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Topography of the Central Alps in the light of Tertiary collisional tectonics

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Collisional shortening in the Central Alps is partitioned very differently between the upper and lower plates along the strike of the orogen. North of the Insubric Line, the amount of post-nappe shortening accommodated in the wedge of accreted lower crustal material, increases westwards, whereas south of the Insubric Line, post-nappe shortening accommodated in the upper plate increases eastward (Rosenberg and Kissling, 2013). Taking the Bergell pluton as a time marker, the age of these deformations is inferred to be post 30 Ma.
We investigate the present-day topography of the Central Alps, in order to test whether the systematic, along-strike changes, in the amounts of post-nappe shortening are associated to a systematic change in the topographic signature. In order to do so, the maximum and minimum elevations, and the local relief along a series of N-S sections are analysed and compared.
The analysis of these topographic sections shows that the local relief varies following two along-strike trends:
1. North of the Insubric Line, i.e. in the wedge of accreted lower crust, the relief decreases from west to east, showing the transition from a highly incised topography in the west to a plateau-like topography in the East.
2. South of the Insubric Line, i.e. in the lower plate, the relief increases from East to West.
These trends point to a positive correlation between the amount of shortening and the intensity of local relief. Linear correlations between local relief and uplift rate (e.g. Hurtez et al., 1999), and between local relief and shortening rates (Champagnac et al., 2012) have been inferred for different, tectonically active areas. Areas of larger finite shortening in the Central Alps, characterized by higher local relief, probably correspond to areas of higher shortening (and uplift) rates during Alpine collision. Considering the very slow, present-day, convergent movements across the Central Alps (Noquet and Calais, 2004) it is not clear whether the observed correlation between shortening and relief is the result of past, but still active tectonics or a well preserved relict of Miocene teconic activity.

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