

Broad band “western mediterranean” an ocean botton “fomar” seismological networks.

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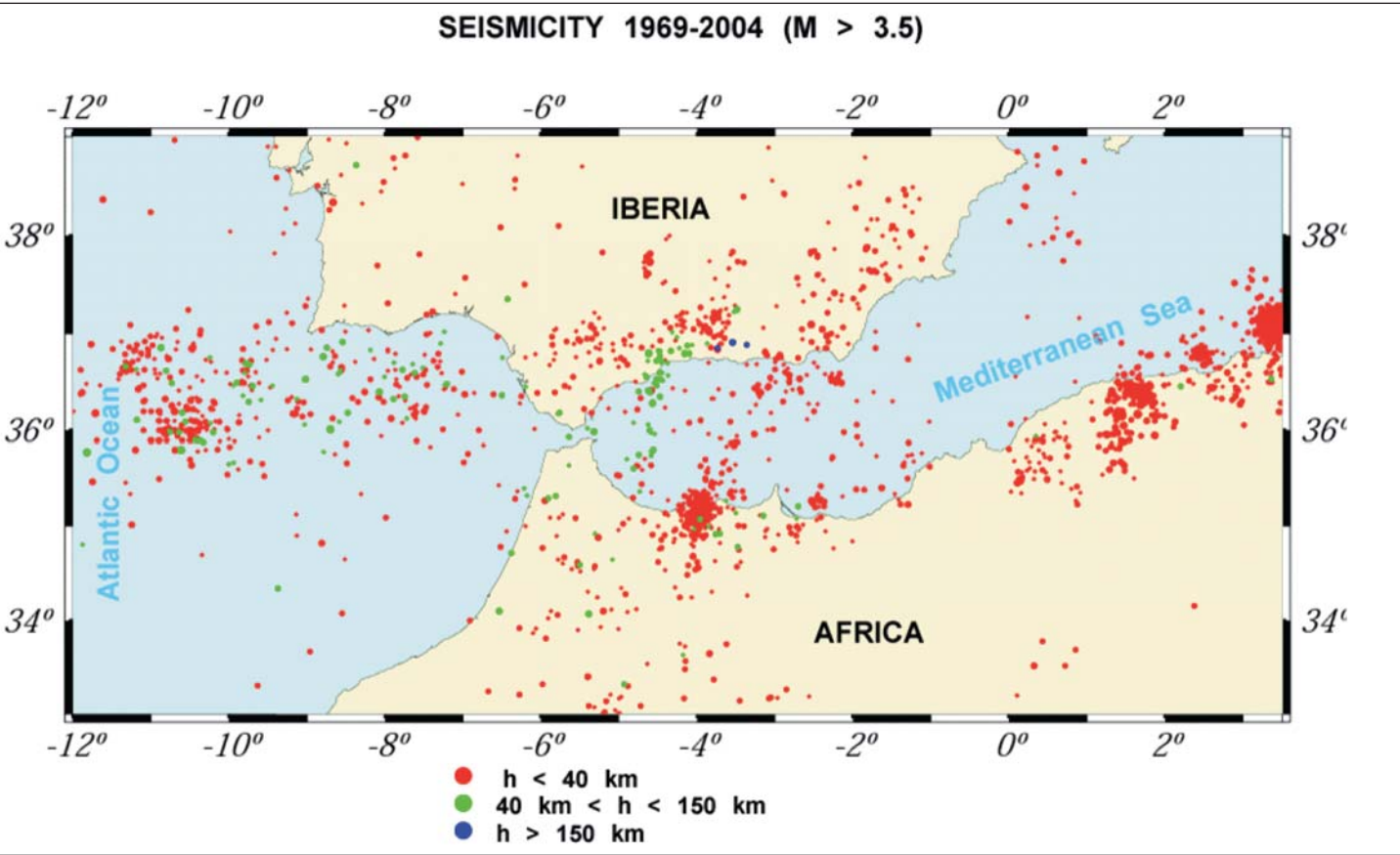
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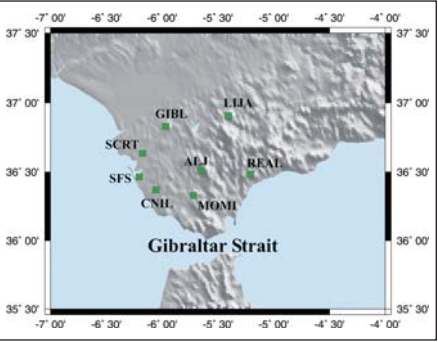
Figure 1: Distribution of epicenters at the Ibero-Maghrebian region (IGN and ROA data files).



Introduction

To study the seismicity associated to the Ibero-Maghrebian region, the Real Instituto y Observatorio de la Armada in San Fernando (ROA) has installed, since 1898, different types of seismological stations. At present two networks are in operation: Long Period station and Short Period net (ROA) and Western

Figure 2: ROA Short Period seismic network.



Mediterranean Broad Band (WM) net (in collaboration among several institutions). The installation of a network of ocean-bottom seismographs (FOMAR) is underway. The Ibero-Maghrebian region corresponds to the western part of the Eurasia-Africa plate boundary and is of great seismological and tectonic interest. It extends from 12°W to 3°E, comprising Southern Iberia and northern Africa, including the Gulf of Cadiz and Alboran Sea (figure 1). Seismicity is characterized by the occurrence of moderate and large magnitude earthquakes at shallow depth, intermediate depth earthquakes (30<h<150 km) and some very deep events (650 km). The whole area constitutes a broad deformation zone, without a well defined plate boundary line, with a plate convergence in a NNW-SSE direction at a rate of 1 to 5 mm/year (Bufo et al., 1995).

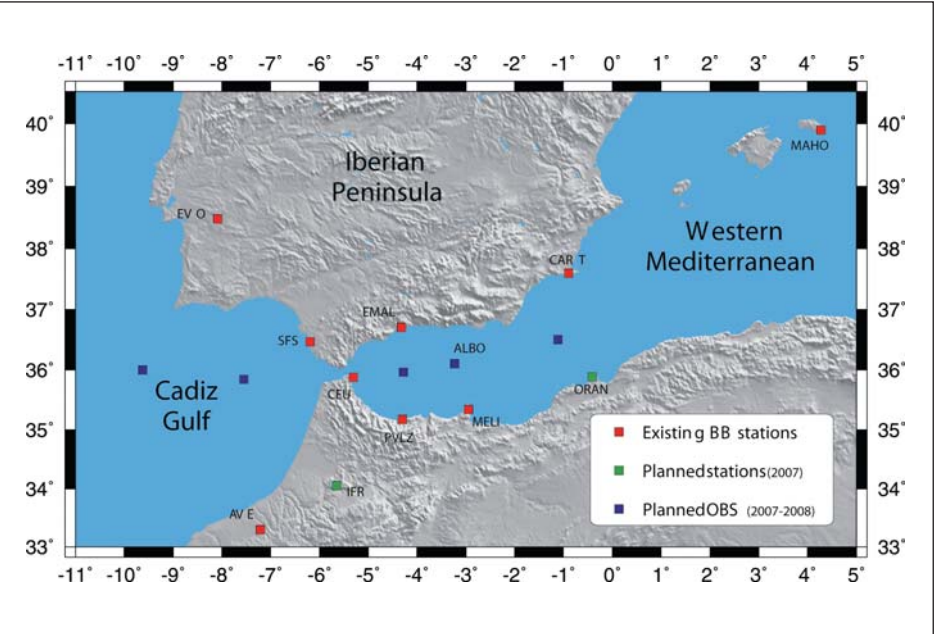
ROA LP seismic station and SP seismic net

A short period network (SFS Network) has been in operation since 1986 in the surrounding area of Gibraltar Strait, in collaboration with Instituto Geográfico Nacional (IGN) and SECEGSA state company (Martin Davila et al, 2001). The network is formed by eight one/three components analogical stations linked to ROA headquarters via radio UHF/VHF (figure 2). These stations are being upgraded at present by extending the sensor bandwidth and converting them to digital transmission (Pazos et al., 2005).

Since 1976 a three components long period station (Sprengnether 5100), is operating in a tunnel in San Fernando.

Western mediterranean (WM) broad-band seismological network

Figure 3: Western Mediterranean (WM) BB seismic network and near future OBS FOMAR network.



From 1996, ROA and the Universidad Complutense de Madrid (UCM), with the support of GeoforschungsZentrum of Potsdam (GFZ), have installed a broad band seismological network with stations located in Southern Spain and Spanish sites located in Northern Africa surrounding the Alboran Sea. This network, initially known as ROA/UCM (Bufo et al., 2002), has been renamed as Western Mediterranean network (WM FDSN code) as new stations have been added outside Spanish territory. At present the stations in operation are the following: San Fernando (SFS), Málaga (EMAL), Cartagena (CART) and Evora University (Portugal) (EVO) in the Iberian Peninsula, Mahón (MAHO) at Minorca Island, and three stations at Melilla (MELI), Peñón de Vélez-Gomera (PVLZ), and Ceuta (CEU), in Northern Africa. In most of them permanent geodetic GPS stations are also installed. One more station has been recently installed in Averroes Observatory (Morocco) in collaboration with the Institut Scientifique of Rabat (Université Mohammed V; Morocco). It is planned to install two stations in the near future, in Ifrane (Morocco) and Oran (Algeria), the last one in collaboration with Université d’Oran (figure 3). The headquarters of the network are located in the ROA facilities in San Fernando, Spain.

All WM Network stations have Streckeisen STS-2 sensors, Quanterra or Earth Data digitizers, and a Seiscomp system. Data are available in real time (phone line or Internet) except for PVLZ, CEU and AVE, which will be available in the near future.

“Fomar” ocean bottom (OBS) seismic network

Due to the fact that part of the seismic activity is located at marine areas (figure 1), and the poor geographic azimuthal coverage at some zones provided by the land stations, in order to complement the WM broad-band network, ROA and UCM will deploy an OBS network with a permanent OBS near the Alboran island (OBS ALBORAN), linked to land by an underwater cable, and four temporary (three years) OBS in the Gulf of Cadiz and Alboran Sea (FOMAR network) (figure 3). The deployment of the OBS will be carried out within 2007 with the support of the Spanish Navy.

Conclusions

In order to study the seismicity associated to the western part of the Eurasia-Africa plate boundary at the Ibero-Maghrebian region, ROA in collaboration with UCM and the support of GFZ have deployed, since 1996, a Broad-Band seismic network with stations installed in Southern Spain and Spanish sites in Northern Africa. This network has been expanded with a station in Evora (Universidad de Evora), Portugal, and another in Averroes (Université Mohammed V), Morocco, forming the new Western Mediterranean Network (WM). It’s planned to install, in the near future, two stations, in Ifrane (Morocco) and Oran (Algeria), the last one in collaboration with the Université d’Oran.

In order to improve the WM network, five Ocean Bottom Seismographs (OBS)

will be deployed in the Gulf of Cadiz and Alboran Sea, including a permanent station (OBS ALBORAN) and three/four (FOMAR net) semi-permanent stations. Deployment of OBS is planned to be carried out on 2007.

Acknowledgements

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Figure 4: A temporary OBS deployment scheme (courtesy Guralp Systems).

