

Fault and Fold Development, Crustal Structure and Seismic Activity in the Almanzora Depression (Eastern Betic Cordillera)

Antonio Pedrera¹, Jesus Galindo-Zaldivar¹, Ana Ruiz-Constan¹, Carlos Duque-Calvache¹, Angel Carlos Lypez-Garrido², Carlos Marin-Lechado³, Carlos Sanz de Galdeano², and Inmaculada Serrano⁴

¹ Departamento de Geodinamica, Universidad de Granada, 18071 Granada, Spain.

² Instituto Andaluz de Ciencias de la Tierra, (CSIC-Univ. Granada), Facultad de Ciencias, Univ. Granada, 18071 Granada, Spain.

³ Instituto Geológico y Minero de España. Urb. Alcazar del Genil, 4. 18006 Granada, Spain.

⁴ Instituto Andaluz de Geofísica, Universidad de Granada, 18071 Granada, Spain.

The relief of the Betic Cordillera, situated along the western part of the Europe-Africa convergent plate boundary, is produced by the interaction of folds and faults that accommodate the N-S to NW-SE convergence between the Eurasian and African plates since Tortonian. The Almanzora Corridor, located in their Internal Zones, constitutes an example of E-W elongated asymmetrical narrow basin generated by the interaction of fold and fault sets.

A detailed structural study (including mapping and kinematics analysis of meso/micro-structures) and the combination of geophysical data (magnetotelluric, gravity and seismicity) allow to characterize: (a) the evolution of the Sierra de Los Filabres- Almanzora- Sierra de Las Estancias folds trend that interact with the faults conditioning the sedimentation since Serravallian-Lower Tortonian, (b) the presence of a main large active detachment with associated seismicity that allow the growth of these kilometric folds in its hanging wall, (c) the structures with associated seismicity that does not extends up to the surface, where NW-SE and WNWSE outcropping normal faults (as the Baza fault) and ENEWSW reverse faults deform the Quaternary sediments and (d) the paleostress evolution from the Serravallian-Lower Tortonian to the present mainly characterized by a N-S to NW-SE compression with an orthogonal associated extension.

The above regional observations give rise to the development of kilometric folds related to large crustal heterogeneities that play an important role during basin evolution. In addition, the instrumental seismicity associated to blind structures point the need of the geophysical crustal studies to characterize the seismic hazard.

Key Words: Crustal detachment, synformal basin development, fault overprinting, relief uplift, crustal thickening.