Geophysical Research Abstracts
Vol. 14, EGU2012-12654, 2012
EGU General Assembly 2012

Uplift and active folding in the western sector of Sierra Nevada (Betic Cordillera, SE Spain).

J.M. Azañón (1,2), V. Pérez-Peña (1), F. Giaconia (1), G. Booth (1,2), M.J. Rodríguez-Peces (3), and C. Ureña (1)

(1) Departamento de Geodinámica, Universidad de Granada. Granada, Spain (jazanon@ugr.es; vperez@ugr.es; flavio@ugr.es;cgunieto@ugr.es; gbooth@ugr.es), (2) Instituto Andaluz de Ciencias de la Tierra (CSIC-UGR). Granada, Spain (jazanon@ugr.es; gbooth@ugr.es), (3) Dpto. de Geodinámica. University Complutense of Madrid. Madrid, Spain. (martinjr@geo.ucm.es)

The Sierra Nevada mountain range, located in the central part of the Betic Cordillera, includes the highest peaks on the Iberian Peninsula. It developed since the late Miocene by E-W open folds. We carried out a geomorphologic study with the aid of evaluating the recent tectonic activity in this mountain range.

We have analyzed several geomorphic indexes (mountain-front sinuosity; Smf), valley floor width-to height ratio (Vf), asymmetry factor (AF)], together with topographic river profiles and hypsometric curves for the main catchments of the Sierra Nevada. The Smf index is higher in the western (Smf = 1.17) and southern (Smf = 1.34) mountain fronts (Fig. 3), suggesting that these two fronts are tectonically active. On the contrary, the value obtained for the northern mountain front (Smf = 2.10) is much higher, pointing out to an inactive front. The obtained Vf values are higher in the Northern mountain front, and lower in the western mountain front.

The geomorphic indexes calculated suggest that the Sierra Nevada is tectonically active, with the more recent uplift concentrated along its western edge, where Smf and Vf present the lowest values. River entrenchment as deduced from the comparison of longitudinal and ridgeline river profiles increases westward. This fact might be related to the recent uplift of the western Sierra Nevada as compared to the eastern. The asymmetry factor of the main catchments draining the Sierra Nevada has also been calculated in order to detect active large-scale surface tilting. Most catchments show no asymmetry, except in the southwestern sector of the range where opposite and systematic asymmetries have been found at both sides of the Lanjarón river. These assimetries are due to active folding produced by an antiform striking parallel to the Lanjarón river (NNE-SSW). The NNE-SSW folds have been previously interpreted as isostatic folds related with the unloading of the extensional detachment foot-wall, whilst the E-W folds have a contractional origin related with the Europe-Africa convergence. However, these folds are subperpendicular to the present NW-SW compressional stress field of the western Mediterranean and, considering its recent activity, a contractional origin can also be attributed. NW-SE high-angle active normal faults of the western border of Sierra Nevada are also consistent with this stress field.