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Differential active uplift in the Granada Basin (Betic Cordillera, SE Spain)

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The Granada Basin is one of the Neogene-Quaternary intramontante basins of the Betic Cordillera in SE Spain. The present-day physiography of this topographic depression mainly results from Guadalquivir river capture in Quaternary times, when the basin still had an internal drainage. However, landscape evolution in the Granada Basin does not respond to a simple model of headward erosion after river capture. In order to check the degree of landscape evolution, we have calculated the Hypsometric Integral (HI) in 2185 subbasins. This analysis reveals different stages of landscape evolution within Granada Basin. High values of HI in the NE corner of the Basin contrast with the lowest values situated in a flat area roughly coincident with the central part of it, where the streams hardly incise into Pleistocene-Holocene fluvial deposits. In this NE corner an elevated geomorphic surface appears well exposed. Drainage pattern analysis reveals two stages of river development and entrenchment. The first stage is represented by abandoned channels slightly incised into this elevated geomorphic surface. The second stage corresponds to the present-day drainage network with higher incisions and a well developed pattern of headward erosional. The local base level for this second erosional stage coincides with the flat surface defined by the Pleistocene-Holocene deposits of the central part of the Granada Basin. This landscape evolution is probably related to differential uplift during the recentmost Quaternary. In this regard, the NE part of the basin seems to have uplifted at higher rates than the central part, probably as a consequence of basin compartmentalization due to active faulting. Actually, NW/SE-oriented normal faults are thought to be the most active structures in this region according to both field geology and seismicity. We propose that these normal faults are responsible for the differential river incision and drainage evolution in the Granada Basin.