Geophysical Research Abstracts
Vol. 20, EGU2018-13413, 2018
EGU General Assembly 2018

Slab dynamics and the extensional attenuation of foreland thrust belts in the western Mediterranean.

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Extensional denudation in the circum Mediterranean orogens formed deep basins in the core of subduction-related orogenic arcs. It has contributed to the thinning of crustal domains and exhumation of metamorphic rocks in the hinterland of the Alps, Cyclades, Betics, Appenines and Rif, among others. However, fewer cases have been described of extensional denudation affecting Foreland Thrust Belts (FTB). Here we describe extensional collapse of FTB′s around the western Mediterranean in response to deep mantle dynamics in a setting of NW-SE convergence between Africa and Eurasia. Extension of FTBs has occurred at the edges of migrating subduction systems like the Gibraltar arc and the Algerian-Tunisian Tell-Atlas, when lithospheric tearing has propagated under the foreland continental crust region. Inboard of Subduction Transfer Edge Propagator (STEP) boundaries continental crust can undergo delamination of its mantle lithosphere driving extension, Si-K-rich magmatism and topographic uplift. This tectonic mechanism has been described as edge delamination in the Betics and Rif. We describe extensional collapse of FTB′s both inboard and outboard of the STEP boundaries. Extension affected the Betics outboard of the STEP boundary in Mallorca and in some regions of the Eastern Betics, forming late Miocene sedimentary basins. Meanwhile, extension thinned the Tunisian Tell and Atlas chains as delamination of the African continental lithospheric mantle propagated towards the SE during the late Miocene to present, inboard of the Tunisian-Atlas dextral STEP boundary.