CRUSTAL STRUCTURE OF THE WESTERN TRANSECT OF THE RIF CORDILLERA FROM BROADBAND MAGNETOTELLURIC DATA

FARIDA ANAHNAH 1, Jesús Galindo-Zaldívar 1-2, Ana Ruiz-Constán 1, Antonio Pedrera 1, Patricia Ruano 1, Jaume Pous 3, Ahmed Chalouan 4, Mohammed Benmakhlouf 5, Pedro Ibarra 6, Eva Asensio 3, M'fedal Ahmamou 4.

1 Departamento de Geodinámica, Universidad de Granada. fanahnah@ugr.es, jgalindo@ugr.es, aconstan@ugr.es, pedrera@ugr.es, pruano@ugr.es
2 Instituto Andaluz de Ciencias de la Tierra, CSIC-Universidad de Granada
3 Departament de Geodinámica i Geofísica, Universitat de Barcelona, Barcelona, Spain. jpous@ub.edu. evasensio@ub.edu
4 Département des Sciences de la Terre, Faculté des Sciences, Université Mohammed V- Agdal. Maroc. chalouan@yahoo.com, ahmamou@fsr.ac.ma
5 Faculté des Sciences. Université Abdelmalek Esaadi. Tetuán. Marruecos. Benmakhlouf@yahoo.fr
6 Instituto Geológico y Minero de España, IGME, Madrid, España. P.ibarra@igme.es

Within the frame of the Topo-Iberia project, the magnetotelluric method has been applied for first time in the western transect of the Rif Cordillera to delineate the electrical crustal structure. Data acquisition has been done in 18 MT measurement sites, with ADU-07 Metronix equipment, including vertical magnetic records. Frequencies range from 4Hz to 32 kHz and acquisition time on each site was from two to three days. The profile extends approximately 110 km in NE-SW trend orthogonal to the main regional geological structures, crossing from the Alboran Sea coast through the major alpine units of the western Rif Cordillera up to the foreland Gharb basin.
We have performed a dimensionality analysis using the Wal's and the Bahr's methods, both based on the rotational invariants. The data obtained show variable dimensionalities ranging from 1D to 3D. Predominant strikes suggest NW-SE orientations. Therefore several 2D models have processed using Winglink software with different rotations. The model with N145ºE rotation shows a good correlation between the resistive structures and the surface geology, as well as their continuity in depth. The Internal Zones corresponds generally to resistive rocks (metamorphic rocks) including a significant conductive body that probably corresponds to the nearby outcropping Beni Boussera peridotites. The External Zones and the foreland basin are characterized by shallow heterogeneous conductive structures. In depth, the most relevant feature corresponds to a large resistive body located below the frontal part of the Rif. The presence of exotic gneiss blocks in the front of the External Zones suggests that this large deep body may correspond to a gneissic or granitic basement surrounded by metapelitic rocks. The deep structure of this transect contributes to highlight the recent evolution and development of the southern part of the Gibraltar Arch in the frame of the Eurasian-African convergent plate boundary.

magnetotelluric, Rif Cordillera, dimensionality

Farida Anahnah, Universidad de Granada, Facultad de Ciencias, Dpto. de Geodinámica, Campus de Fuentenueva, 180071 Granada (Spain), Tel.: 0034958243351, Fax: 0034958248527, fanahnah@ugr.es.