Geophysical Research Abstracts
Vol. 21, EGU2019-10344, 2019
EGU General Assembly 2019

From small and cold to large and hot: What controls mountain belt growth?

Sebastian G. Wolf (1), Ritske S. Huismans (1), Josep A. Muñoz (2), Peter van der Beek (3), and Magdalena Ellis Curry (3)

(1) University of Bergen, Department of Earth Science, Norway (sebastian.wolf@uib.no), (2) University of Barcelona, Geomodels Research Institute, Spain, (3) University of Grenoble, ISTerre, France

During recent years, geodynamic models have underpinned our understanding of the growth of a mountain belt from a small, cold to a large, hot orogen as a function of the amount of convergence. Additionally, studies have demonstrated that the structural style of a mountain belt is strongly influenced by inherited weak (extensional) structures, the amount of erosion and deposition, as well as the distribution of shallow detachment horizons. We use upper-mantle scale plane-strain thermo-mechanical models coupled to a 2D, mass conserving surface process model (FastScape), to investigate the long-term evolution of mountain belts and the influence of extensional inheritance and surface processes thereon. With our models we can establish an evolutionary framework for orogenic growth from a monovergent wedge to an orogenic plateau, and find that internal crustal loading is the main driver for the evolution. Extensional inheritance and uniform surface processes modify the structures, but have no first order mechanical influence. To verify and discuss our generic modeling results, we present a comparison of the models with natural systems, with a particular focus on the Pyrenees, Alps and Himalaya.