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From orogen collapse to margin rift: new U/Pb constrains to the post- Variscan and pre-Tethyan history in the Ligurian Alps (Italy).

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Although involved in Alpine nappe stacking, the stratigraphy and the relative thicknesses within the Late Paleozoic volcano-sedimentary successions in the Ligurian Briançonnais (Ligurian Alps) was unravelled (Cortesogno et al., 1993). On the whole, active tectonics coheval with igneous activity and continental sedimentation in fluvial-lacustrine environment is inferred from abrupt or gradual lateral thickness variations throughout the wide areal distribution of the successions. Such changes support the coheval development of normal faults, presently trending N30˚ and N110˚, producing graben and half-graben structures. Bulk strain measures suggest that faulting took place in a transtensional regime, moreover no proofs of Upper-Carboniferous-Permian compressional events were found in the Ligurian Alps. On the other hand evidence such as unconformities and erosion between sedimentary and/or volcanic formations, differences in the areal distribution, chemical changes, indicates that the tectonic activity and the associated igneous and continental sedimentation were discontinuous and experienced a stepwise evolution.

U-Pb radiometric dating was carried out in situ by LA ICP MS on zircon from the post-Variscan volcano-sedimentary covers of the Ligurian Alps. Two samples representative of the early acidic event (Case Lisetto Rhyolites), one of the middle andesitic event (Eze Fm.), two of the late acidic event (C Lithozone), three of the latest, alkalic potassic event (D Lithozone) were selected from the igneous stratigraphic succession.

Disregarding results from spots on recrystallized rims or altered cores, magmatic ages resulted as old as about 290 Ma for the Case Lisetto Metarhyolites, about 275 Ma for C Lithozone and about 270 Ma for D Lithozone. The Eze Fm. andesites contain zircons with ages spreading between 767 and 478 Ma, only one spot yielded the age of 296 $\pm$ 10 Ma, consistent with their Early Permian emplacement.

In the lower Paleozoic basement, the age of high-grade Variscan metamorphism is set between 340-320 Ma and the low-grade overprint at 310-300 Ma (Del Moro et al., 1981; Barbieri et al., 2003; Giacomini et al. 2006). As the first volcanic episode (directly spread over the amphibolite facies basement) is dated at about 290 Ma, the exhumation rate of the basement results rather high (ca. 1 mm/y). Therefore, following the collision, the orogen collapse mostly occurred driven by tectonic unroofing. Later, in the time span between 290 (Lisetto) and 275 (C-Lithozone) Ma, igneous activity became wider and dominant over tectonics. In this regard, the Ligurian Alps underwent a generalized lithospheric attenuation associated to emplacement of huge magmatic products, instead of erosion procesess characterizing other records of the Variscan collapse. In this phase the orogen collapse is associated with high thermal flow and enhanced by widespread intracrustal magmatic reservoirs. This mechanism is still active between 275 and 270 (D Lithozone) Ma, when occurred the magmatic switch between the calc-alkaline and alkaline activity as elsewhere in Southern Europe. No clear evidence supports that also the tectonic regime turned from transtensional to extensional, in parallel with e.g. Sardinia at the same time.

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