Geophysical Research Abstracts
Vol. 21, EGU2019-14868, 2019
EGU General Assembly 2019

Characterizing the mode of growth in crustal normal faults

David Fernández-Blanco (1), Gino de Gelder (2), Robin Lacassin (1), and Rolando Armijo (1)

(1) Institut de Physique du Globe de Paris, Lithosphere Tectonics and Mechanics, Paris, France (geo.david.fernandez@gmail.com), (2) ISTerre (Institut des Sciences de la Terre), Université de Grenoble Alpes, Grenoble, France

Better characterizations of the evolution of active normal faults is key to understand crustal mechanics and dynamics, and thus, continental tectonics. We propose a simple theoretical framework to characterize the mode of growth of active crustal faults from the geomorphology of their extensional footwalls. The framework is based on the shape of fault displacement profiles and the height of tectonic knickpoints in footwall rivers that are expected, barring complicating factors, in response to different scenarios of active fault linkage and growth. The framework provides inferences on the relative onset of activity for individual fault segments and their linkage mode (simple, directed or propagated) in active colinear faults, and we use it to understand the evolution of the active faults bounding the uplifting shoulder of the Corinth Rift. We use coeval markers of past sea levels and the present-day footwall relief as proxies to fault displacement profiles in time and tectonic knickpoints in river trunks draining the extensional footwall orthogonally towards the bounding faults. Our results imply that the individual fault segments of the rift bounding system are a kinematically-coherent composite fault, and that the fault grew along-strike from the rift centre linking and integrating fault segments by propagation along their strike.