

ALPARRAY COLLABORATIVE RESEARCH INITIATIVE ADDRESSING FUNDAMENTAL QUESTIONS OF ALPINE OROGENY

KISSLING, Edi*

ETH Zürich, Switzerland

kiss@tomo.ig.erdw.ethz.ch

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In all aspects, the Alps are by far the best documented orogen. Yet, the more we learn the more clear it appears that Alpine orogeny and likely orogenic processes in general may only be understood in a 4D-space-time frame and currently we are still far from mastering this challenge. Within their only 1000km lengths from Nice to Vienna, the Alps exhibit an extraordinary variation in structure along strike and from surface to great depth. The modern well-accepted mountain building concept calls for a material flux carefully balanced by mantle flow, plate convergence, subduction and obduction, crustal delamination, surface topography evolution, uplift and erosion. From an evolutionary point of view, structures and presently dominating tectonic processes in the Eastern, Central and Western Alps document significantly different past and present orogen evolution within a single mountain belt. Furthermore, the late Alpine orogenic evolution is intimately linked with the geodynamic forces expressing themselves in Northern Apennines evolution.

The Alpine data set provides a basis to relate subduction processes with Penninic nappes evolution and overthrusting of Austroalpine lid, collision and oceanic slab break-off with build-up of topography, and post-collisional slab rollback and isostatic rebound due to erosional unloading to exhumation of deep European basement structures such as Tauern and Aar massiv. Temporal and spatial variations and relative importance of these processes and their relation to the overall convergence between the Adriatic/Africa and European continental plates, however, are still poorly understood and remain matters of debate. While the AlpArray Seismic Experiment will provide new geophysical information of unprecedented resolution and reliability, discussions and interdisciplinary earth science research among AlpArray community targeted at key questions will lead to a better understanding of collisional orogeny in general and Alpine evolution in particular.