



Doming and unroofing of the Lepontine Dome (Central European Alps). New insights from Low-Temperature thermochronology

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New apatite fission track (AFT) and (U-Th-Sm)/He (AHe) data provide deeper insights into timing and processes of the latest stage exhumation history of the Lepontine Dome. Two major phases affected the evolution of the Lepontine area. (i) Early metamorphism during convergence of the European and the Adriatic plate and (ii) lateral extension causing tectonic unroofing along orogen perpendicular shear zones (e.g. Simplon fault). Uplifting of the Lepontine area started during the Oligocene and propagated from the Ticino subdome at ~25-20 Ma westwards, reaching the area of the Toce subdome at ~20 Ma. The later was rapidly exhumed related to the activity of the Rhone-Simplon fault since the Miocene.

In this presentation, which is supported by the EUROCORES programme TOPO-EUROPE of the European Science Foundation, we show new data along horizontal profiles (± 250 m) across the Lepontine Dome. Avoiding a vertical offset in the sampling design reduces the influence of sample altitude on cooling ages. Concordantly to other studies, AFT ages increase towards the Insubric Line to the south. But in contrast to these studies, our new data also show a clear trend towards older ages northwards to the External Massifs. The U-shaped distribution of AFT ages from north to south indicates maximum exhumation rates in the center of the Lepontine Dome. Thus the exhumation patterns coincide with the metamorphic patterns described for the investigated area with most deeply exhumed rocks situated in the center of the dome. Due to this concurrence we suggest that Miocene exhumation of the Lepontine is largely controlled by tectonic processes. If this interpretation is correct, uplifting in the Lepontine area lasted much longer than previously assumed and was controlled by tectonic rather than climatic forces.

Furthermore, the offset between the AFT ages of the horizontal profiles and the published AFT ages of the adjacent Gotthard massif indicate late vertical movements along the Penninic Frontal Thrust after 6 Ma.

In contrast to the AFT ages, AHe ages do not seem to show distinct trends in any direction. This suggests a change in erosion and exhumation regime after 5 Ma. This may be related to the onset of Alpine glaciation, which in turn may be responsible for enhanced erosion in Plio-Pleistocene times.