CHAPTER 4

In this study, the teleseismic earthquakes recorded by various permanent and temporary stations have been utilized to compute P and S receiver functions. Descriptions of each data set as well as spatial distributions of stations are presented in this chapter.

4. Data

Due to various constraints for applying P and S receiver function techniques, a number of data sets are used.

4.1 Data set for P receiver function analysis

4.1.1 Seismic stations

In order to reach an optimum station coverage across the Aegean, various networks were deployed. The first one consisted of 21 stations, which had been installed across the Aegean during the "Seisfaultgreece" experiment from January 1997 to July 1997 to record teleseismic and regional earthquakes. They were equipped with Lennartz LE5S (5 s), Güralp CMG40 (20 or 60 s), and Güralp CMG3 (60 or 100 s) seismometers and Reftek 72A06 and Agecodagis TitanDat data loggers, which recorded continuously at a sample frequency of 50 or 62.5 samples per second, respectively. Stations were installed in permanent observatories of the National

Observatory of Athens, of the Seismological Network of Thessaloniki, and in temporary shelters. They are indicated with triangles in Figure 4.1. Their coordinates and equipments are also given in Table A.1, Appendix A.

Fig. 4.1. Location of the seismic stations used for P receiver function technique. NOA stations are represented by circles, Seisfaultgreece stations by triangles, GEOFON stations by cubes and MEDNET stations by star. Hexagons denote both NOA and Seisfaultgreece stations.

8 permanent broad band stations of GEOFON network located on the island of Crete and in the southern Aegean Sea were also used to compute P receiver functions. The stations were equipped with STS-2 seismometers and have been in operation since 1996 by the GFZ Potsdam. More records were available from GEOFON stations, since they are operating for several years. In Figure 4.1 the GEOFON stations are

shown as cubes. Deploying one permanent MEDNET station located on the island of Crete could improve the spatial coverage on this island. IDI, shown with star in Figure 4.1, was equipped with STS-2. The station distribution was significantly enhanced using the 21 permanent stations of the National Observatory of Athens, which were equipped with either Lennartz LE20S or Güralp CMG40 seismometers. These stations have been utilized since March 2003 for a period of 11 months. The distribution of the stations is represented with circles in Figure 4.1.

4.1.2 Prerequisites for P receiver function method

The data which satisfied the following conditions have been used to compute P receiver functions.

1. Epicentral distances between 30-95°
2. Magnitude larger than 5.5 (mb)
3. clear P onset with high signal-to-noise ratio

A total number of 343 teleseismic earthquakes (Table B.1-B.3, Appendix B) recorded by 43 broad band and short period stations have been used to estimate lithospheric structure in the Aegean area using P receiver function technique. The epicenter distribution of the earthquakes is shown in Fig. 4.2.

4.2 Data set for S receiver function analysis

4.2.1 Seismic stations

In order to have a high resolution data in the central and southern Aegean Sea, The CYC network located in the Cyclades area, operated by Bochum University has been deployed since 2002 for a period of 23 months.

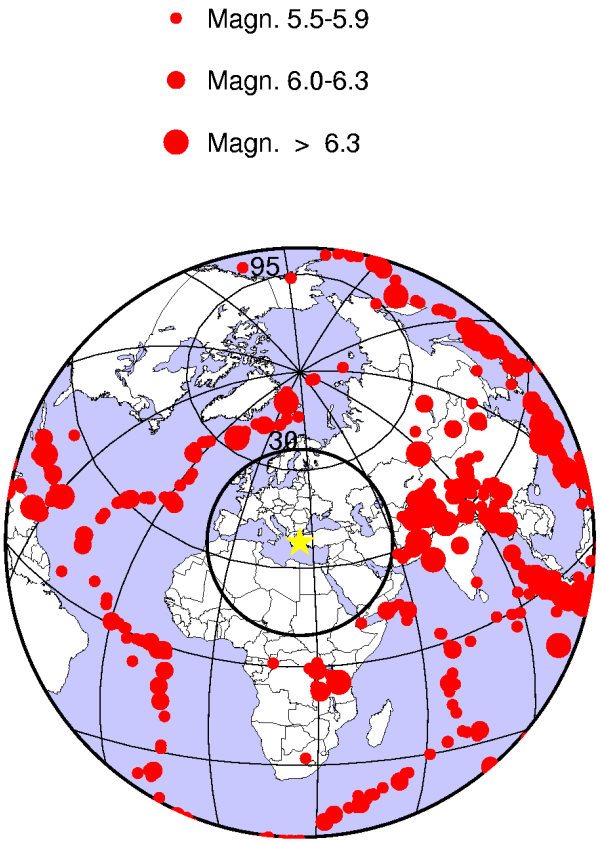

Fig 4.2. Epicenter distribution of earthquakes used to determine P receiver functions. The events have magnitude larger than 5.5 (mb) with epicentral distances between 30-95°.

The CYC-NET consisted of 22 temporary short period stations equipped with Mark L4-3D and in some cases STS2 seismometers. The coordinates of the stations as well as the equipments used are detailed in Table A.1, Appendix A. This network together with 8 broad band GEOFON stations as well as 21 NOA stations and one MEDNET station have provided a homogeneous station distribution within the study area, as shown in Figure 4.3.

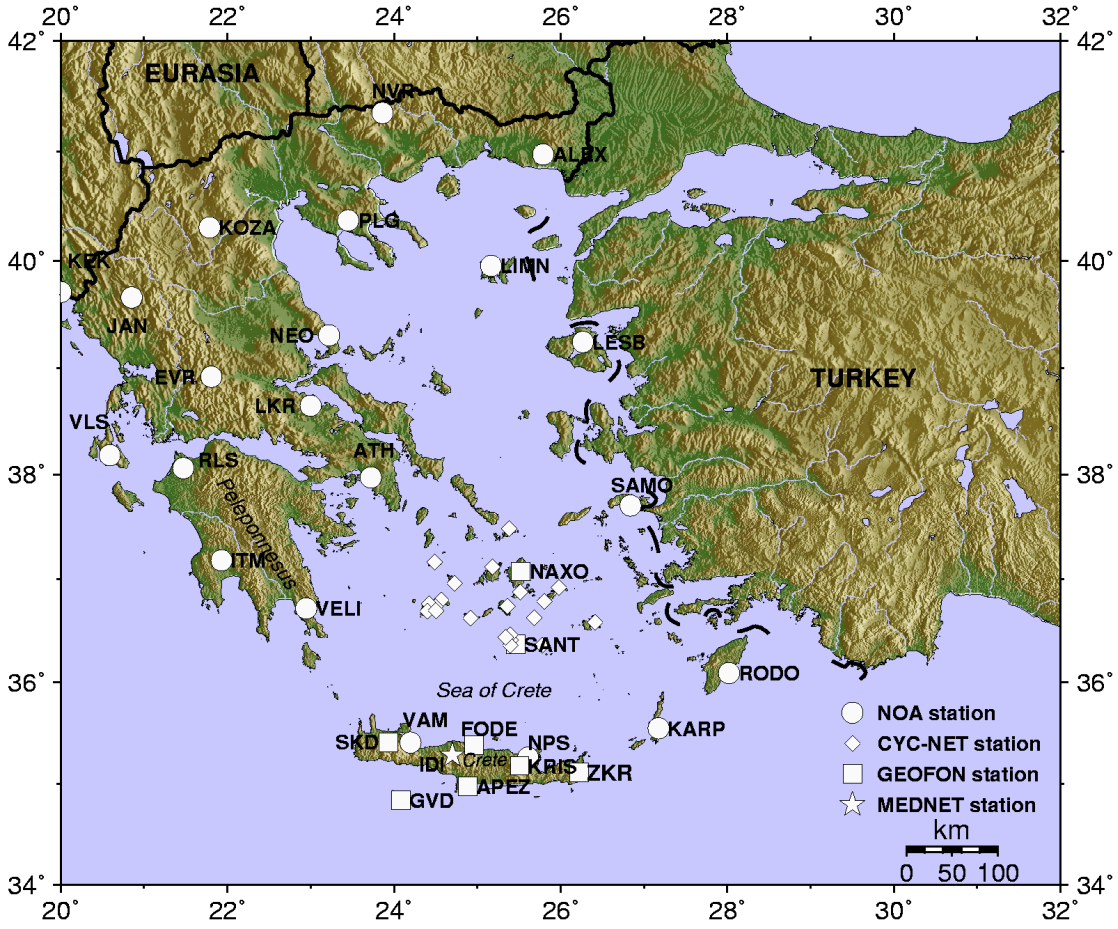

Fig.4.3. Location map of the seismological stations utilized to compute S receiver functions. The CYC-NET stations are represented with diamonds in central Aegean. Cubes and circles denote GEOFON and NOA stations, respectively. The MEDENET station located on the island of Crete is shown with star.

4.2.2 Prerequisites for S receiver function method

To obtain lithospheric structure by S receiver function technique, the data were selected according to the following criteria:

1. Epicentral distances between 60-85°
2. Magnitude larger than 5.7
3. A clear S onset with high signal-to-noise ratio

The Data of 21 temporary stations of the Seisfaultgreece were not included to compute S receiver functions, since they had low signal-to-noise ratio. A total number of 294 teleseismic earthquakes (Table B.4-B.6, Appendix B) recorded by 52 broad band and short period stations have been also utilized to investigate lithospheric structure in the Aegean area using S receiver function technique. The earthquakes distribution is shown in Figure 4.4.

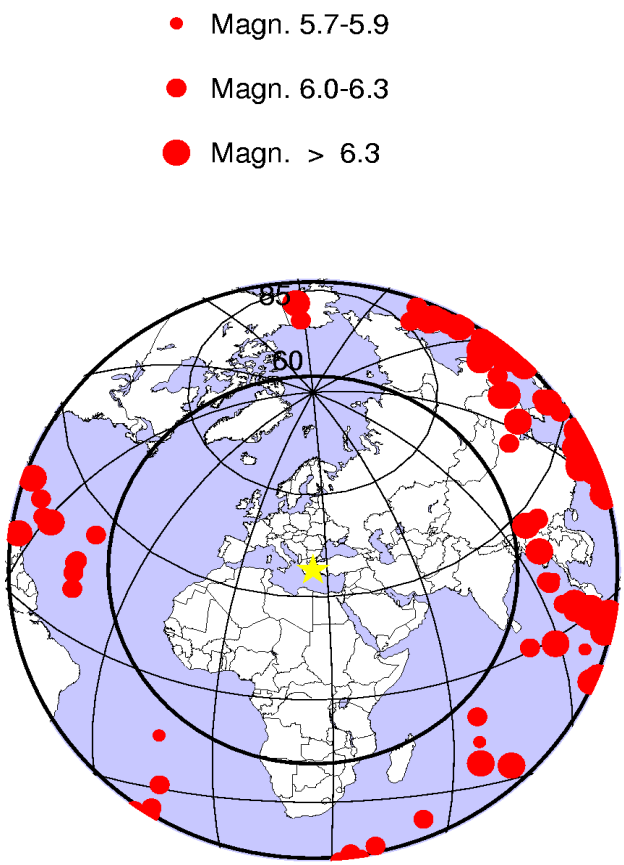

Fig. 4.4. Epicenter distribution of the events used to estimate S receiver functions. The selected data have magnitude larger than 5.7 with epicentral distances between 60-85°.