



Rift-related Triassic Alpine magmatism traced by U-Pb dating and Hafnium isotopes of detrital zircons

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The geodynamic setting and source of syn-sedimentary Triassic igneous activity in the Alpine Tethys is a matter of discussion since long time. There are two contrasting models proposed, either within an extensional environment (e.g. Crisci et al., 1984) or in a subduction-related setting (e.g. Castellarin, 1988); the latter in particular is based on the apparent calc-alkaline geochemical signature.

We analyse Triassic and Jurassic sandstones from the southern margin of the Alpine Tethys. Laser-ablation ICP-MS methods are used to date the detrital zircons and to evaluate Hf-isotope ratios in order to characterise the time and type of magmas in which the zircons crystallised. For analyses we have chosen the Early Triassic Fuorn Formation and the Middle Triassic Prosanto and Altein formations (Upper Austroalpine Silvretta nappe), the Middle Jurassic Saluver Formation (Lower Austroalpine Err nappe), the Middle Triassic Buchenstein Formation and the early Late Triassic Val Sabbia Formation (South Alpine domain).

The detrital zircon U-Pb ages reveal a main sourcing of the Triassic sandstones in coeval igneous rocks, and alternatively, in Permian igneous and volcaniclastic (Verruccano type) rocks. Triassic re-melting of older continental crust is documented by the presence of post-Variscan, Variscan and older inherited cores in the detrital zircons. A mixed mantle-crust source of the Triassic melts is confirmed by the Hf-isotope ratios. Finally, Triassic rift-related igneous activity developed in a similar crustal setting as the post-Variscan magmatism.

We conclude that the Triassic magmas formed through partial melting of the upper mantle, which was deeply modified during the previous Variscan orogeny (Crisci et al. 1984). The rising melts included crustal material, and the apparent calc-alkaline signature was inherited due to recycling of previous subduction-related orogenic cycle products. With regard to the obtained epsilon Hafnium values of the detrital zircons, the post-Variscan (Permian) extension and Triassic Alpine rifting were continuous processes.