
Curling into the hole: Drainage reorganization and speciation at the edge of a sinking slab.

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Résumé

Subduction Transform Edge Propagators (STEPs) bound the edge of subduction zones allowing slab rollback and the migration of narrow orogenic arcs and the basins they enclose. STEPs migrate in space and time changing the topography of the regions they traverse. Producing consecutive waves of subsidence/uplift related to tectonic mechanisms including slab flexure, slab pull and small-scale mantle upwelling that travel through the slab tearing region. We describe how these tectonic mechanisms affect the landscape, active faulting pattern, drainage reorganization and speciation around the northern edge of the Betic-Rif slab during the Plio-Quaternary. Filtered topography of the western Betics shows a topographic low between two uplifted domains that is centered in the locus of the subducted Betic-Rif slab, as defined by intermediate-depth seismicity. Moreover, lower-amplitude topographic highs respond to active shortening structures along the Betic mountain front and to high-angle orogen-parallel normal faults in the rear, bounding the Malaga basin. These structures are segmented by strike-slip faults, and together influence the local drainage evolution. The main drainage divide attests to the competition between Atlantic and Mediterranean watersheds, attaining equilibrium after a middle Pleistocene capture in the Antequera plains that host several late Pleistocene endorheic basins. Rivers around the slab edge underwent a 90° piracy event curling towards the capturing Mediterranean Guadalquivir river. Incision below the capture site increased by an order of magnitude after 150 ka, whilst flow decreased in the lower reach of the captured Las Yeguas river leading to aggradation and late Pleistocene lake development. Speciation around the sinking slab is driven by both isolation in recently uplifted mountain ranges, endorheic basins and late Miocene island development or by dispersal to late Pliocene newly emerged land around the Gibraltar straits and through river captures. Fresh-water fishes including *Luciobarbus sclateri* and *Squalius pyrenaicus* colonized the Guadalquivir river following the capture, adding a new Mediterranean branch to their Atlantic clades. Base-level lowering along the drainage divide region drove cave development and karstic rerouting towards the Mediterranean that may have also determined speciation of cave dwelling organisms and offered shelter to Nearthental populations.

Mots-Clés: Drainage reorganization, STEP faults, biogeography, Western Betics

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