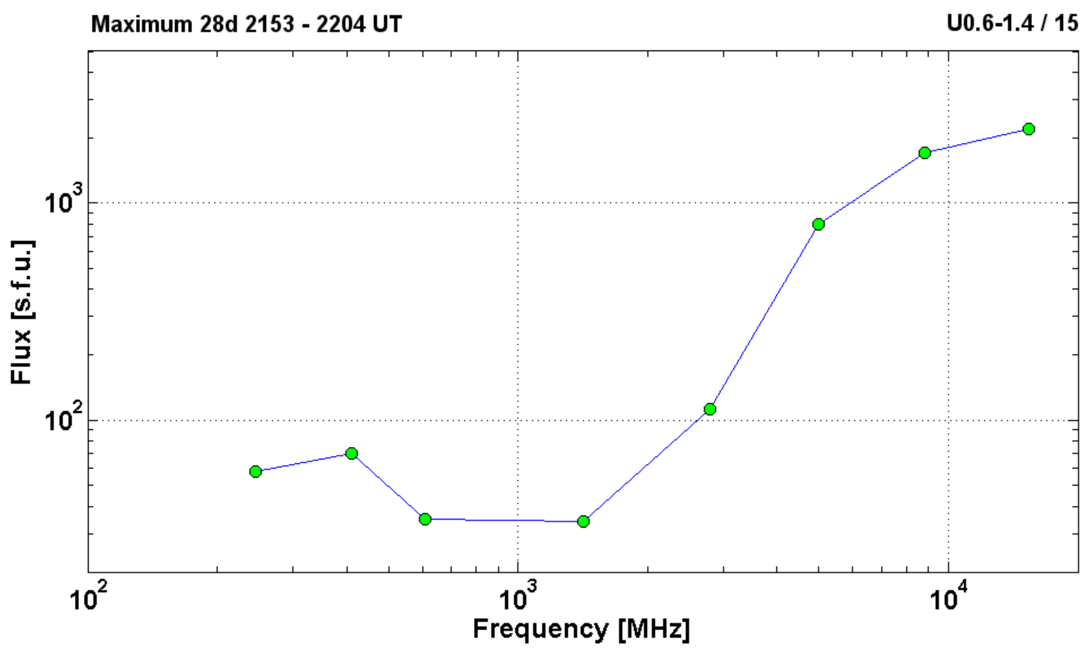
* − probable localization of the flare event





2005 July 28 Ø AR10792 To event 467

Hα	6563 Å	2151	2200	2221	N08E84	SF	FH
1 – 12	keV	2139	2208	2224		M4.8	8.1E-2
12-25	keV	221244	221342	231452		2447943	RHESSI
15.4	GHz	2142.0	2154.0	2210.0	U0.6-1.4 / 15	3.34	
8.8	GHz	2142.0	2153.0	2220.0		3.23	
5	GHz	2142.0	2154.0	2220.0		2.90	
2.8	GHz	2147.0	2154.0	2209.0		2.05	
1.4	GHz	2152.0	2204.0	2204.0		1.53	
610	MHz	2201.0	2201.0	~2201.0		1.54	
410	MHz	2201.0	2201.0	~2201.0		1.85	
245	MHz	2158.0	2204.0	2205.0		1.76	
DS II	110-170	2153		2157	UE	1	
DS IV	30-220	2158		2214		1	
DS III	20-180	2157		2221	S,C	1	
DS III	27-90	2206		2206	B	2	
DS III	20-90	2218		2218	G	3	
CME	WL	2206	1478 km/s				

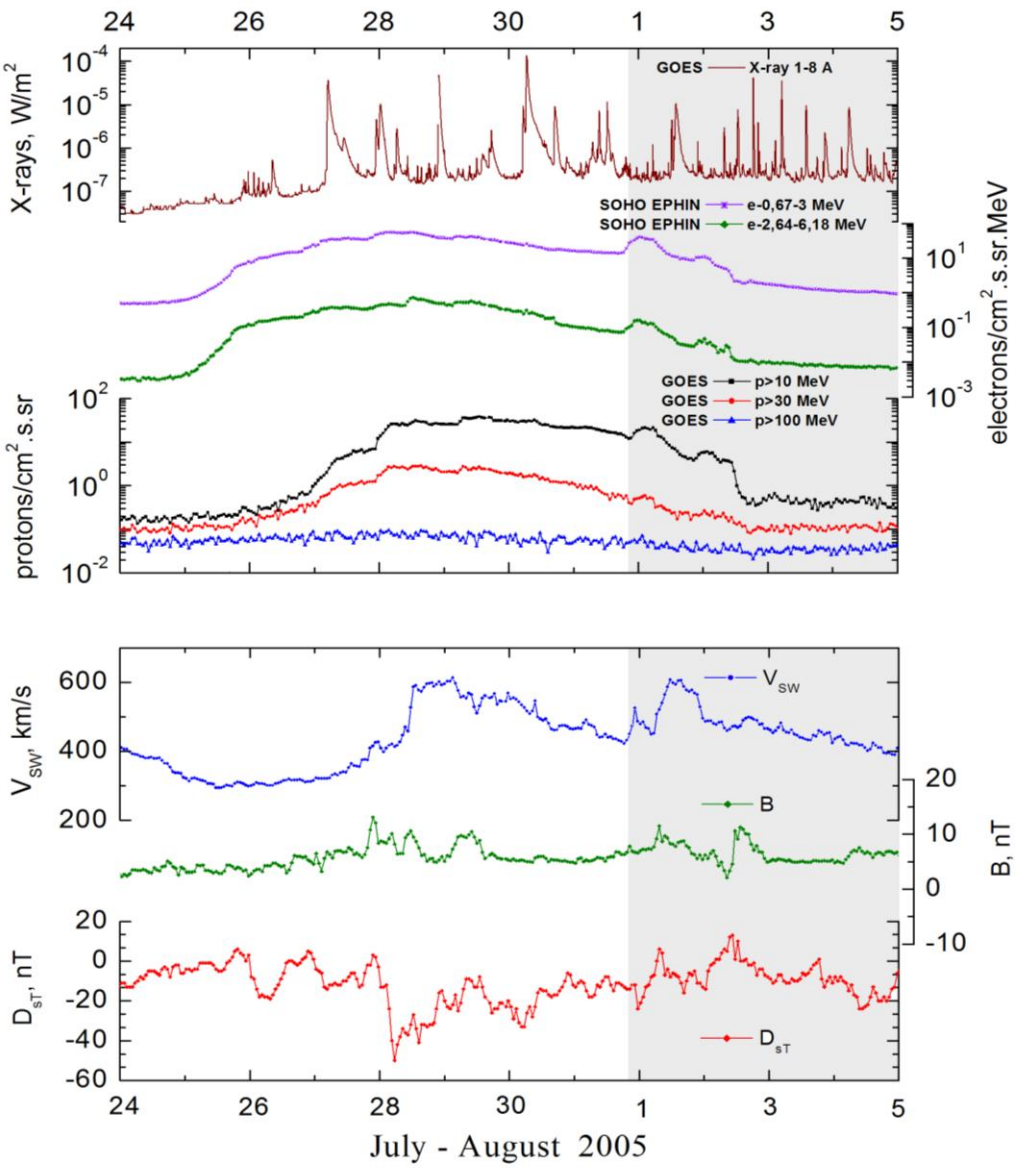


Event 2005.07.31 – (2005-212) **№ 468**

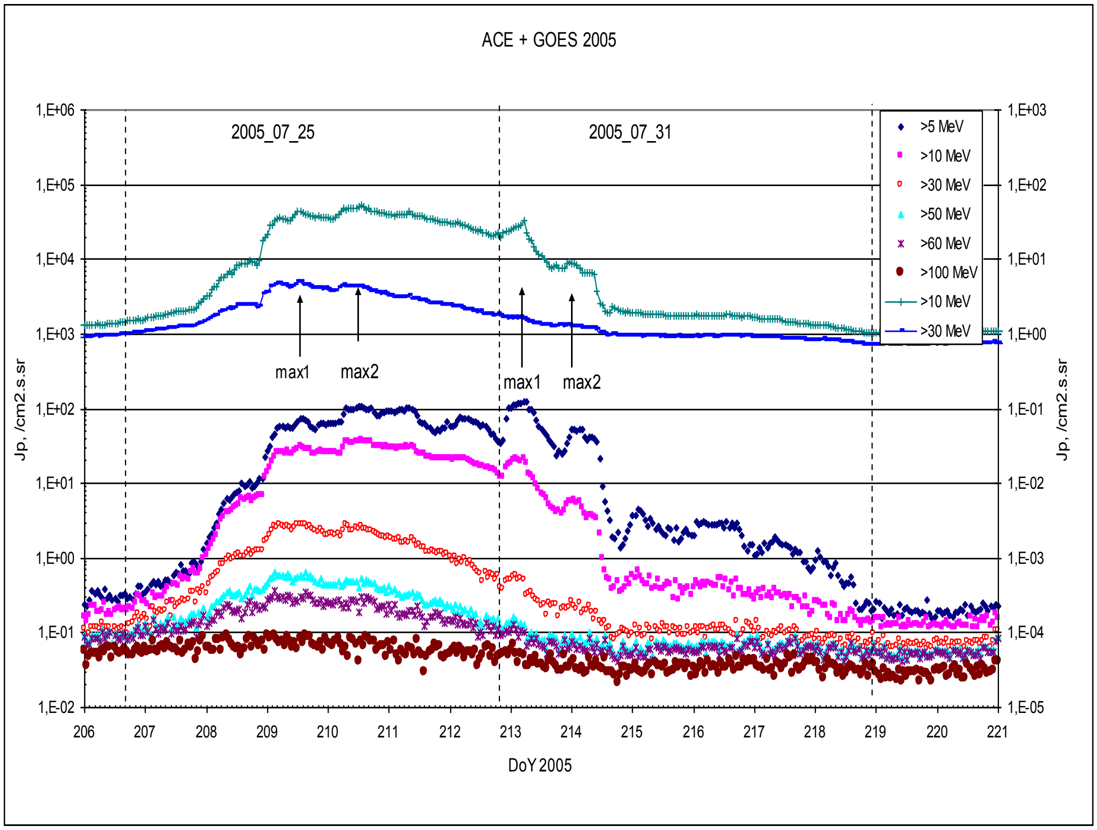
Particle event: To(Ep>10MeV) – 31d22^h
Tmax$_1$(Ep>10MeV) – 01d05^h, Jmax$_1$(Ep>10MeV) – 21 /cm^2.s.sr
Tmax$_2$(Ep>10MeV) – 02d01^h, Jmax$_2$(Ep>10MeV) – 6 /cm^2.s.sr
Duration of the event – 5 days
Quasimaximal energy of protons in the event – Eqm$_1$ = 65 MeV
– Eqm$_2$ = 65 MeV

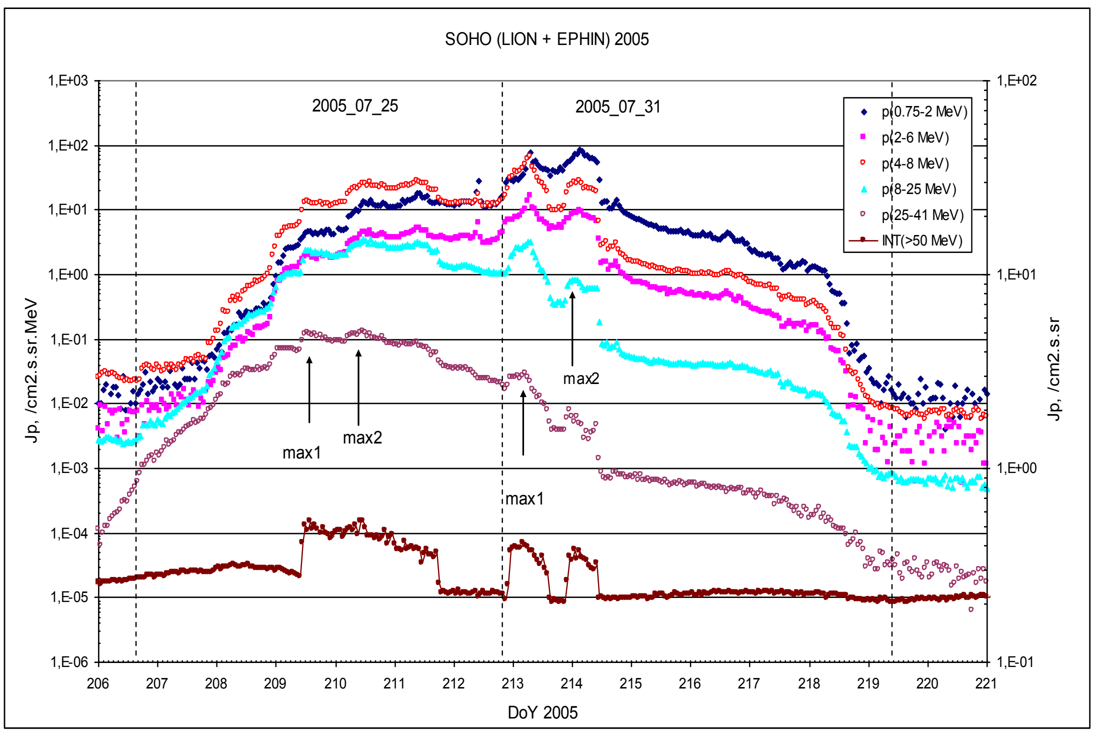
Sources: ⊙ solar flare 30d06^{h}17^m, X1.3/2B, N12E61, AR10792
Ø solar flare 01d13^{h}00^m, M1.0/1F, N14E29, AR10792
Main X-ray burst 1-8 Å: onset – 30d16^{h}17^m, max – 30d06^{h}35^m, Φ = 0.23 J/m^2
CME: 30d06^{h}50^m, V = 1968 km/s, $\Delta\varphi$ = 360^o, dA = 050˚.

Particle fluxes and associated phenomena



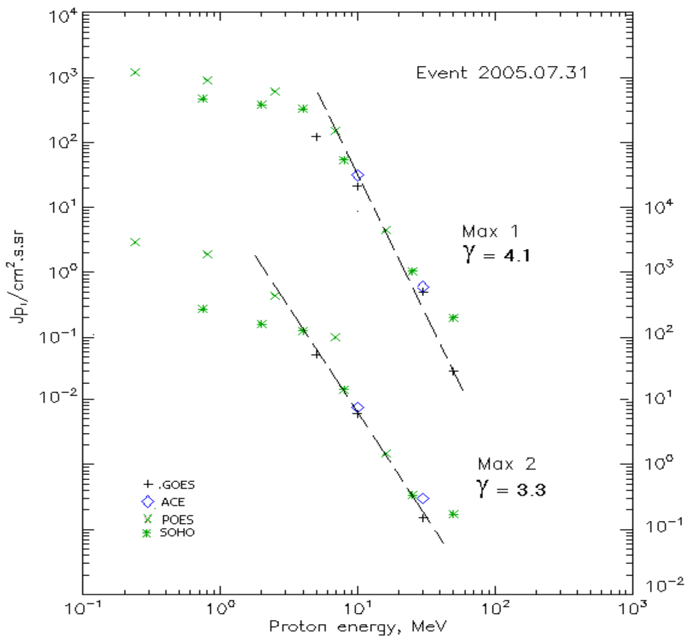
Time profiles of the proton fluxes for the event of 2005 July 31





Arrows on the profiles of the events indicate the time of the proton flux maxima, taken to build the proton spectra (see below)

Integral time-of-maximum proton spectrum



Integral fluxes of protons for the event of 2005 July 31

S/c, instruments	Ep, MeV	To	Tmax	Jmax, $(cm^2.s.sr)^{-1}$	Duration	Comments
GOES-10						
EPS	>5	22^h	$01d06^h/02d02^h$	122/49.3	6d	
EPS	>10	22^h	$01d05^h/02d01^h$	21/6	5d	
EPS	>30	22^h	$01d02^h/02d00^h$	0.5/0.15	2d	
EPS	>50	22^h	$01d02^h$/ -	0.03/ -	1d	
EPS	>60	22^h	-	-		
EPS	>100	-	-	-	-	
POES-16						
MEPED	>0.24	-	$01d06^h/02d04^h$	1230/2620	6d	
MEPED	>0.8	-	$01d06^h/02d04^h$	910/1710	6d	
MEPED	>2.5	-	$01d06^h/02d02^h$	640/390	6d	
MEPED	>6.9	-	$01d05^h/02d02^h$	150/90	5d	
MEPED	>16	-	$01d05^h/02d02^h$	4.5/1.5	5d	
MEPED	>36	-	-	-	-	
MEPED	>70	-	-	-	-	
MEPED	>140	-	-	-	-	
ACE						
SIS	>10	22^h	$01d05^h/02d02^h$	31.3/7.6	6d	
SIS	>30	-	$01d05^h/02d01^h$	0.6/0.3	2d	
SOHO						
EPHIN (INT)	>50	$24d00^h$	$01d05^h/02d03^h$	0.2/0.17	1.5d	

Differential fluxes of protons for the event of 2005 July 31

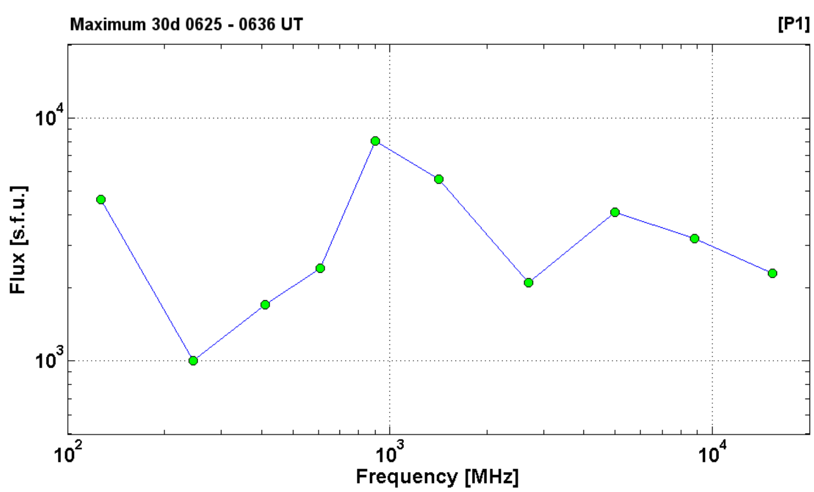
S/c, instruments	ΔE, MeV	To	Tmax	Jmax, $(cm^2.s.sr.MeV)^{-1}$	Duration	Comments
SOHO						

LION	0.75-2	22^h	$01d07^h/02d04^h$	78/80.5	6d	
LION	2-6	22^h	$01d07^h/02d03^h$	16.2/9.7	6d	
EPHIN	4-8	21^h	$01d07^h/02d04^h$	68.3/25.1	6d	
EPHIN	8-25	21^h	$01d07^h/02d02^h$	3.1/0.82	6d	
EPHIN	25-41	$24d00^h$	$01d05^h/02d02^h$	0.03/0.006	6d	
EPHIN	41-53	- " -	- " -	- " -	- " -	

Electromagnetic and other phenomena that are sources and/or accompanying for the event of 2005 July 31

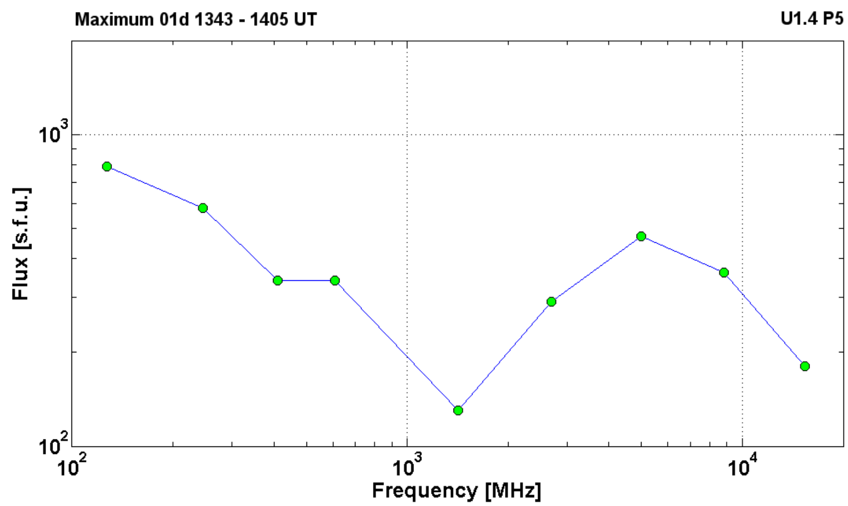
2005 July 30 • AR10792 To event 468

Hα	6563 Å	0608	0625	0823	N11E59	2N	UZ
1 – 12	keV	0617	0635	0701		X1.3	2.3E-1
100-300	keV	062740	063042	071348		82189624	RHESSI
6-12	keV	081736	081902	081908		48672	RHESSI
12-25	keV	091808	082118	082312		131232	RHESSI
15.4	GHz	0621.0	0625.0	0704.0		3.36	
8.8	GHz	0620.0	0632.0	0715.0		3.51	
5	GHz	0619.0	0632.0	0754.0		3.61	
2.7	GHz	0619.0	0636.0	0754.0		3.32	
1.4	GHz	0621.0	0625.0	0716.0		3.75	
900	MHz	0543.5	0626.1	0848.0	[P1]	3.91	
610	MHz	0621.0	0626.0	0720.0		3.38	
410	MHz	0621.0	0626.0	0719.0		3.23	
245	MHz	0621.0	0632.0	0641.0		3.00	
127	MHz	<0630.0	0633.4	>0642.0		3.66	
DS II	20-180	0626		0640	S,H	3	
DS IV	200-4000	0621		0847	P,S	3	
DS IV	25-180	0634		0734		2	
DS III	18-180	0626		0634	GG	3	
DS DCIM	2000-4500	0619		0803	GG	3	
CME	WL	0650	1968 km/s	-102.6 km/s^2	360°	050°	



2005 August 01 Ø AR10792 To event 468

Hα	6563 Å	1315	1340	1436	N14E29	1F	EF
1 – 12	keV	1300	1351	1429		M1.0	2.9E-2
6-12	keV	130244	130250	130820		3064	RHESSI
12-25	keV	130820	131718	132356		77104	RHESSI
25-50	keV	132356	132950	133448		263876	RHESSI
15.4	GHz	1329.0	1343.0	1416.0		2.26	
8.8	GHz	1328.0	1343.0	1411.0		2.56	
5	GHz	1328.0	1343.0	1416.0	U1.4 P5	2.67	
2.7	GHz	1329.0	1347.0	1416.0		2.46	
1.4	GHz	1341.0	1347.0	0000.0		2.11	
610	MHz	1342.0	1343.0	1349.0		2.53	
410	MHz	1341.0	1350.0	1418.0		2.53	
245	MHz	1345.0	1349.0	1418.0		2.76	
127	MHz	1355.0	1405.6	1425.0		2.90	
DS II	200-500	1349		1359		3	
DS IV	25-180	1349		1743		1	
DS DCIM	200-1600	1409		1419	P	3	
CME	WL	1430	0984 km/s	17.9 km/s^2	093°	068°	

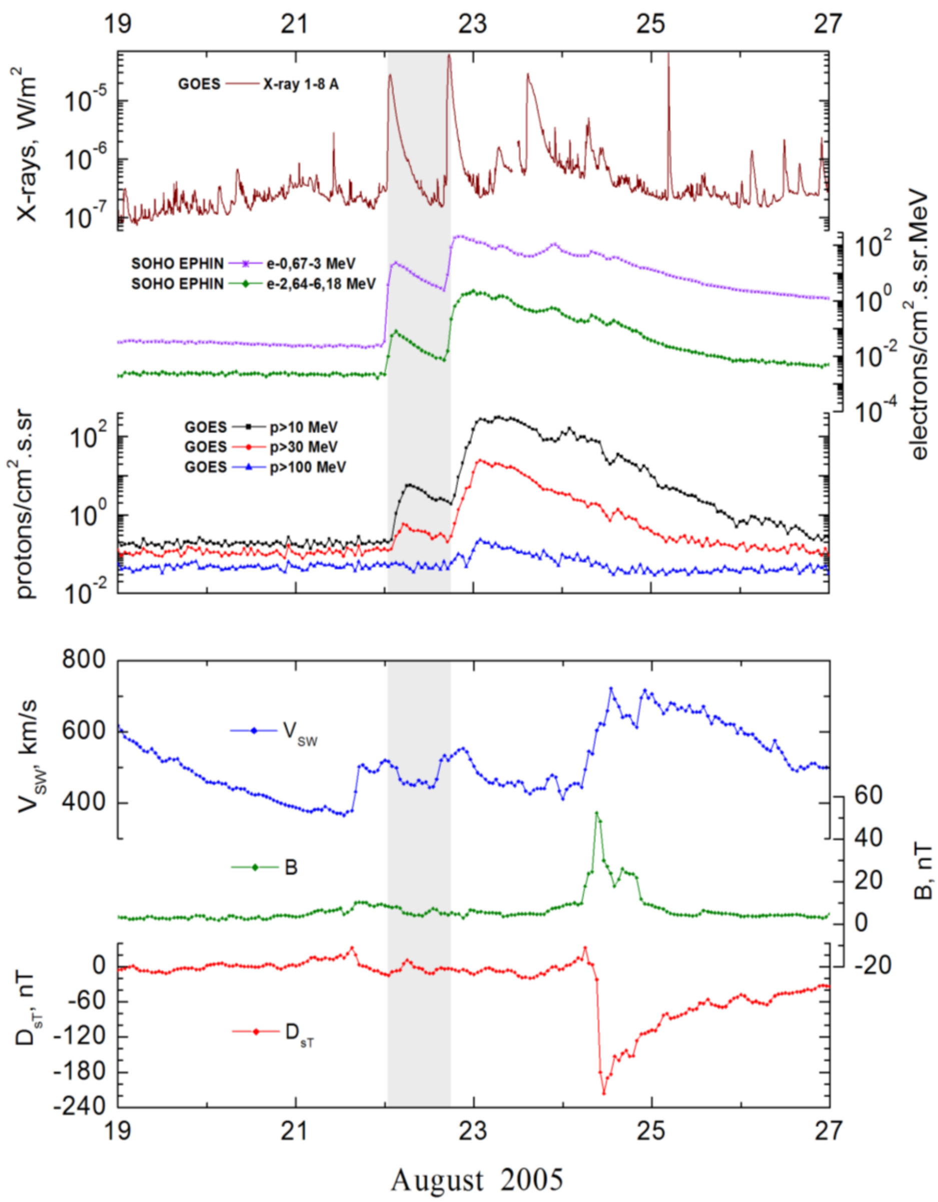


Event 2005.08.22 – (2005-234) **№ 469**

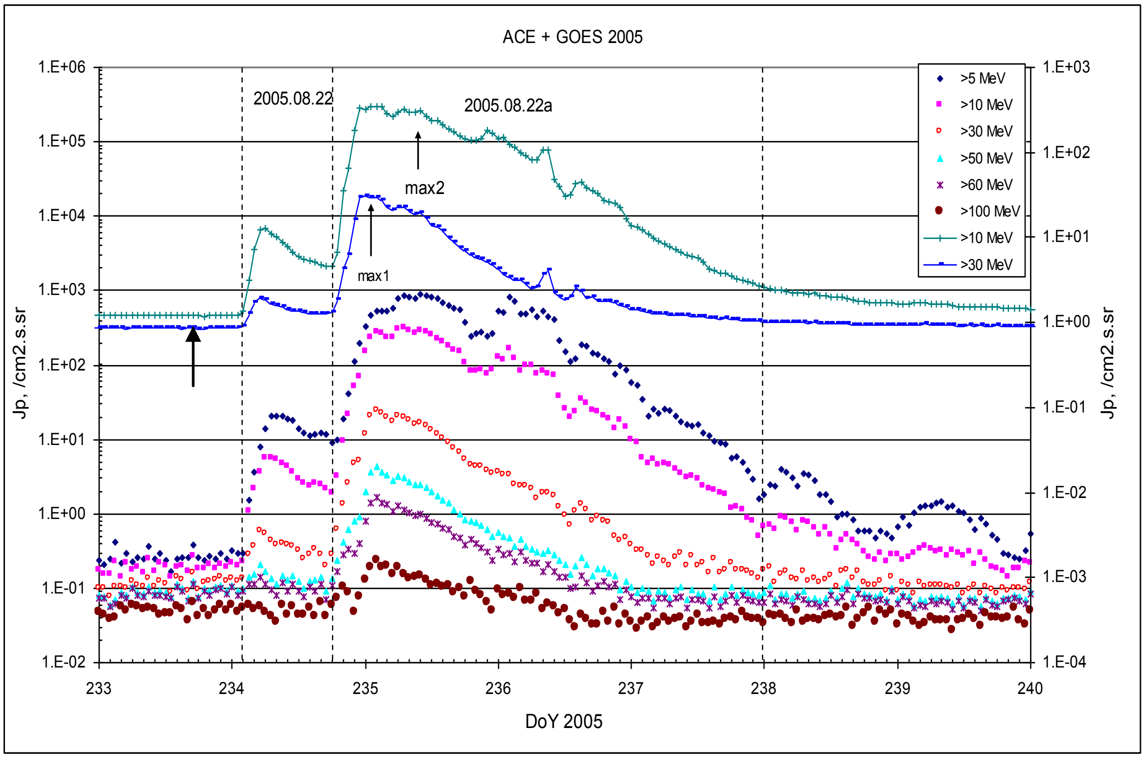
Particle event: To(Ep>10MeV) – 22d03^h
Tmax(Ep>10MeV) – 22d07^h, Jmax (Ep>10MeV) – 5.4 /cm^2.s.sr
Duration of the event – 0.7 day
Quasimaximal energy of protons in the event – Eqm = 80 MeV

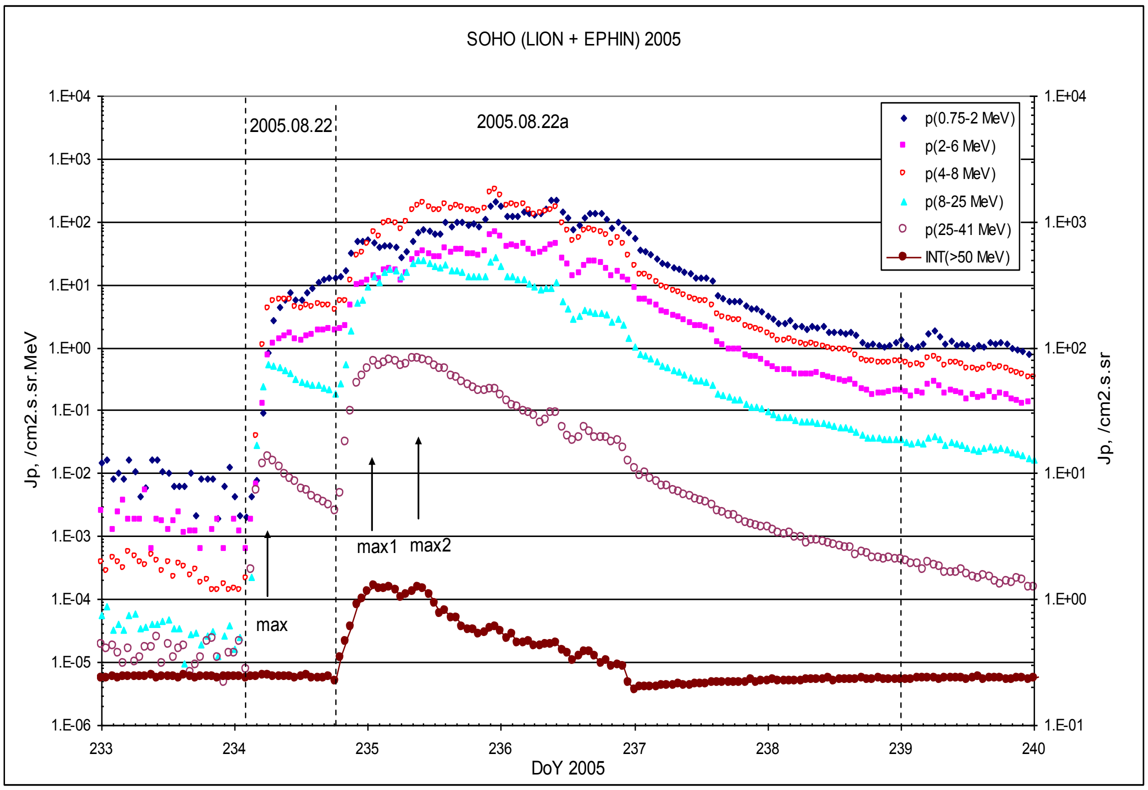
Sources: ● solar flare 22d00^{h}44^m, M2.6/1F, S09W48, AR10798
Main X-ray burst 1-8 Å: onset – 22d00^{h}44^m, max – 22d01^{h}33^m, Φ = 0.096 J/m^2
CME: 22d01^{h}32^m, V=1194 km/s, Δφ = 360^o, dA= 220^o

Particle fluxes and associated phenomena



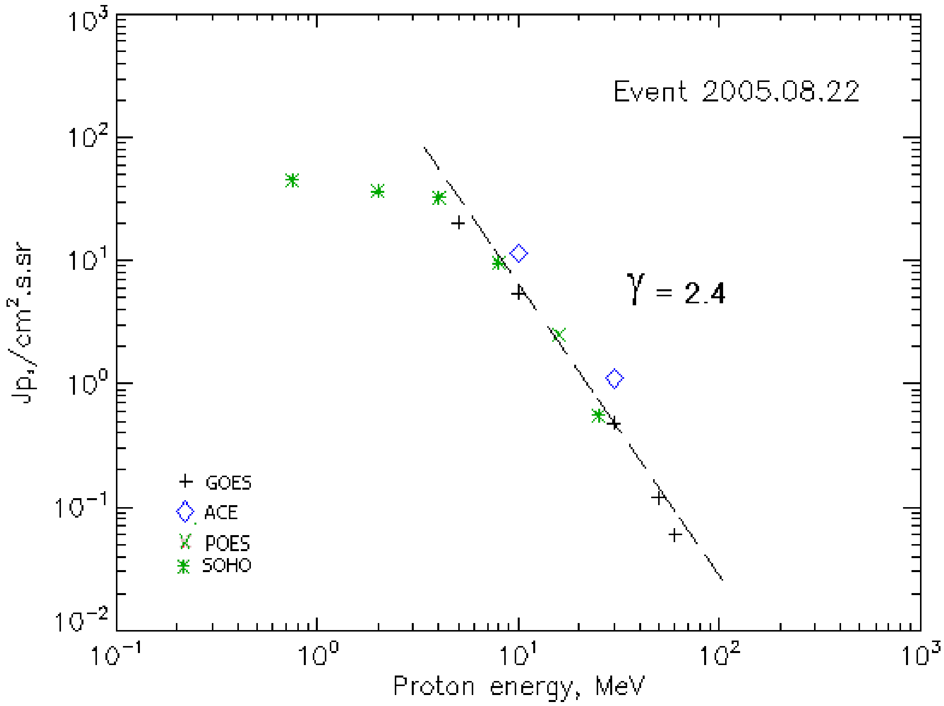
Time profiles of the proton fluxes for the event of 2005 August 22





Arrows on the profiles of the events indicate the time of the proton flux maxima, taken to build the proton spectra (see below)

Integral time-of-maximum proton spectrum



Integral fluxes of protons for the event of 2005 August 22

S/c, instruments	Ep, MeV	To	Tmax	Jmax, $(cm^2.s.sr)^{-1}$	Dura-tion	Comments
GOES-10						
EPS	>5	03^h	08^h	20.1	0.7d	
EPS	>10	03^h	07^h	5.4	0.7d	
EPS	>30	03^h	05^h	0.48	0.7d	
EPS	>50	03^h	05^h	0.12	0.7d	
EPS	>60	03^h	05^h	0.06	0.7d	
EPS	>100	-	-	-	-	
POES-16						
MEPED	>0.24	-	-	-	-	
MEPED	>0.8	-	-	-	-	
MEPED	>2.5	-	-	-	-	
MEPED	>6.9	-	-	-	-	
MEPED	>16	-	07^h	2.5	1d	
MEPED	>36	-	-	-	-	
MEPED	>70	-	-	-	-	
MEPED	>140	-	-	-	-	
ACE						
SIS	>10	03^h	06^h	11.4	0.7d	
SIS	>30	03^h	05^h	1.1	0.7d	
SOHO						
EPHIN (INT)	>50	-	-	-	-	

Differential fluxes of protons for the event of 2005 August 22

S/c, instruments	ΔE, MeV	To	Tmax	Jmax, $(cm^2.s.sr.MeV)^{-1}$	Dura-tion	Comments
SOHO						
LION	0.75-2	03^h	10^h/	7.4	0.7d	
LION	2-6	03^h	07^h/	1.15	0.7d	
EPHIN	4-8	03^h	09^h	5.8	0.7d	
EPHIN	8-25	03^h	06^h	0.53	0.7d	
EPHIN	25-41	03^h	06^h	0.02	0.7d	

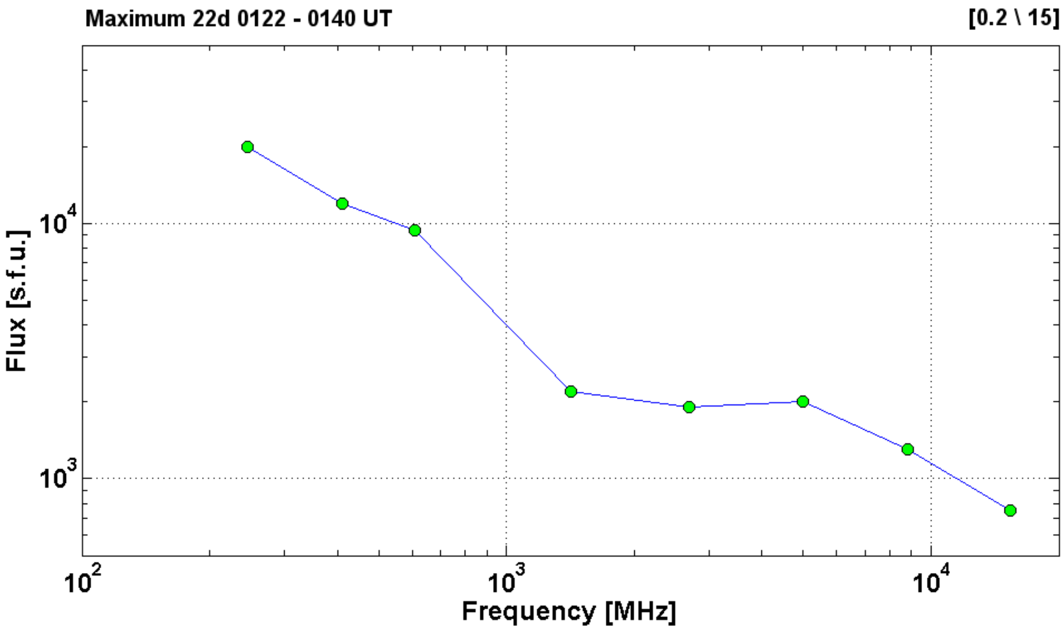
Electromagnetic and other phenomena that are sources and/or accompanying for the event of 2005 August 22

2005 August 22 ● AR10798 To event 469

Hα	6563 Å	0104	0117	0300	S09W48	1F	FH
1 – 12	keV	0044	0133	0218		M2.6	9.6E-3
25-50	keV	010148	012134	020240		31078596	RHESSI
6-12	keV	023752	023846	031408		707931	RHESSI
15.4	GHz	0053.0	0122.0	0000.0		2.88	
8.8	GHz	0054.0	0124.0	0301.0		3.11	
5	GHz	0051.0	0124.0	0301.0		3.30	
2.7	GHz	0051.0	0124.0	0245.0		3.28	
1.4	GHz	0053.0	0137.0	0219.0		3.34	
610	MHz	0050.0	0138.0	0257.0		3.97	
410	MHz	0051.0	0138.0	0000.0		4.08	
245	MHz	0054.0	0140.0	0000.0	[0.2 \ 15]	4.30	
DS II	90-430	0054		0110		1	
DS II	30-60	0102		0108	S,H	3	
DS IV	50-1000	0101		0315		1	
DS IV	25-180	0103		0316	F,S	3	
DS III	20-90	0101		0122	GG	3	
DS III	20-50	0130		0135	G	3	

410	MHz	0051.0	0204.0	0402.0		4.38	
245	MHz	0054.0	0205.0	0000.0		4.89	
CME	WL	0132	1194 km/s	-17.8	360˚	220˚	

/



Event 2005.08.22a – (2005-234a) **№ 470**

Particle event: To(Ep>10MeV) – 22d19^{h}

Tmax$_1$(Ep>10MeV) – 23d02^{h}, Jmax$_1$(Ep>10MeV) – 280 /cm^2.s.sr

Tmax$_2$(Ep>10MeV) – 23d10^{h}, Jmax$_2$(Ep>10MeV) – 290 /cm^2.s.sr

Duration of the event – 3 days

Quasimaximal energy of protons in the event – Eqm$_1$ = 330 MeV

– Eqm$_2$ = 290 MeV

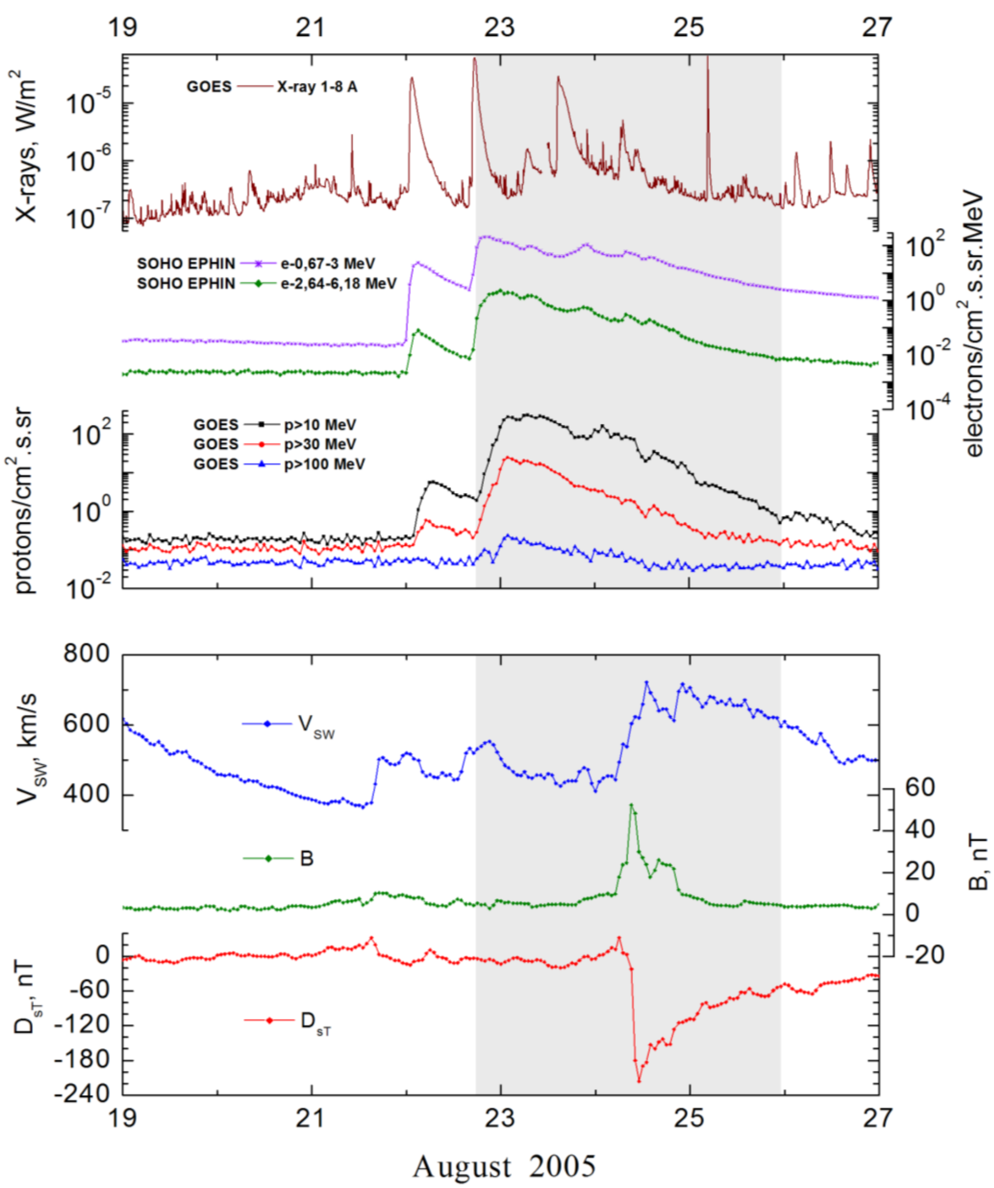
Sources: ● solar flare 22d16^{h}52^{m}, M5.6/1N, S12W60, AR10798

Main X-ray burst 1-8 Å: onset – 22d16^{h}52^{m}, max – 22d17^{h}27^{m}, Φ = 0.17 J/m^2

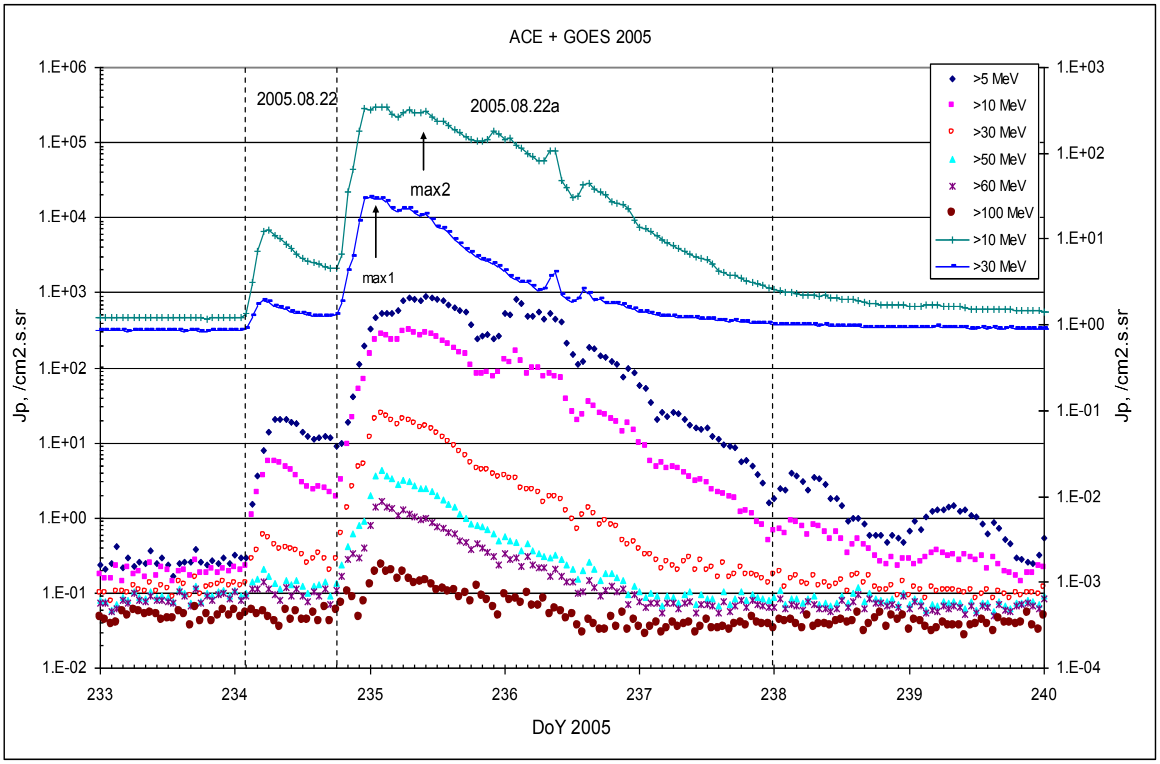
CME: 22d17^{h}30^{m}, V=2378 km/s, Δφ = 360^{o}, dA= 220^{o};

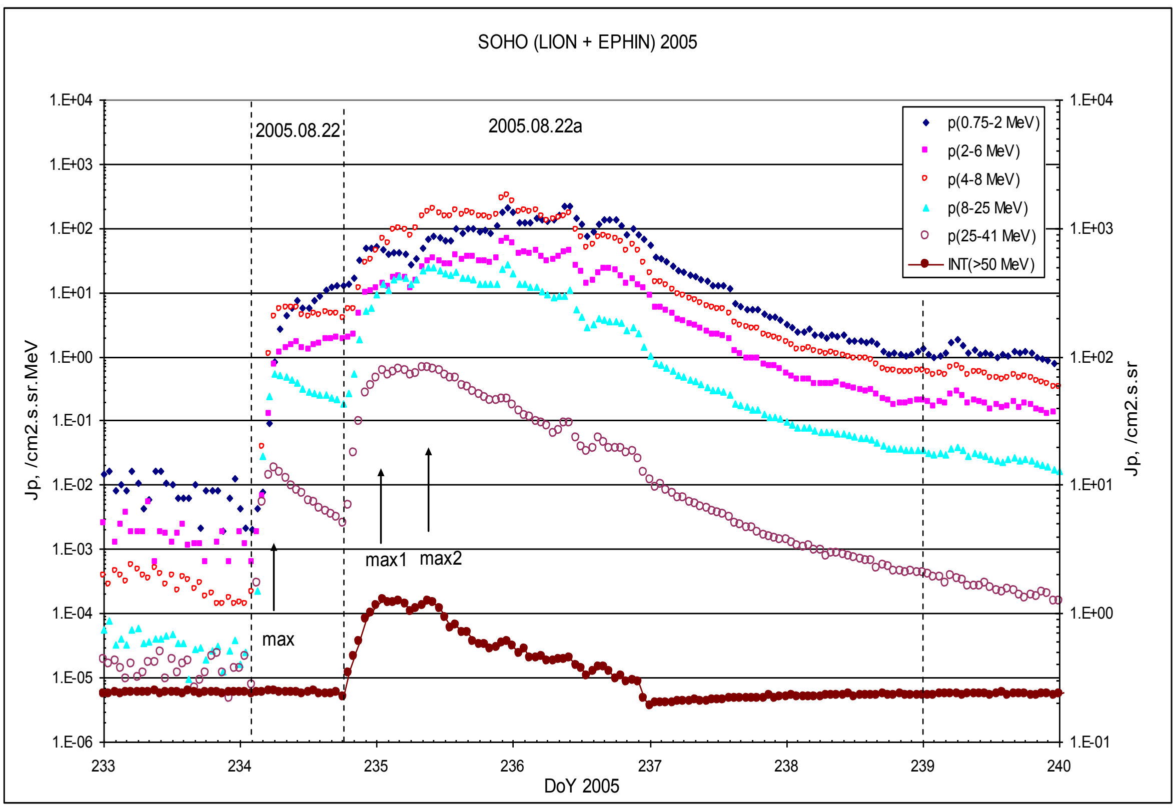
▲SC 24d06^{h}13^{m}

Particle fluxes and associated phenomena



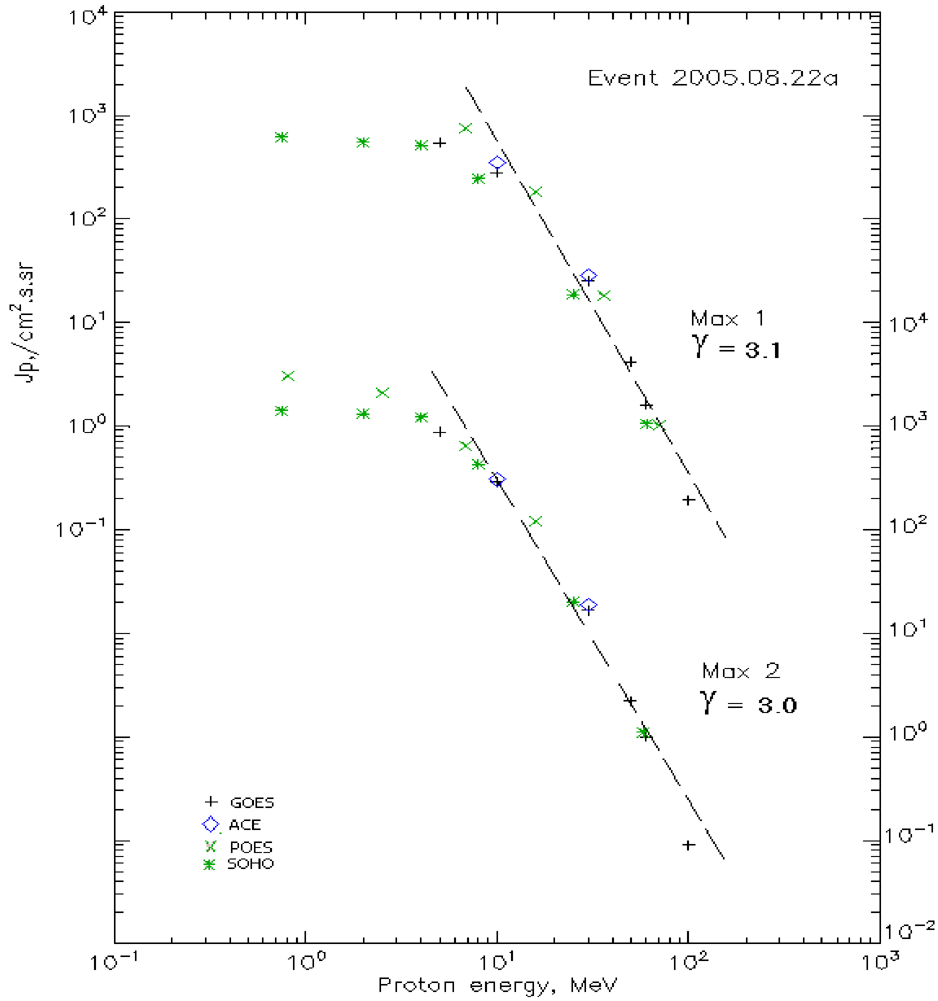
Time profiles of the proton fluxes for the event of 2005 August 22a





Arrows on the profiles of the events indicate the time of the proton flux maxima, taken to build the proton spectra (see below)

Integral time-of-maximum proton spectrum



Integral fluxes of protons for the event of 2005 August 22a

S/c, instruments	Ep, MeV	To	Tmax	Jmax, $(cm^2.s.sr)^{-1}$	Dura-tion	Comments
GOES-10						
EPS	>5	19^h	$23d02^h/23d10^h$	540/880	3d	
EPS	>10	19^h	$23d02^h/23d10^h$	280/290	3d	
EPS	>30	19^h	$23d02^h/23d10^h$	24.9/16.7	2d	
EPS	>50	19^h	$23d02^h/23d10^h$	4.1/2.2	2d	
EPS	>60	19^h	$23d02^h/23d10^h$	1.6/1	2d	
EPS	>100	18^h	$23d02^h/23d10^h$	0.19/0.09	1d	
POES-16						
MEPED	>0.24	-	-	-	-	
MEPED	>0.8	-	$- /23d10^h$	- /3120	3d	
MEPED	>2.5	-	$- /23d10^h$	- /2140	3d	
MEPED	>6.9	-	$23d02^h/23d10^h$	760/650	3d	
MEPED	>16	-	$23d02^h/23d10^h$	180/120	3d	
MEPED	>36	-	$23d02^h/ -$	18.1/ -	2d	
MEPED	>70	-	$23d02^h/ -$	1/ -	2d	
MEPED	>140	-	-	-	-	

ACE						
SIS	>10	19^h	$23d02^h/23d10^h$	350/308	4 d	
SIS	>30	19^h	$23d02^h/23d10^h$	28.5/19	4 d	
SOHO						
EPHIN (INT)	>50	19^h	$23d01^h/23d09^h$	1.05/1	2d	

Differential fluxes of protons for the event of 2005 August 22a

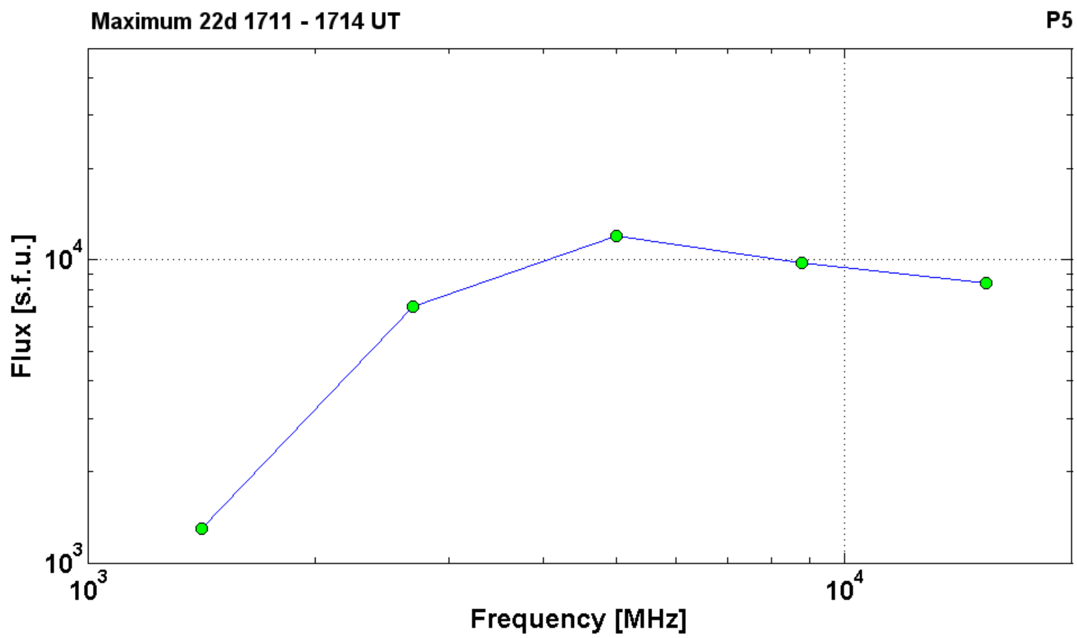
S/c, instruments	ΔE, MeV	To	Tmax	Jmax, $(cm^2.s.sr.MeV)^{-1}$	Duration	Comments
SOHO						
LION	0.75-2	19^h	$23d01^h/23d09^h$	51/75.4	3d	
LION	2-6	19^h	$23d01^h/23d09^h$	13.3/33.7	3d	
EPHIN	4-8	19^h	$23d01^h/23d09^h$	66.8/200	3d	
EPHIN	8-25	19^h	$23d01^h/23d09^h$	13.3/24	3d	
EPHIN	25-41	19^h	$23d01^h/23d09^h$	0.62/0.68	3d	

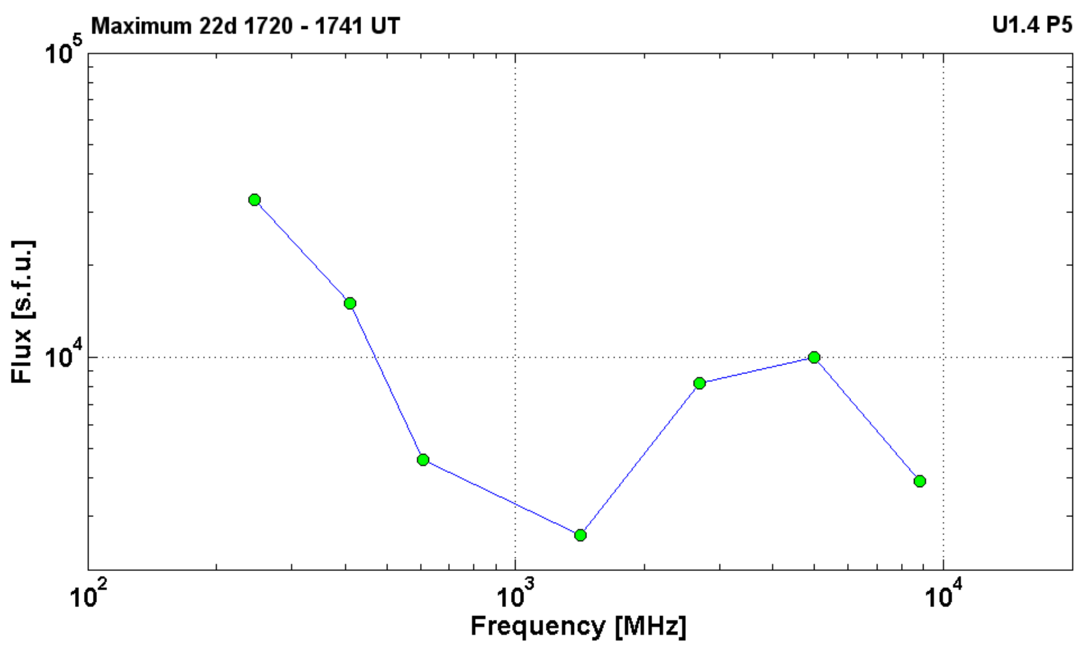
Electromagnetic and other phenomena that are sources and/or accompanying for the event of 2005 August 22a

2005 August 22 ● AR10798 To event 470

Hα	6563 Å	1652	1711	1845	S12W60	1N	FU
1 – 12	keV	1646	1727	1802		M5.6	1.7E-1
100-300	keV	170116	171610	174320		67140128	RHESSI
6-12	keV	183712	183838	191308		301914	RHESSI
15.4	GHz	1707.0	1711.0	2006.0		3.92	
8.8	GHz	1707.0	1711.0	2014.0		3.99	
5	GHz	1649.0	1711.0	1717.0		4.08	
2.7	GHz	1649.0	1713.0	1717.0		3.85	
1.4	GHz	1651.0	1714.0	1717.0	P5	3.11	
DS IV	100-4000	1652		1737		3	
DS IV	30-180	1654		2145	P	3	

8.8	GHz	1654.0	1721.0	1915.0		3.59	
5	GHz	1654.0	1721.0	1936.0	U1.4 P5	4.00	
2.7	GHz	1654.0	1722.0	1937.0		3.91	
1.4	GHz	1654.0	1722.0	1921.0		3.41	
610	MHz	1655.0	1720.0	1907.0		3.66	
410	MHz	1655.0	1728.0	2035.0		4.18	
245	MHz	1656.0	1741.0	2035.0		4.52	
DS III	25-87	1720		1721		1	
CME	WL	1730	2378 km/s	108.0km/s	360˚	227˚	



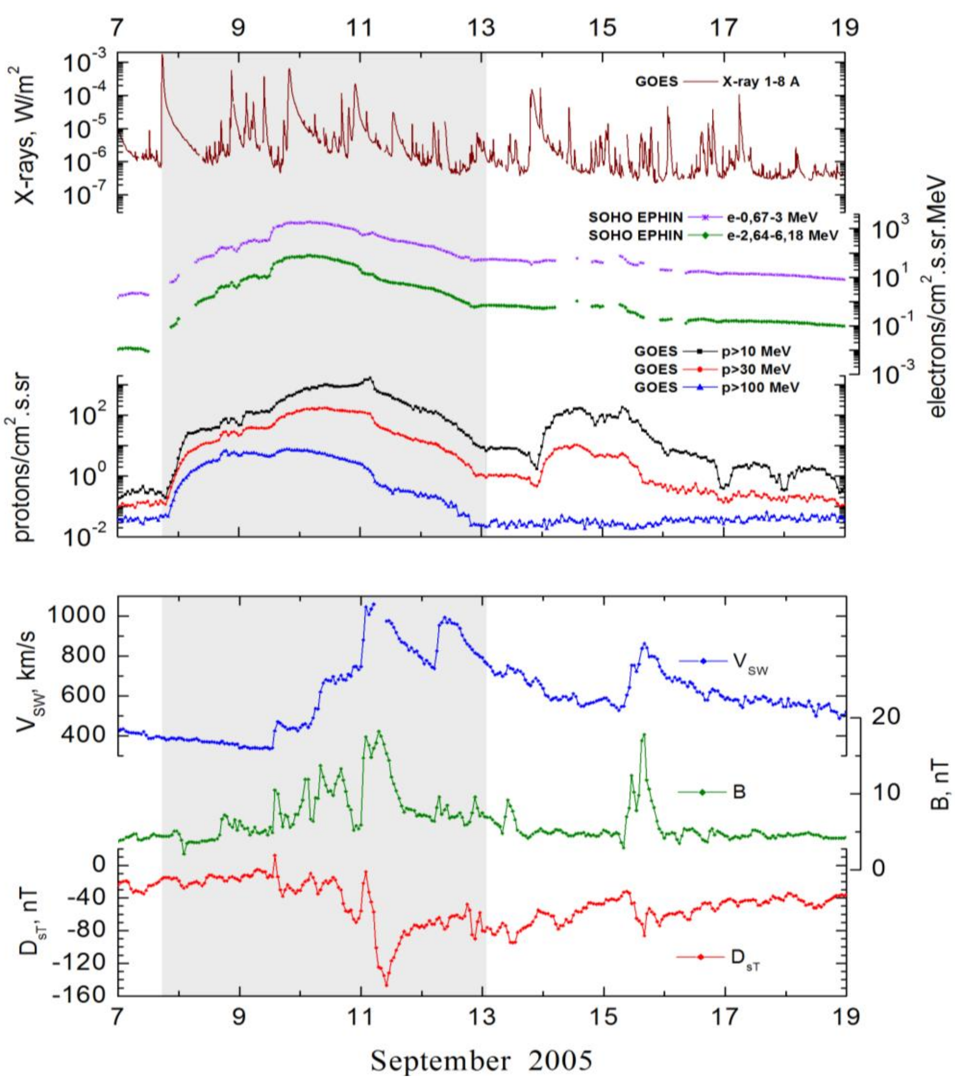


Event 2005.09.07 – (2005-250) **№ 471**

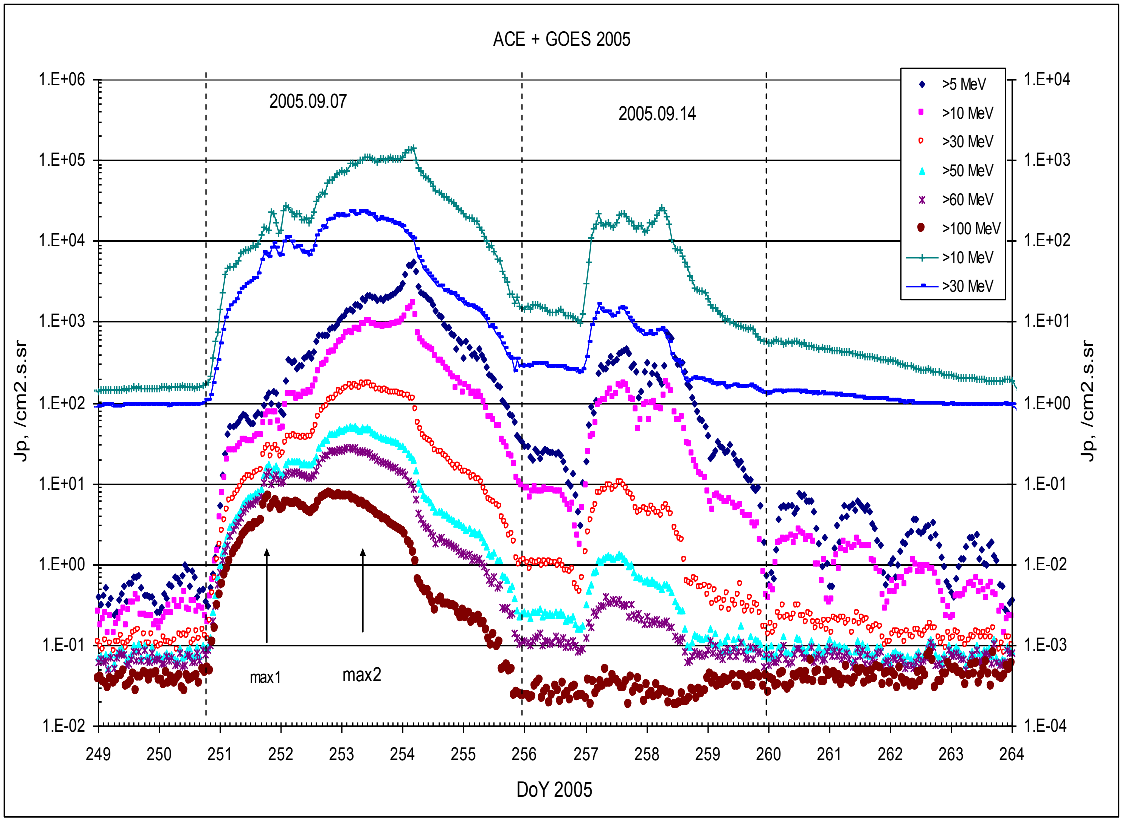
Particle event: To(Ep>10MeV) – 07d21^{h}
Tmax$_1$(Ep>10MeV) – 08d20^{h}, Jmax$_1$(Ep>10MeV) – 70 /cm^2.s.sr
Tmax$_2$(Ep>10MeV) – 10d11^{h}, Jmax$_2$(Ep>10MeV) –1000 /cm^2.s.sr
Duration of the event – 5 days
Quasimaximal energy of protons in the event – Eqm$_1$ = 800 MeV
– Eqm$_2$ = 555 MeV

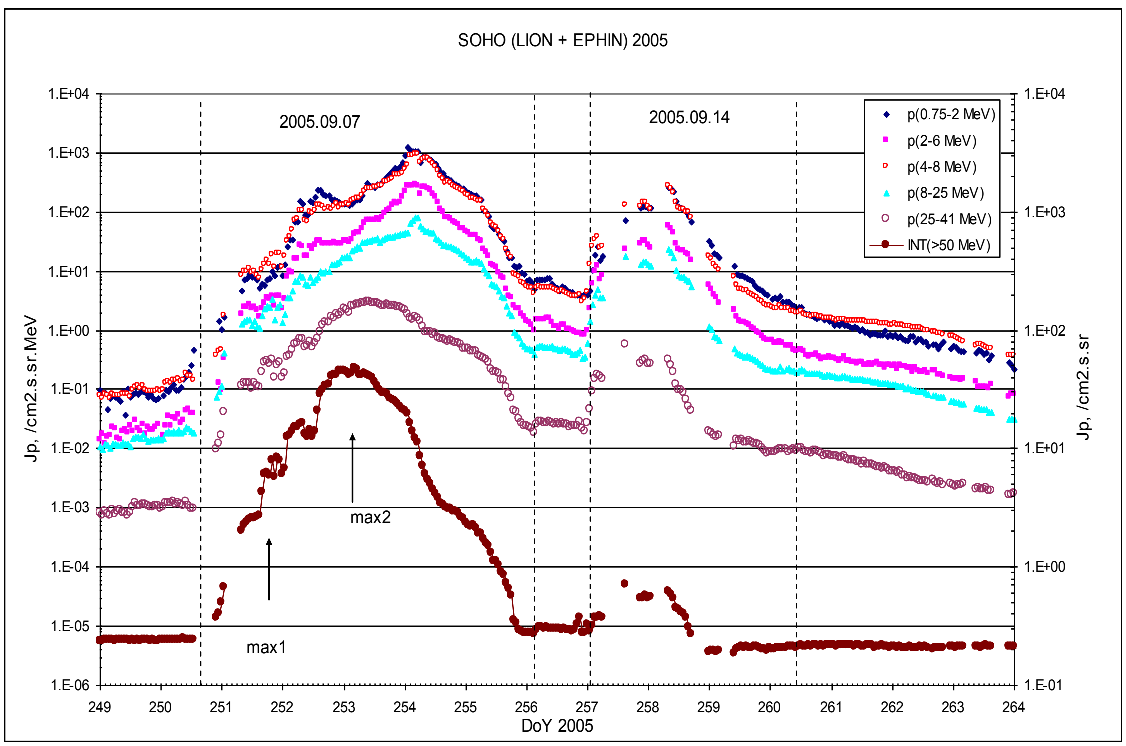
Sources: ● solar flare 07d17^{h}17^{m}, X17.0/3B, S06E89, AR10808
Ø solar flare 08d20^{h}52^{m}, X5.4/2B, S12E62, AR10808
Ø solar flare 09d09^{h}42^{m}, X3.6/1N, S11E64, AR10808
Ø solar flare 09d19^{h}13^{m}, X6.2/2B, S12E67*, AR10808
Main X-ray burst 1-8 Å: onset – 07d17^{h}17^{m}, max – 07d17^{h}40^{m}, Φ = 2.6 J/m^2
CME: gap
▲ SC 09d14^{h}01^{m}; ▲ SC 11d01^{h}14^{m}
* – localisation on the X-ray burst

Particle fluxes and associated phenomena



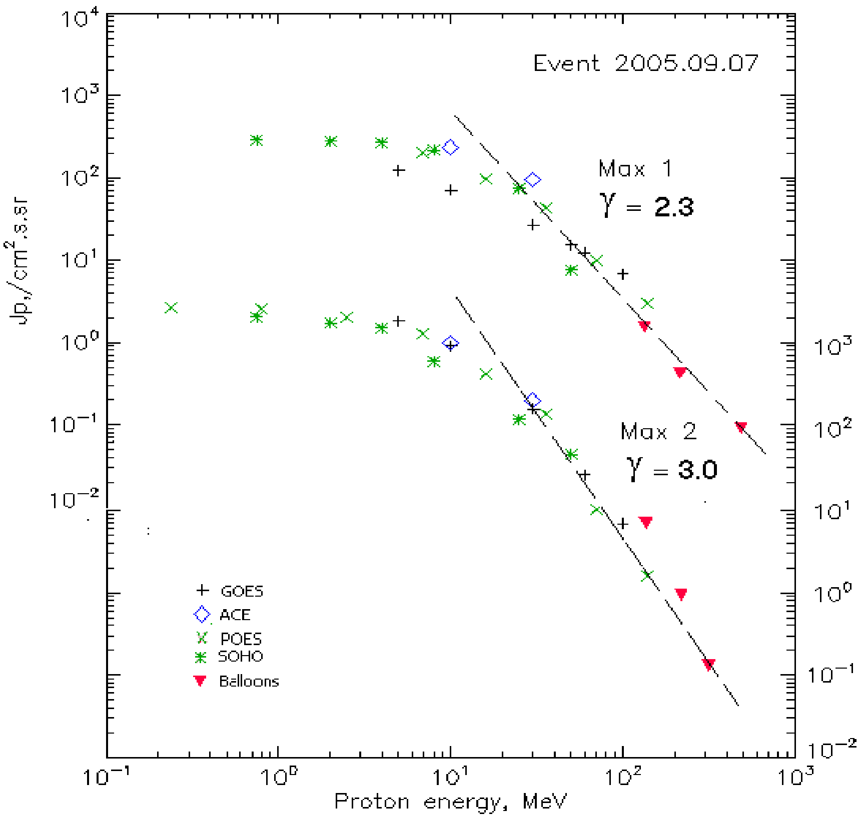
Time profiles of the proton fluxes for the event of 2005 September 07





Arrows on the profiles of the events indicate the time of the proton flux maxima, taken to build the proton spectra (see below)

Integral time-of-maximum proton spectrum



Integral fluxes of protons for the event of 2005 September 07

S/c, instruments	Ep, MeV	To	Tmax	Jmax, $(cm^2.s.sr)^{-1}$	Dura -tion	Comments
GOES-10						
EPS	>5	21^h	$08d20^h/10d12^h$	123/2000	5d	
EPS	>10	21^h	$08d20^h/10d11^h$	70/1000	5d	
EPS	>30	21^h	$08d20^h/10d09^h$	26.7/170	5d	
EPS	>50	21^h	$08d20^h/10d06^h$	15.3/47.4	5d	
EPS	>60	21^h	$08d19^h/10d05^h$	12.2/27.4	5d	
EPS	>100	21^h	$08d19^h/10d03^h$	6.8/6.9	5d	
POES-16						
MEPED	>0.24	-	- /$10d12^h$	- /2920	5d	
MEPED	>0.8	-	- /$10d12^h$	- /2810	5d	
MEPED	>2.5	-	- /$10d10^h$	- /2230	5d	
MEPED	>6.9	-	$08d20^h/10d09^h$	210/2140	5d	
MEPED	>16	-	$08d20^h/10d06^h$	95/460	5d	
MEPED	>36	-	$08d20^h/10d04^h$	16/150	5d	
MEPED	>70	-	$08d20^h/10d04^h$	10/10.3	5d	
MEPED	>140	-	$08d20^h/10d04^h$	3/1.6	5d	
ACE						
SIS	>10	20^h	$08d21^h/10d11^h$	233/1080	5d	
SIS	>30	20^h	$08d21^h/10d11^h$	94/216	5d	
SOHO						
EPHIN (INT)	>50	20^h	$08d20^h/10d04^h$	7.6/47.5	5d	

BALLOONS						
Mi	>134	-	08d09^{h}25^m/ -	1.5/ -	-	
Mi	>216	-	08d09^{h}25^m/ -	0.42/ -	-	
Mi	>492	-	08d09^{h}25^m/ -	0.09/ -	-	
Mi	>136	-	- /09d10^{h}30^m	- /6.9	-	Before max2
Mi	>218	-	- /09d10^{h}30^m	- /0.93	-	- " -
Mi	>316	-	- /09d10^{h}30^m	- /0.13	-	- " -

Differential fluxes of protons for the event of 2005 September 07

S/c, instruments	ΔE, MeV	To	Tmax	Jmax, $(cm^2.s.sr.MeV)^{-1}$	Dura -tion	Comments
SOHO						
LION	0.75-2	20^h	08d19^h/10d09^h	7.4/304	5d	
LION	2-6	20^h	08d19^h/10d10^h	3.3/71.3	5d	
EPHIN	4-8	20^h	08d19^h/10d09^h	13/252	5d	
EPHIN	8-25	20^h	08d19^h/10d08^h	2.4/30.7	5d	
EPHIN	25-41	20^h	08d19^h/10d08^h	0.27/2.9	5d	

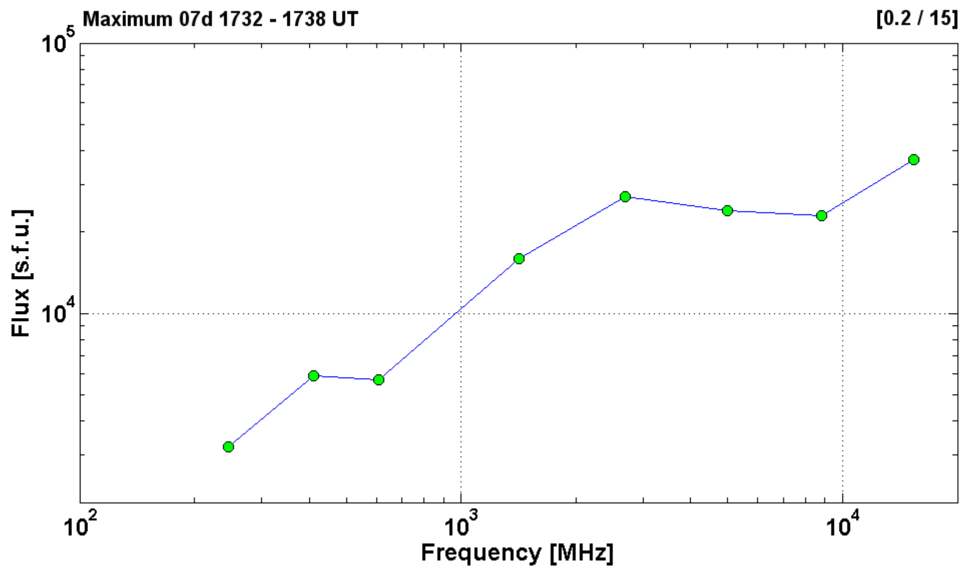
References:

Kuwabara T., Bieber J.W., Clem J., et.al., 2006.
Struminsky A.B., 2011.

Electromagnetic and other phenomena that are sources and/or accompanying for the event of 2005 September 07

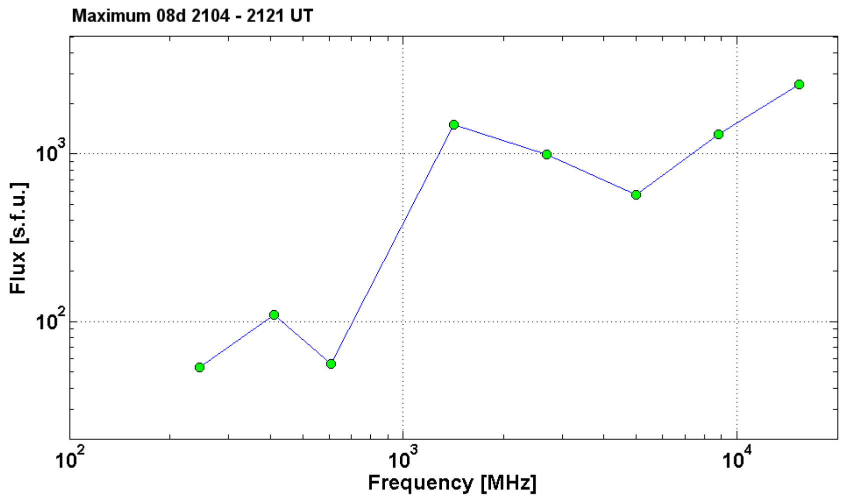
2005 September 07 ● AR10808 To event 471

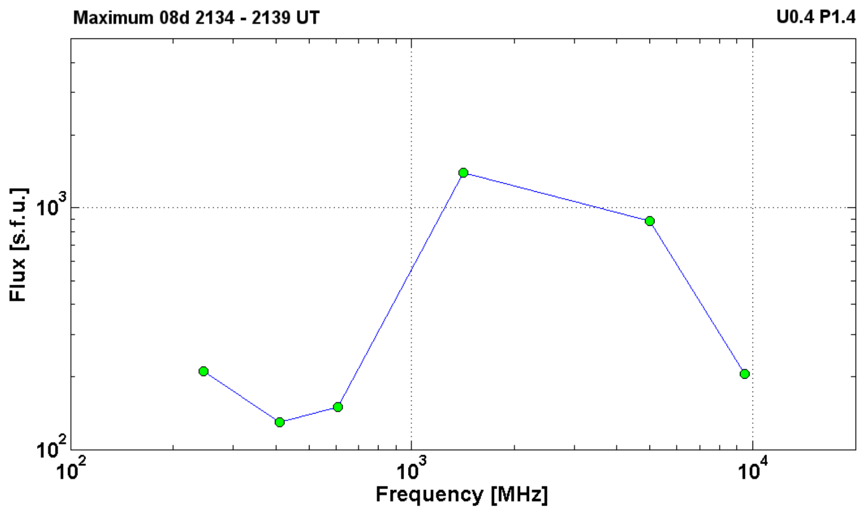
H_α	6563 Å	1724	1740	1847	S06E89	3B	MY
1 – 12	keV	1717	1740	1803		X17.0	2.6E00
6-12	keV	171104	171334	171752		585282	RHESSI
50-100	keV	174244	174346	174704		3848547	RHESSI
50-100	keV	181904	182002	182752		21973536	RHESSI
25-50	keV	182752	183230	185936		52805952	RHESSI
15.4	GHz	1723.0	~1736.0	1902.0	[0.2 / 15]	4.57	
8.8	GHz	1723.0	~1736.0	1902.0		4.36	
5	GHz	<1725.0	~1736.0	>1902.0		4.38	
2.7	GHz	<1728.0	~1736.0	>1910.0		4.43	
1.4	GHz	<1729.0	~1732.0	>1905.0		4.20	
610	MHz	1732.0	~1738.0	1853.0		3.76	
410	MHz	1733.0	~1736.0	1843.0		3.77	
245	MHz	1735.0	~1737.0	1841.0		3.51	
DS II	25-180	1742		1750		3	
DS IV	25-180	1750		1846		2	
CME	WL						gap



2005 September 08 Ø AR10808 To event 471

H_α	6563 Å	2052	2105	0042	S11E74	2B	MU
1 – 12	keV	2052	2106	2117		X5.4	3.8E-1
25-50	keV	213016	213118	222056		9633607	RHESSI
12-25	keV	223324	223334	223424		19872	RHESSI
12-25	keV	230632	230654	234616		457791	RHESSI
6-12	keV	234616	234654	000208		78348	RHESSI
15.4	GHz	2026.0	2107.0	2148.0		3.41	
8.8	GHz	2053.0	2105.0	2142.0		3.11	
5	GHz	2101.0	2105.0	0000.0		2.76	
2.7	GHz	2102.0	2104.0	0000.0		3.00	
1.4	GHz	2105.0	2106.0	2145.0		3.18	
610	MHz	2111.0	2111.0	~2111.0		1.75	
410	MHz	2114.0	2114.0	2121.0		2.04	
245	MHz	2121.0	2121.0	~2121.0		1.72	
DS IV	25-300	2116		2337		1	
DS III	30-180	2110		2131	N	1	
DS III	40-200	2110		2112	G	3	
9.5	GHz	2135.2	2139.2	2143.1		2.31	
5	GHz	2101.0	2135.0	2143.0		2.94	
1.4	GHz	<2104.0	2137.0	>2146.0	U0.4 P1.4	3.15	
610	MHz	2111.0	2135.0	2138.0		2.18	
410	MHz	2114.0	2137.0	2151.0		2.11	
245	MHz	2122.0	2134.0	2203.0		2.32	
DS IV	23-57	2132		>2400	F,S	2	
DS IV	38-180	2244		0344		2	
DS III	20-57	2130		>2400	N	1	
CME	WL						gap

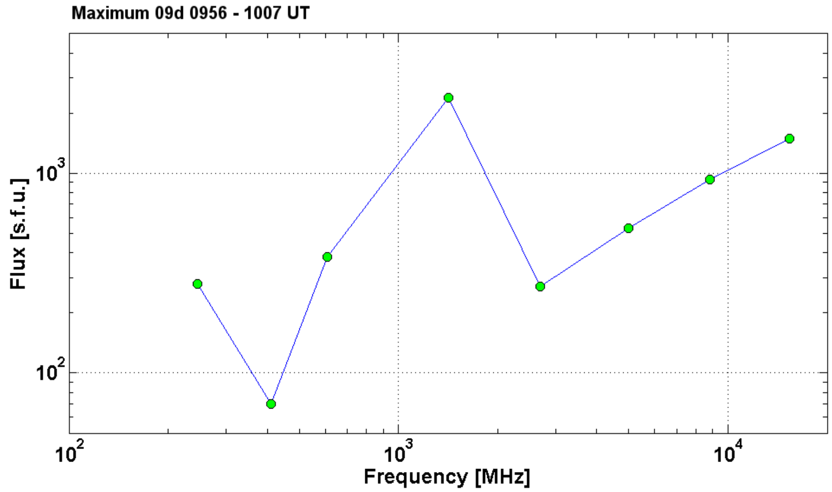




2005 September 09 Ø AR10792 To event 471

H_α	6563 Å	<1020	–	1115	S12E62	2B	MU
1 – 12	keV	0942	0959	1008		X3.6	2.3E-1
25-50	keV	092524	094602	094636		279628	RHESSI
12-25	keV	101800	101854	103316		2530704	RHESSI
12-25	keV	110024	110042	110848		32808	RHESSI
12-25	keV	110848	110914	112040		33560	RHESSI
15.4	GHz	0953.0	0956.0	1024.0		3.18	
8.8	GHz	0952.0	0956.0	1019.0		2.97	
5	GHz	0953.0	0956.0	1019.0		2.72	
2.7	GHz	0954.0	0956.0	1012.0		2.43	
1.4	GHz	0957.0	1005.0	1011.0		3.38	
610	MHz	1000.0	1001.0	1011.0		2.58	
410	MHz	1006.0	1007.0	1007.0		1.85	
245	MHz	1006.0	1006.0	1025.0		2.45	
DS IV	100-4000	0954		1024	P	3	
DS III	50-180	1025		1025		2	
DS DCIM	2000-4500	0952		1026	GG	3	
DS DCIM	800-2000	0954		1026	GG,F,S	3	

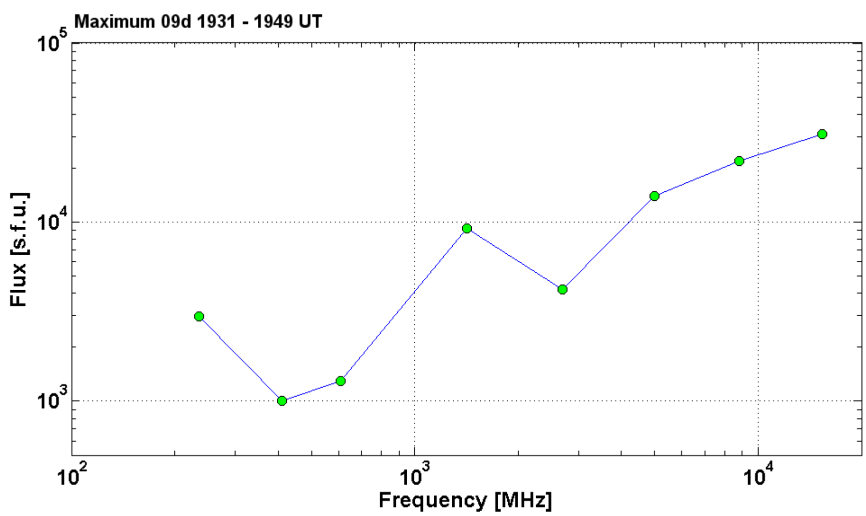
CME	WL						gap



2005 September 09 Ø AR10808 To event 471

H_α	6563 Å	No Flare			S12E67		
1 – 12	keV	1913	2004	2036		X6.2	1.7E00
12-25	keV	191908	192146	192240		604126	RHESSI
50-100	keV	205652	205658	205840		531774	RHESSI
15.4	GHz	1916.0	1947.0	2147.0		4.49	
8.8	GHz	1916.0	1948.0	0000.0		4.34	
5	GHz	1916.0	~1949.0	2143.0		4.15	
2.7	GHz	1921.0	~1949.0	2142.0		3.62	
1.4	GHz	1905.0	1931.0	0000.0		3.96	
610	MHz	1929.0	1945.0	0000.0		3.11	
410	MHz	1925.0	~1945.0	2036.0		3.00	
235	MHz	1931.9	~1931.9	2048.0		>3.47	
DS II	25-180	1934		1949		2	
DS IV	30-180	1934		2123		3	
CME	WL	1948	2257 km/s	-128.6 km/s^2	360^o	220^o	

* – localisation on the X-ray burst



Event 2005.09.14 – (2005-257) **№ 472**

Particle event: To(Ep>10MeV) – 14d00^h

Tmax$_1$(Ep>10MeV) – 14d15^h, Jmax$_1$(Ep>10MeV) –160 /cm^2.s.sr

Tmax$_2$(Ep>10MeV) – 15d08^h, Jmax$_2$(Ep>10MeV) –180 /cm^2.s.sr

Duration of the event – 3 days

Quasimaximal energy of protons in the event – Eqm$_1$ = 85 MeV

– Eqm$_2$ = 85 MeV

Sources: ● solar flare 13d19^{h}19^m, X1.5/2B, S09E10*, AR10808

13d23^{h}15^m, X1.7/2B, S09E10*, AR10808

Ø solar flare 15d08^{h}30^m, X1.1/2N, S11W15, AR10808

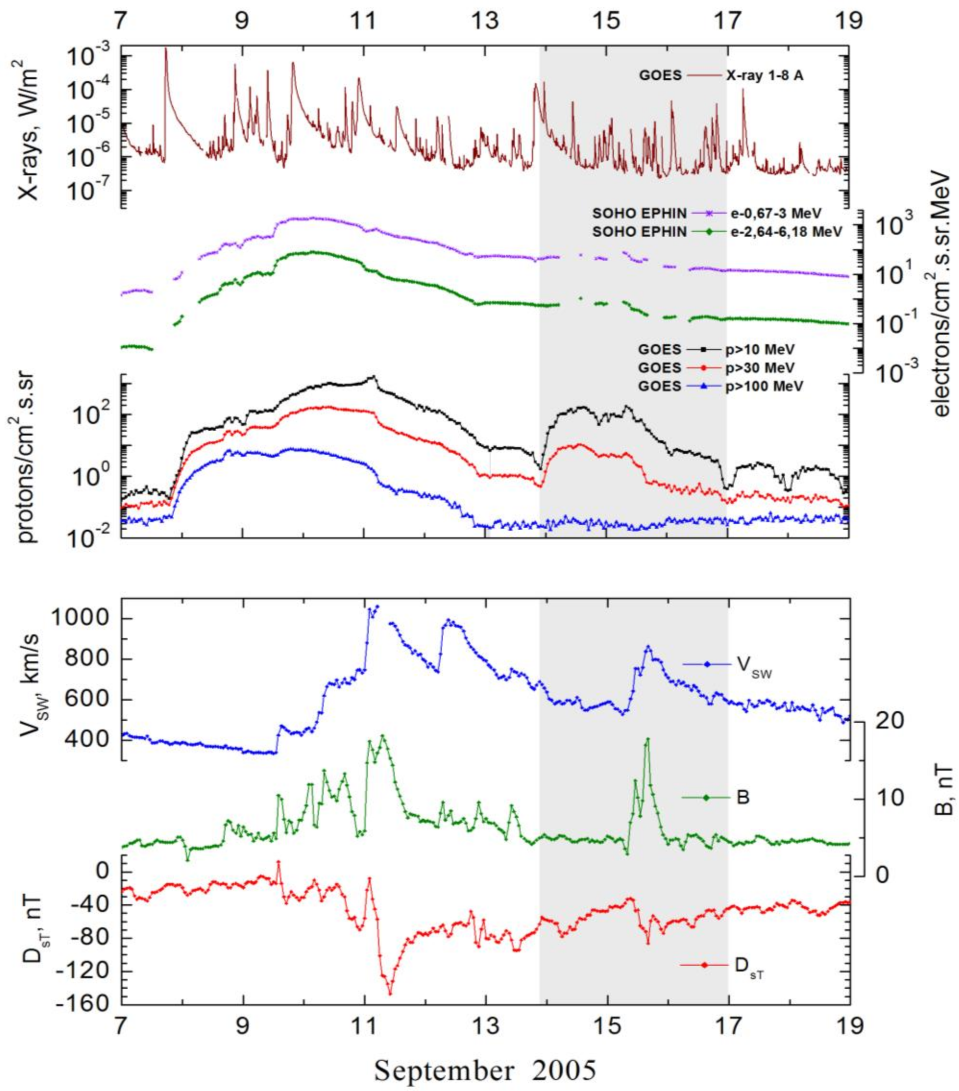
Main X-ray burst 1-8 Å: onset – 13d19^{h}19^m, max – 13d19^{h}27^m, Φ = 0.055 J/m^2

CME: 13d20^{h}00^m, V = 1866 km/s, Δφ = 360^o, dA = 149^o

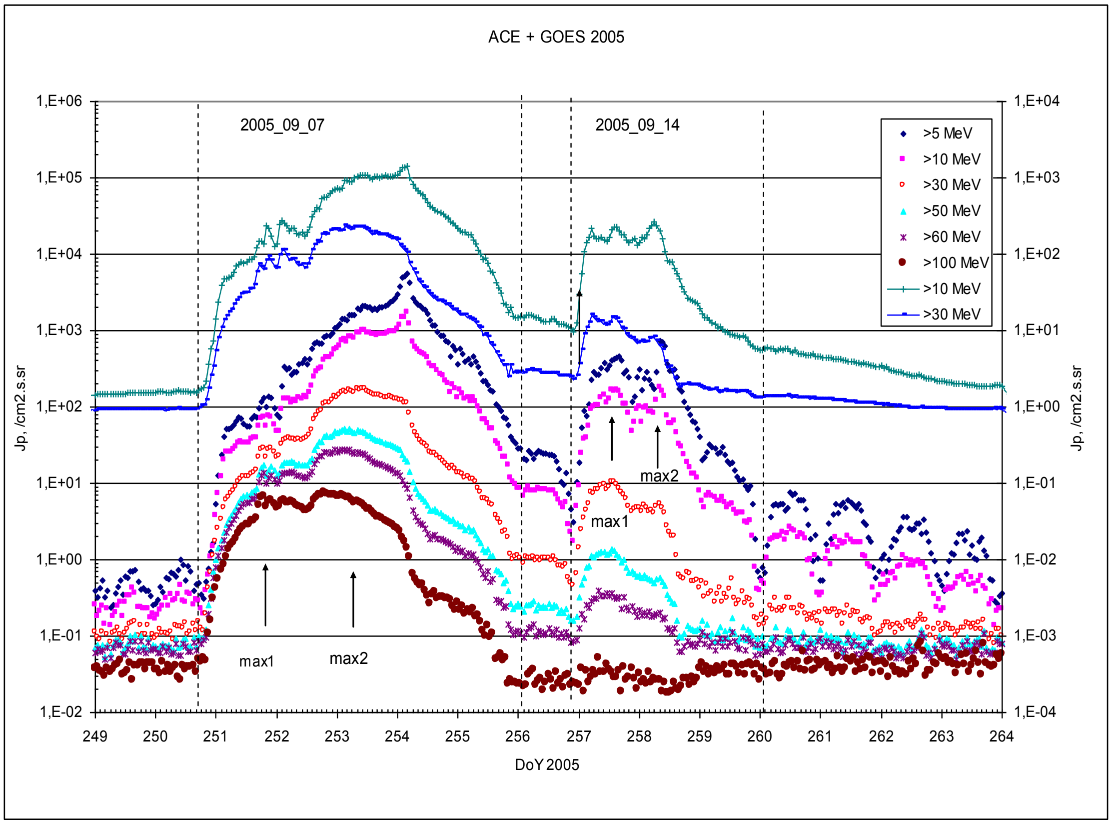
▲SC 15d08^{h}35^m; Δ SC15d09^{h}04^m;

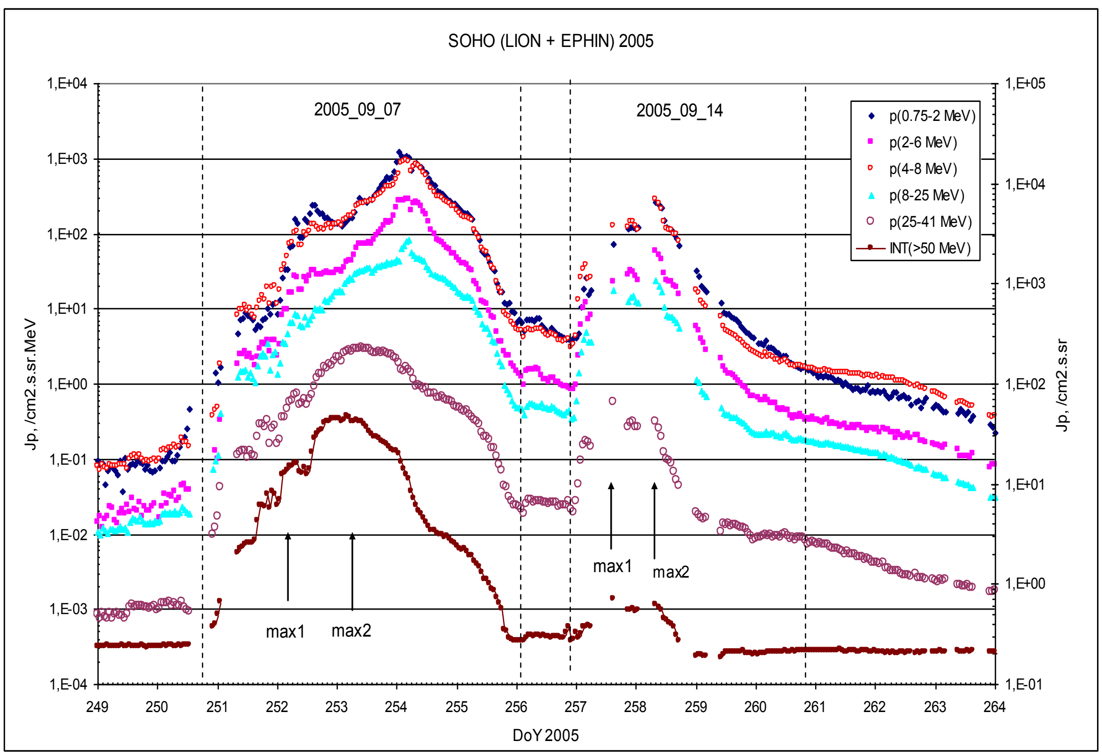
* – One solar flare event with two X-ray burst

Particle fluxes and associated phenomena



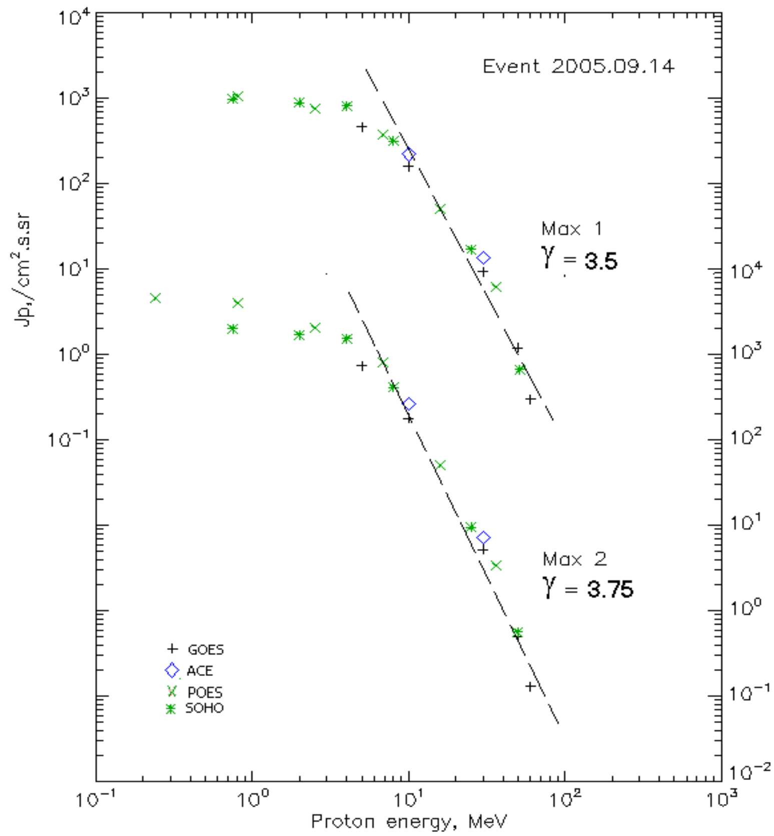
Time profiles of the proton fluxes for the event of 2005 September 14





Arrows on the profiles of the events indicate the time of the proton flux maxima, taken to build the proton spectra (see below)

Integral time-of-maximum proton spectrum



Integral fluxes of protons for the event of 2005 September 14

S/c, instru-ments	Ep, MeV	To	Tmax	Jmax, $(cm^2.s.sr)^{-1}$	Dura-tion	Comments
GOES-10						
EPS	>5	00^h	$16^h/15d08^h$	460/740	3d	
EPS	>10	00^h	$15^h/15d08^h$	160/180	3d	
EPS	>30	00^h	$14^h/15d08^h$	9.4/5.2	2d	
EPS	>50	00^h	$14^h/15d08^h$	1.2/0.5	2d	
EPS	>60	00^h	$14^h/15d08^h$	0.3/0.13	2d	
EPS	>100	-	-	-	-	
POES-16						
MEPED	>0.24	-	- /$15d08^h$	- /4580	3d	
MEPED	>0.8	-	$14^h/15d08^h$	1050/4210	3d	
MEPED	>2.5	-	$14^h/15d08^h$	750/2050	2d	
MEPED	>6.9	-	$14^h/15d07^h$	370/820	2d	
MEPED	>16	-	$14^h/15d06^h$	50/50	2d	
MEPED	>36	-	$14^h/15d06^h$	6.2/3.4	1d	
MEPED	>70	-	-	-	-	
MEPED	>140	-	-	-	-	
ACE						
SIS	>10	00^h	$15^h/15d06^h$	222/263	3d	
SIS	>30	00^h	$15^h/15d06^h$	13.7/7.2	2d	

SOHO						
EPHIN (INT)	>50	00^h	$15^h/15d08^h$	0.68/0.6	2d	

Differential fluxes of protons for the event of 2005 September 14

S/c, instru-ments	ΔE, MeV	To	Tmax	Jmax, $(cm^2.s.sr.MeV)^{-1}$	Dura-tion	Comments
SOHO						
LION	0.75-2	00^h	$15^h/15d08^h$	73/245	3d	
LION	2-6	00^h	$15^h/15d08^h$	23/59	3d	
EPHIN	4-8	00^h	$15^h/15d08^h$	126/281	3d	
EPHIN	8-25	00^h	$15^h/15d08^h$	17.7/23.5	3d	
EPHIN	25-41	00^h	$15^h/15d08^h$	0.58/0.32	2d	
EPHIN	41-53	- “ -	- “ -	- “ -	- “ -	

References:

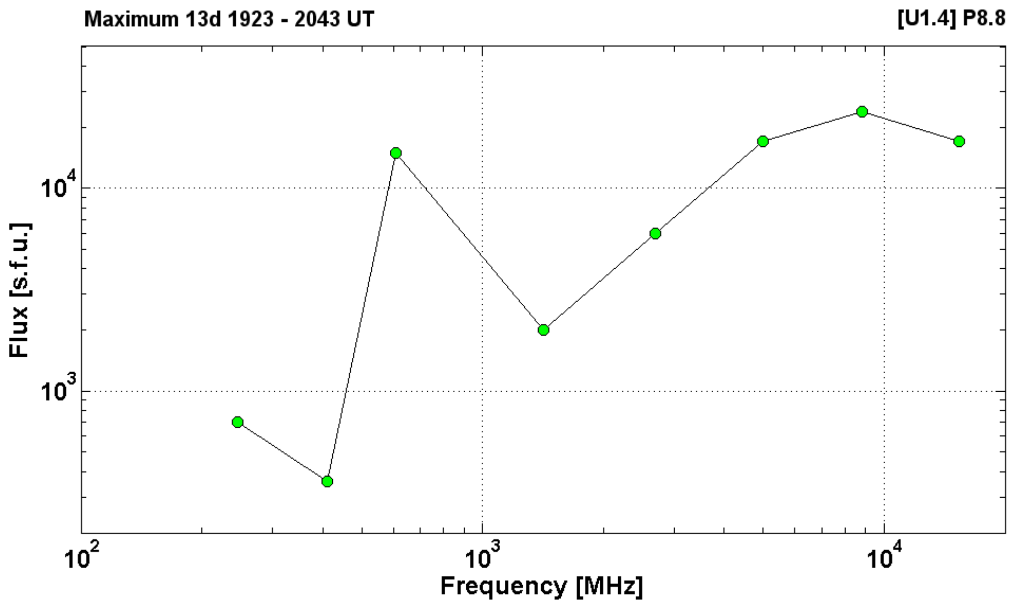
Kuwabara T., Bieber J.W., Clem J., et al., 2006.
Struminsky A.B., 2011.

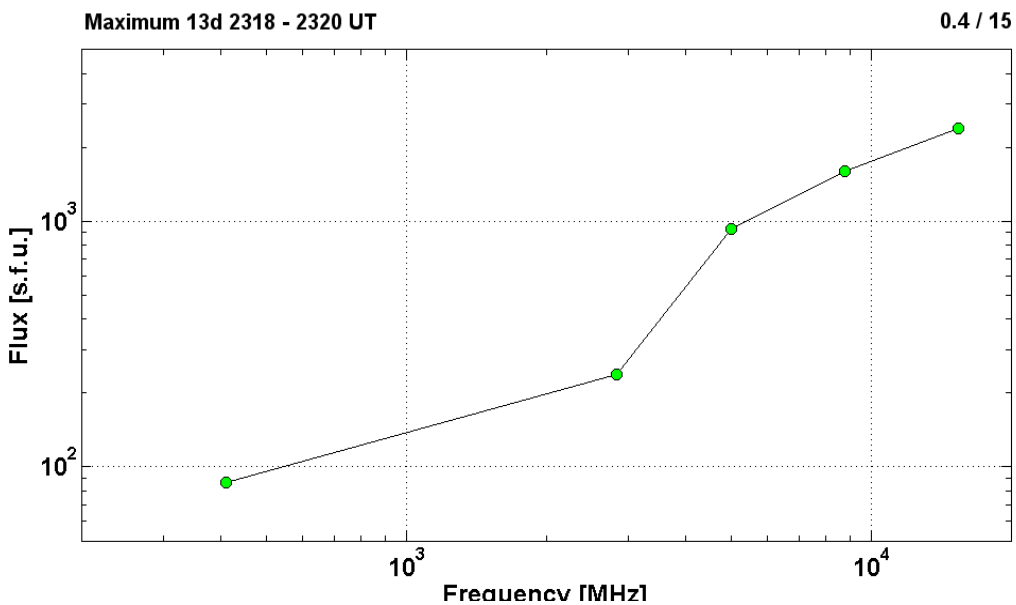
Electromagnetic and other phenomena that are sources and/or accompanying for the event of 2005 September 14

2005 September 13 ● AR10808 To event 472

Hα	6563 Å	1922	1923	0021	S09E10	2B	FU
1 – 12	keV	1919	1927	2057		X1.5	5.5E-1
1 – 12	keV	2315	2322	2330		X1.7	9.3E-2
25-50	keV	195252	195822	201344		21140692	RHESSI
12-25	keV	201344	201510	202224		5285486	RHESSI
100-300	keV	202224	203254	203316		6368830	RHESSI
50-100	keV	204308	204330	205716		5777847	RHESSI
12-25	keV	212900	213046	215352		1368541	RHESSI
12-25	keV	215352	215638	221632		912288	RHESSI
12-25	keV	230456	230522	231052		116139	RHESSI
6-12	keV	231052	321234	231500		47715	RHESSI
100-300	keV	231500	232150	000540		22934672	RHESSI
15.4	GHz	<1922.0	1923.0	>2131.0		4.23	
8.8	GHz	<1921.0	1923.0	>2129.0	[U1.4] P8.8	4.38	
5	GHz	1921.0	1923.0	0000.0		4.23	
2.7	GHz	1922.0	1923.0	2137.0		3.78	
1.4	GHz	<1922.0	2021.0	>2135.0		3.30	
610	MHz	1929.0	2015.0	2059.0		4.18	
410	MHz	1937.0	2029.0	2153.0		2.56	
245	MHz	1930.0	2043.0	2157.0		2.85	
DS IV	20-57	<2010		>2400		3	
DS III	25-180	1950		1951		2	
DS III	25-135	2027		0422	N	1	
DS III	25-57	2041		2041	B	3	
DS V	30-180	1950		1951		2	

15.4	GHz	2317.0	2318.0	0000.0	0.4 / 15	3.38	
8.8	GHz	2317.0	2320.0	0000.0		3.20	
8.8	GHz	2317.0	2320.0	2337.0		3.20	
5	GHz	2318.0	2320.0	2330.0		2.97	
2.8	GHz	2314.0	2320.5	2354.0		2.37	
410	MHz	2319.0	2320.0	2321.0		1.93	
CME	WL	2000	1866 km/s	11.5 km/s^2	360º	149°	
CME	WL	2336	0999 km/s	-13.9 km/s^2	046º	158°	

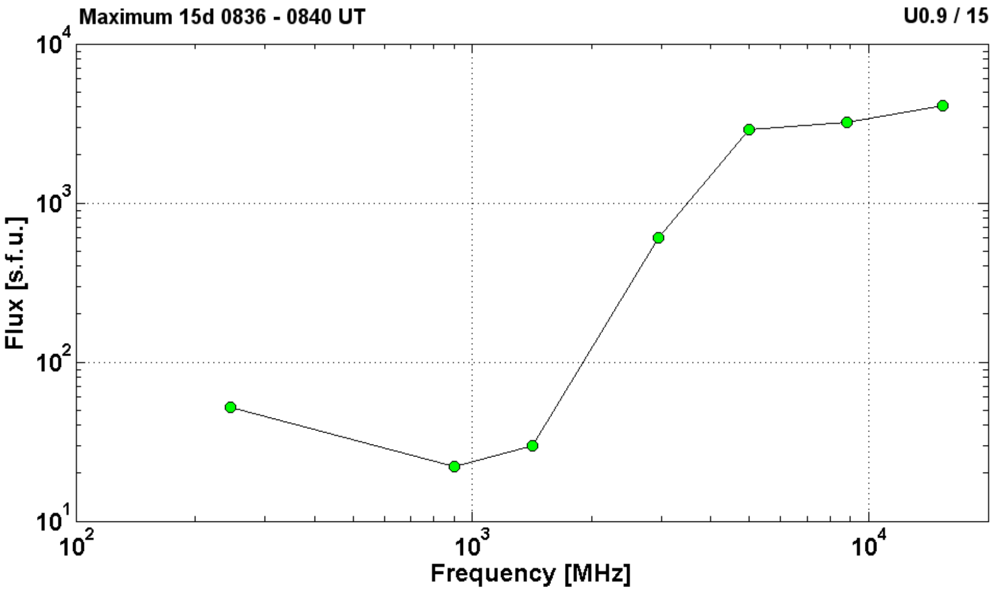




2005 September 15 Ø AR10808 To event 472

Hα	6563 Å	0834	0837	0953	S11W15	2N	FZ
1 – 12	keV	0830	0838	0846		X1.1	5.6E-2
3-6	keV	08:40:28	08:41:10	08:42:24		1256426	RHESSI
6-12	keV	08:42:24	09:11:22	09:34:04		646872	RHESSI

15.4	GHz	0834.0	0836.0	0932.0	U0.9 / 15	3.61	
8.8	GHz	0834.0	0836.0	0922.0		3.51	
5	GHz	0834.0	0836.0	0932.0		3.46	
3	GHz	0834.5	0836.8			2.78	
1.4	GHz	0836.0	0836.0	0000.0		1.48	
900	MHz	0835.1	0838.1	0840.3		1.34	
245	MHz	0840.0	0840.0	~0840.0		1.72	
DS DCIM	2000-4500	0834		0849	G	3	
DS DCIM	1000-4000	0835		0842	C	3	
CME	WL						gap



События 2006 г.

Стр.

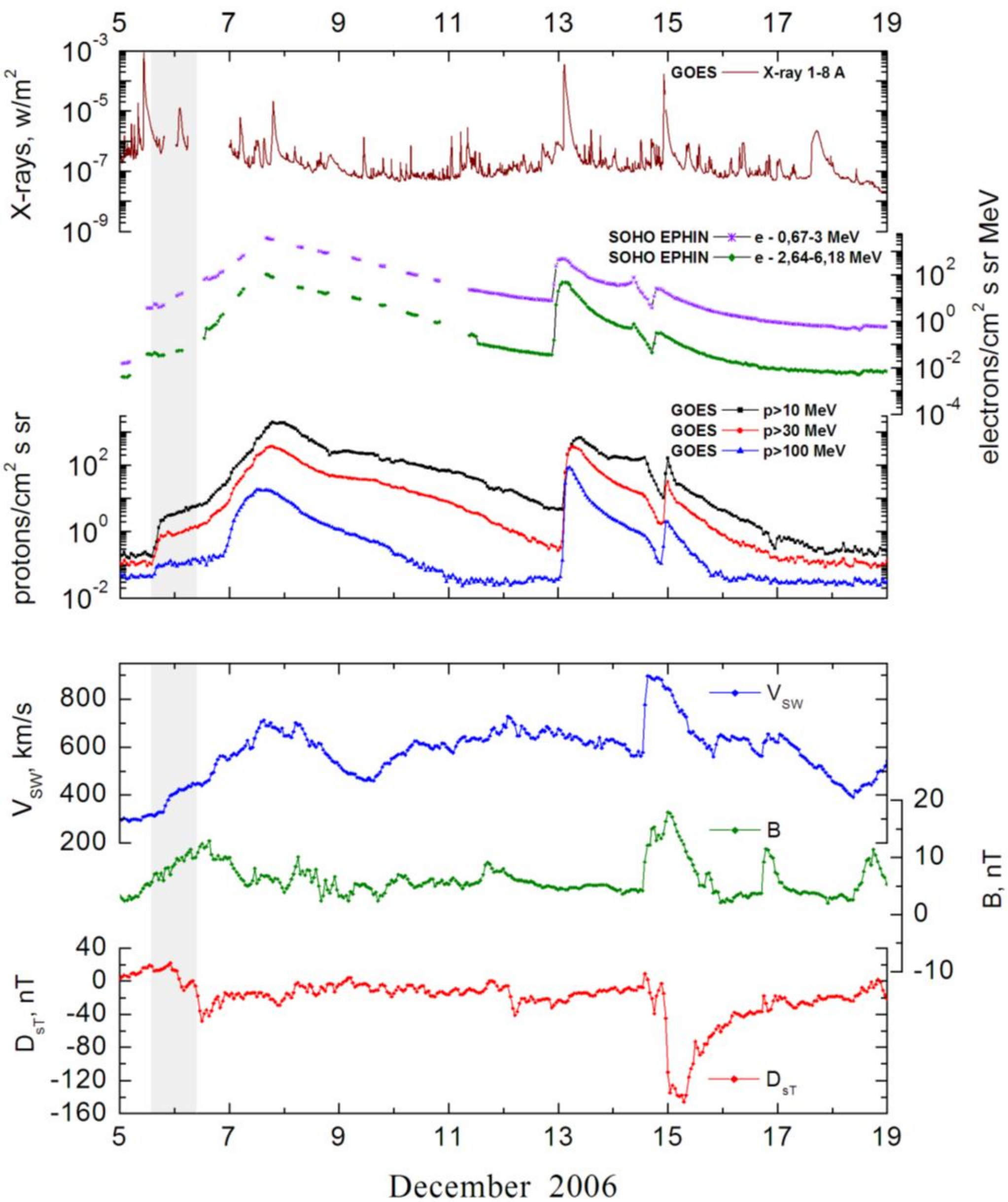
1. Event 2006.12.05 – (2006-339) № 473 717
2. Event 2006.12.06 – (2006-340) № 474 722
3. Event 2006.12.13 – (2006-347) – GLE-70 № 475 727
4. Event 2006.12.14 – (2006-348) № 476 733

Event 2006.12.05 – (2006-339) **№ 473**

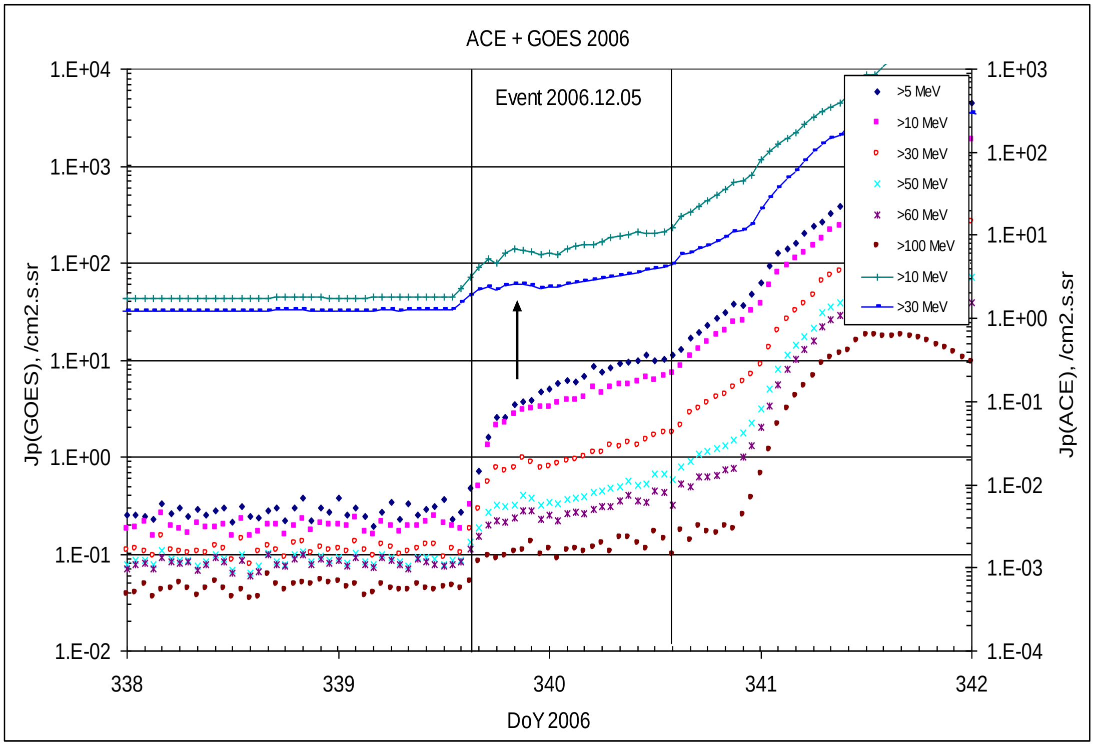
Particle event: To(Ep>10MeV) – 05d15^h
Tmax(Ep>10MeV) – 05d20^h, Jmax(Ep>10MeV) – 2.5 /cm^2.s.sr
Duration of the event – 1 day
Quasimaximal energy of protons in the event – Eqm = 275 MeV

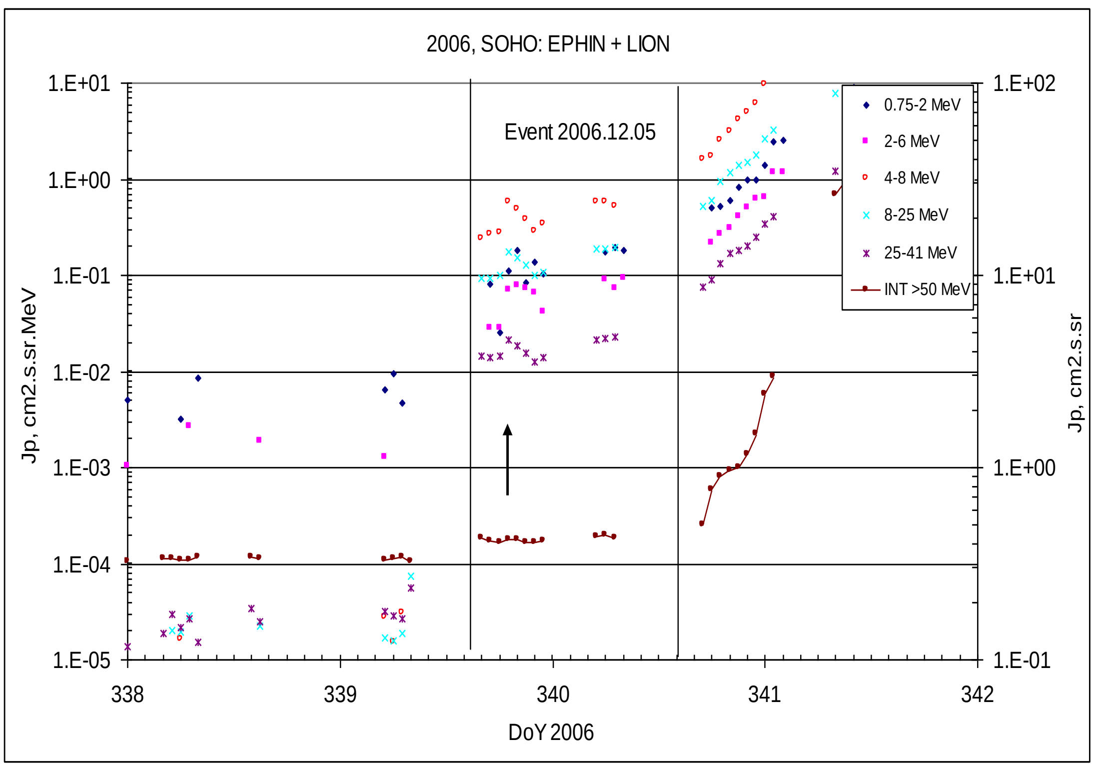
Sources: ● solar flare 05d10^{h}18^m, X9.0/2N, S07E79, AR10930;
Main x-ray burst 1–8 Å: onset – 05d10^{h}18^m, max – 05d10^{h}35^m, Φ = 0.71 J/m^2
CME: gap

Particle fluxes and associated phenomena



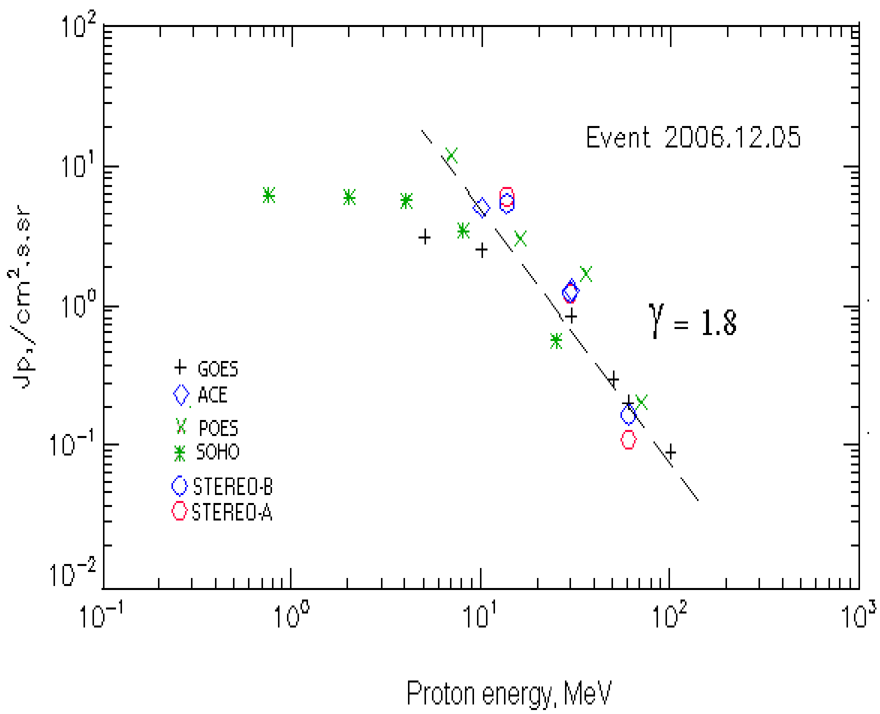
Time profiles of the proton fluxes for the event of 2006 December 05





Arrows on the profiles of the events indicate the time of the proton flux maxima, taken to build the proton spectra (see below)

Integral time-of-maximum proton spectrum



Integral fluxes of protons for the event of 2006 December 05

S/c, instruments	Ep, MeV	To	Tmax	Jmax, $(cm^2.s.sr)^{-1}$	Dura-tion	Comments
GOES-10						
EPS	>5	15^h	20^h	3.1	1d	
EPS	>10	15^h	20^h	2.5	1d	
EPS	>30	15^h	21^h	0.85	1d	
EPS	>50	15^h	21^h	0.3	1d	
EPS	>60	15^h	21^h	0.2	1d	
EPS	>100	16^h	22^h	0.09	1d	
POES-16						
MEPED	>0.24	-	-	-	-	
MEPED	>0.8	-	-	-	-	
MEPED	>2.5	-	-	-	-	
MEPED	>6.9	-	20^h	100	1d	
MEPED	>16	-	20^h	3	1d	
MEPED	>36	-	20^h	1.7	1d	
MEPED	>70	-	18^h	0.2	1d	
MEPED	>140	-	-	-	-	
ACE						
SIS	>10	14^h	20^h	5	1d	
SIS	>30	14^h	20^h	1.3	1d	
SOHO						
EPHIN (INT)	>50		-	-	-	

Differential fluxes of protons for the event of 2006 December 05

S/c, instruments	ΔE, MeV	To	Tmax	Jmax, $(cm^2.s.sr.MeV)^{-1}$	Dura-tion	Comments
SOHO						
LION	0.75-2	-	20^h	0.18	1d	
LION	2-6	-	20^h	0.08	1d	
EPHIN	4-8	-	19^h	0.56	1d	
EPHIN	8-25	08^h	19^h	0.17	1d	
EPHIN	25-41	08^h	19^h	0.02	1d	
EPHIN	41-53	- “ -	- “ -	- “ -	- “ -	
STEREO – A						
HET	13.6-29.5	12^h	23^h	0.35	1d	
HET	29.5-60	12^h	23^h	0.04	1d	
HET	60-100	12^h	23^h	0.001	1d	
STEREO - B						
HET	13.6-29.5	12^h	23^h	0.3	1d	
HET	29.5-60	12^h	23^h	0.04	1d	
HET	60-100	12^h	23^h	0.0015	1d	

References:

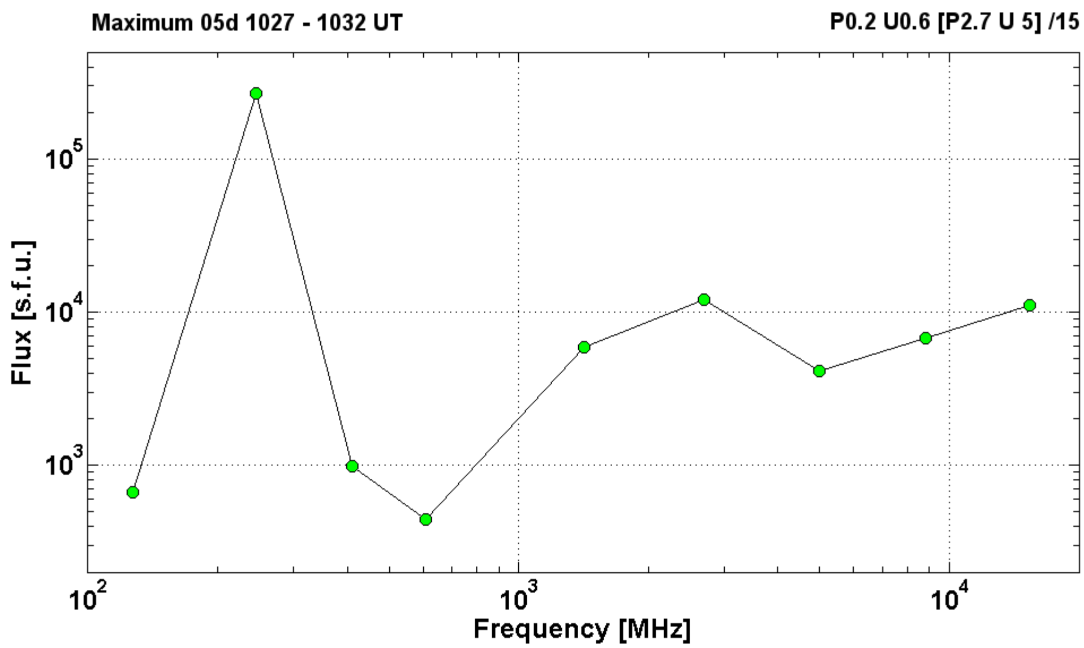
Struminsky A. and I. Zimovets I., 2008.
Cohen C.M.S., G.M. Mason, R.A. Mewaldt et al., 2009.
Damiani A., M. Storini, M. Santee et al., 2009.
Veselovskij I.S., I.N. Myagkova, O.S. Yakovchuk, 2012.

Electromagnetic and other phenomena that are sources and/or accompanying for the event of 2006 December 05

2006 December 05 ● AR10808 To event 473

Hα	6563 Å	1028	1038	1100	S07E79	2N	F
1 – 12	keV	1018	1035	1045		X9.0	7.1E-01
25-50	keV	103032	103938	114424		87206176	RHESSI

15.4	GHz	1025.0	1030.0	1105.0	P0.2 U0.6[P2.7 U 5]/15	4.04	
8.8	GHz	1025.0	1030.0	1058.0		3.83	
5	GHz	1025.0	1030.0	1057.0		3.61	
2.7	GHz	1024.0	1029.0	1056.0		4.08	
1.4	GHz	1027.0	1030.0	1037.0		3.77	
610	MHz	1027.0	1028.0	1044.0		2.64	
410	MHz	1026.0	1029.0	1059.0		2.99	
245	MHz	1027.0	1027.0	1105.0		5.43	
127	MHz	1026.0	1032.2	1042.0		2.83	
DS II	100-300	1028		1036	H	3	
DS II	38-73	1034		1039		3	
DS IV	25-180	1034		1054		2	
DS III	110-400	1026		1033	GG,RS	3	
DS III	25-180	1027		1034		2	
DS DCIM	100-4000	1025		1234	P	3	
CME	WL						gap

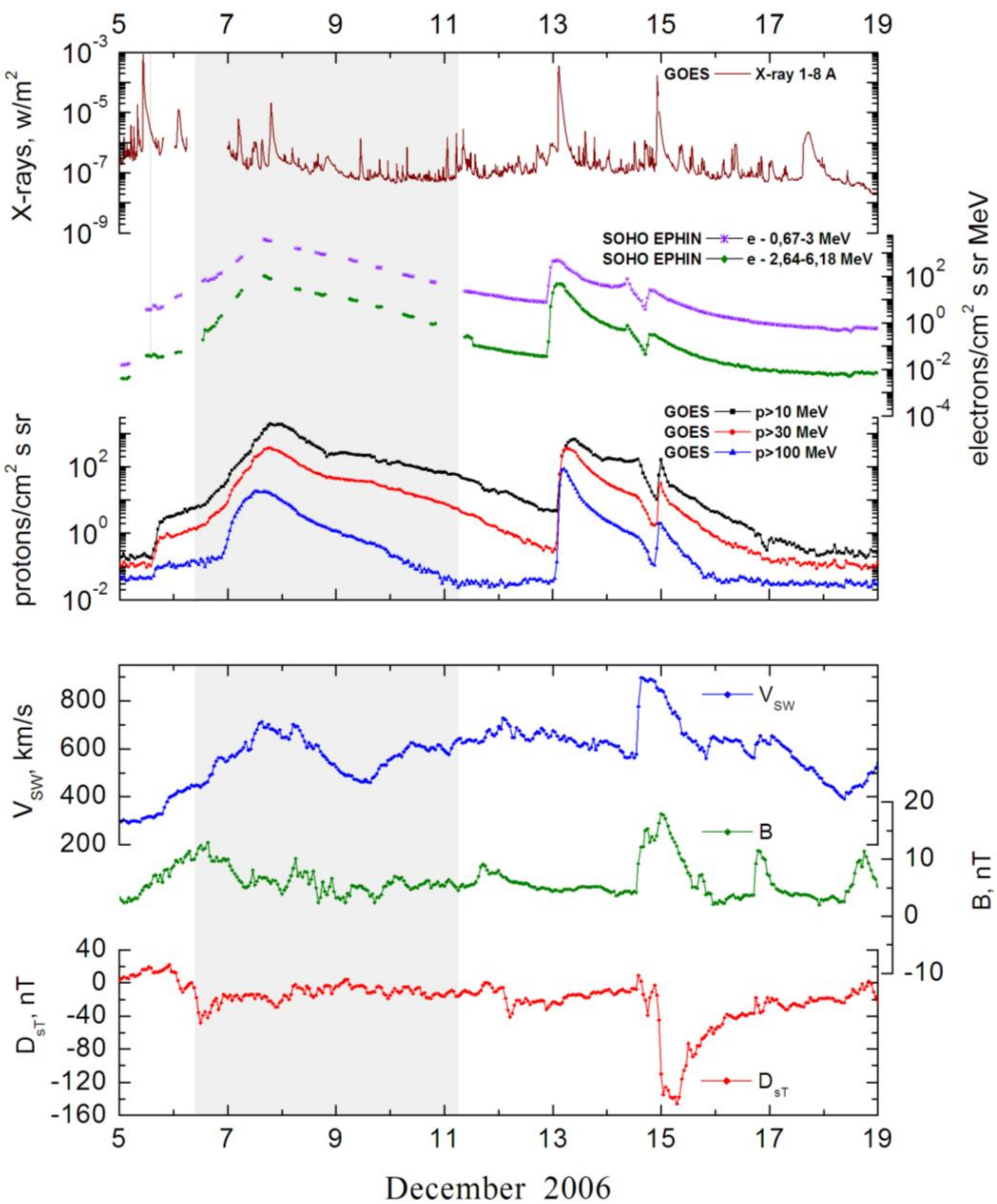


Event 2006.12.06 – (2006-340) **№ 474**

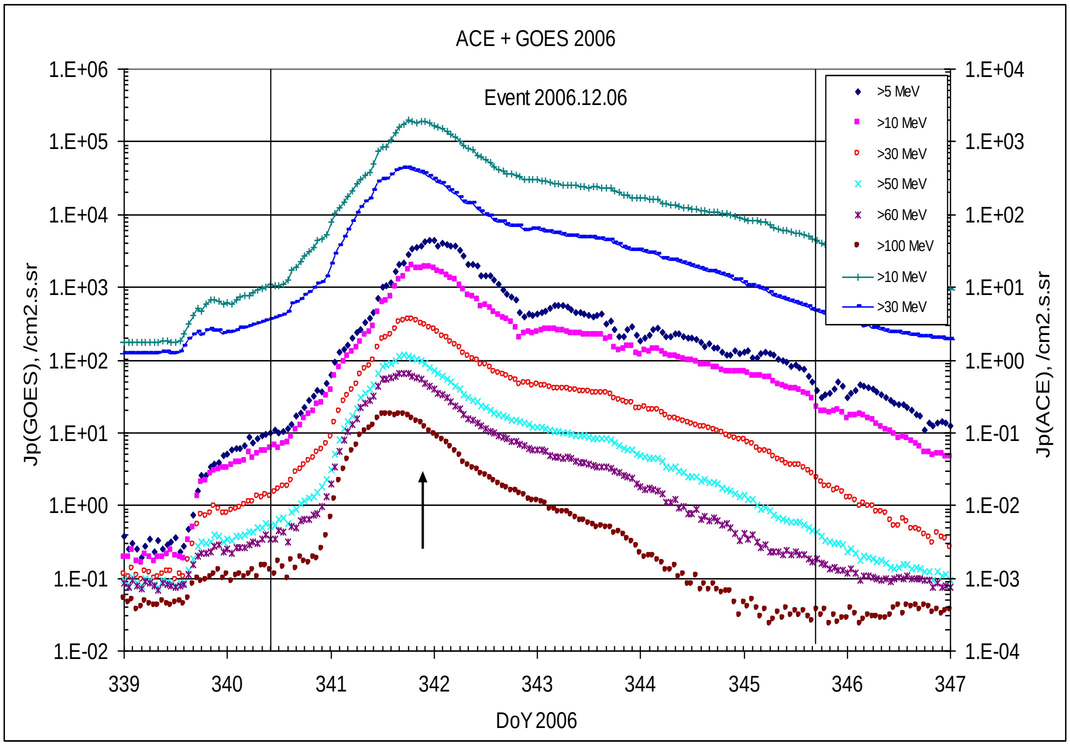
Particle event: To(Ep>10MeV) – 06d10^{h}
Tmax(Ep>10MeV) – 07d22^{h}, Jmax(Ep>10MeV) – 1860 /cm^{2}.s.sr
Duration of the event – 5 days
Quasimaximal energy of protons in the event – Eqm = 850 MeV

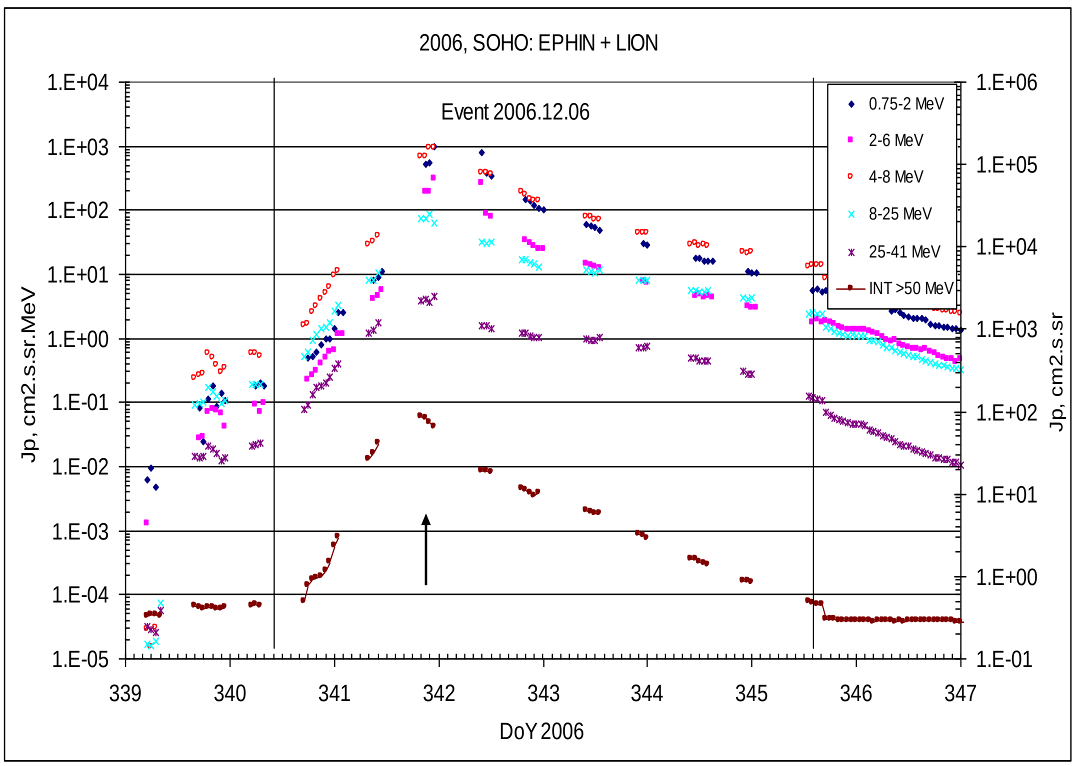
Sources: ● solar flare 06d18^{h}29^{m}, X6.5/3B, S06E63 AR10930
Main x-ray burst 1–8 Å: onset – 06d 18^{h} 29^{m}, max – 06d18^{h}47^{m}, Φ = 0.480 J/m^{2}
CME: 06d20^{h}12^{m}, V = ….. km/s, Δφ = 360^{o}, dA = 135˚.
▲SC 08d 0435

Particle fluxes and associated phenomena



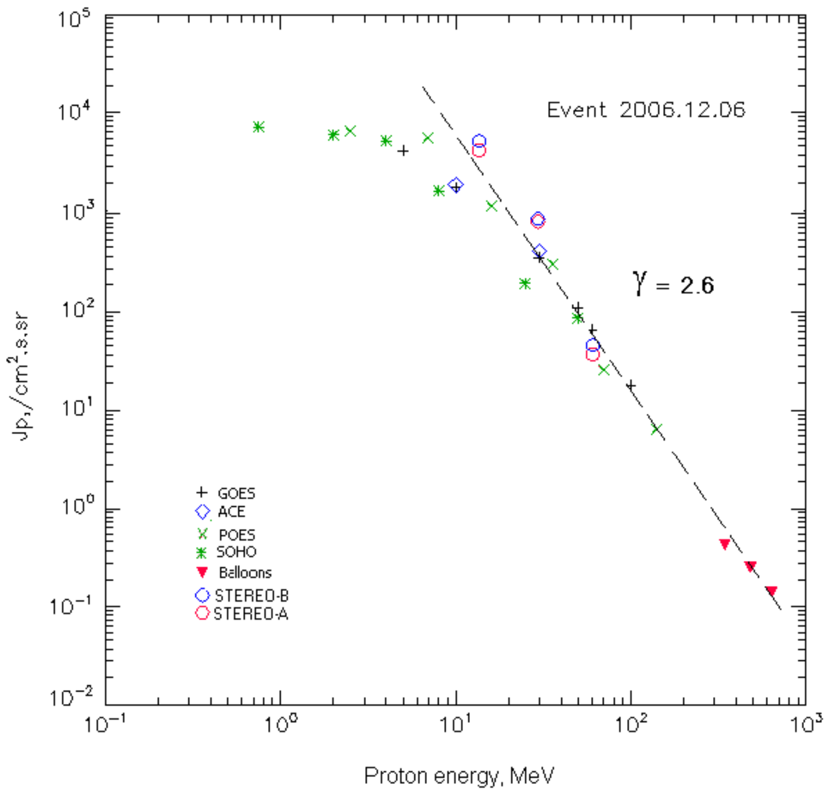
Time profiles of the proton fluxes for the event of 2006 December 06





Arrows on the profiles of the events indicate the time of the proton flux maxima, taken to build the proton spectra (see below)

Integral time-of-maximum proton spectrum



Integral fluxes of protons for the event of 2006 December 06

S/c, instruments	Ep, MeV	To	Tmax	Jmax, $(cm^2.s.sr)^{-1}$	Dura-tion	Comments
GOES-10						
EPS	>5	10^h	$7d23^h$	4460	6d	
EPS	>10	10^h	$7d22^h$	1860	6d	
EPS	>30	10^h	$7d18^h$	360	6d	
EPS	>50	10^h	$7d16^h$	112	5d	
EPS	>60	10^h	$7d16^h$	66	5d	
EPS	>100	10^h	$7d12^h$	18	4d	
POES-16						
MEPED	>0.24	-	-	-	-	
MEPED	>0.8	-	-	-	-	
MEPED	>2.5	-	$7d23^h$	7220	-	
MEPED	>6.9	-	$7d23^h$	6130	-	
MEPED	>16	-	$7d20^h$	1230	-	
MEPED	>36	-	$7d18^h$	310	-	
MEPED	>70	-	$7d14^h$	26	-	
MEPED	>140	-	$7d13^h$	6.5	-	
ACE						
SIS	>10	10^h	$7d18^h$	1990	6d	
SIS	>30	10^h	$7d16^h$	420	6d	
SOHO						
EPHIN (INT)	>50	10^h	$7d20^h$	86.8	5d	

BALLONS						
Mi	>345		$8d(09^h37^m-09^h57^m)$	0.42		12 hours after
Mi	>483		$8d(09^h37^m-09^h57^m)$	0.25		maximum
Mi	>642		$8d(09^h37^m-09^h57^m)$	0.14		

Differential fluxes of protons for the event of 2006 December 06

S/c, instruments	ΔE, MeV	To	Tmax	Jmax, $(cm^2.s.sr.MeV)^{-1}$	Dura-tion	Comments
SOHO						
LION	0.75-2	-	$7d23^h$	980	6d	
LION	2-6	-	$7d23^h$	310	6d	
EPHIN	4-8	-	$7d22^h$	950	6d	
EPHIN	8-25	10^h	$7d22^h$	90	6d	
EPHIN	25-41	10^h	$7d21^h$	4	6d	
STEREO – A						
HET	13.6-29.5	12^h	$8d00^h$	267	6.5d	
HET	29.5-60	12^h	$8d00^h$	27.5	6.5d	
HET	60-100	12^h	$8d00^h$	0.7	6.5d	
STEREO - B						
HET	13.6-29.5	12^h	$8d00^h$	342	6.5d	
HET	29.5-60	12^h	$8d00^h$	29.3	6.5d	
HET	60-100	12^h	$8d00^h$	0.83	6.5d	

References:

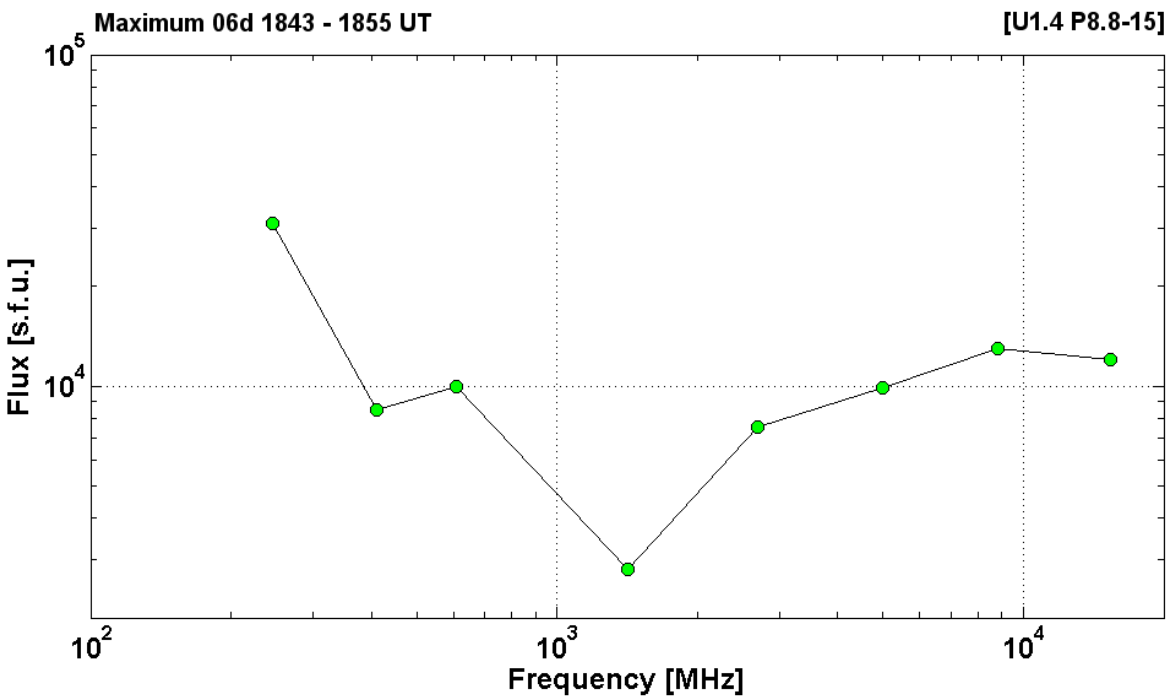
Struminsky A. and I. Zimovets, 2008.
Cohen C.M.S., G.M. Mason, R.A. Mewaldt et al., 2009.
Damiani A., M. Storini, M. Santee et al., 2009.
Veselovskij I.S., I.N. Myagkova, O.S. Yakovchuk, 2012.

Electromagnetic and other phenomena that are sources and/or accompanying for the event of 2006 December 06

2006 December 06 ● AR10930 To event 474

Hα	6563 Å	1832	1845	2135	S06E63	3B	FZ
1 – 12	keV	1829	1847	1900		X6.5	4.8E-1
300 800	keV	183232	184526	192232		60269264	RHESSI
6-12	keV	200740	200810	201332		120125	RHESSI
25-50	keV	201332	201746	204628		1984508	RHESSI
6-12	keV	204628	204750	204956		22362	RHESSI
6-12	keV	204956	205042	205436		26997	RHESSI
15.4	GHz	1838.0	1847.0	1937.0	[U1.4 P8.8-15]	4.08	
8.8	GHz	1833.0	1855.0	1959.0		4.11	
5	GHz	1832.0	1855.0	1959.0		4.00	
2.7	GHz	1842.0	1855.0	0000.0		3.88	
1.4	GHz	1841.0	1847.0	0000.0		3.45	

610	MHz	1842.0	1843.0	0000.0		4.00	
410	MHz	1844.0	1845.0	0000.0		3.93	
245	MHz	1844.0	1844.0	1855.0		4.49	
DS II	25-180	1842		1859		3	
DS IV	30-180	1844		1902		3	
DS III	30-180	1842		1844		2	
9.5	GHz	1916.2	1917.2	1959.6		2.79	
1.4	GHz	1842.0	1917.0	0000.0		5.18	
610	MHz	1844.0	1918.0	0000.0		4.28	
CME	WL	2012	–	–	360˚	135˚	

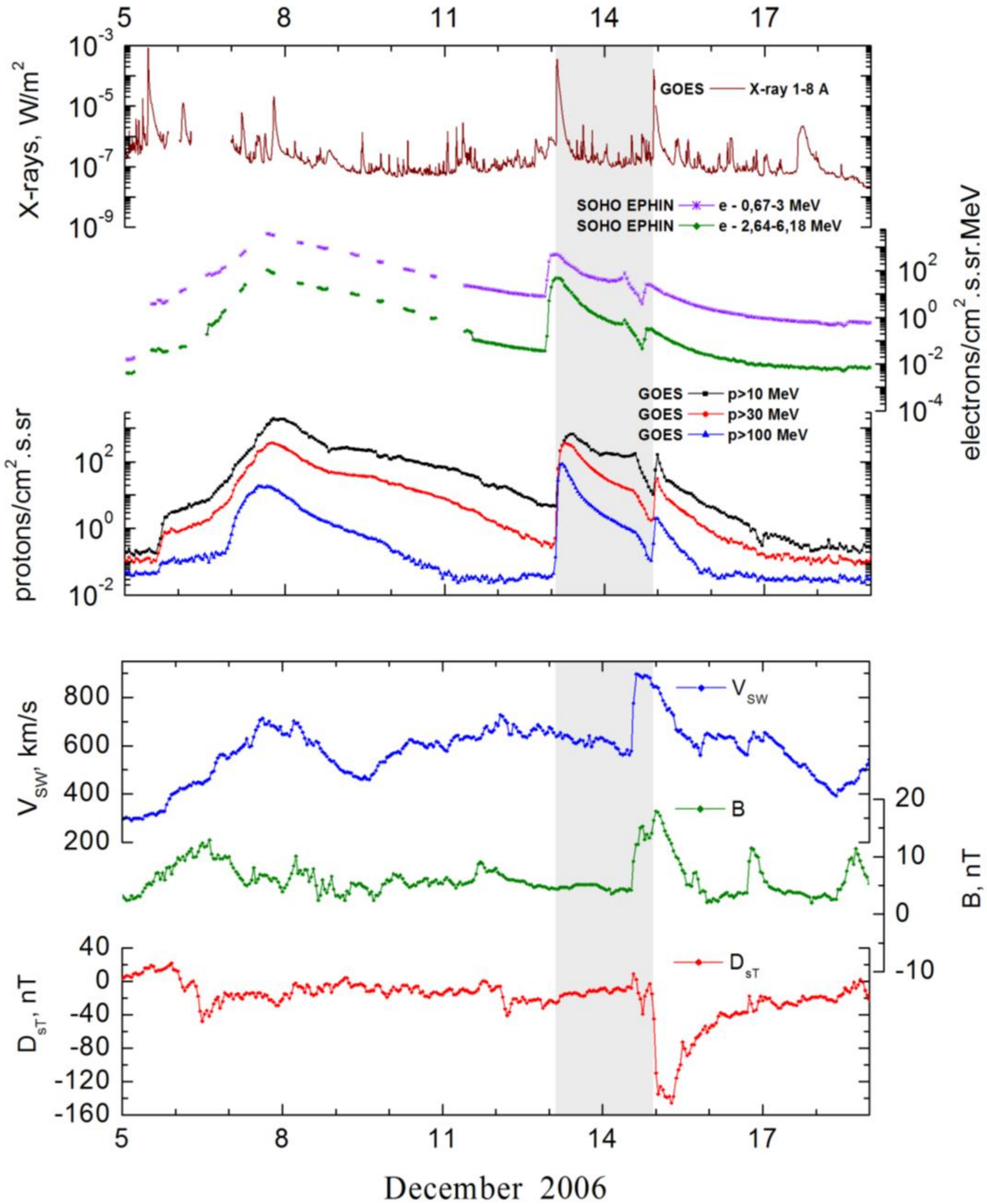


Event 2006.12.13 – (2006-347) – GLE-70 **№ 475**

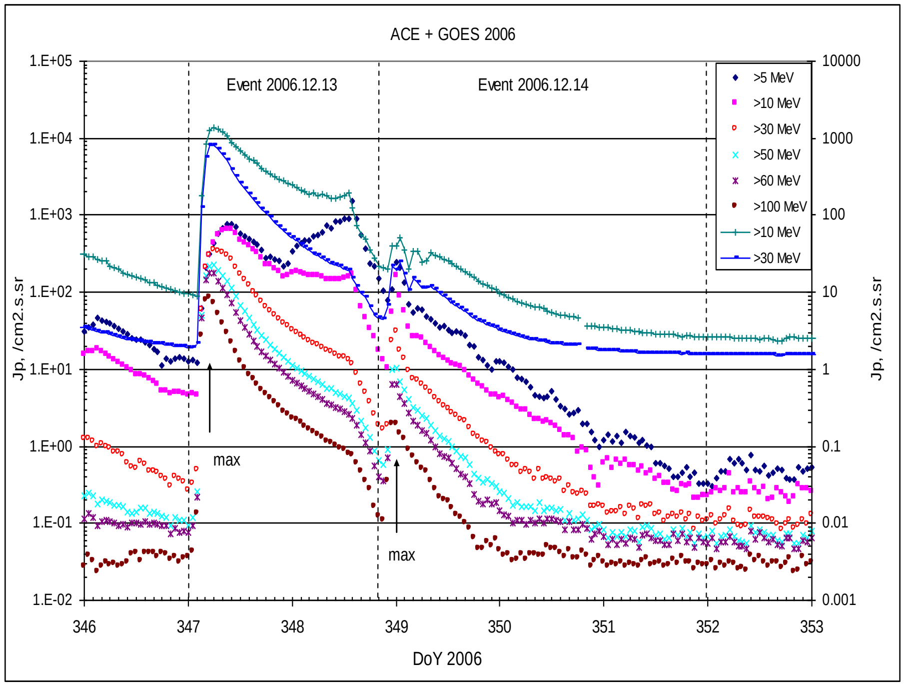
Particle event: To(Ep>10MeV) – 13d03^h
Tmax(Ep>10MeV) – 13d09^h, Jmax (Ep>10MeV) – 660 /cm^2.s.sr
Duration of the event – 2 days
Quasimaximal energy of protons in the event – Eqm = 3440 MeV

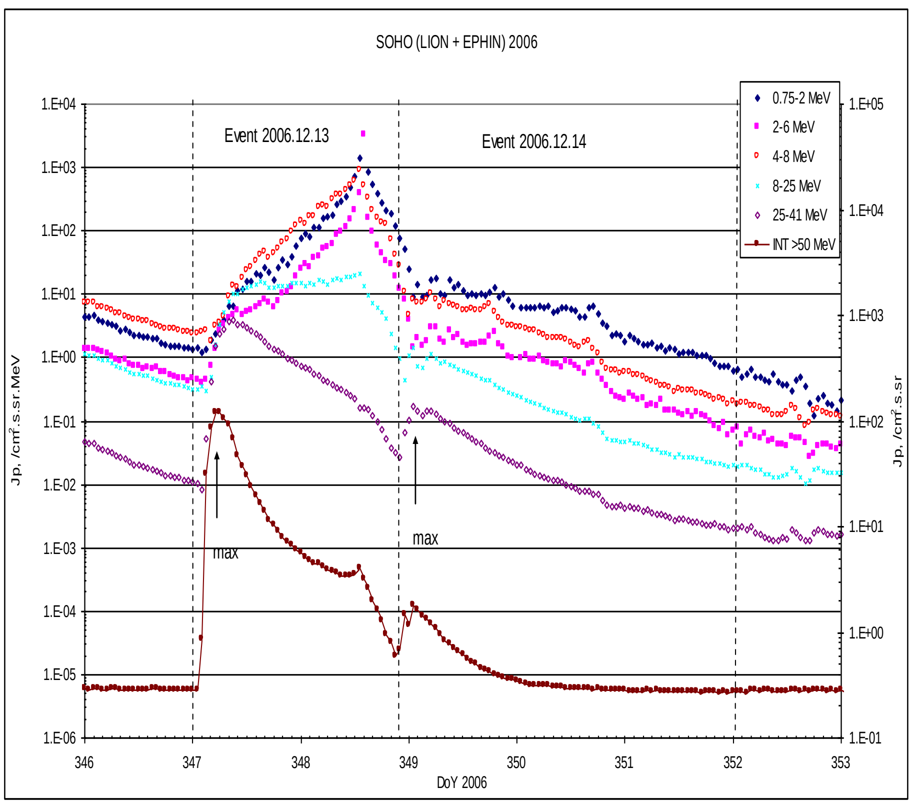
Sources: ● solar flare 13d02^{h}14^m, X3.4/4B, S06W24, AR10930
Main X-ray burst 1–8 Å: onset – 13d02^{h}14^m, max – 13d02^{h}40^m, Φ = 0.51 J/m^2
CME: 13d02^{h}54^m, V = 1774 km/s, Δφ = 360^o, dA = 193^o;
▲SC 14d14^{h}14^m

Particle fluxes and associated phenomena



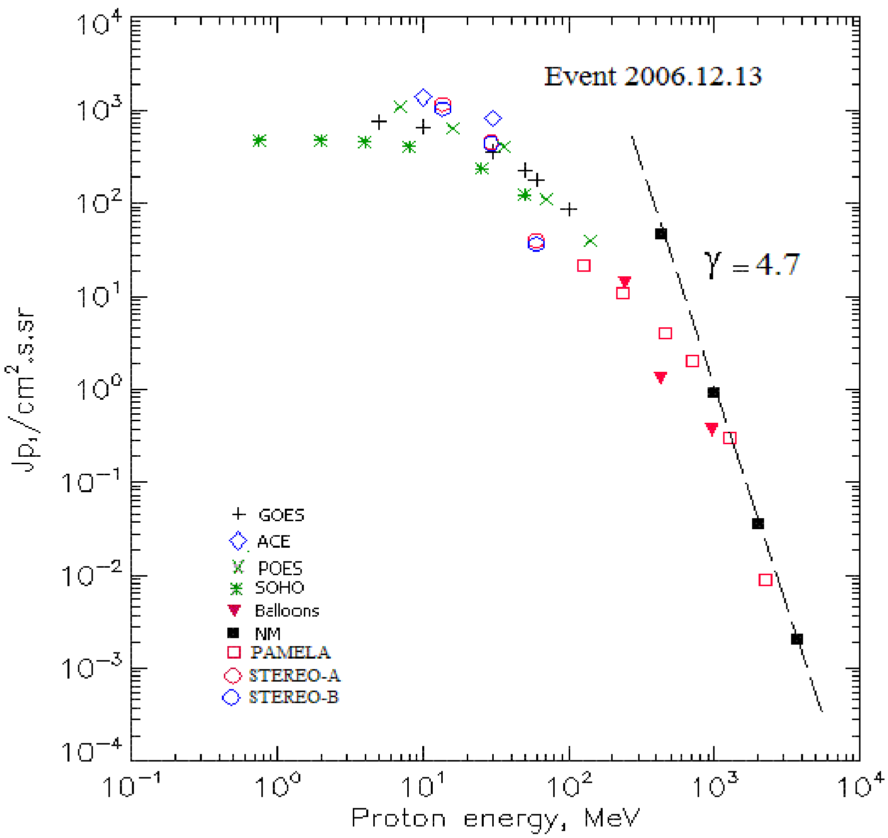
Time profiles of the proton fluxes for the event of 2006 December 13





Arrows on the profiles of the events indicate the time of the proton flux maxima, taken to build the proton spectra (see below)

Integral time-of-maximum proton spectrum



Integral fluxes of protons for the event of 2006 December 13

S/c, instruments	Ep, MeV	To	Tmax	Jmax, $(cm^2.s.sr)^{-1}$	Dura-tion	Comments
GOES-10						
EPS	>5	03^h	09^h	750	2d	
EPS	>10	03^h	09^h	660	2d	
EPS	>30	02^h	07^h	360	2d	
EPS	>50	02^h	06^h	227	2d	
EPS	>60	02^h	05^h	180	2d	
EPS	>100	01^h	05^h	86	2d	
POES-16						
MEPED	>0.8		-	-	-	
MEPED	>2.5		-	-	-	
MEPED	>6.9		05^h	1120	2d	
MEPED	>16		06^h	630	2d	
MEPED	>36		06^h	410	2d	
MEPED	>70		06^h	110	2d	
MEPED	>140		05^h	40	2d	
ACE						
SIS	>10	03^h	06^h	1375	2d	
SIS	>30	03^h	06^h	812	2d	
SOHO						
EPHIN (INT)	>50	02^h	06^h	122	2d	

BALLOONS						
Mu	>245	-	08^h24^m-09^h11^m	13.9	-	
Mu	>428	-	08^h24^m-09^h11^m	1.3	-	
Mu	>968	-	08^h24^m-09^h11^m	0.36	-	
NM						
Network	>433	-	04^h	46.8		
Network	>1000	-	04^h	0.915	-	
Network	>2000	-	04^h	0.035	-	
Network	>3700	-	04^h	0.002	-	

Differential fluxes of protons for the event of 2006 December 13

S/c, instruments	ΔE, MeV	To	Tmax	Jmax, $(cm^2.s.sr.MeV)^{-1}$	Dura-tion	Comments
SOHO						
LION	0.75-2	04^h	08^h	6,5	2d	
LION	2-6	04^h	08^h	4	2d	
EPHIN	4-8	05^h	09^h	13.2	2d	
EPHIN	8-25	04^h	09^h	10.2	2d	
EPHIN	25-41	03^h	09^h	4	2d	
STEREO-A						
HET	13.6-29.5	03^h	12^h	44	2d	
HET	29.5-60	03^h	12^h	13.5	2d	
HET	60-100	03^h	12^h	0.9	2d	
STEREO-B						
HET	13.6-29.5	03^h	12^h	39.3	2d	
HET	29.5-60	03^h	12^h	13.1	2d	
HET	60-100	03^h	12^h	0.9	2d	
PAMELA						
Tracker	126-136	03^h	05^h	0.23	>1.5d	
Tracker	237-265	03^h	04^h	0.068	>1.5d	
Tracker	455-512	03^h	03^h	0.016	>1.5d	
Tracker	713-804	03^h	03^h	0.0057	>1.5d	
Tracker	1260-1420	03^h	03^h	0.00051	>1.5d	
Tracker	2230-2520	03^h	03^h	0.0000134	>1.5d	

References:

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Cohen C.M.S., G.M. Mason, R.A. Mewaldt et al., 2009.
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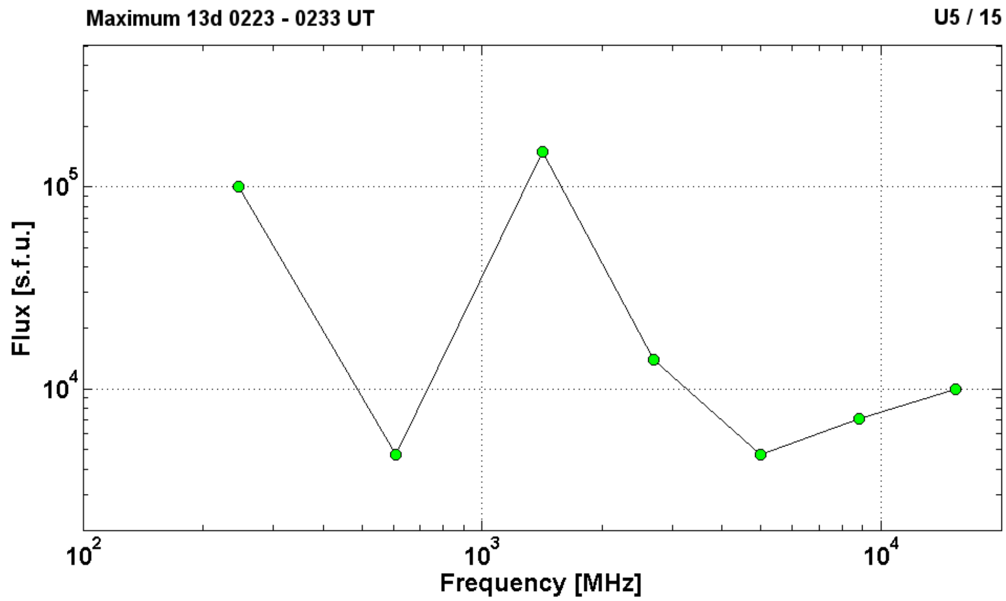
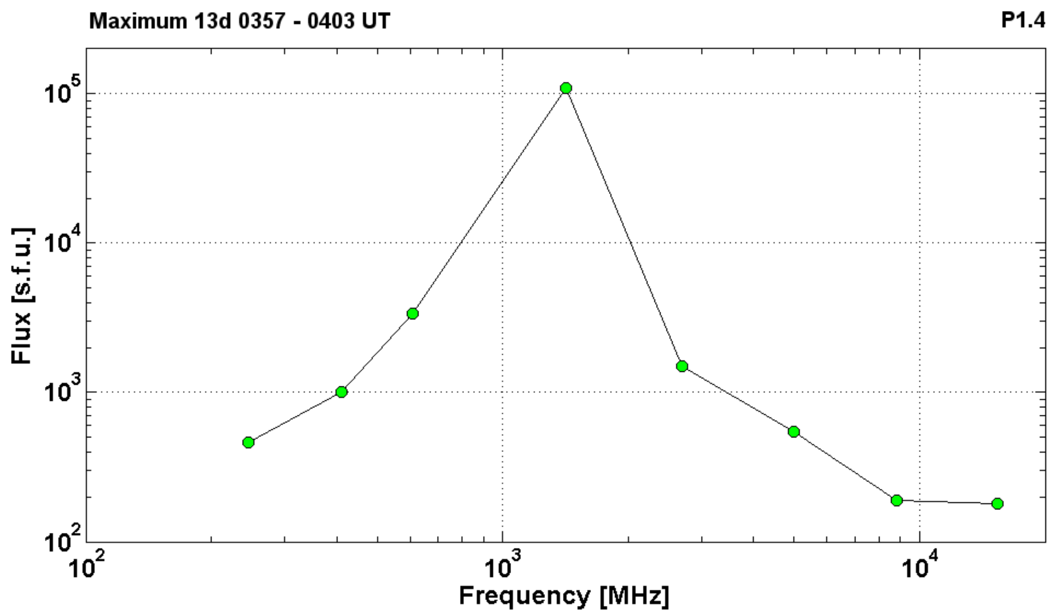
Electromagnetic and other phenomena that are sources and/or accompanying for the event of 2006 December 13

2006 December 13 ● AR10930 To event 475

Hα	6563 Å	0220	0234	0618	S06W24	4B	EF
1 – 12	keV	0214	0240	0257		X3.4	5.1E-1
100-300	keV	022812	023858	033104		248619072	RHESSI
6-12	keV	040408	040518	050640		4424582	RHESSI
15.4	GHz	0221.0	0229.0	0343.0	U5 / 15	4.00	
8.8	GHz	0221.0	0229.0	0325.0		3.85	
5	GHz	0222.0	0233.0	0326.0		3.67	
2.7	GHz	0222.0	0223.0	0000.0		4.15	
1.4	GHz	0223.0	0225.0	0326.0		5.18	
610	MHz	0223.0	0224.0	0000.0		3.67	
245	MHz	0224.0	0225.0	0326.0		5.00	
DS II	25-300	0227		0244		3	
DS IV	25-2000	0225		0404		3	
DS III	18-1800	0224		0233	GG	3	
DS V	25-180	0224		0226		3	
2.7	GHz	0222.0	0302.0	0326.0		4.81	
610	MHz	0223.0	0306.0	0326.0		5.08	
410	MHz	0224.0	0306.0	0326.0		4.30	
DS III	160-1800	0301		0307	GG	2	
DS III	25-120	0303		0307	G	1	
15.4	GHz	0356.0	0357.0	0402.0		2.26	
8.8	GHz	0356.0	0357.0	0359.0		2.28	
5	GHz	0355.0	0401.0	0404.0		2.74	
2.7	GHz	0355.0	0357.0	0404.0		3.18	
1.4	GHz	0355.0	0402.0	0404.0	P1.4	5.04	
610	MHz	0355.0	0359.0	0404.0		3.53	
410	MHz	0355.0	0403.0	0404.0		3.00	
245	MHz	0403.0	0403.0	~0403.0		2.66	
CME	WL	0254	1774 km/s	-61.4 km/s^2	360º	193º	



Maximum 13d 0223 - 0233 UT
U5 / 15
Flux [s.f.u.]
Frequency [MHz]



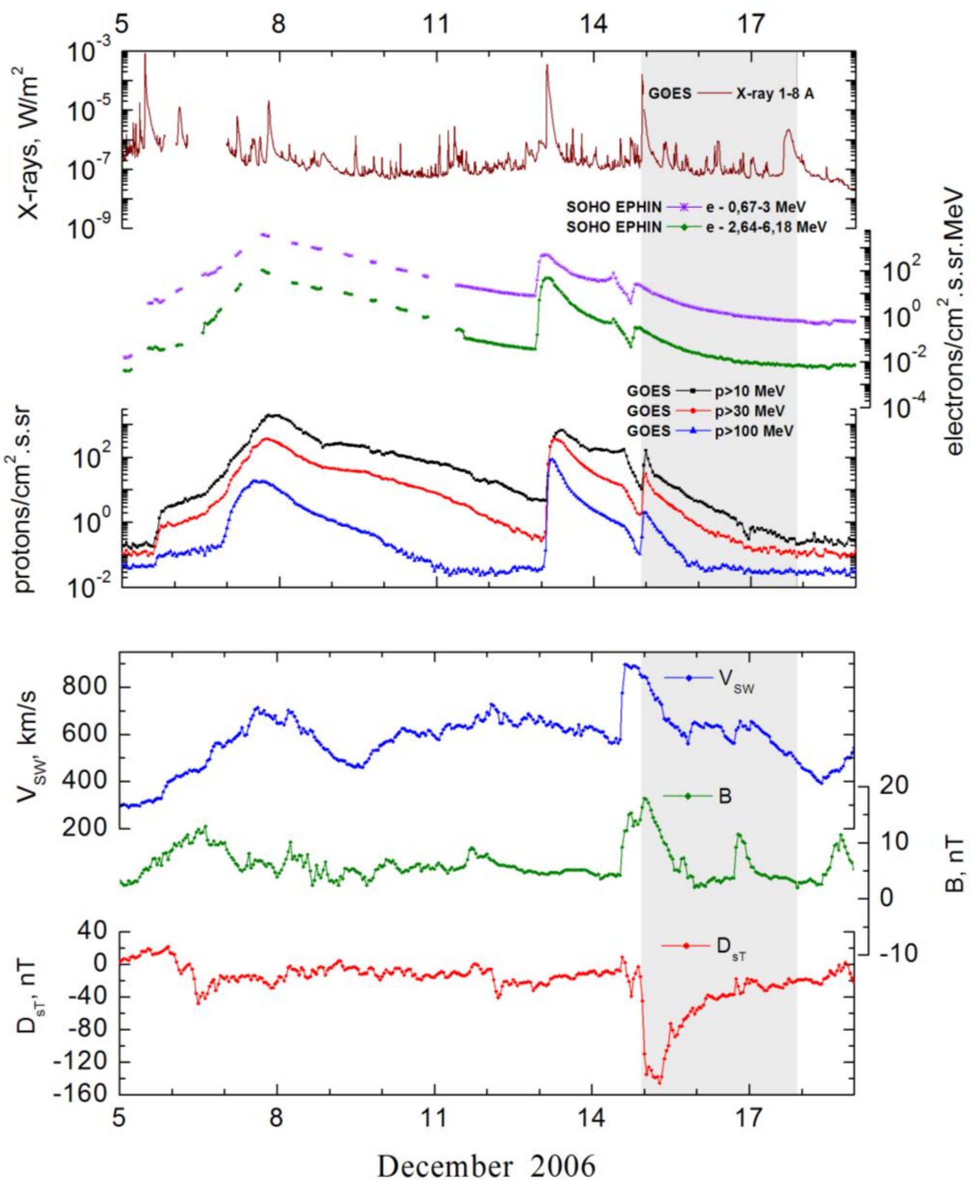
Maximum 13d 0357 - 0403 UT
P1.4
Flux [s.f.u.]
Frequency [MHz]

Event 2006.12.14 – (2006-348) **№ 476**

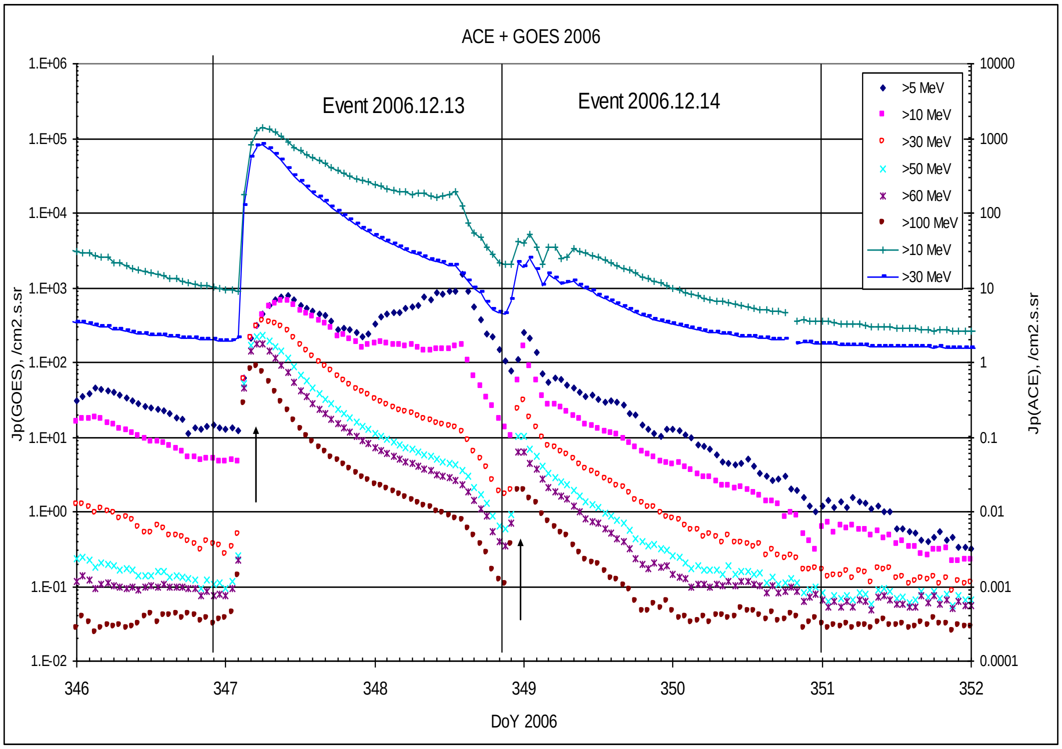
Particle event: To(Ep>10MeV) – 14d23^h
Tmax(Ep>10MeV) – 15d00^h, Jmax (Ep>10MeV) – 160 /cm^2.s.sr
Duration of the event – 3 days
Quasimaximal energy of protons in the event – Eqm ≥ 500 MeV

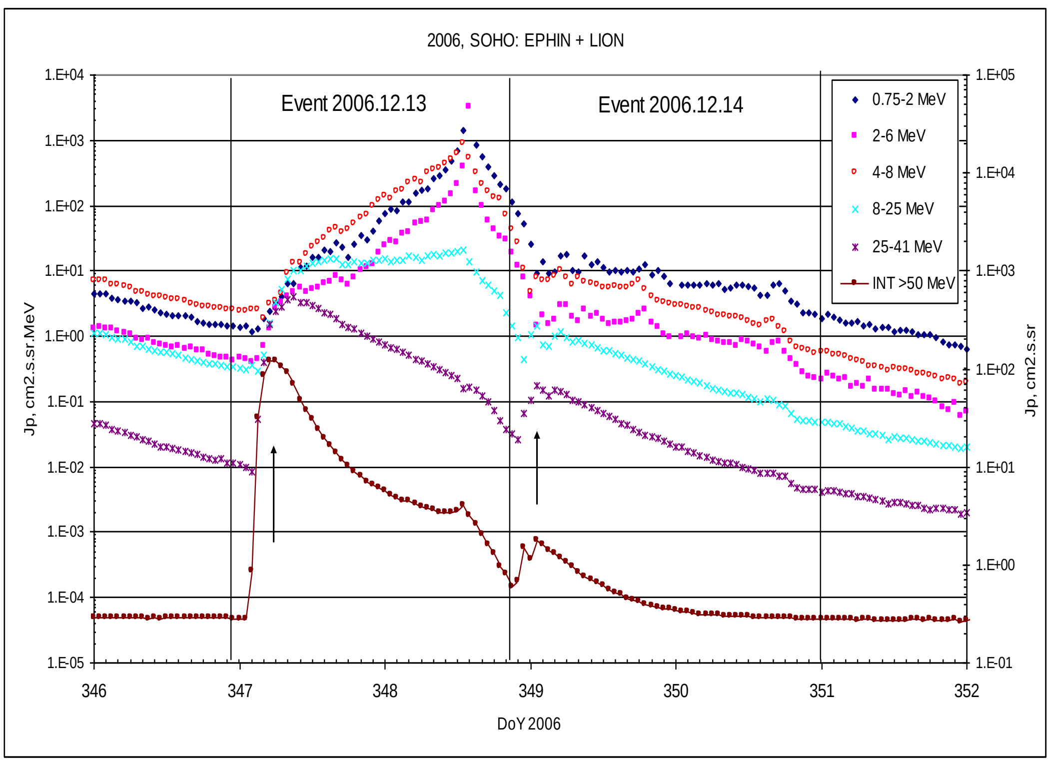
Sun source: ● solar flare 14d21^{h}07^m, X1.5/2B, S06W46, AR10930
Main X-ray burst 1-8 Å: onset – 14d21^{h}07^m, max – 14d22^{h}15^m, Φ = 0.12 J/m^2
CME: 14d22^{h}30^m, V = 1042 km/s, Δφ = 360^o, dA = 248^o;
▲SC 16d17^{h}55^m;

Particle fluxes and associated phenomena



Time profiles of the proton fluxes for the event of 2006 December 14

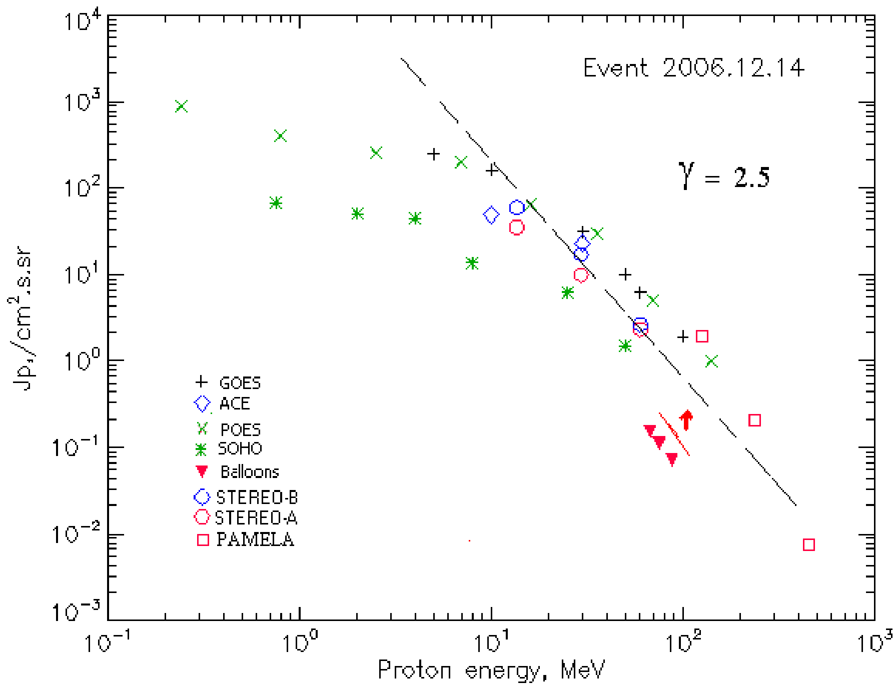




Arrows on the profiles of the events indicate the time of the proton flux maxima, taken to build the proton spectra (see below)

Список 2006 г.

Integral time-of-maximum proton spectrum



Integral fluxes of protons for the event of 2006 December 14

S/c, instruments	Ep, MeV	To	Tmax	Jmax, $(cm^2.s.sr)^{-1}$	Dura-tion	Comments
GOES-10						
EPS	>5	23^h	$15d00^h$	245	3d	
EPS	>10	23^h	$15d00^h$	160	3d	
EPS	>30	23^h	$15d00^h$	31	2d	
EPS	>50	22^h	$15d00^h$	10	2d	
EPS	>60	22^h	23^h	6.2	1d	
EPS	>100	22^h	23^h	1.9	1d	
POES-16						
MEPED	>0.24	-	$15d02^h$	920	3d	
MEPED	>0.8	-	$15d02^h$	410	3d	
MEPED	>2.5	-	$15d01^h$	250	3d	
MEPED	>6.9	-	$15d01^h$	230	3d	
MEPED	>16	-	$15d01^h$	65	2d	
MEPED	>36	-	$15d01^h$	31	2d	
MEPED	>70	-	$15d00^h$	5	1d	
MEPED	>140	-	$15d00^h$	1	1d	
ACE						
SIS	>10	23^h	$15d01^h$	49	2d	
SIS	>30	22^h	$15d01^h$	23	1d	
SOHO						
EPHIN (INT)	>50	22^h	$15d01^h$	1.5	1d	
BALLOONS						
Mi	>68	-	$16d11^h39^m$	0.15	-	After maximum
Mi	>75	-	$16d11^h39^m$	0.11	-	- “ -
Mi	>88	-	$16d11^h39^m$	0.07	-	- “ -

Differential fluxes of protons for the event of 2006 December 14

S/c, instruments	ΔE, MeV	To	Tmax	Jmax, $(cm^2.s.sr.MeV)^{-1}$	Duration	Comments
SOHO						
LION	0.75-2	$15d01^h$	$15d02^h$	13.2	3d	
LION	2-6	$15d01^h$	$15d02^h$	1.9	3d	
EPHIN	4-8	$15d00^h$	$15d01^h$	7.8	3d	
EPHIN	8-25	$15d00^h$	$15d01^h$	0.43	3d	
EPHIN	25-41	23^h	$15d01^h$	0.17	3d	
STEREO - A						
HET	13.6-29.5	23^h	$15d00^h$	1.6	8d	
HET	29.5-60	23^h	$15d00^h$	0.3	8d	
HET	60-100	23^h	$15d00^h$	0.016	8d	
STEREO - B						
HET	13.6-29.5	23^h	$15d00^h$	3.1	8d	
HET	29.5-60	23^h	$15d00^h$	0.54	8d	
HET	60-100	23^h	$15d00^h$	0.023	8d	
PAMELA						
Tracker	126-136	23^h	23^h30^m	0.03	<1d	
Tracker	237-265	23^h	23^h30^m	0.0017	<1d	
Tracker	455-512	23^h	23^h30^m	0.00013	<1d	

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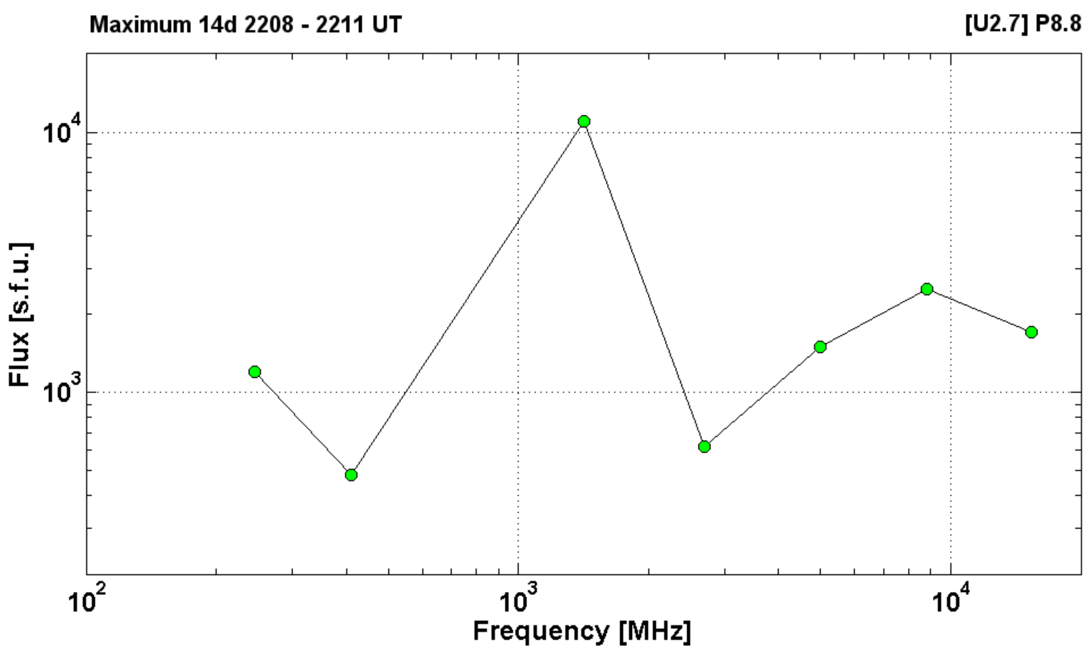
De Simone N., O. Adriani, G.C. Barbarino et al., 2009.
Veselovskij I.S., I.N. Myagkova, O.S. Yakovchuk, 2012.

Electromagnetic and other phenomena that are sources and/or accompanying for the event of 2006 December 14

2006 December 14 ● AR10930 To event 476

Hα	6563 Å	2206	2211	0011	S06W46	2B	EFZ
1 – 12	keV	2107	2215	2226		X1.5	1.2E-1
6-12	keV	213812	214106	214316		1525	RHESSI
6-12	keV	214316	214734	214824		1713	RHESSI
12-25	keV	233000	233302	233528		174608	RHESSI
15.4	GHz	2207.0	2209.0	0000.0		3.23	
8.8	GHz	2207.0	2211.0	2314.0	[U2.7] P8.8	3.40	
5	GHz	2206.0	2211.0	2316.0		3.18	
2.7	GHz	2207.0	2208.0	0000.0		2.79	
1.4	GHz	2207.0	2209.0	0000.0		4.04	
410	MHz	2207.0	2208.0	0000.0		2.68	
245	MHz	2209.0	2210.0	2227.0		3.08	

DS II	25-290	2209		2219		3	
DS IV	25-2000	2207		2312		2	
DS III	18-90	2219		2226	GG	3	
DS V	25-114	2218		2226		2	
2.7	GHz	2207.0	2228.0	2316.0		3.41	
1.4	GHz	2207.0	2307.0	2315.0	0.4 / 1.4	4.80	
610	MHz	2207.0	2302.0	2308.0		3.89	
410	MHz	2207.0	2247.0	2309.0		3.30	
DS III	20-1300	2244		2248	GG	1	
DS III	300-820	2301		2304	G	2	
CME	WL	2230	1714km/s	-0.4	360º	248º	



Сводная таблица солнечных протонных событий в 23 цикле солнечной активности (1997–2006 гг.)

Обозначения:

Имя события - (yyyymmdd-doy – год.месяц-день-день года);
То – час начала события, дата совпадает с датой в имени события;
T_{max} – время первого (второго и третьего, если есть) максимумов;
J_{max} – поток протонов с энергией ≥10 МэВ в первом (втором и третьем, если есть) максимуме;
γ – показатель степени интегрального спектра ($J(>E) \sim E^{-\gamma}$);
Eqm – квазимаксимальная энергия протонов в данном событии;
b/s – событие на невидимой полусфере Солнца;
W_L-1d – 1 день за W-лимбом;
DSF– длина выброшенного волокна в градусах;

Обозначения, относящиеся к вспышкам – общепринятые.

В таблице представлены все 142 события, включенные в Каталог солнечных протонных событий 23 цикла солнечной активности

Характеристики возрастания частиц						**Солнечные вспышки или CME - источники частиц**			
Наименова-ние события	**T_o**	**T_{max}**	**J_{max} (pfu)**	**γ**	**Eqm, МэВ**	**$T_{Fl\,max}/T_{0\,CME}/T_{0\,SC}$, (UT) ***	**Класс вспышки**	**Локали-зация**	**Активная область**
19971104-308	07^h	$04d11^h$ $05d02^h20$	66 17.5	2.0 1.8	470 320	● $04d05^h58^m$	X2.1/3B	S14W34	8100
19971106-310	13^h	$07d02^h$	430	3.5	2900	● $06d11^h55^m$	2B/X9.4	S18W63	8100
19971113-317	23^h	$14d04^h$	1.3	1.7	170	⊡ <13d22h26m	CME	b/s, W_L	8100, W_L-5d
19980420-110	11^h	$21d06^h$ $21d12^h$	860 $1.6 \cdot 10^3$	3.3 2.4	440 600	■ $20d10^h21^m$	M1.4/EPL	s20w90	8194, W_L-2d
19980430-120	02^h	$30d15^h$ $01d15^h$	1.3 1.2	2.9 2.6	65 75	● $29d16^h37^m$	M6.8/3B	S16E22	8210
19980502-122	14^h	$02d16^h$	130	1.8	800	● $02d13^h42^m$	X1.1/3B	S15W15	8210
19980506-126	08^h	$06d09^h$	120	2.6	575	● $06d08^h09^m$	X2.7/1N	S15W64	8210
19980509-129	06^h	$09d13^h$ $09d23^h$	4.7 8.9	2.3 2.3	230 230	■ $09d03^h40^m$	M7.7/ -	s15w90	8210, W_L-1d
19980616-167	21^h	$17d09^h$ $18d02^h$	1.3 1.4	2.4 2.2	80 75	■ $16d18^h\,42^m$	M1.0/ -	s22w90	8232, W_L-1d
19980822-234	06^h	$23d00^h$ $23d08^h$	1.7 1.5	1.8 1.8	80 85	● $22d00^h09^m$	M9.0/2B	N42E51	8307
19980824-236	23^h	$25d02^h$ $26d07^h$	96 320	1.7 3.4	720 310	● $24d22^h12^m$	3B/X1.0	N35E09	8307
19980923-266	13^h	$25d01^h$	22	3.3	75	● $23d07^h\,13^m$	M7.1/3B	N19E09	8340
19980930-273	14^h	$30d23^h$	785	2.3	600	● $30d13^h50^m$	M2.8/2N	N23W78	8340
19981018-291	22^h	$19d02^h$ $19d06^h$	1.8 2.3	2.2 2.8	140 80	o $15d{<}10^h05^m$ o $18d01^h45^m$	DSF/27° M2.4/2B	N19E10 N16W53	 8358
19981106-310	03^h	$06d12^h$	4.6	3.0	75	● $05d19^h55^m$	M8.4/2B	N22W18	8375
19981107-311	12^h	$07d14^h$ $08d02^h$	2.8 6	2.4 2.1	75 80	● $07d11^h06^m$ ▲SC $08d04^h51^m$	M2.4/SN	N14W43	8375
19981114-318	06^h	$14d12^h$ $15d06^h$	250 10	2.4 2.9	580 190	⊡ $14d05^h08^m$	C1.3/BSL	n28w90	8375, W_L-2d

Характеристики возрастания частиц						**Солнечные вспышки или CME - источники частиц**			
Наименова-ние события	**T_o**	**T_{max}**	**J_{max} (pfu)**	**γ**	**Eqm, МэВ**	**$T_{Fl\ max}/T_{0\ CME}/T_{0\ SC}$, (UT) ***	**Класс вспышки**	**Локали-зация**	**Активная область**
19981122-326	07^h	$22d09^h$ $22d14^h$	1.1 0.6	1.5 1.6	285 160	● $22d06^h\ 42^m$	X3.7/1N	S27W82	8384
19981124-328	03^h	$24d10^h$	1.25	1.6	210	● $24d02^h20^m$	X1.0/SF	S30W81	8384
19990120-020	23^h	$21d11^h$ $22d06^h$	1.3 1.0	1.7 1.8	270 250	⊡ $20d20^h04^m$	M5.2/...	n27e90	unknown, E_L
19990122-022	02^h	$22d16^h$ $22d14^h$	3 5	1.7 3.1	85 85	unknown Ø $22d17^h24^m$	M1.4/SF	N19W44	unknown 8440
19990424-114	15^h	$24d21^h$ $25d06^h$	3.7 4.3	2.2 2.3	85 210	⊡ $24d<13^h31^m$	CME	b/s, W_L	8517, W_L-3d
19990504-124	08^h	$05d21^h$ $06d06^h$	3.7 4.0	2.8 3.2	75 65	⊙ $03d06^h02^m$	M4.4/2N	N15E32	8525
19990509-129	19^h	$09d21^h$	1.2	1.5	75	■ $09d18^h07^m$	M7.6/ …	n23w90	8526, W_L-1d
19990527-147	12^h	$27d13^h$	2.75	1.6	275	⊡ < $27d11^h06^m$ ○ $26d19^h32^m$	CME M1.2/2N	b/s, W_L N17E46	unknown 8552
19990601-152	20^h	$02d09^h$ $02d21^h$	23 13	1.9 2.3	350 240	□ $01d19^h04^m$	C1.2/...	n25w90	unknown
19990604-155	08^h	$04d12^h$	20	2.3	300	● $04d07^h03^m$	M3.9/2N	N18W72	8552
19990611-162	01^h	$11d03^h$	2.2	1.7	240	□ $11d01^h10^m$	C1.0/…	b/s W event	unknown
19990625-176	10^h	$26d12^h$	1.7	3.5	40	Ø $26d05^h12^m$	M2.3/2B	N24E02	8598
19991117-321	19^h	$19d02^h$ $19d23^h$	1 0.4	2.55 3.1	50 25	● $17d09^h57^m$	M7.4/2B	N17E21	8766
20000218-049	06^h	$18d12^h$	1.7	2.0	290	⊙ $17d20^h45^m$	M1.3/2N	S29E07	8872
20000404-095	17^h	$05d02^h$ $06d06^h$	25 4	3.1 2.9	105 75	● $04d15^h41^m$	C9.7/2F	N16W66	8933
20000607-159	00^h	$08d10^h$	54	3.3	100	● $06d15^h25^m$	X2.3/3B	N20E18	9026
20000610-162	17^h	$10d20^h$	24	2.2	390	● $10d17^h02^m$	M5.2/3B	N22W39	9026
20000617-169	07^h	$18d06^h$	1.7	2.1	110	● $17d02^h37^m$	M3.5/2B	N22W72	9033
20000625-177	10^h	$26d07^h$	1.5	2.6	70	⊙ $25d07^h52^m$	M1.9/2N	N16W55	9046
20000713-195	06^h	$13d10^h$	5	3.1	40	⊙ $12d18^h47^m$	M5.7/2F	N16W64	9070
20000714-196	10^h	$14d18^h$ $15d13^h$	$7.2\ 10^3$ $1.8\ 10^4$	3.7 4.7	2160 630	● $14d10^h24^m$ SC $15d14^h37^m$	X5.7/3B	N22W07	9077
20000716-198	11^h	$16d12^h$ $17d02^h$	100 37	2.5 2.3	370 320	⊙ $15d08^h33^m$ Ø $16d23^h37^m$	M1.3/SF M1.4|2F	N16W12 N17W40	9077
20000722-204	12^h	$22d14^h$ $22d20^h$	13 6	1.8 2.6	340 80	● $22d11^h34^m$	M3.7/2N	N14W56	9085
20000728-210	02^h	$28d06^h$ $28d12^h$	5 13	2.1 2.8	140 105	⊙ $27d23^h42^m$	M1.2/SF	N11W78	9090
20000811-224	15^h	$11d17^h$	3.2	3.3	75	□ $<11d16^h54^m$	CME	b/s, E_L	unknown
20000813-226	01^h	$13d06^h$	1.2	3.35	70	● $12d09^h56^m$	M1.1/SN	S16W79	9119
20000912-256	14^h	$13d02^h$	180	2,6	350	● $12d12^h00^m$	2F/M1.0	S19W08	9163
20001016-290	08^h	$16d11^h$ $16d17^h$	3.5 9.8	1.7 2.6	310 140	□ $16d07^h28^m$	M2.5/ -	n05w90	9182
20001025-299	13^h	$25d23^h$	4.1	2.2	95	⊡ $25d11^h25^m$	C4/…	… W90	unknown
20001031-305	07^h	$01d03^h$	2.1	2.3	70	○ $31d03^h00^m$	C6.0/1N	S20E80	9209
20001108-313	23^h	$09d15^h$	$9.7\ 10^3$	3.7	650	● $08d23^h\ 28^m$	3F/M7.4	N20W66	9213
20001124-329	07^h	$24d21^h$	65	1.7	460	● $24d05^h02^m$	X2.0/3B	N20W05	9236

Характеристики возрастания частиц						Солнечные вспышки или CME - источники частиц			
Наименова-ние события	**T_o**	**T_{max}**	**J_{max} (pfu)**	**γ**	**Eqm, МэВ**	**$T_{Fl\ max}/T_{0\ CME}/T_{0\ SC}$, (UT) ***	**Класс вспышки**	**Локали-зация**	**Активная область**
20001126-331	03^h	26d20^h	670	2.9	400	● 25d01^{h}31^m	M8.2/2N	N07E50	9240
20010128-028	18^h	29d01^h	29	2.1	325	● 28d16^{h}40^m	1N/M1.5	S04W59	9313
20010226-057	09^h	26d20^h	1	2.4	65	⊡ 26d07^{h}41^m	C1.6/…	s04w90	9354
20010326-085	20^h	27d08^h	1.8	3.0	55	⊙ 26d13^{h}26^m	M2.2/1F	N15E27	9393
20010329-088	13^h	29d19^h 31d00^h	7 22	2.3 3.1	215 115	● 29d10^{h}15^m	1N/X1.7	N16W12	9393
20010402-092	23^h	03d07^h	112	2.9	575	■ 02d21^{h}51^m	X>17.5/	n19w90	9393
20010409-099	17^h	09d20^h	2.2	1.2	390	● 09d15^{h}34^m	M7.9/1B	S21W04	9415
20010410-100	08^h	11d01^h 11d20^h	50 280	2.2 2.8	350 260	● 10d05^{h}26^m Ø 11d13^{h}26^m	3N/X2.3 M2.3/1F	S23W09 S20W28	9415
20010412-102	12^h	12d17^h 13d10^h	4.3 8.7	1.45 1.5	410 275	● 12d10^{h}28^m	X2.0/2B	S20W42	9415
20010415-105	14^h	15d16^h	270	4.2	3480	● 15d13^{h}50^m	X14.4/2B	S20W84	9415
20010418-108	03^h	18d10^h	190	2.8	2100	⊡18d02^{h}14^m	C2.2	s20w90	9415
20010427-117	03^h	28d05^h	15	3.6	80	● 26d13^{h}20^m	M7.8/2B	N17W31	9433
20010507-127	14^h	07d18^h 08d12^h	7.7 11.5	2.3 3.15	80 85	⊡ <07d12^{h}06^m	CME	b/s, W_L	9433, 5d-W_L
20010520-140	07^h	20d10^h	1.8	1.75	410	● 20d06^{h}03^m	M6.4/	s18w90	9455
20010615-166	16^h	15d20^h 16d06^h	5 8.1	2.1 2.7	335 120	⊡<15d15^{h}56^m	CME	b/s, W_L	unknown
20010809-221	20^h	09d11^h	6	3.3	85	⊙ 09d11^{h}22^m	C3.7/SF	N10E54	DSF
20010816-228	00^h	16d03^h 17d12^h	87 75	3.0 2.1	600 475	⊡ <15d23^{h}54^m	CME	b/s, W_L-	9557?,5d-W_L
20010915-258	12^h	15d15^h	6	2.4	150	●15d11^{h}28^m	1N/M1.5	S21W49	9608
20010924-267	11^h	24d18^h 25d07^h 25d22^h	390 $1.1\cdot10^3$ $9.5\cdot10^3$	3.8 2.5 3.2	470 580 580	● 24d10^{h}38^m Ø 25d04^{h}24^m SC 25d20^{h}25^m	X2.6/2B M7.6/1N	S17E26 S18W01	9632 9628
20011001-274	14^h	01d23^h 02d07^h	370 $1.3\cdot10^3$	4.8 5.6	155 150	■ 01d05^{h}15^m	M9.1/…	s18w80	9628
20011019-292	02^h	19d08^h 19d21^h	3.6 8	1.75 1.9	300 310	● 19d01^{h}05^m Ø 19d16^{h}13^m	X1.6/2B X1.6/2B	N16W18 N15W30	9691
20011022-295	16^h	22d21^h	17	1.5	425	● 22d17^{h}59^m	X1.2/2B	S18E16	9672
20011028-301	02^h	28d07^h	1.1	2.6	60	○ 28d04^{h}50^m	M1.3/1F	N12E40	9682
20011104-308	16^h	04d20^h 06d00^h	540 $2.4\cdot10^4$	3.2 4.5	750 685	Ø 04d06^{h}43^m ● 04d16^{h}20^m	C8.4/1N X1.0/3B	N14W57 N07W19	9682 9684
20011117-321	10^h	19d22^h	13	4.6	45	● 17d05^{h}25^m	M2.8/2N	S13E42	9704
20011122-326	21^h	23d10^h 24d06^h	$2.7\cdot10^3$ $1.1\cdot10^4$	4.2 4.5	390 350	Ø 22d20^{h}36^m ● 22d<23^{h}30^m	M3.8/2B M9.9/3B	S26W68 S13W38	9698 9704
20011226-360	05^h	26d11^h	336	2,55	800	● 26d05^{h}40^m	M7.1/1B	N08W54	9742
20011229-363	05^h	29d08^h	40	2,7	195	■ 28d20^{h}45^m	X3.4/ -	s26e90	9767
20011230-364	20^h	31d02^h 31d16^h	25.5 75	2.6 3.1	190 170	⊡ 29d21^{h}27^m	M1.8/	s08w90	9748
20020110-010	02^h	11d01^h	70	3.0	85	⊙ 09d18^{h}01^m	M9.5/2B	N13W02	9773
20020115-015	07^h	15d18^h	7.5	2.15	80	⊡ 14d06^{h}27^m	M4.4/…	s23w90	9767, 1.5d-W_L
20020220-051	07^h	20d08^h	3.3	2.5	145	● 20d06^{h}12^m	M5.1/1N	N12W72	9825

Содержание

Характеристики возрастания частиц						Солнечные вспышки или CME - источники частиц			
Наименова-ние события	T_o	T_{max}	J_{max} (pfu)	γ	Eqm, МэВ	$T_{Fl\ max}/T_{0\ CME}/T_{0\ SC}$, (UT) *	Класс вспышки	Локали-зация	Активная область
20020316-075	02^h	16d13^h 17d11^h	1.3 1.1	2.7 2.4	70 65	● 15d23h10m	M2.2/1F	S08W03	9866
20020318-077	00^h	18d15^h 19d06^h	14.5 20	2.65 2.6	155 145	⦿ 17d19^{h}31^m Ø 18d02^{h}31^m	M4.0/SF M1.0/SN	S22E16 S16E27	9871
20020320-079	13^h	20d17^h	8	3.6	60	○ 20d08^{h}33^m ▲SC20d13^{h}28^m	C1.9/SF	S19W41	9873
20020322-081	12^h	22d20^h 23d13^h	1 9	3.7 3.85	45 50	■ 22d11^{h}14^m SC 23d11^{h}37^m	M1.6/…	s10w90	9866
20020417-107	10^h	17d16^h	21	2.75	120	● 17d08h24m	M2.6/2N	S14W36	9906
20020419-109	05^h	19d09^h 19d19^h	1 2.7	3.5 3.4	45 50	SC 19d08^{h}36^m ○ 19d15h21m	- C2.5/SF	- S16W59	9906
20020421-111	01^h	21d03^h 21d09^h	915 $1.7\cdot10^3$	1.9 2.8	575 570	■ 21d01^{h}51^m	X1.5/1F	S14W84	9906
20020522-142	07^h	23d10^h 23d16^h	260 87	3.75 3	125 175	⦿ 22d03^{h}54^m	C5.0/SF	S22W53	DSF
20020707-188	13^h	07d20^h	26	2.8	85	■ 07d11^{h}43^m	M1/…	s19w90	10017
20020716-197	12^h	16d22^h 17d14^h	27 85	3.5 3.4	125 135	● 15d20^{h}08^m Ø 17d07^{h}13^m	3B/X3.0 M8.5/1B	N19W01 N20W16	10030
20020719-200	05^h	19d11^h	3.6	2.15	215	□ 18^{d}07^{h}44^m	X1.8/2B	N19W33	10030
20020722-203	01^h	22d11^h	18.5	2.6	85	□ 20d21^{h}30^m	X3.3/…	s13e90	10039
20020814-226	06^h	14d09^h 14d16^h	6.7 6.9	2.5 4	85 50	● 14d02^{h}12^m	M2.3/1N	N10W54	10061
20020817-229	00^h	17d10^h	1.7	2.6	70	● 16d12^{h}32^m	2N/M5.2	S14E20	10069
20020818-230	22^h	19d03^h 19d12^h	2.3 1.8	2.1 2.25	75 70	● 18d21^{h}25^m	1N/M2.2	S10W20	10069
20020820-232	09^h	20d10^h	2.5	1.95	80	● 20d01^{h}40^m	M5.0/1B	S10W35	10069
20020822-234	03^h	22d05^h	16	1.5	450	● 22d01^{h}57^m	M5.4/2B	S07W62	10069
20020824-236	01^h	24d03^h	92	2.1	775	● 24d01^{h}12^m	X3.1/1F	S02W81	10069
20020906-249	06^h	06d14^h 07d17^h	3 67	2.2 3.15	80 175	⊙ 05d17^{h}06^m SC 07d16^{h}38^m	C5.2/SF	N12E28	10102
20021109-313	17^h	10d02^h 10d13^h	150 40	3.5 3.1	160 145	● 09d13^{h}23^m Ø 10d03^h 21^m	M4.6/2B M2.4/2N	S04W29 S12W37	10180
20030528-148	04^h	28d11^h 29d16^h	2 77	2.0 2.95	170 175	● 27d23^{h}07^m Ø 29d01^{h}05^m	X1.3/2B X1.3/2B	S06W20 S06W37	10365
20030531-151	03^h	31d06^h	15.6	1.5	415	● 31d02^{h}24^m	M9.3/2B	S07W65	10365
20030618-169	08^h	20d06^h	10.2	2.7	180	⊙ 17d22^{h}55^m	M6.8/...	s12e60	10368
20031026-299*	18^h	26d20^h 27d02^h	230 360	3.1 2.9	340 400	● 26d18^{h}19^m	X1.2/1N	N02W38	10484
20031028-301	12^h	28d18^h 29d02^h	$4.6\cdot10^3$ $1.2\cdot10^4$	2.9 3.9	3340 1025	● 28d11^{h}10^m	X17.2/4B	S16E08	10486
20031029-302	22^h	29d23^h	$2.2\cdot10^3$	2.0	810	● 29d20^{h}49^m	X10.0/2B	S15W02	10486
20031102-306	17^h	02d23^h	990	3.1	1700	● 02d17^{h}25^m	X8.3/2B	S14W56	10486
20031104-308	22^h	05d07^h	126	2.7	445	● 04d19^{h}50^m	X>17.5/3B	S19W83	10486

Содержание

Характеристики возрастания частиц						Солнечные вспышки или CME - источники частиц			
Наименова-ние события	**T_o**	**T_{max}**	**J_{max} (pfu)**	**γ**	**Eqm, МэВ**	**$T_{Fl\ max}/T_{0\ CME}/$ $T_{0\ SC}$, (UT) ***	**Класс вспышки**	**Локали-зация**	**Активная область**
20031120 324	08^h	$20d11^h$	4.4	2.2	140	● $20d07^h47^m$ SC $20d08^h03^m$	M9.6/2B	N01W08	10501
20031121-325	08^h	$22d02^h$	10.7	2.5	80	● $20d23^h53^m$	M5.8/2B	N02W17	10501
20031202-336	12^h	$02d18^h$	21	4.0	100	⊙ $02d09^h47^m$	C7.2/…	s19w90	10508
20040411-102	06^h	$11d12^h$ $11d20^h$	13 14.5	3.0 3.0	95 80	● $11d04^h19^m$ Ø <$11d11^h54^m$	C9.6/1F CME	S14W47 b/s, W_L	10588 unknown
20040722-204	17^h	$22d20^h$ $23d10^h$	0.9 2	2.0 2.0	70 155	⊙ $22d00^h32^m$	M9.1/SB	n06e25	10652
20040723-205	16^h	$23d19^h$	1.8	2.25	75	⊙ $22d22^h58^m$	2N/M1.6	N05E04	10652
20040725-207	17^h	$25d21^h$ $26d23^h$	27 430	2.8 3.8	140 155	● $25d15^h14$ SC$26d22^h49^m$	M1.1/1F	N08W33	10652
20040801-214	01^h	$01d21^h$ $02d02^h$	5.2 4.8	2.25 2.3	80 75	⊡ $31d05^h16^m$ Ø $31d10^h35^m$	C8.4/… C5.3/	n02w90 n02w90	10652 >1,5d W_L
20040913-257	19^h	$13d23^h$ $14d05^h$	210 180	3.4 4.1	110 90	⊙ $12d00^h56^m$ Ø $12d01^h39$	M4.8/2N M3.2/SN	N04E42 S14W61	10672 10667
2004.09.19-263	18^h	$20d01^h$ $21d02^h$	46 10	2.2 2.2	390 100	● $19d17^h12^m$	M1.9/…	n03w60	10672
20041101-306	06^h	$01d08^h$	54	1.9	410	● $01d03^h22^m$	M1.1/1F	N15W41	10691
20041107-312	01^h	$07d23^h$ $09d00^h$	490 70	3.0 3.2	330 100	● $07d15^h42^m$ Ø $08d15^h49^m$	X2.0/… M2.3/1N	n10w15 N08W35	10696
20041110-315	02^h	$10d10^h$ $10d16^h$ $12d09^h$	264 193 75	2.2 2.5 3.0	485 430 110	● $09d17^h19^m$ Ø $10d02^h13^m$	M8.9/2N X2.5/3B	N07W51 N09W49	10969
20050115-015	07^h	$15d11^h$	7.4	1.7	300	● $15d06^h38^m$	M8.6/SF	N11E06	10720
20050116-016	00^h	$16d18^h$	330	2.9	330	● 15d23h02m	X2.6/3B	N14W08	10720
20050117-017	13^h	$17d17^h$	$3.8\cdot10^3$	2.8	750	● $17d09^h52^m$	X3.8/3N	N14W24	10720
20050120-020	06^h	$20d10^h$ $21d17^h$	$1.1\cdot10^3$ 134	3.9 2.2	3840 1520	● $20d07^h01^m$ SC $21d17^h11^m$	X7.1/2B	N12W58	10720
20050513-133	19^h	$14d03^h$ $14d14^h$ $15d03^h$	7.7 155 $1.9\cdot10^3$	1.85 3.3 4.4	300 85 85	● $13d16^h57^m$ SC 15d 02^h38^m	M8/2B	N12E12	10759
20050616-167	20^h	$17d04^h$	41	1.8	510	■ $16d20^h22^m$	M4.0/SF	N09W87	10775
20050710-191	03^h	$10d05^h$ $10d12^h$	1.1 1.9	1.85 2.8	75 70	● $09d22^h06^m$	M2.8/1N	N11W27	10786
20050713-194	17^h	$15d04^h$	9.7	2.6	115	● $13d14^h49^m$	M5/SF	N10W80	10786
20050714-195	14^h	$15d03^h$	130	3.15	185	■ $14d10^h55^m$	X1.2/…	n11w90	10786
20050717-198	14^h	$17d18^h$ $17d22^h$	12 19	2.25 3.9	85 85	⊡ $17d10^h32^m$	B1.1/…	n13w9	10786, 3d-W_L
20050725-206	21^h	$28d14^h$ $29d14^h$	30 36	2.8 2.8	85 85	□ $27d04^h33^m$ Ø$28d22^h08^m$	M3.7/... M4.8/SF	n10e90 N08E84	10792, E_L 10792
20050731-212	22^h	$01d05^h$ $02d01^h$	21 6	4.1 3.3	65 65	⊙ 30d 06^h35^m Ø $01d13^h51^m$	X1.3/2B M1.0/1F	N12E61 N14E29	10792
20050822-234	03^h	$22d07^h$	5.4	2.4	80	● $22d01^h33^m$	M2.6/1F	S09W48	10798
20050822a-234	19^h	$23d02^h$ $23d10^h$	280 290	3.1 3.0	330 290	● $22d16^h52^m$	M5.6/1N	S12W60	10798

Характеристики возрастания частиц						Солнечные вспышки или CME - источники частиц			
Наименова-ние события	T_o	T_{max}	J_{max} (pfu)	γ	Eqm, МэВ	$T_{Fl\ max}/T_{0\ CME}/T_{0\ SC}$, (UT) *	Класс вспышки	Локали-зация	Активная область
20050907-250	21^h	$08d20^h$ $10d11^h$	70 1000	2.3 3.0	800 555	● $07d17^h40^m$ Ø$09d20^h04^m$	X17.0/3B X6.2/2B	S06E89 S12E67	10808
20050914-257	00^h	$14d15^h$ $15d08^h$	160 180	3.5 3.75	85 85	● $13d19^h27^m$ SC 08^h35^m	X1.5/2B	S09E10	10808
20061205-339	15^h	$05d20^h$	2.5	1.8	275	● $05d10^h35^m$	X9/2N	S07E79	10930
20061206-340	10^h	$7d22^h$	$1.9 \cdot 10^3$	2.6	850	● $06d18^h47^m$	X6.5/3B	S06E63	10930
20061213-347	03^h	$13d09^h$	660	4.7	3440	● $13d02^h40^m$	X3.4/4B	S06W24	10930
20061214-348	23^h	$15d00^h$	160	2.5	≥500	● $14d22^h15^m$	X1.5/2B	S06W46	10930

*) **$T_{Fl\ max}$** – время пика интенсивности для вспышки (UT);
$T_{0\ CME}$ – время первого появления CME в поле зрения коронографа;
$T_{0\ SC}$ – время прихода SC к Земле.

Содержание