

Neogene Mountain Building in the European Alps

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Recently, numerous studies have tried to unveil the late Neogene exhumation history of the Central Alps and their adjacent northern foreland, the Molasse Basin. These studies show that km-scale erosion occurred within these regions, but it remains unclear whether this is a consequence of climate-induced post-orogenic isostatic rebound, active shortening during the late stages of orogenesis, or regional uplift in response to mantle processes. These various mechanisms presumably cause differences in the orogenic response, in particular in the magnitude and lateral extent of the shortening and erosion signal. A key element to constrain the responsible mechanism behind the erosion signal is the Subalpine Molasse, which forms the southern, folded and thrust part of the foreland basin and is as such links the Alps with their foredeep. It remains to be tested (i) whether the Subalpine Molasse has been tectonically active in the Neogene, (ii) whether the tectonic signal is observable along strike the orogeny and (iii) whether the shortening is synchronous using the same detachment system or not.

Here I combine new low-temperature thermochronology data from the basin with existing data from the structurally related hinterland. I use these data to reconstruct the kinematic evolution of the Central Alpine wedge since 10 Ma. Finally, I use wedge mechanical considerations to understand the exhumation and erosion history of the Central Alps since Late Miocene times.