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ΤΗΣ ΕΛΛΗΝΙΚΗΣ ΓΕΩΛΟΓΙΚΗΣ ΕΤΑΙΡΙΑΣ
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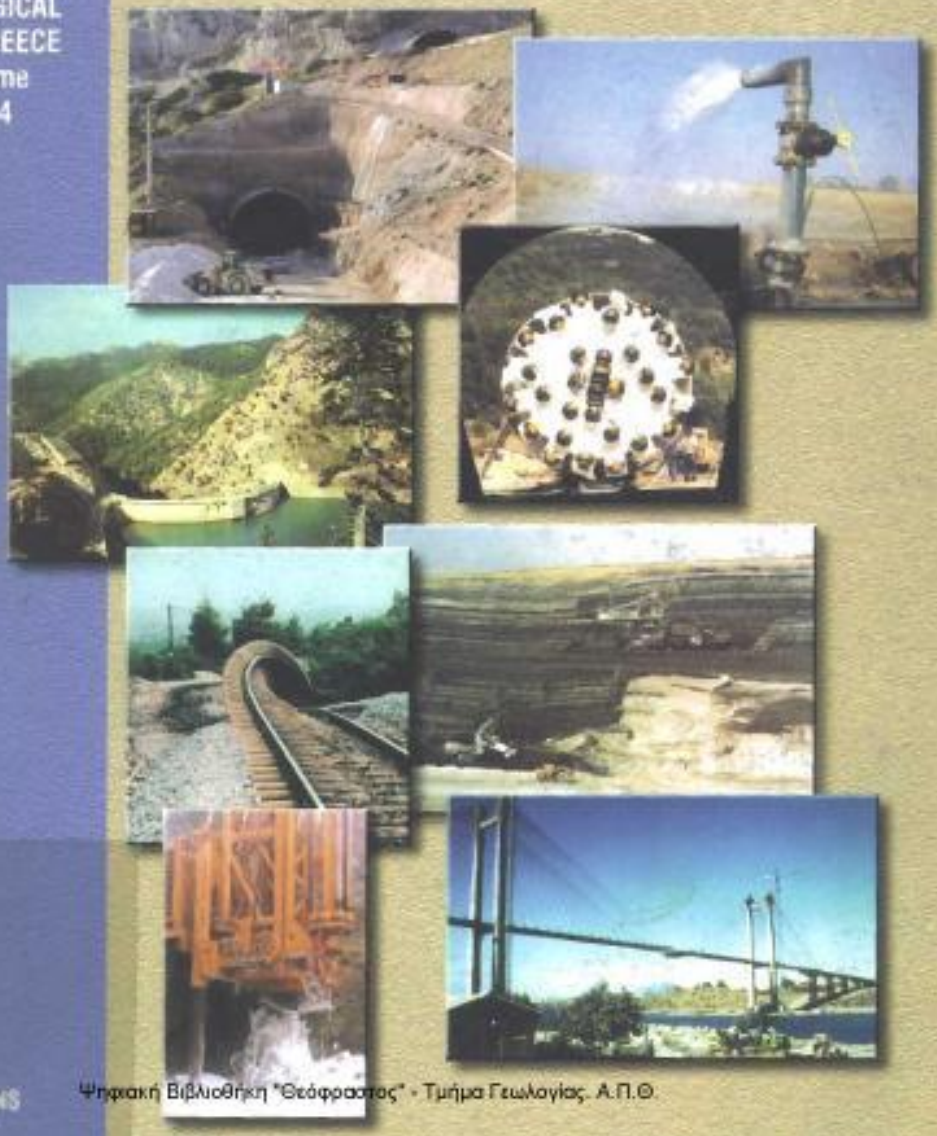

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A REVISED CATALOGUE OF EARTHQUAKES IN THE BROADER AREA OF GREECE FOR THE PERIOD 1950-2000

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ABSTRACT

An earthquake catalogue for Greece and the surrounding areas for the time period 1950 – 2000, is presented. This catalogue contains more than 59,000 earthquakes recorded and located by the seismological network of the Institute of Geodynamics, National Observatory of Athens. The accuracy of the determinations of the source parameters as well as the completeness of the catalogue have been improved significantly, but they vary according to the period of observation as both depend on the number and quality of the seismological stations consisting the network.

This revised catalogue is listed on the Worldwide Web Page http//www.gein.noa.gr, of the Institute of Geodynamics.

KEY WORDS: earthquake catalogue, local magnitude, earthquake source parameters, Greece.

1. INTRODUCTION

The Institute of Geodynamics, National Observatory of Athens, (IG-NOA) is one of the oldest Institutes in Greece, operating continuously since 1893. At that time the first seismograph installed in Greece while in 1897 the first seismological network of mechanical type started to operate. However 1964, is considered as the most important date. From that year, electromagnetic type satellite stations started to set up, so systematic and detailed seismic observations were continuously performed. In 1973, 13 satellite stations were in operation; in 1983 the network became telemetric, in 1988 started its´ expansion with 14 more satellite stations and in 1994 the majority of the stations became digital. Since 1964 the initial network grew in size and extent so that today consists of 29 telemetric stations covering almost the whole country (Figure 1). Moreover from 1999, 7 telemetric stations belonging to OASP are connected with the seismological network of the IG-NOA. The detectability of the modern network enables accurate determination of earthquake focal parameters with Ml>4,0 for the whole area of Greece (Papanastassiou 1989), while for some areas the threshold magnitude is lower.

The data collected from all the stations, corresponding to earthquakes occurring in the territory of Greece and the bordering areas, are analysed in detail. The results are presented in seismological bulletins. So from 1896 till 1936, these appear in the "Annales de l'Observatoire National d'Athenes", from 1936 till 1946 the observations are not systematically published and from 1950 till now are listed in the monthly bulletins of the Institute.

These bulletins are distributed regularly all over the world, at several Seismological Centres and Universities, as well as at different National Centres, Universities, Organizations and Libraries.

The catalogue covers the area limited to latitudes 34°N to 42°N and longitudes 19°E to 29°E north of the 38°E parallel. South of the 38°E parallel, in order to cover the Dodecanese Islands, it extends till the 30°E longitude.

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This catalogue is the first step of a project that IG-NOA has initiated, in order to relocate more accurately all the earthquakes recorded by its instruments during the period 1900 to 2000. Our ultimate goal is to produce a comprehensive and accurate catalogue for the seismicity of Greece and the adjacent areas spanning the 20th century.

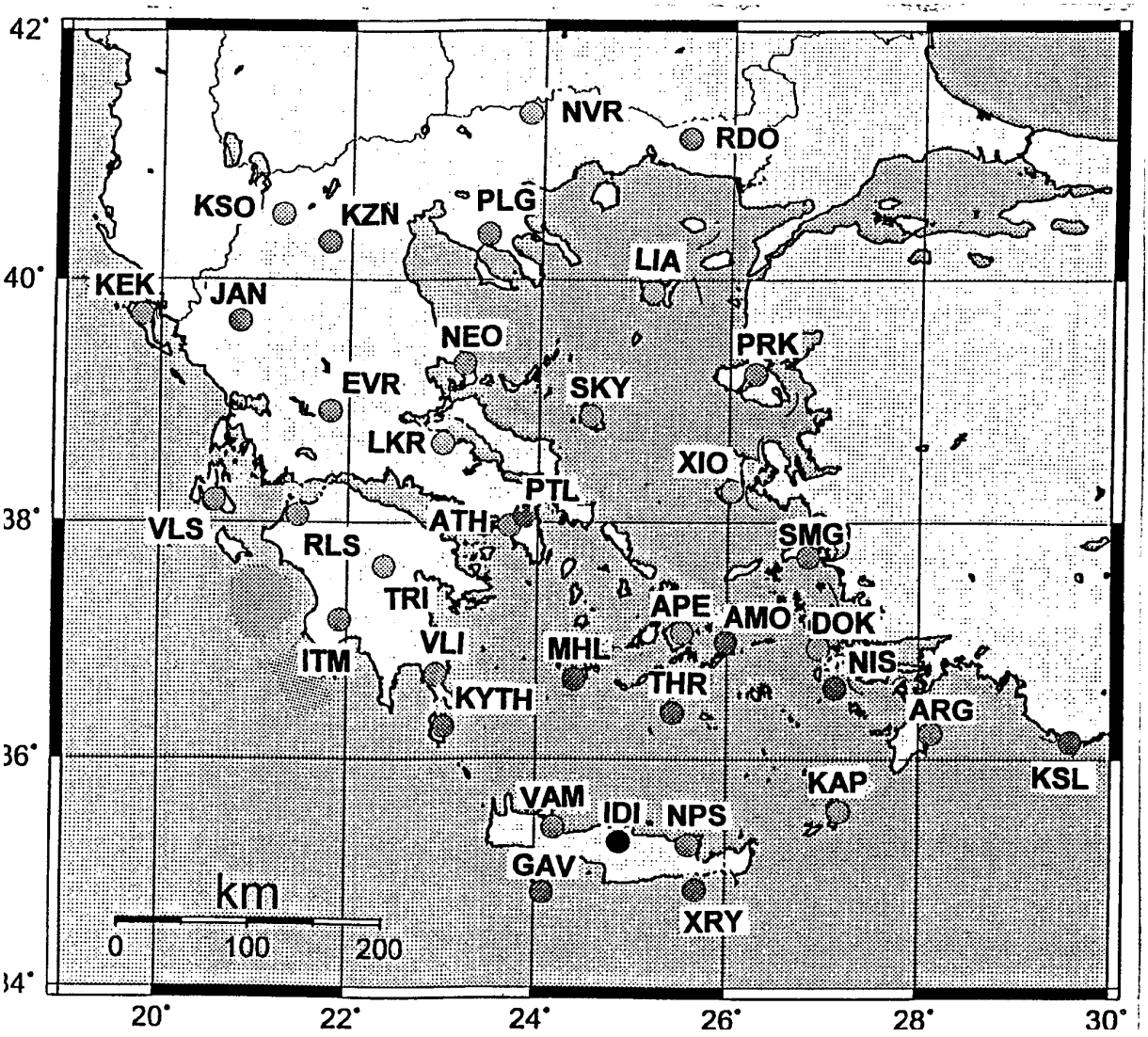

Figure 1. The seismological stations of IG-NOA.

2. DATA AND METHOD OF ANALYSIS

The data collected from all the stations, are analysed daily by the staff of IG-NOA, in detail. This means that all the necessary parameters, like the arrival times of P and S-waves and latter phases, are measured accurately in order to calculate the earthquake source parameters, which are the coordinates of the epicentre, the focal depth and the origin time.

During the period 1964 – 1982 the determination of the source parameters was carried out manually, by using appropriate travel time curves according to the crustal model of Herrin et al.

(1968). In 1983 for accurate calculation of the source parameters, a computer program started to use, Hypo 71-Revised (Lee and Lahr 1975). As input in this program the velocity model given in Table 1 and the Vp/Vs = 1,73 ratio are used.

From the installation of the mechanical type seismographs in the station of Athens, surface magnitude (Ms) for the strong events is calculated from these instruments.

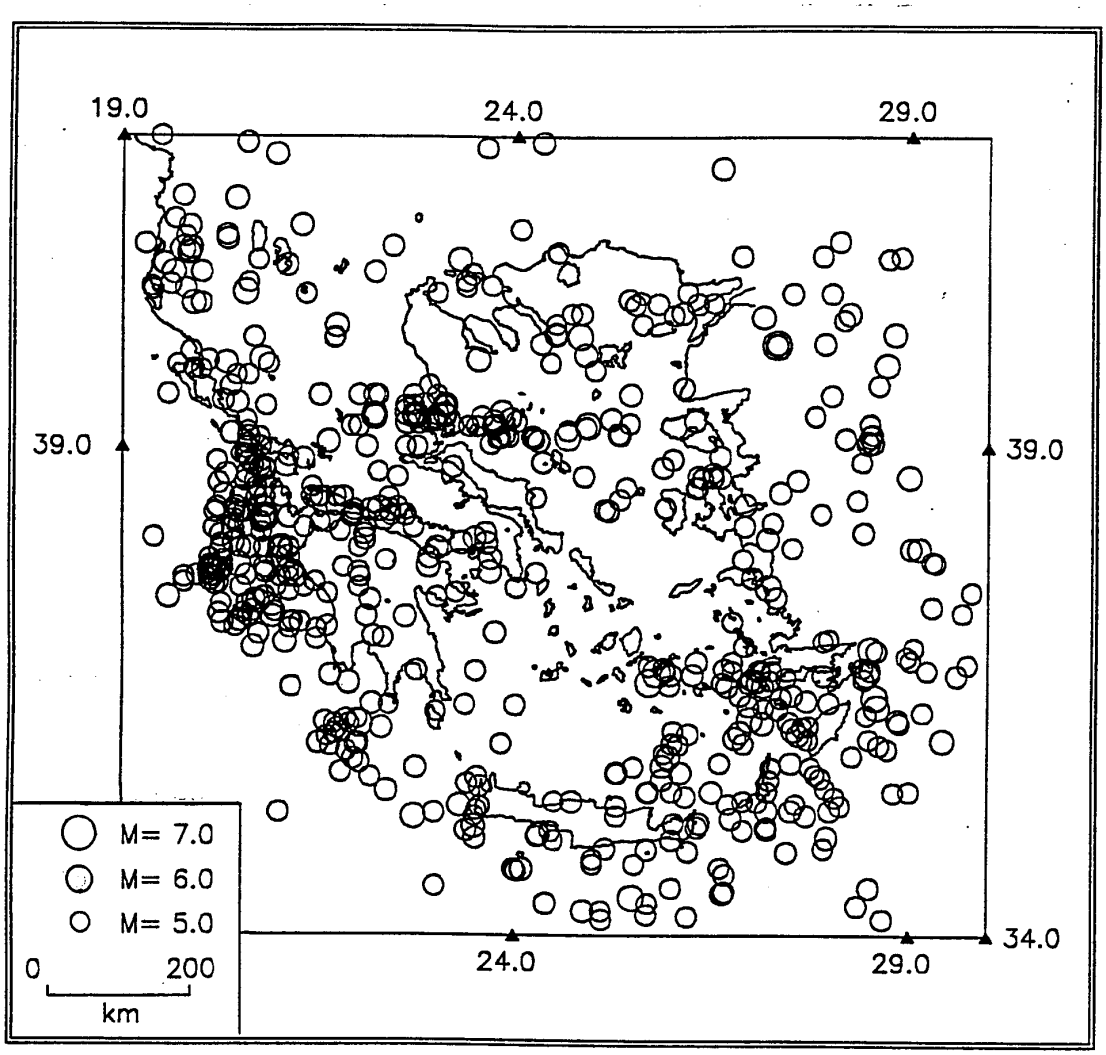

Figure 2. Spatial distribution of 632 located earthquakes during the period 1950—2000 and having Ml>5.0.

Since 1967, local magnitude (Ml) is routinely determined on the Richter scale from the maxima trace amplitudes recorded by the existing in IG-NOA, unique in Greece standard Wood - Anderson torsion seismograph. Since 1990 average duration magnitude (Md) corresponding to Ml is also computed for shallow earthquakes.

In order to provide a uniform catalogue for the period 1950-2000, firstly all the earthquakes of the period 1964-1982 were processed one by one, by using the crustal model of Herrin et al. (1968), and the Hypo 71-Revised computer program, Lee and Lahr (1975). Their local

magnitudes were also checked. Moreover the parameters of the earthquakes of the period 1950-1964 were checked carefully and finally included in the catalogue.

TABLE 1

Layer width (km)	Vp (km/sec)}:
0 - 15	6.0
15 - 40	6.75
> 40	8.05

In the presented revised catalogue, 59,467 events are included, covering the period 1950-2000. From them 632 have Ml > 5.0 and are plotted in figure 2. Their spatial distribution delineates the main tectonic features of the broader area of Aegean.

Figure 3, shows the annual number of the located events in relation with the existing seismological stations. The fluctuation, that is observed, could be associated also with the seismicity rate. This is also seen in figure 4, where is plotted the annual number of the located events with Ml>4.5.

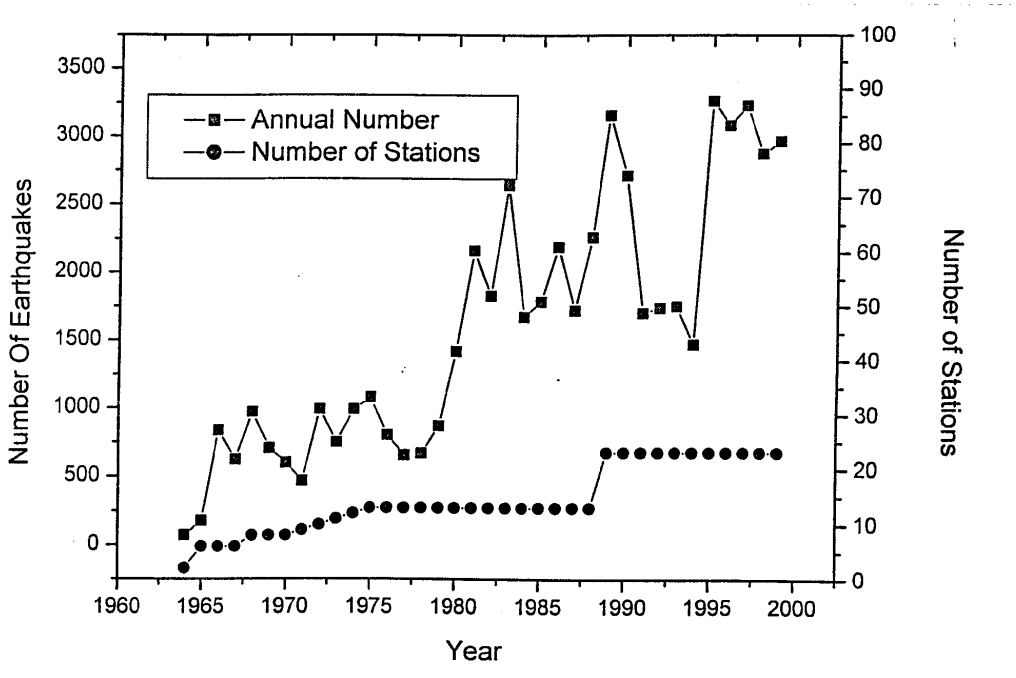

Figure 3. Annual number of the located events plotted versus the number of the existing seismological stations.

3. FUTURE PLANS

Our future plans are:

- to finish the calculation of duration (Md) magnitudes for all the earthquakes of the period 1964-1990. This work will permit to assign magnitudes to a greater number of earthquakes.
- by using modern tomographic techniques, to find a more accurate velocity model appropriate for the whole area of Greece.
- having this accurate velocity model will be able to re-calculate the source parameters of all the earthquakes of the period 1964-2000.

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