

ABSTRACT

In this work I analyzed seismic data recorded by two arrays installed in the area of Mt. Gran Sasso (Central Italy), one located at 1.4 km depth (UNDERSEIS), and the other at surface (Fontari). The aim is to compare the seismic signals recorded at depth with those recorded at surface.

In chapter 1 the configurations and performances of the two arrays are illustrated.

In chapter 2 the coherence of the seismic signals among the array stations is computed on all available data to measure the waveform similarity and to detect potentially interesting events different from regular tectonic earthquakes.

In chapters 3 and 4 array and polarization techniques are described. I used three techniques of array analysis, BF (Beam Forming), HR (High Resolution), ZLCC (Zero Lag Cross Correlation). These array methods, together with detailed analysis of polarization, allow to study the wavefield through the values of slowness and backazimuth. Numerous applications were made on noise and earthquake signals, with particular attention to some events detected by coherence analysis.

In chapter 5 horizontal-to-vertical spectral ratios technique has been also applied to earthquake signals to identify the fundamental frequency of the investigated site.

In chapter 6 coherence and array analysis were applied to some particularly interesting signals in the period April-May 2009, after the seismic sequence triggered by the earthquake of April 6, 2009.

Finally, in chapter 7 a statistical analysis was applied to the parameters estimated by array and polarization techniques. The comparison of the results obtained at surface and at depth shows some significant and interesting differences, highlighting features of local seismicity at Gran Sasso.