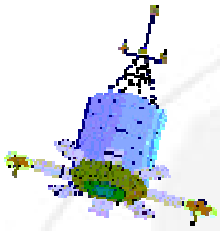
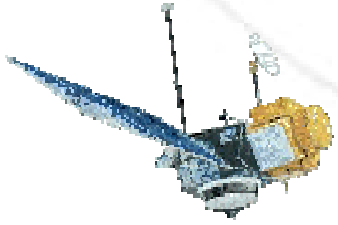
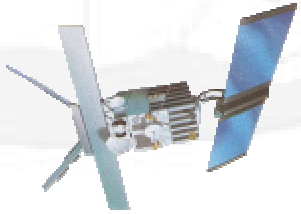
P. Medvedev, D.Pleshacov,
A. Bulychev

An Integrated Satellite Altimetry, Gravity and Geodesy Data Base: Data Processing and Regional Marine Gravity Field Modeling







Integrated Satellite Altimetry Data Base

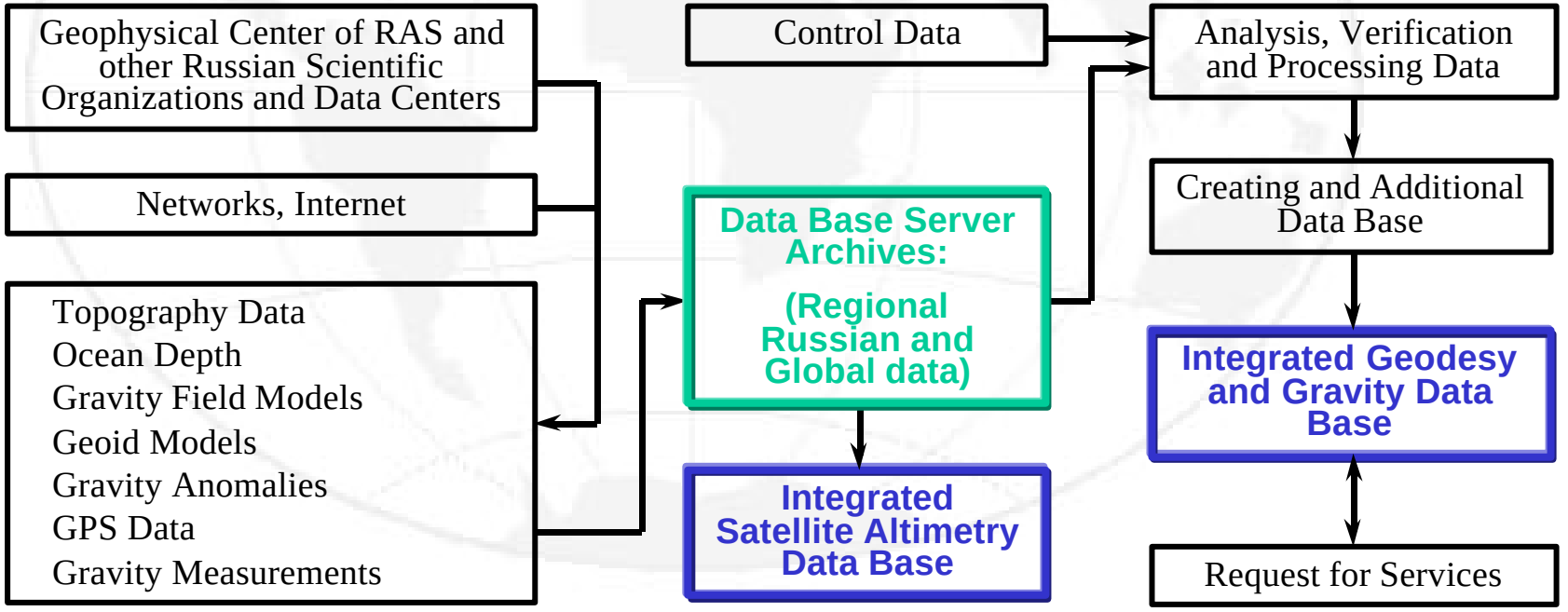
http://www.wdcb.rssi.ru/ALTIM/Welcome.htm

Abstract

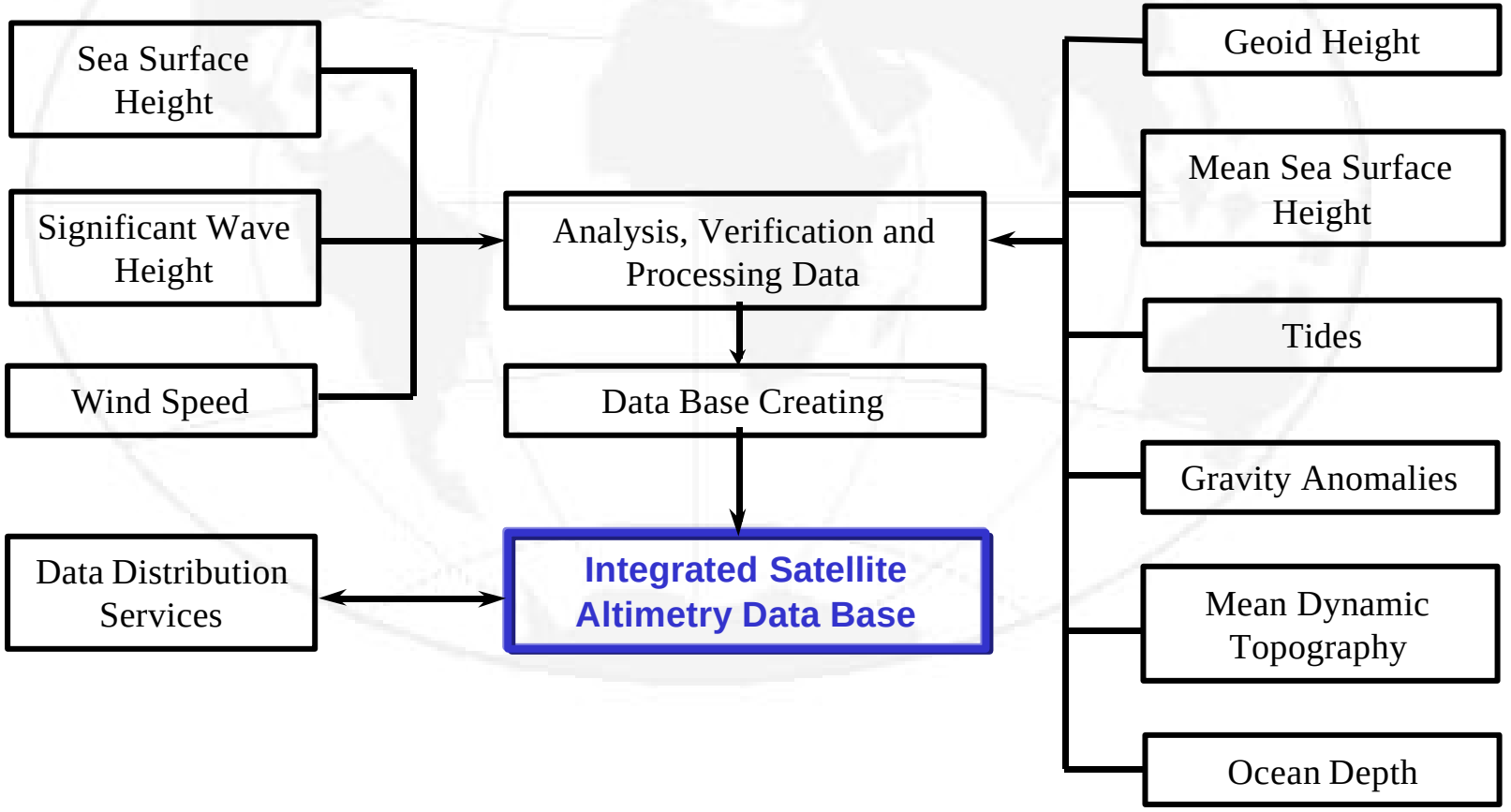
The integrated database of satellite altimetry data and supplementary gravity and geodesy information which is necessary for geodesy, geophysics, geology and oceanography applications was created in Geophysical Center of RAS. The satellite altimetry data sets of the Russian GEOIK geodetic satellites and GEOSAT and TOPEX/POSEIDON data are used for marine gravity modeling North Atlantic region, Baltic and Okhotsk sea. The results of these investigations are presented. Comparisons with gravity measurements and resolution of satellite altimetry data are discussed. New approach to processing the altimetric measurements for closed seas and some unsolved problems are discussing also. The work was supported by Russian Basic Research Foundation.

Principles Satellite Altimetry, Geodesy and Gravity Integrated Date Bases Construction

Integrated Satellite Altimetry Data Base

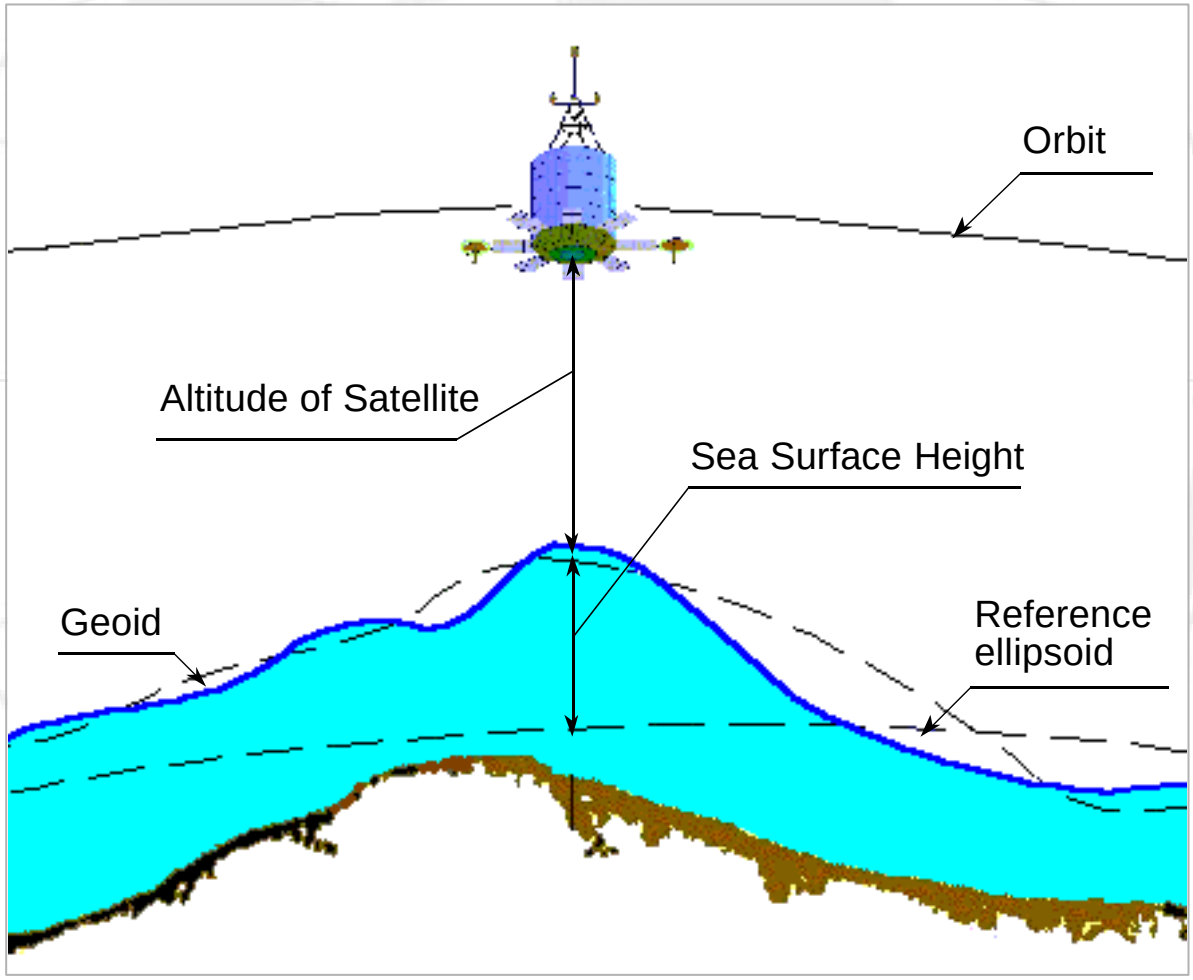


Integrated Satellite Altimetry Data Base



Integrated Satellite Altimetry Data Base

Satellite Altimetry Method



Integrated Satellite Altimetry Data Base

ISADB Data Records Format

	Parameter	Units
1	UTC (refers of January 1, 1985 00:00:00)	sec
2	UTC (continue)	10^{-3} sec
3	Latitude	10^{-6} deg.
4	Longitude	10^{-6} deg.
5	Sea Surface Height (with instrumental and environmental corrections)	10^{-2} ì
6	Number of Valid points for 1s altitude	
7	RMS One Per Second Altimeter Range	10^{-2} m
8	Additional to Sea Surface Height	m
9	Inverse Barometer correction	10^{-3} m
10	Mean Sea Surface Height	10^{-2} m
11	Geoid Height	10^{-2} m
12	Gravity Anomaly	10^{-4} Gal
13	Elastic Ocean Tide	10^{-3} m
14	Full Ocean Tide	10^{-3} m
15	Solid Tide	10^{-3} m
16	Geocentric Pole Tide	10^{-3} m
17	Ocean Mean Dynamic Topography	10^{-1} m
18	Ocean Depth	m
19	Significant Wave Height	10^{-3} m
20	Wind Speed	10^{-2} m/s
21	Flags	

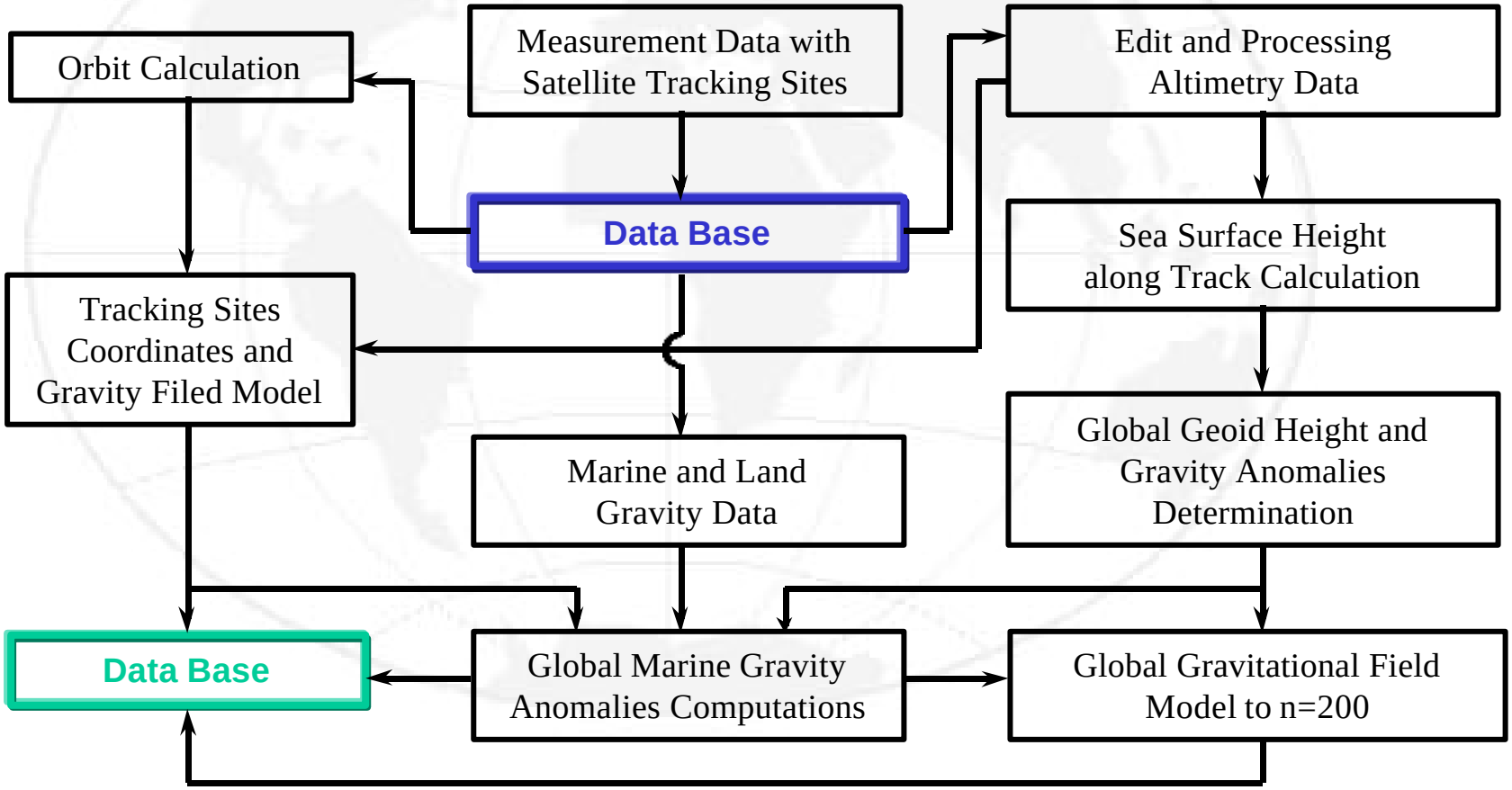
Satellite Altimetry Missions

Satellites	Country	Work Periods
GEOS-3	(USA)	Apr. 1975 - Dec. 1978
SEASAT	(USA)	Jul. 1978 - Nov. 1978
GEOSAT	(USA)	Mar. 1985 - Dec. 1989
GEOIK	(Russia)	Mar. 1985 - Jul. 1995
ERS-1	(ESA)	Aug. 1991 - to our time
TOPEX/POSEIDON	(USA-France)	Sep. 1992 - to our time
ERS-2	(ESA)	Apr. 1995 - to our time
GFO	(USA)	Feb. 1998
JASON-1	(USA)	May 2000
ENVISAT	(ESA)	May 2000
GEOIK-2	(Russia)	after 2000

Russian GEOIK mission

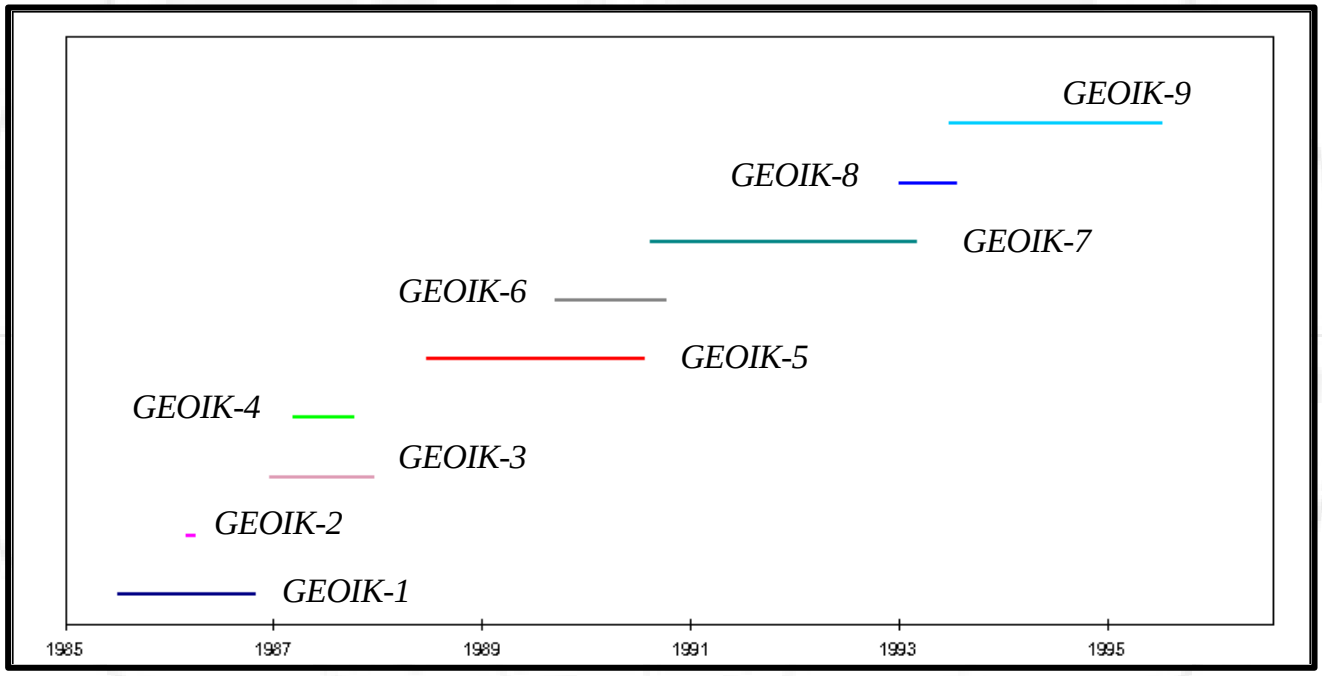
Satellites	Date of launch	Inclination, *deg.*	Periods	Standard deviation, *sm*
GEOIK-1	14.06.85	73.6	85.07.08 - 86.10.31	60
GEOIK-2	11.02.86	73.6	86.03.03 - 86.03.28	140
GEOIK-3	02.12.86	83.6	86.12.21 - 87.12.15	166
GEOIK-4	19.02.87	73.6	87.03.09 - 87.10.12	105
GEOIK-5	30.05.88	73.6	88.06.20 - 90.07.27	88
GEOIK-6	28.08.89	73.6	89.09.18 - 90.09.26	-
GEOIK-7	30.07.90	73.6	90.08.19 - 93.03.05	-
GEOIK-8	01.10.93	73.6	93.01.10 - 93.07.23	-
GEOIK-9	01.12.94	73.6	94.12.18 - 95.07.28	-

GEOIK Data Processing



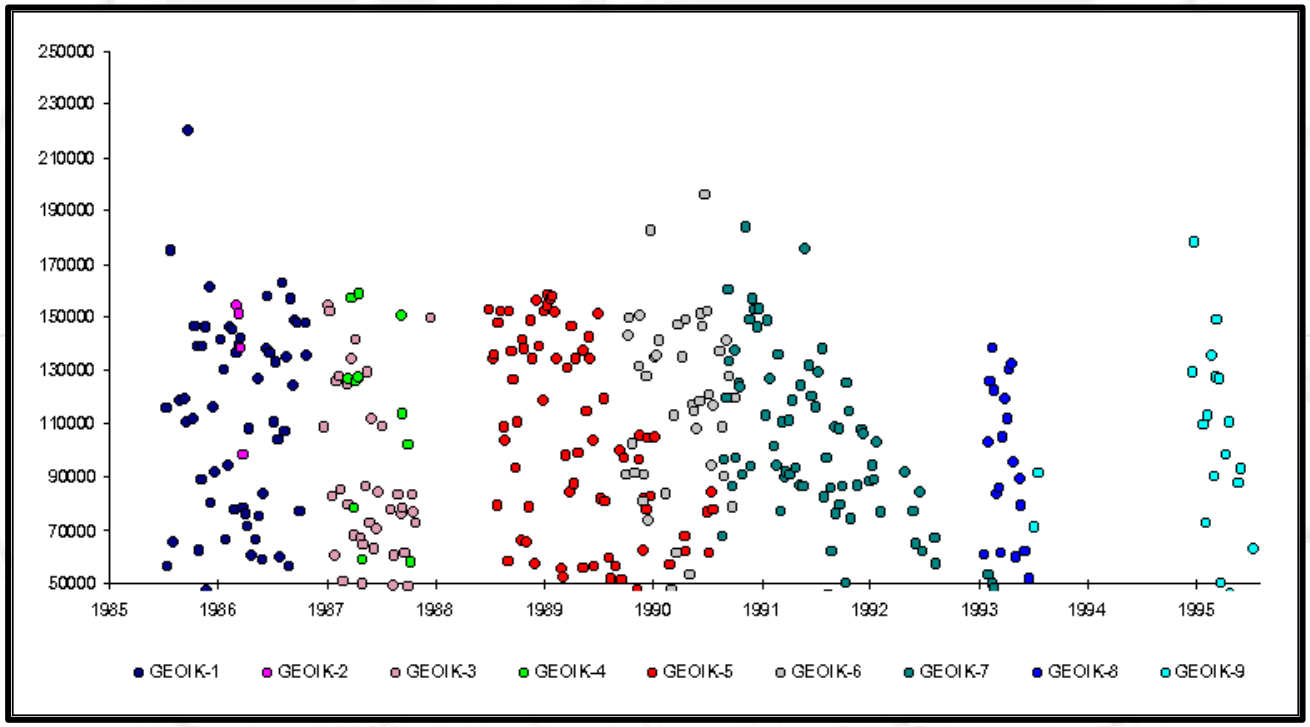
Integrated Satellite Altimetry Data Base

Statistics of GEOIK measurements



Time Period for All GEOIK Satellites

Statistics of GEOIK measurements

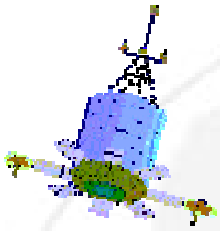


Number of Each Week Measurements for All GEOIK satellites

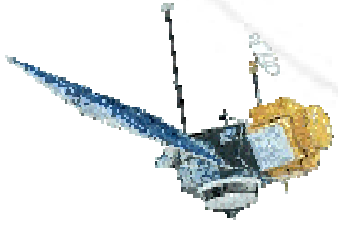
Satellite Altimetry Data Base

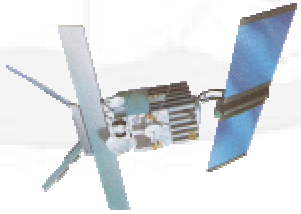
Satellites	Data Base	Inverting method
GEOSAT	Geodetic and Exact Repeat Mission	Time
GEOSAT	Crossover Difference Data Base	Regions
GEOIK	Geodetic program	Time and Satellite Number
ERS	Exact Repeat Mission	Pass
TOPEX/ POSEIDON	Exact Repeat Mission	Cycle and Pass

Integrated Satellite Altimetry Data Base



ISADB and IGGDB Utilization





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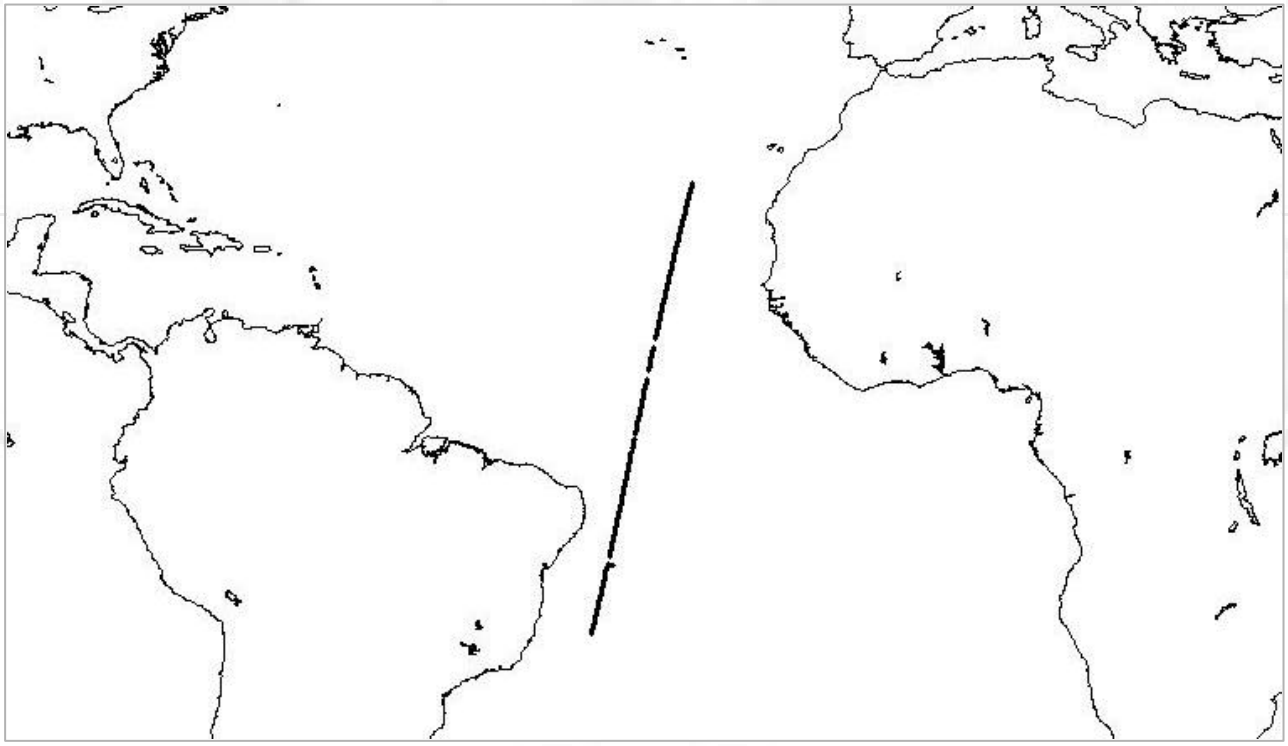
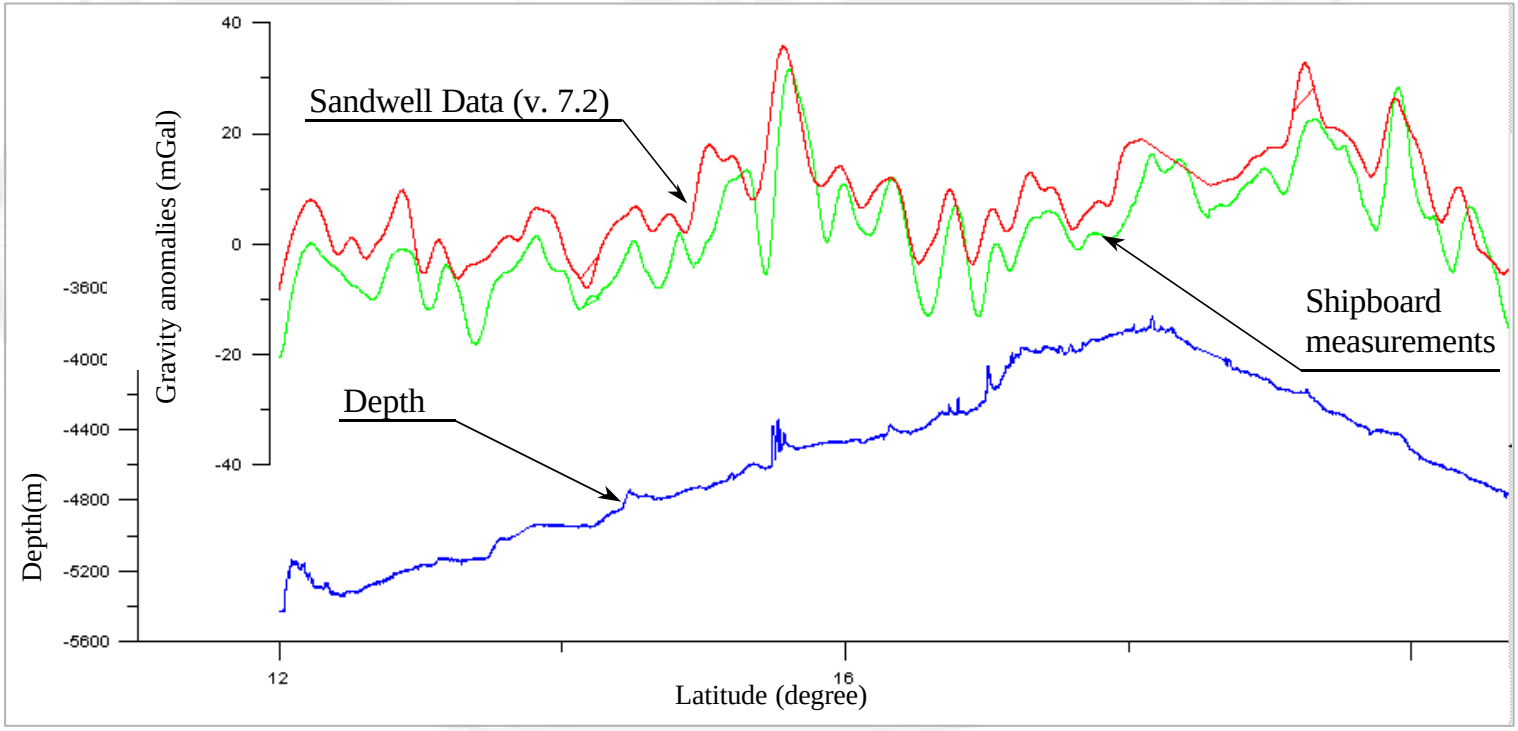
Comparison of Gravity Anomalies Derived with Use Altimetry Data Along GEOIK Ground Track with Marine Gravity Measurements

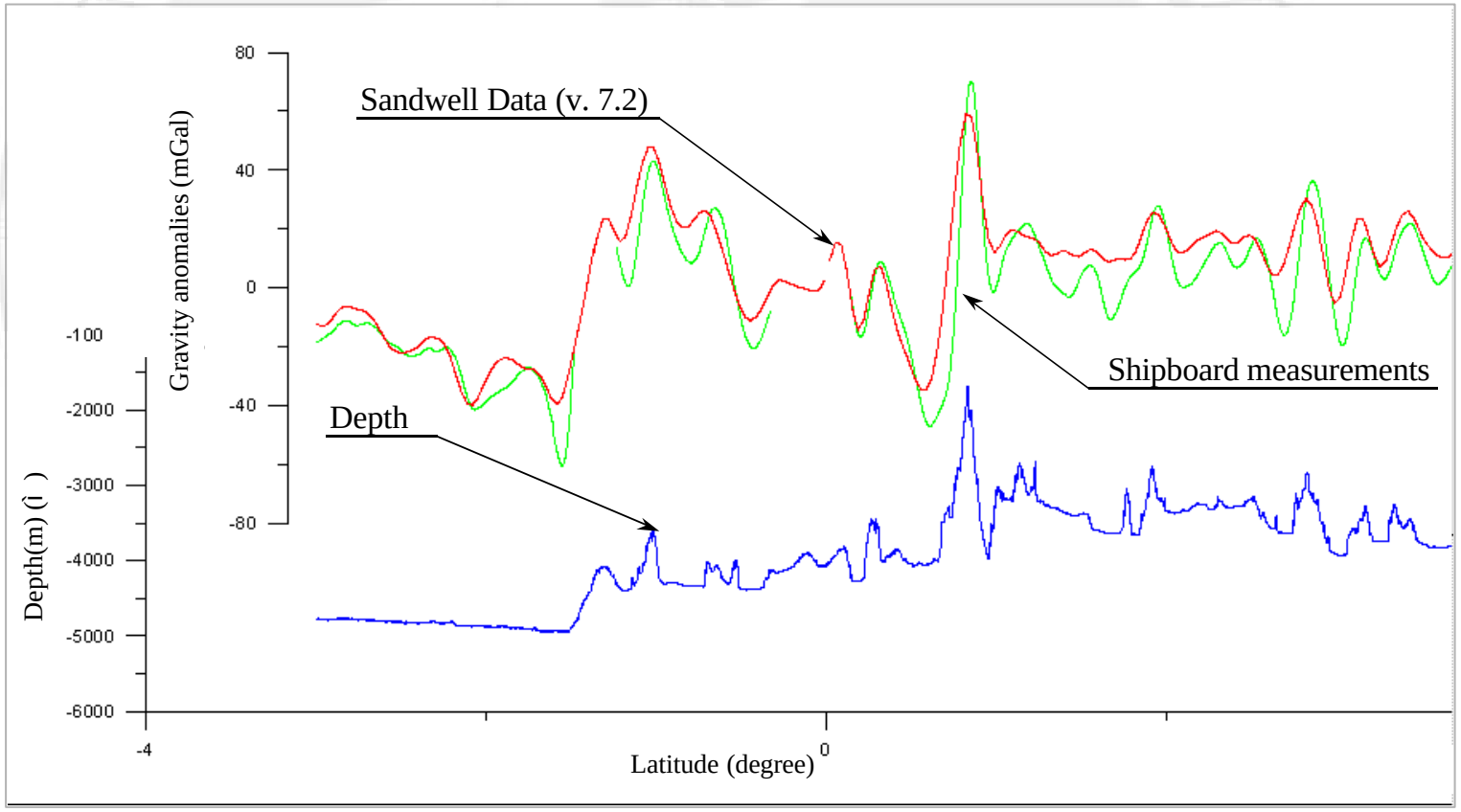


December 1997

Comparison of Shipboard Gravity Anomalies Along Ground Track GEOIK with Sandwell Data (v. 7.2)



Comparison of Shipboard Gravity Anomalies Along Ground Track GEOIK with Sandwell Data (v. 7.2)

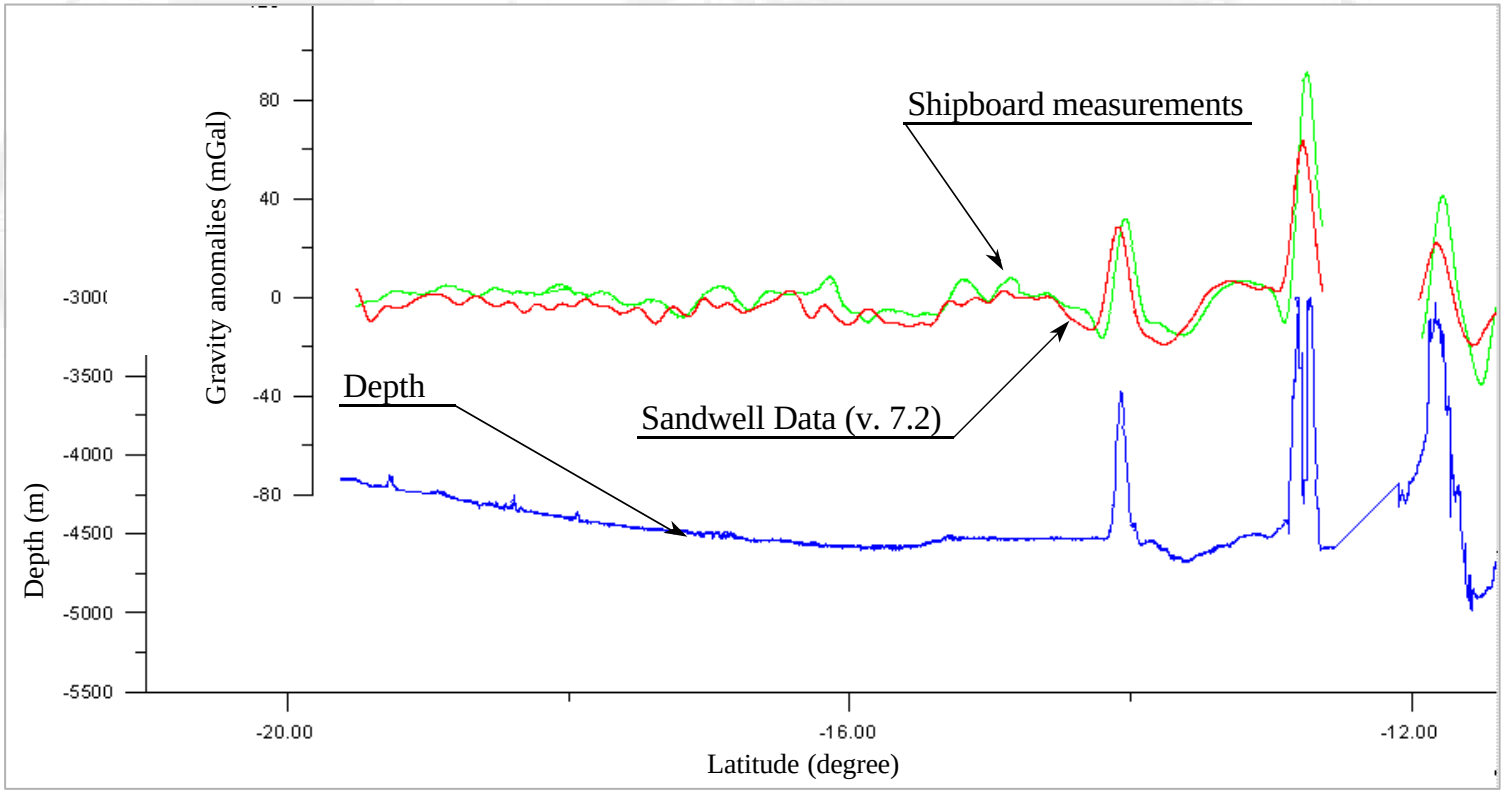


Integrated Satellite Altimetry Data Base

http://www.wdcb.rssi.ru/ALTIM/Welcome.htm

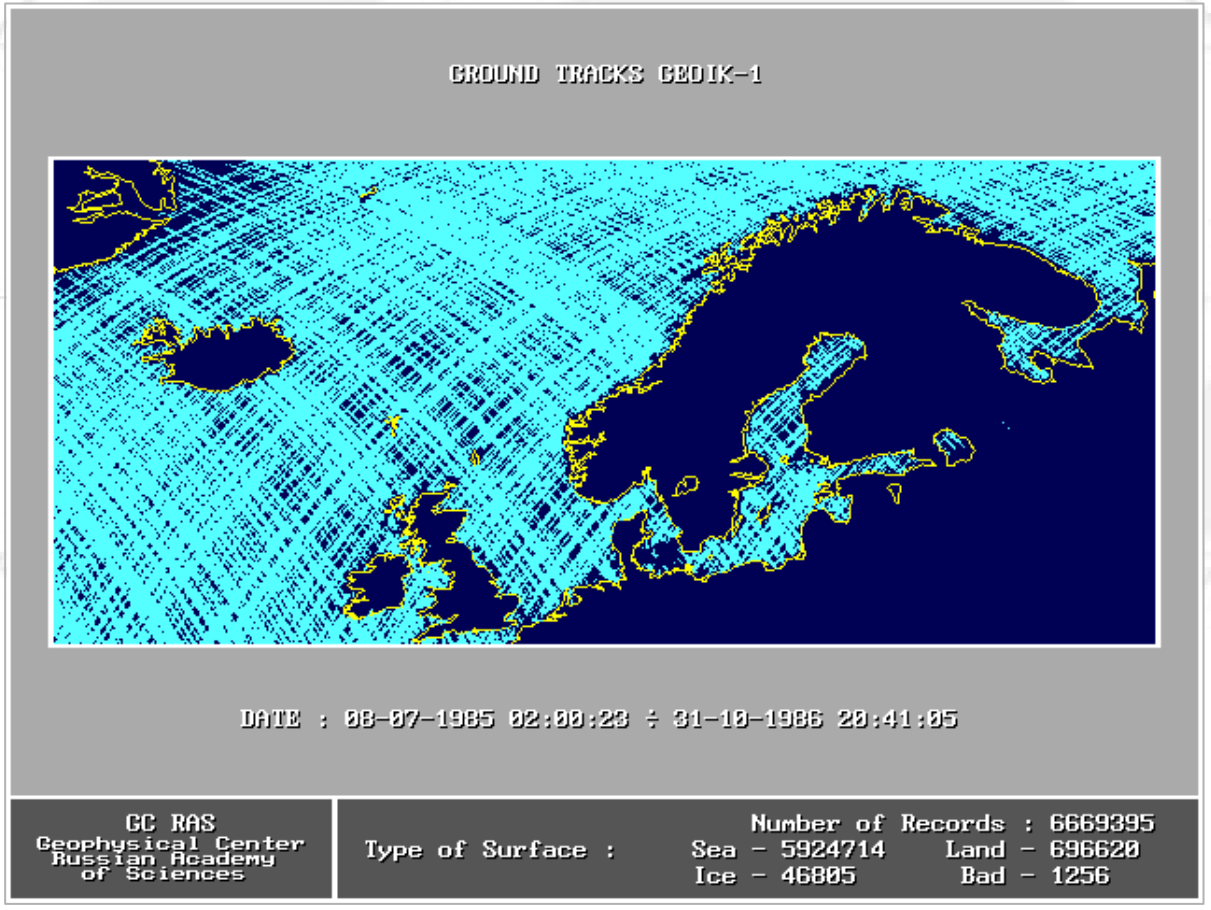
' Geophysical Center RAS, 1999

Comparison of Shipboard Gravity Anomalies Along Ground Track GEOIK with Sandwell Data (v. 7.2)

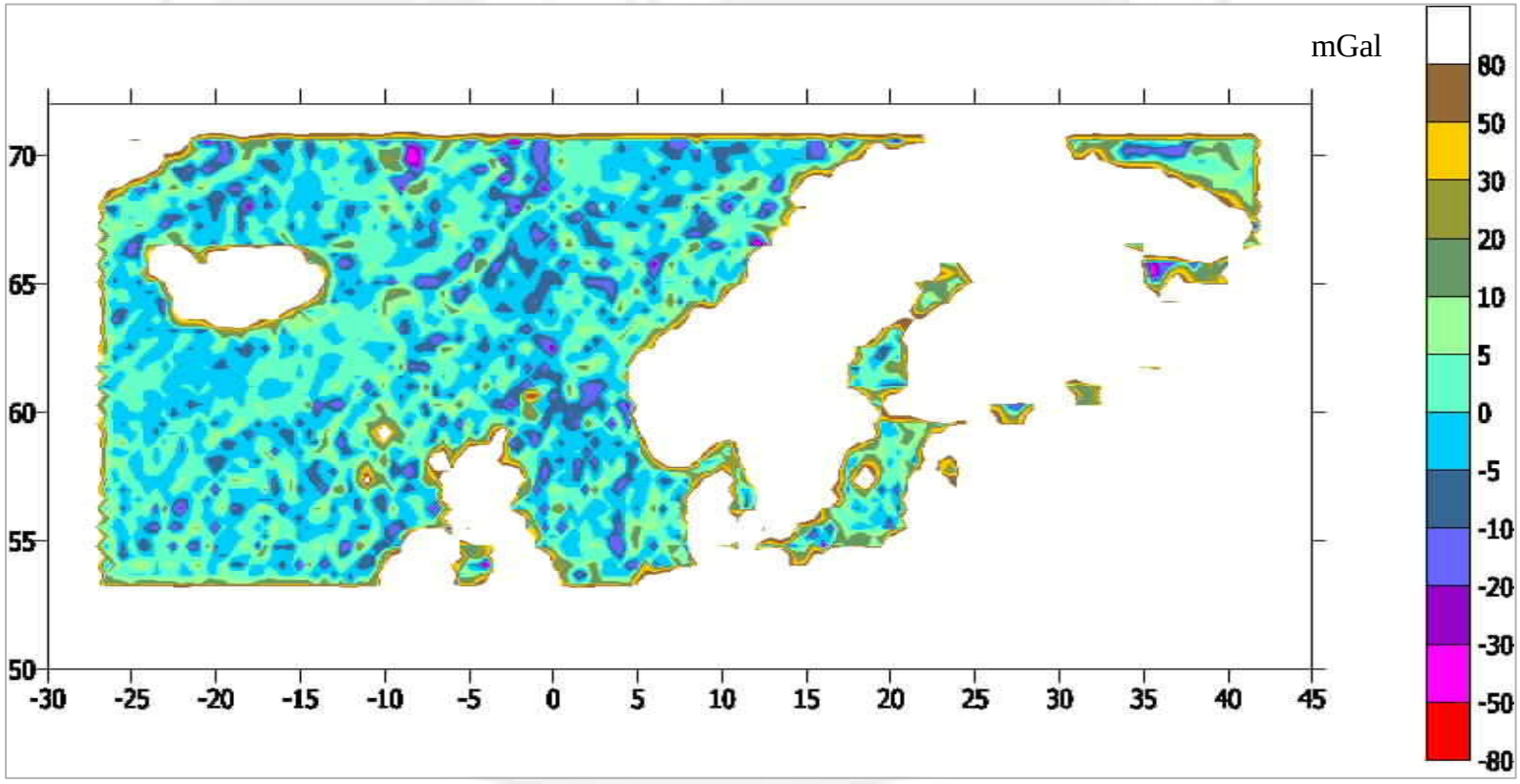


Integrated Satellite Altimetry Data Base

GEOIK-1 Ground Track for 50î -72î N and 30î W - 45î E Region



Comparison of GEOIK Gravity Anomalies with Sandwell Data v. 9.2



Integrated Satellite Altimetry Data Base

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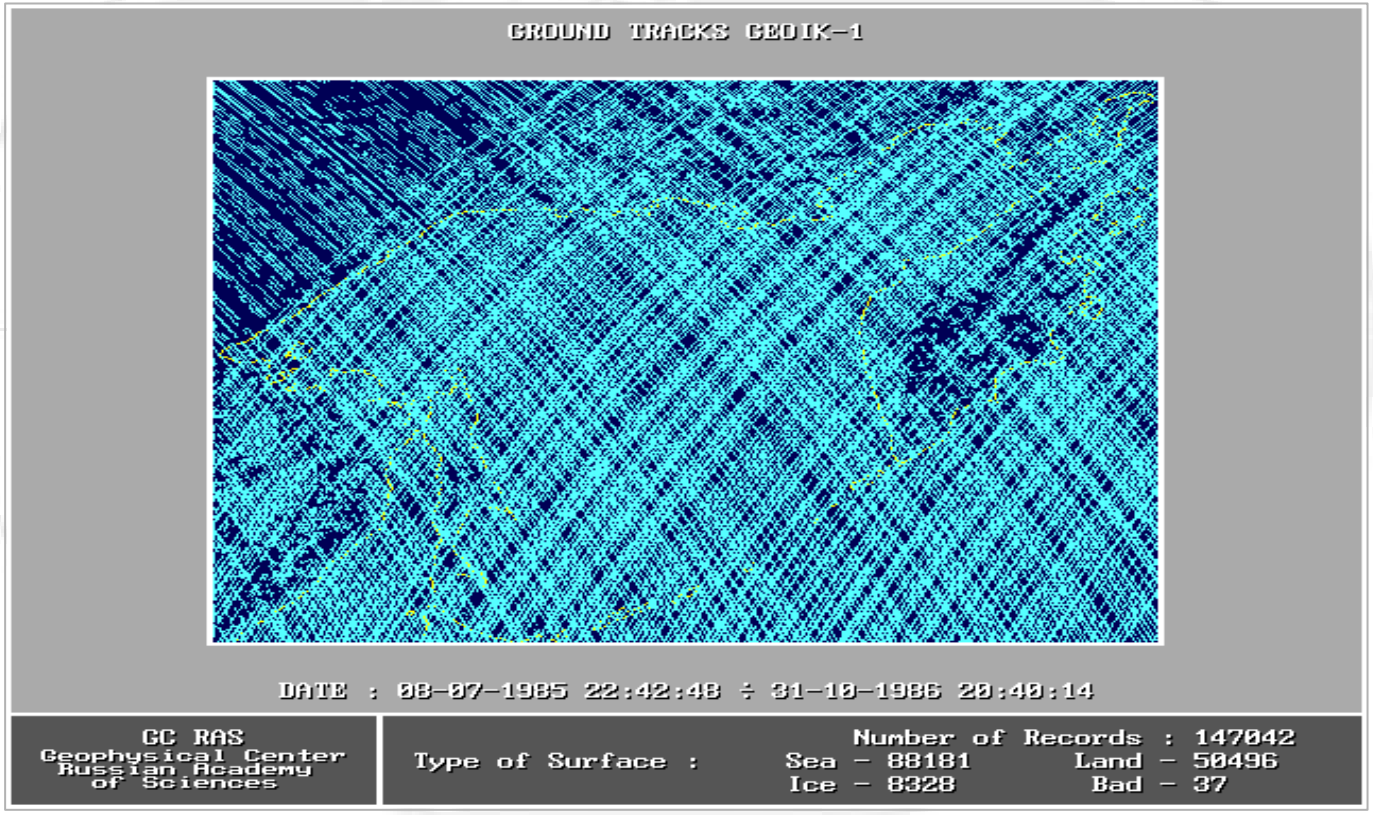
Comparison of Gravity Anomalies for 50î -72î N and 30î W - 45î E Region

Data	Min.	Max.	RMS
GEOIK - Sandwell (v.9.2)	-55	71	10.4
GEOIK - Hwang	-53	66	9.9
GEOIK - Sandwell (v.7.2)	-66	73	10.9
GEOIK - EGM96	-51	55	9.6
Sandwell (v.9.2) - Hwang	-32	22	2.5
Sandwell (v.9.2) - Sandwell (v.7.2)	-70	37	3.4
Sandwell (v.9.2) - EGM96	-50	79	9.4
Sandwell (v.7.2) - EGM96	-68	79	13.4
Hwang - EGM96	-46	79	6.7

Data	Min.	Max.	Mean Values	RMS values
GEOIK	-130	120	7.3	28.0
Sandwell (v.7.2)	-62	110	16.1	22.4
Sandwell (v.9.2)	-65	120	17.3	21.7
Hwang - EGM96	-72	110	17.0	21.0

GEOIK-1 Altimetry Measurements Statistic for Sea of Okhotsk



Integrated Satellite Altimetry Data Base

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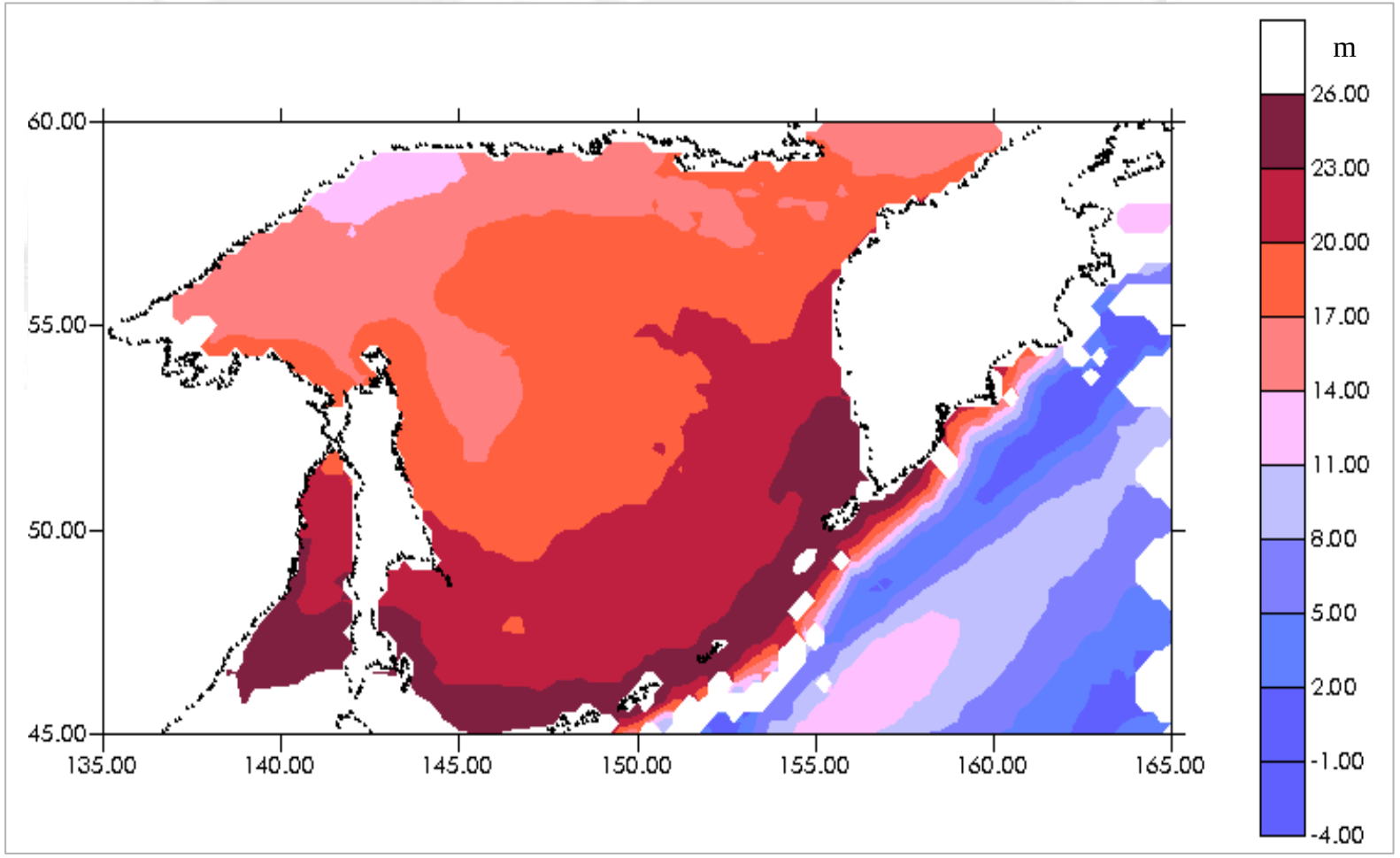
GEOIK Sea Surface Height for Sea of Okhotsk



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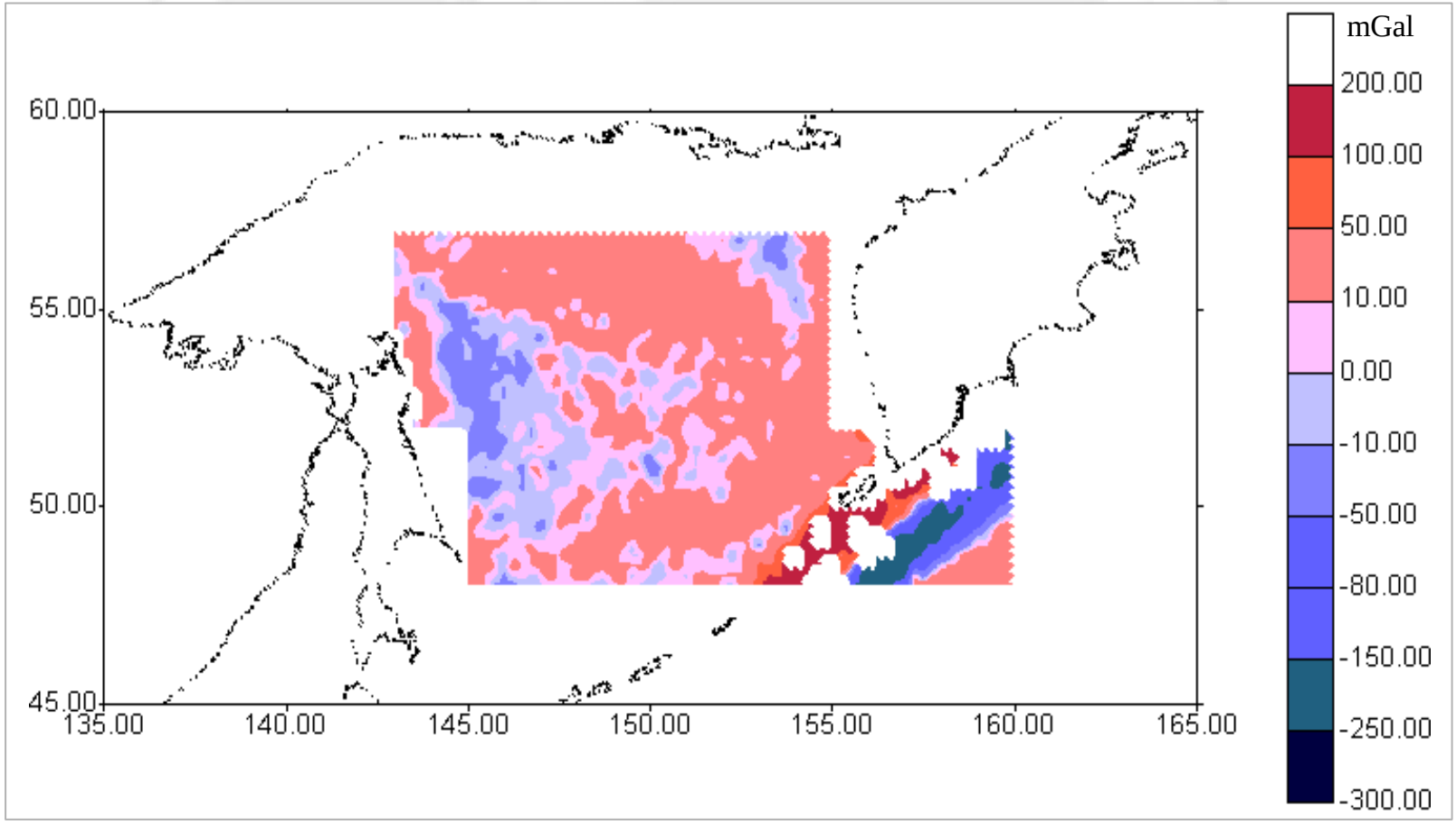
' Geophysical Center RAS, 1999

GEOIK Gravity Anomalies for Sea of Okhotsk



Integrated Satellite Altimetry Data Base

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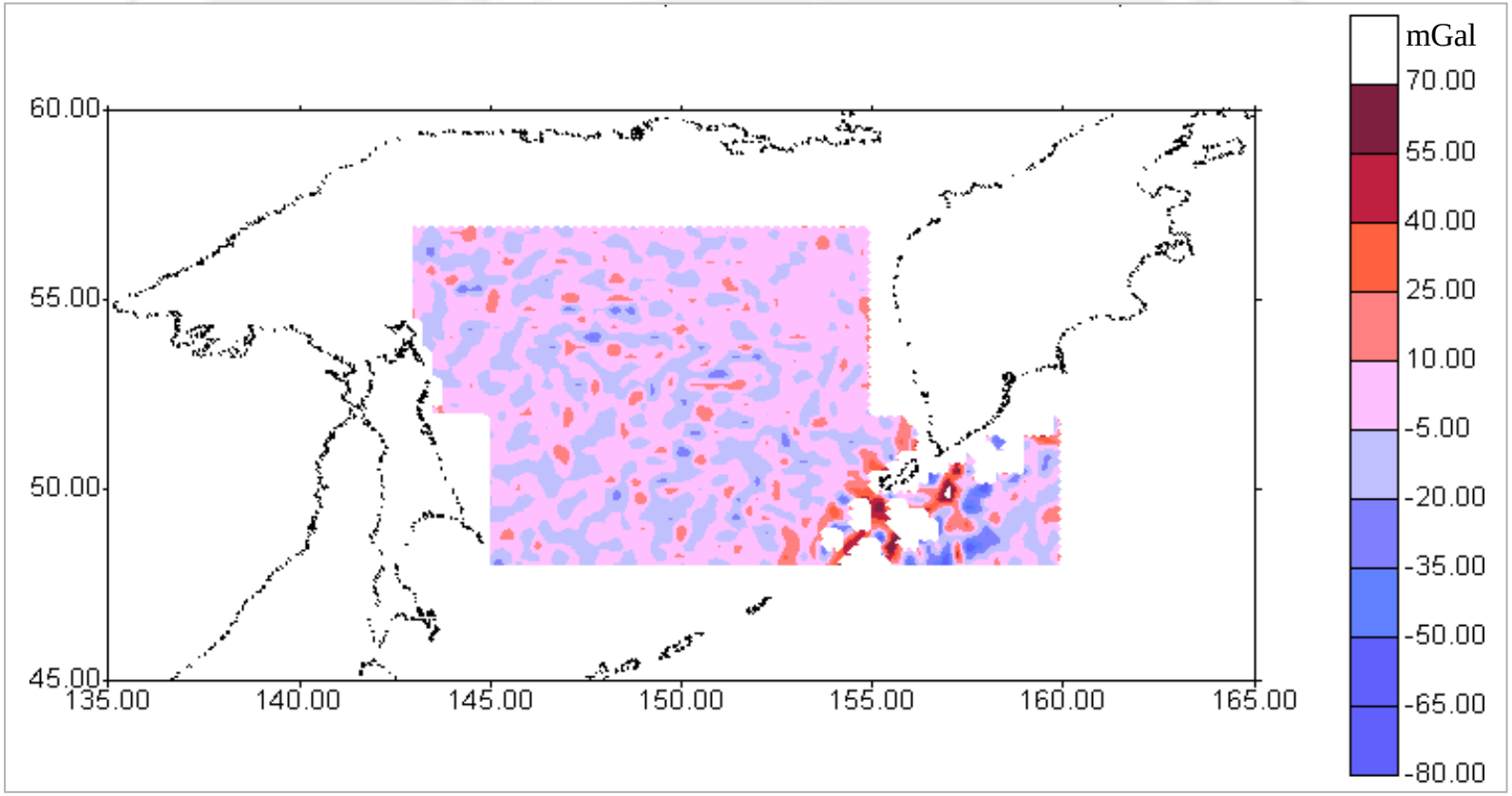
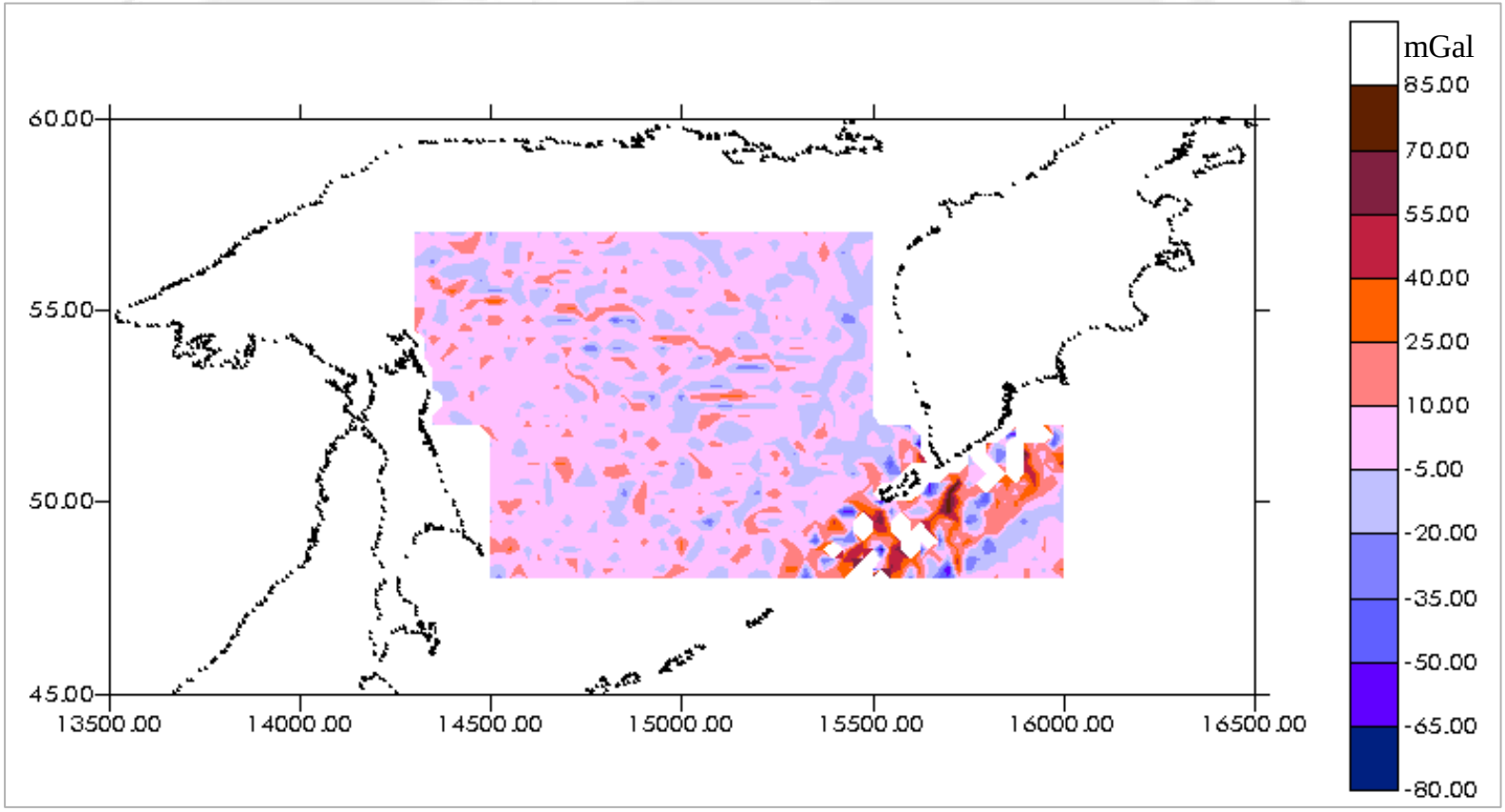
' Geophysical Center RAS, 1999

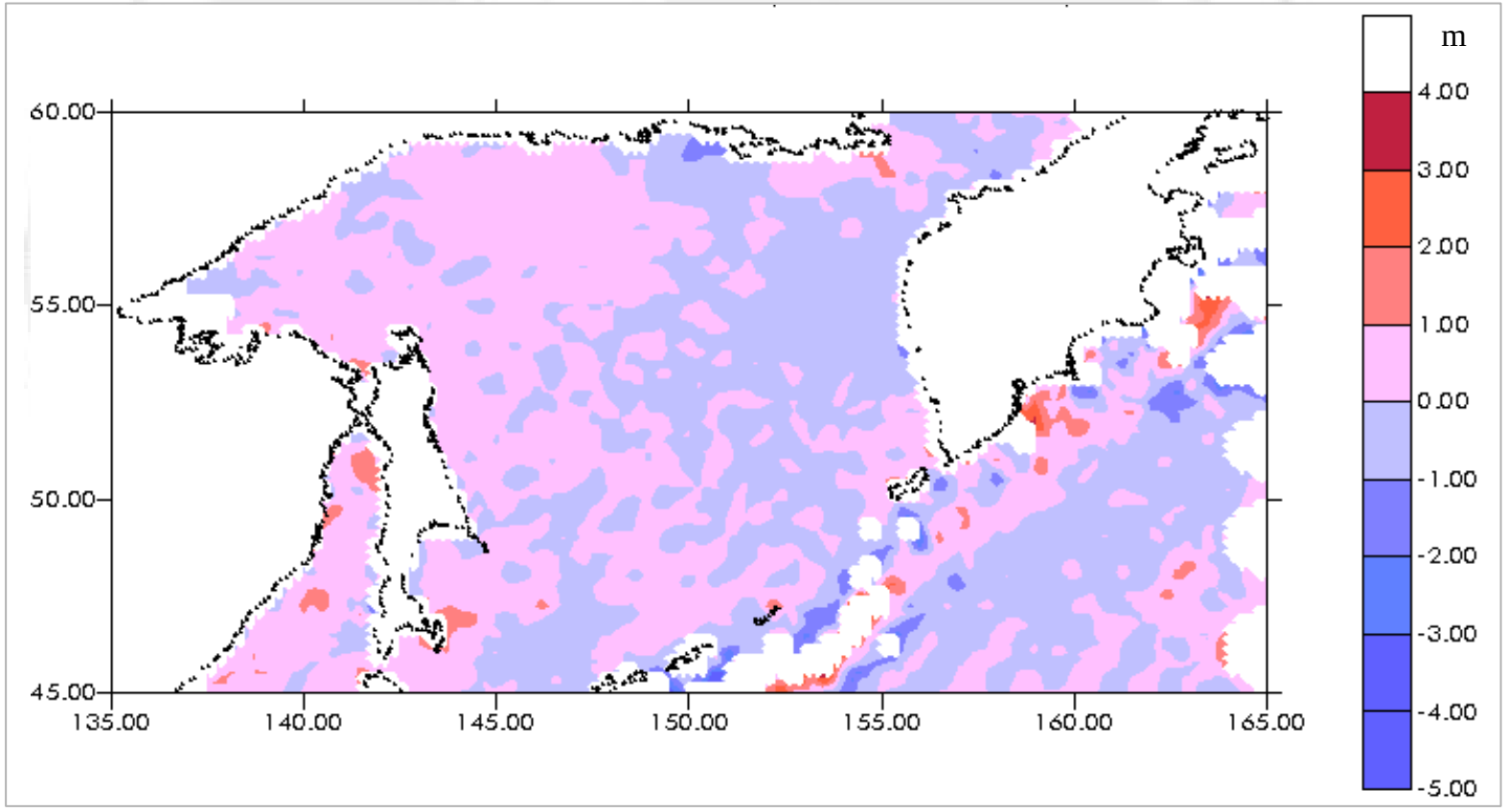
Comparison GEOIK Gravity Anomalies with Marine Gravity Data



Comparison of GEOIK Gravity Anomalies with Sandwell Data v. 7.2

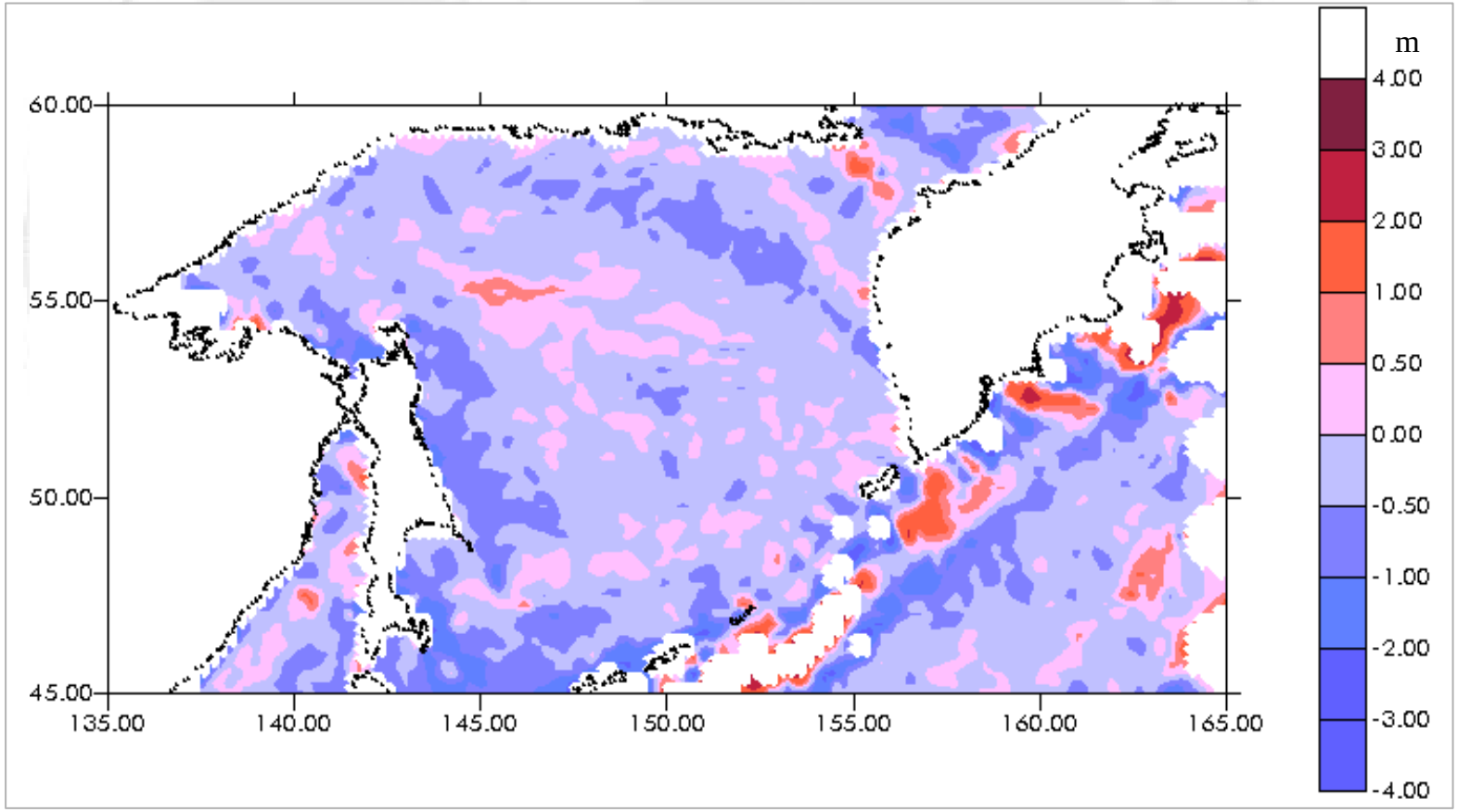


Comparison of GEOIK Sea Surface Height with EGM96 Geoid



Integrated Satellite Altimetry Data Base

Comparison of GEOIK Mean Sea Surface Height with CSRMSS95



Comparison GEOIK Mean Sea Surface Height with Geoid OSU91a