

Topographic disequilibrium in response to tectonic processes induced by crustal buoyancy and slab tearing (Betic Cordillera, SE Spain)

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New crustal and mantle lithosphere data under the Betic Cordillera reveal an important decoupling between relief and crustal thicknesses. Predicted elevations due to the lithospheric buoyancy exceed observed elevations on the Neogene basins of the central sector showing a negative residual topography. Moreover, the western sector of this chain, where flysch units outcrop, shows the most extreme negative values of the residual topography. By contrary, the eastern sector of the Betic Cordillera shows a positive residual topography. However, the most important positive values of residual topography are located on the western sector of Sierra Nevada, where surface elevation reaches more than 3.300 m. Precisely, this sector of the Range, without a thick root/crust, has been exhumed during the last 8 Ma and has the higher incision and elevation Plio-Quaternary rates. We present a complete analysis of the drainage pattern and its recent evolution considering: a) the current crustal component of buoyancy; b) the buoyancy consequences of the slab rollback motion towards the west; d) the potential push up of the asthenosphere produced by the tearing and removal of the Iberian lithosphere.