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Is the Betic-Rif Arc still collapsing?

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The Alpine orogenic arc formed by the Betics and Rif mountain ranges protects a close basin floored by an extremely attenuated continental crust: the Alboran Sea. It is demonstrated that westwards migration of the arc occurred simultaneously with extension in the Alboran region during the Neogene (mostly since the Oligocene and through the Miocene), within an oblique plate convergence between the African and Eurasian plates. Extensional collapse of the orogen was driven by low-angle extensional fault systems, which determined surface uplift and high denudation rates throughout the Miocene. Within this scenario we discuss if collapse-related processes can be still operative in the region.

Gathering information from diverse stress indicators (earthquake, borehole, and data from recent faults) we reconstruct the present-day stress field throughout the Gibraltar Arc. This field results from the complex superposition of two different stress sources; namely, differences in the gravitational potential energy imposed by the crustal structure and the occurrence of active faults. Extensional collapse in the arc is restricted currently to the central Betics, coinciding with the region with higher topographic elevation and maximum crustal thickness ($>$34 km). Beyond this restricted domain, active deformation is accomplished by a major, left-lateral strike-slip fault system that cross cut entirely and obliquely the arc, from eastern Betics to the Rif. Stress rotations along this fault zone and the overall stress field evidence that most of the plate convergence deformation is currently accommodated by lateral extrusion of material along this major-scale strike slip fault system, rather than ongoing extensional collapse of the Betic-Rif Arc.