

Crustal Structure of the Western Transect of the Betic Cordilleras (Southern Spain) from Geophysical Data

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The Betic Cordilleras, located at the present-day Eurasian-African plate boundary, are the westernmost end of the Mediterranean Alpine orogenic belt and constitutes the northern branch of the Gibraltar Arc that surrounds the Alboran Sea. A NW-SE cross section of the western cordilleras has been performed (from Internal Zones, crossing the External Zones, the Guadalquivir Foreland Basin and up to the Iberian Massif) using different geophysical data (magnetotelluric, gravity, magnetometry and seismicity) in order to obtain information on the deep structure and determine the location of the main contacts. In addition, these data are important to establish the continuity in depth of the Iberian Massif, under the Betic Cordilleras, and the relationships between major faults and seismogenetic zones.

2D inversion of 12 new MT soundings along the NW-SE profile provides the first deep resistivity image of this transect. A sharp variability in depth of resistivities may evidence the location of crustal detachments. The heterogeneous upper crust, characterized by high variability on resistivity values according to the shallow geological structure, is separated from the more homogeneous lower crust of the Iberian Massif. This Variscan basement is characterized by large resistive bodies on the northern end of the profile and flat and elongated deep conductive bodies in the central and southern part of the profile.

The seismicity evidences the activity of major detachment faults located in the Betic Cordilleras that are responsible of the present day relief. In the frontal part, shallow seismicity suggests that the mountain front is now active and formed by a major reverse fault dipping southwards, to the Internal Zones of the Cordilleras. In addition, other low-angle faults are active at different crustal levels at the boundaries of the major bodies.

Key words: Betic Cordilleras, deep structure, resistivity image, seismogenetic zones.