From Faults and Fluids to Mountain Belt Dynamics

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For understanding the formation of mountain belts it is necessary to gain quantitative insights on fault and fracture mechanics on multiple scales. In particular, for addressing the role of fluids on larger processes, it is inevitable to constrain fault and fracture geometries at depth, as well as gain insights on how fluids influence fault mechanics. At least partly, the future of such analyses lies in exploiting large data sets, as well as in multi- and interdisciplinary research.

In this talk I will present results from variety of geological settings, including dilatant faults at Mid-Ocean Ridges, the Oman Mountains, the Khao Kwang fold-trust belt in Thailand, and the European Alps. I will show how multi-scale studies and the use of large data sets helps constraining fluid migration in mountain belts, fault geometries, as well as possible feedbacks between fluid flow and strain localization. Results are then applied to discuss the role of mechanical stratigraphy on structural style in foreland fold-thrust belts.