A CATALOGUE OF EARTHQUAKES IN THE MEDITERRANEAN AND THE SURROUNDING AREA FOR THE PERIOD 1901-1975

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1. INTRODUCTION

The spatial and time distribution of earthquakes in the Mediterranean and surrounding area is of great interest not only for seismic risk problems but for seismotectonic problems too. Such problems, however, require large samples of accurate, homogeneous and complete data, which concern large sample periods. To face this problem we can properly separate the whole time interval, for which data are available, in several subintervals and choose for each subinterval a smallest magnitude which decreases as the time increases (Papazachos, 1973).

The method is applied here to obtain four samples of homogeneous, complete and, to a satisfactory degree, accurate data for the area which is bounded by the 30° N, 50° N parallels and by the 10° W, 40° E meridians. This area belongs to the Eurasian - Melanesian fracture zone and its seismic and other geodynamic properties are of great interest.

Therefore, the purpose of the present paper is to present, for the Mediterranean and surrounding area, a catalogue of earthquakes consisting of four groups, each of which includes complete, homogeneous and as accurate as possible data. Figure (1) shows a map of the epicenters of the shallow earthquakes ($h < 60$ km) with $M \geq 5.0$ and figure (2) shows the epicenters of the deep and intermediate earthquakes ($h \geq 60$ km) with $M \geq 4.5$.

The errors made in the epicenters, focal depths and magnitudes are, in more than seventy per cent of the cases, less than 35 km, 40 km and 0.4 respectively (Comninakis and Papazachos, 1977).

2. PRINCIPLES ON WHICH THE CATALOGUE IS BASED

The catalogue includes information regarding earthquakes which occurred between January 1901 and December 1974. This time interval has been separated into the sample periods 1901-1910, 1911-1949, 1950-1963 and 1964-1975. The corresponding minimum earthquake magnitudes are 6.5, 5.5, 5.0 and 4.5, respectively.

All the available instrumental and macroseismic information, which concern each earthquake of this catalogue, has been carefully examined before we list the finally adopted focal parameters.

For almost all shocks independent determinations of the origin time, epicenter and focal depth have been made by several centers. The last revision of the independent instrumental determinations has been usually considered as most accurate, except for the cases when other information (macroseismic etc) clearly suggested that a previous determination was more accurate.

Concerning the first three sample periods, focal depth values are given only for the intermediate and deep focus earthquakes ($h \geq 60$ km), while for the shallow earthquakes ($h < 60$ km) the indication n (= normal) is written in the column for focal depths. For the last period (1964-1975), values of the focal depths of the shallow shocks are given as well, since such instrumentally determined values are available for this period.

The magnitude M of each earthquake, listed in the present table, is the average value of all the independent reliable determinations of the surface magnitude M_S. It is believed that, in this way, affects of

unsymmetrical focal radiation, propagation paths, conditions at the station sites and errors of measurements can be smoothed out.

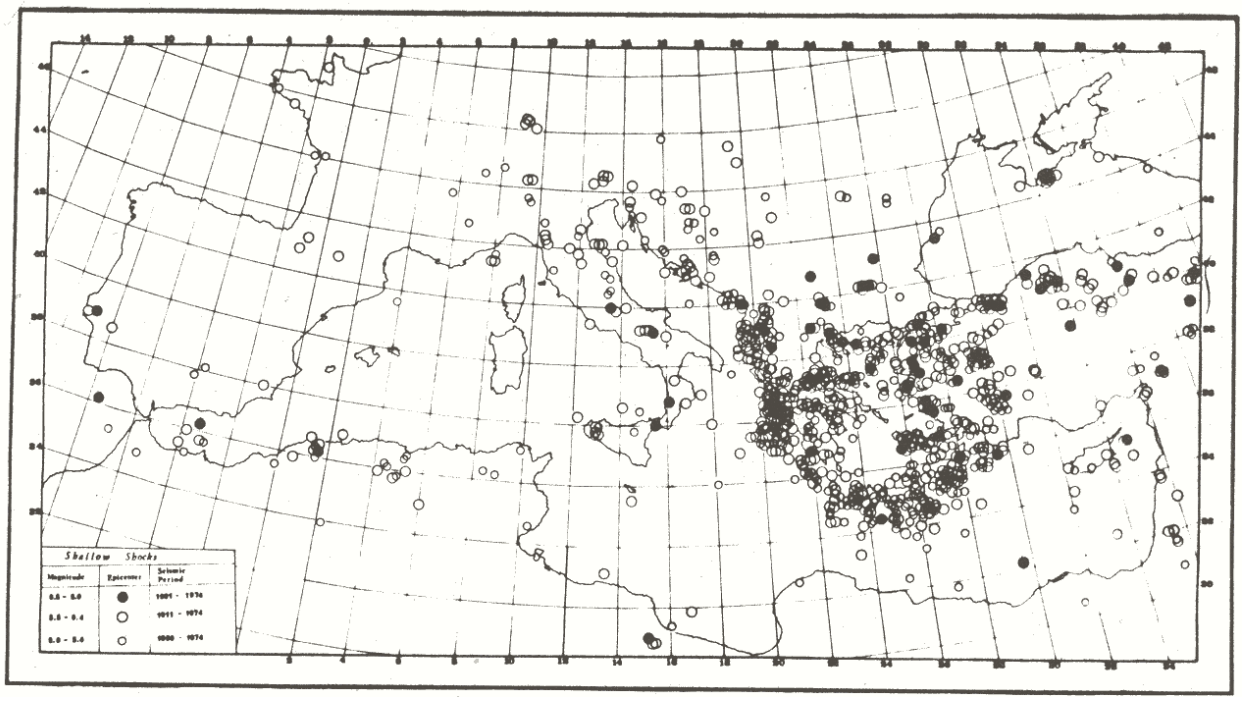

Fig. 1. Epicenters of shallow earthquakes (h < 60 km) in the Mediterranean and the surrounding area for the period 1901-1974.

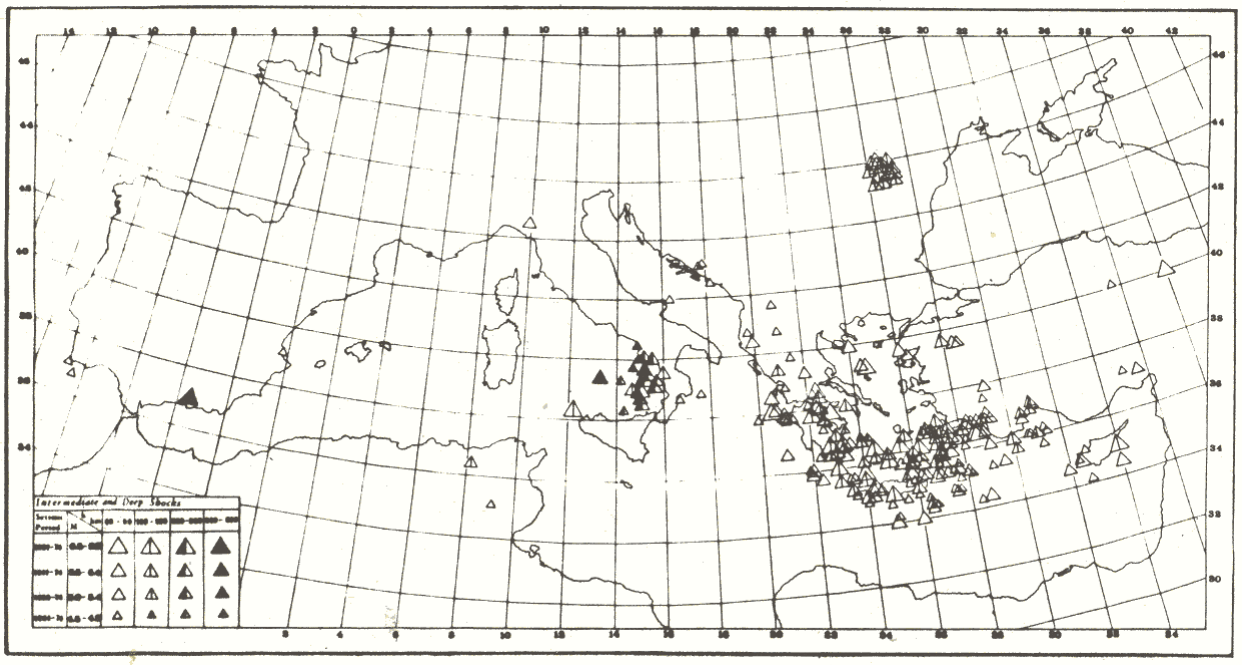

Fig. 2. Epicenters of the intermediate shocks (60 km ≤ h ≤ 600 km) in the Mediterranean and the surrounding area for the period 1901-1974.

a) Period 1901-1910.

Seismology has been an identifiable science almost since the turn of present century. Since the same time systematic collection of instrumental seismic data has started. This justifies the inclusion of data concerning earthquakes occurred only after 1900 in this catalogue. It is not possible to obtain complete, homogeneous and accurate data for earthquakes which occurred before the present century, especially for an area of which a large part is covered by sea, as it is the Mediterranean area.

The minimum magnitude value for this period has been chosen equal to 6.5 because the available data are not complete regarding magnitudes smaller than this value, as it is shown below.

The part of the catalogue, which includes the data for this period, is mainly based on information given by Gutenbern and Richter (1954), Karnik (1969), Galanopoulos (1963), UNESCO (1974).

b) Period 1911-1949.

During the first decade of the present century some progress has been made in the collection of seismic data. On the other hand, the first reliable seismometer was installed in the Aegean region, which is the most active region of the Mediterranean area, in 1910. This is a two horizontal component Mainka seismometer which has been in operation in Athens since that time. These are the reasons why 1911 was chosen as the lower limit of this sample period.

The minimum magnitude for this sample period has been chosen equal to 5.5, although the available data are complete for even smaller magnitudes. We have done so in order to increase the accuracy of the data.

This second part of the catalogue is based on the sources used for the first part and on information given by Sultarova et al (1971), Papazachos and Comninakis (1972), Alsan et al (1975), Crampin et al (1975) as well as on the International Seismological Summary (ISS).

c) Period 1950-1963.

Due to reorganization of seismological centers and to installation of new instruments immediately after the second world war, improved data have been obtained after 1949. This is the reason why the 1950 has been chosen as the lower limit of this sample period.

The minimum magnitude for this time was chosen equal to 5.0 for reasons of accuracy since the data are complete for even smaller magnitudes.

The part of the catalogue, which contains data for the earthquakes of this sample period, is based on the sources used for the first and second part of the catalogue and on information given in the bulletins of the BCIS and several seismological stations as well as in the cards of USCGS.

d) Period 1964-1974.

The year 1964 has been chosen as lower limit of this sample period, for the reason that the International Seismological Center (ISC) has determined, in a uniform way, and published the focal parameters (epicenter, focal depth, origin time, magnitude) of the earthquakes which have occurred since that year.

The magnitude of the smallest earthquakes considered for this period is equal to 4.5. The data are complete for even smaller magnitudes.

The epicenter coordinates, focal depths and origin times, given by the ISC for the earthquakes of this time period, have been adopted in almost all cases. In very few cases, however, other determinations have been prefered.

The ISC and the USCGS have published unified magnitudes, m. Besides, the station of Athens usually gives local magnitudes M_L. In order that these magnitudes can be used as well, relations between the magnitudes, given by each of these centers and the mean magnitude of each earthquake, as it is determined by the use of the surface magnitudes given by several stations, have been established.These relations will be published elsewhere. The finally adopted magnitude of each shock is the average of the

surface magnitudes given by the stations and those values of M determined by these relations, but these last values have been weighted according to the number of observations used to find each given m or M_L.

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Area	Period	Magnitude
	1901 – 1910	$M \geq 6.5$
30^0 N – 50^0 N	1911 – 1949	$M \geq 5.5$
10^0 W – 40^0 E	1950 – 1963	$M \geq 5.0$
	1964 – 1975	$M \geq 4.5$