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Stratigraphy, U-Pb dating and structural control of post- Variscan volcanism in Sardinia and Southalpine

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At the Early Permian, a trans-tensional geodynamic regime developed along the southern Palaeoeurope, due to a dextral megashear between Gondwana and Laurasia. In West-Mediterranean southern Variscides, the post-orogenic evolution is characterized by the interaction of magmatism, tectonics and sedimentation related with the opening of intracontinental alluvial to lacustrine basins. The western boundary between the peri-Gondwanian derived microcontinents and Gondwana is characterized by the presence of the East Variscan Shear Zone (ESVZ, [1, 2]). The ESVZ is part of the Variscan shear-network, and acted with a coeval NW-SE shortening direction. The EVSZ is considered as the connection between the Atlas Shear System and the Elbe Shear Zone, one of the biggest Variscan intracontinental dextral-strike-slip shear zones, which runs from Slovenia to Morocco, passing through the Alps, active in a time slice between 325 and 300 Ma. In the **Southern Alps,** at Permian times, the post-Variscan extension is associated with widespread plutonic and volcanic activities [3, 4]. The Permian volcanic to subvolcanic sequence (Valganna sequence) in the western Southern Alps, between Lugano and Maggiore lakes is almost tectonically undisturbed.

Here, 3 volcanic series [3] were identified, and petrographic observations suggested subaqueous lacustrine and subaerial emplacements. **Series I** (basal series): extrusive rocks, directly deposited upon a non-conformity surface over the Scisti dei Laghi basement [5], consists of a few m-thick volcaniclastic mass-flow followed by lithic-crystal and crystal tuffs interbedded with cinerite levels. The Mt. Piambello rhyolite lava flow tops the series. **Series II**: andesite to dacites agglomerates are in turn covered by tuff and cinerite levels, the Alpe Tedesco rhyolite flow and a final ignimbrite (P. Ganna ignimbrite). SHRIMP U-Pb dating on zircons of 288 $\pm$ 1.3 Ma - 285.6 $\pm$ 0.6 Ma can be regarded as the extrusion age of series II. **Series III:** the M. Piambello dacite lava flow is followed by lithic-crystal and crystal tuffs and a rhyolitic ignimbrite. The SHRIMP U-Pb dating on zircons of 280.8 $\pm$ 0.7 Ma is likely the emplacement age of series III. In **Sardinia**, the Late Palaeozoic–Early Mesozoic continental succession [6] of N and SW Sardinia, is made of sedimentary sequences [7]. LA ICP-MS U–Pb dating on zircons revealed that volcanism occurred from ca. 300 Ma (basal ignimbrites) to ca. 292 Ma (top ignimbrites) (Upper Carboniferous-Lower Permian). In Nurra, the end of the calc-alkaline magmatism resulted as old as 297 ± 1 Ma, whereas the Case Satta alkalic ignimbrite was emplaced at 288 ± 1 Ma, following the Santa Giusta effusive episode. The inception of the calc-alkaline volcanism at 299 ± 1 Ma post-dates the unroofing of nappes in the External Zone of the belt, accordingly, the lower crust results exposed at 297 ± 1 Ma in Nurra. In the external zone the intermediate andesite volcanic rocks were emplaced at 294 ± 2, in good agreement with the latest felsic volcanism, as old as 292 ± 2 Ma.

On the whole, i) the new radiometric dating represents a consistent dataset, ii) the volcanism in Sardinia developed earlier that in the Southalpine, iii) the tectonic control on volcanic dominated series extended

to late Permian, thus the supposed change of geodynamic setting towards the beginning of the Alpine cycle was at least non synchronous.

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