The Lepontine Dome: A starting point for the Oligo-Miocene Western Alps' extrusion

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Sismotectonic and geologic map have long portrayed the late Oligocene-Recent geologic history of the Lepontine Dome (Central Alps) as tectonically quiescent. We present here new data, based on paleostress inversions, which indicate clearly the late brittle extensional deformation in the whole gneissic core. Three tectonic phases, representing more a progressive evolution of state of stress than single dissociated events, were reconstructed by the analysis of strain/stress field by four different methods of which results are coherent. ESE-WNW transpression of late Oligocene, previously described (Merle et al. 1989) resulted in gently dipping reverse and conjugate strike-slip faults of which occurrences are very rare and don't allow to reconstruct any paleotensor. Then, it appears that this state of stress progresses from transtensive to pure extensive movements, both characterized by regionally consistent NE-SW $\sigma 3$ axes. The fault pattern resulting is composed of relatively local strike-slip faults (transfer faults) accommodating differential extension from the northern to southern Lepontine Dome. This phase formed mainly NW-SE striking normal or oblique-normal faults. Dating of pseudotachylytes, by in situ high spatial resolution UV-laser ablation $^{40}Ar/^{39}Ar$, provide new constraints on timing which prove that this NE-SW extensional phase was still active in the late Miocene. Another discrete E-W fault family, more recent, with N-S extensional directions, was also determined and thought to be linked to the collapse of the chain.

These newly recognized Oligocene-Miocene tensional phases in LD appear well in line with others previous studies conducted from the south of the Alps to the Bergell intrusion. The kinematics synthesis of faults-striae and sismotectonic data allows to propose that the post-doming evolution of the Lepontine gneissic core was associated with considerable crustal extension coherent all along the Alpine arc. This history supports the notion that inherited lithospheric structures controlled the location and the modes of intracontinental deformation in the Alps coupled with the evolving boundary conditions of the whole Alpine arc.

REFERENCES

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