

Wave Propagation Group R & D Activities

DEVELOPMENT OF A SEISMOLOGICAL STATION

Crete is an area of high seismic risk. The monitoring of the seismic activity in Crete is therefore a task of priority for social and scientific reasons. The wave propagation group has the necessary background to contribute to this task by providing space for the development of a seismological station and the scientific experience for studying and analyzing seismic propagation, based on the measurements of the seismological station.

In 2009 the Wave Propagation group extended its activities in the field of seismic wave propagation. In collaboration with the Geodynamical [Institute of Geodynamics](#) of the National Observatory of Athens, the basic equipment was purchased and installed in a new building, which is currently the Seismological Station of IACM. The station is linked to the [HELLENIC SEISMOLOGICAL BROADBAND NETWORK \(NOA HL\)](#) of the National Observatory of Athens and a continuous monitoring of the seismicity in the area of Heraklion is maintained.

The station currently is equipped with the following instruments:

- ✓ A triaxial seismometer (STS-2 from G. STRECKEISEN AG)
- ✓ An accelerometer (CMG-5T from GURALP SYSTEMS)
- ✓ A 6-channel digitizer (Model-2400 6 Channel from EARTHDATA)
- ✓ A PC-104 Linux computer operating the *seiscompP* software for the continuous recording of seismic signals (SeisComp from Alpha2000).

These instruments are located in a custom made seismological station in the premises of FORTH (Figures 1 - 3).



Figure 1: The well where the seismograph and the accelerometer were placed and insulated. The well was later closed and filled with insulation material in order to keep the temperature inside the well constant



Figure 2: The inside of the station. The digitizer the Seiscomp computer and the battery that powers the equipment can be seen.



Figure 3: The seismicological station building. The GPS antenna can be seen on the right.

There is also a personal computer running Linux, located at the computer center of FORTH dedicated to saving (as a backup) seismic signals from our station. These signals are then used for analysis.

Two different directions are available to the personnel involved with the recording and analysis of the seismic signals:

1. To have a direct online view of the recorded signal using an appropriate software¹ (Figure 4) or

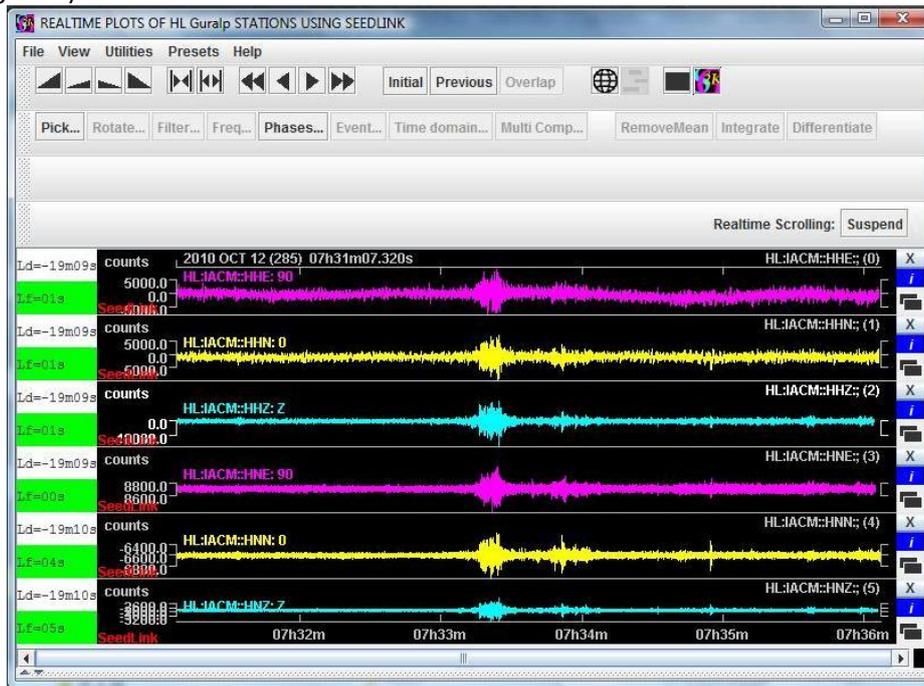


Figure 4: Seismic signals recorded in the three channels of the seismometer and the three signals of the accelerometer in real time.

2. To analyze the stored signals using signal processing techniques. Figure 5 show an example of recorded and analyzed earthquake.

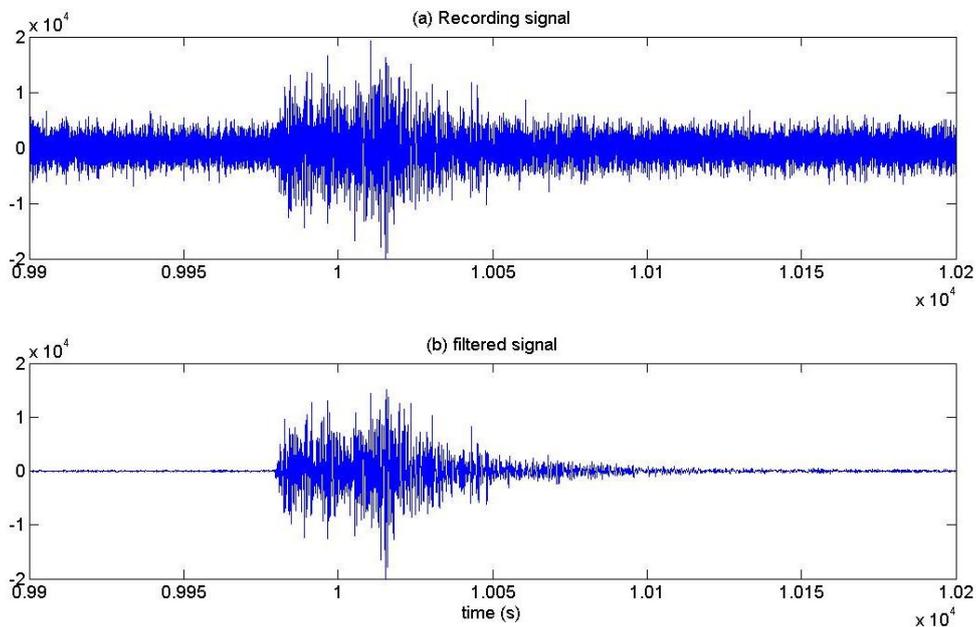


Figure 5: (a) An earthquake (June 14 2010) recorded at the seismometer (vertical channel) and (b) The signal after processing to remove noise.

¹ SeisGram2K Seismogram Viewer v5.1.0X57 (05Apr2006) (BETA) Copyright © 2000-2006 Anthony Lomax (www.alomax.net)

The station is now part of the National Seismological Network. Therefore, information about the station and its operation is available from the World Wide Web:

- ✓ Station Information. The station is continuously monitored and its status is available in the Internet. Thus any problem with the operation of the instruments can be detected and corrected. (Figure 6)

Name	Network	Status	Station Last Recorded Time (Day,Time)	Station Delay (Day, Time)	Av. Time Q. (%)	Dig. Bat.	Dig. Temp.
IACM	HL	Station is OK	292, 10:20:00	0, 0:0:5	100	12.949V	40.0C

Figure 6: Station information as it appears in the internet

- ✓ Quality control. The signals recorded during previous week, previous month current year etc are graphically available. (Figure 7)

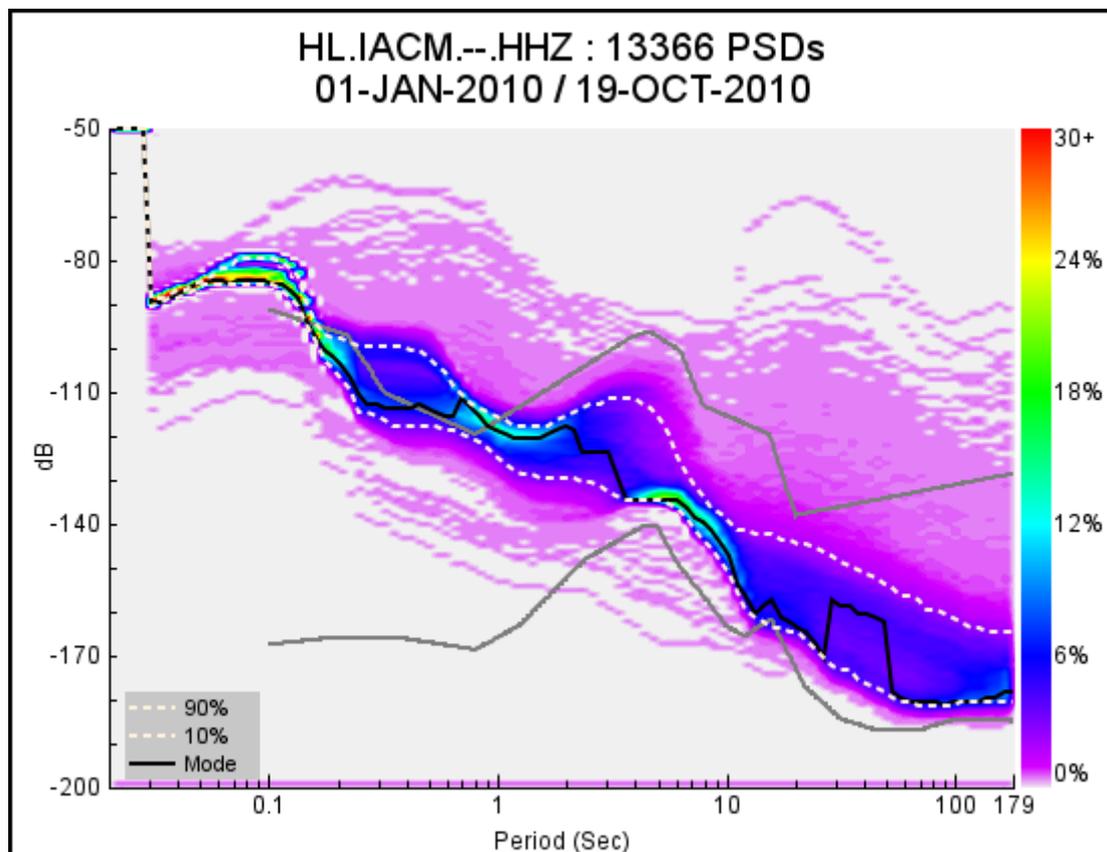


Figure 7: The power spectrum density of the signals recorded at the station from the beginning of 2010 until October 19 2010.

- ✓ [Current signal recording](#). A filtered version of the signals recorded by the seismometer can be seen and thus any earthquake can be detected. (Figure 8).

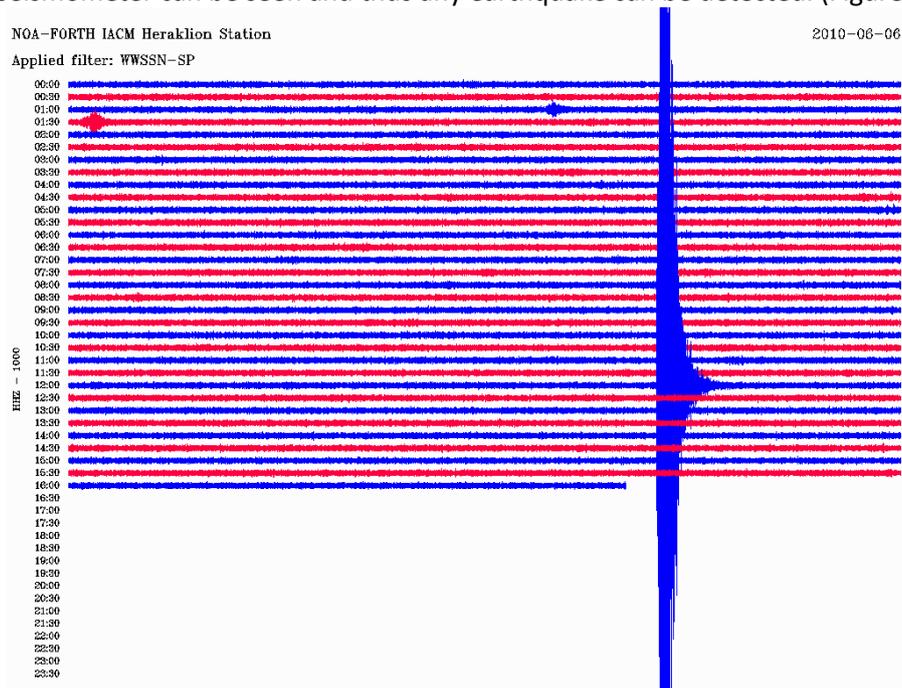


Figure 8: An earthquake recorded at the station as it appeared in the Web. This was a magnitude 4.5 earthquake which took place in the island of Crete on June 6 2010. The WWSSN-SP filter has been applied to the raw recorded signal.

Personnel

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Station Identity

- Site Name: **Heraklio Crete**
- Station Code: **IACM_HL**
- Latitude: **N 35.3058**
- Longitude: **E 25.0709**
- Elevation: **45m**
- Starting Date: **10/11/2009**

Contact

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