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Crustal detachments and seismicity distribution: new constraints from MT data in central Betic Cordilleras

A. Ruiz-Constán (1), J. Galindo-Zaldívar (1), A. Pedrera (1), C. Marín-Lechado (2), D. Stanica (3) and M. Stanica (3)

(1) Departamento de Geodinámica. Universidad de Granada. 18071- Granada (Spain). (2) Instituto Geológico y Minero (Spain). (3) Institute of Geodynamics of the Romanian Academy. Jean Louise Calderon str. 19-21. Bucharest (Romania).

The detachment faults constitute large fractures that determine the crustal structure of the cordilleras, with associated seismic hazard. In extensional settings, low-angle normal faults join the major detachments. However, most of the known outcropping examples are inactive exhumated faults. The identification of the active fractures and the relationships with the inactive ones is a main task to improve the assessment of the seismic risk.

The Granada Depression is a large Neogene-Quaternary basin that covers the contact between the Internal and External Zones in the central Betic Cordillera. In the Internal Zones, extensional detachments, with a top-to-the SW kinematics, separate metamorphic complexes. These faults are observed in surface, but up to now, there are not precise geophysical data to show their continuity into depth. Six new MT soundings were acquired along a profile that crosses the southern part of the basin, from Internal to External Zones. The 2D inversion of the data provides a deep resistivity image of the region, where a crustal detachment separates a homogeneous lower crust from a heterogeneous upper crust. The seismicity distribution in the study area is related to normal faults developed on the hanging-wall of the extensional detachment.