Permian geodynamics of the central Southalpine by tectono-thermal record in post-Variscan conglomerates

Zanoni D., Roda M. & Spalla M.I.*

Dipartimento di Scienze della Terra "A. Desio", Università degli Studi di Milano

* *Corresponding email:* davide.zanoni@unimi.it

Keywords: Microstructural and petrologic analysis, Pangea break-up, geodynamic modelling.

The central Southern Alps consist of the pre-Alpine basement and Permian-Mesozoic covers, both affected by the Alpine fold-and-thrust belt. The pre-Alpine basement recorded heterogeneous structural and metamorphic evolutions and therefore consists of different tectono-metamorphic units related to different stages of the Variscan evolution. To the east, rocks recorded the effects of the Variscan tectonic burial and escaped the subsequent collision, whereas the units outcropping westward recorded both the effects of Variscan tectonic burial and collision and the westernmost basement rocks even host late-Variscan intrusives and recorded the effects of lithosphere thinning-related Triassic high-temperature (Spalla et al., 2014). Lower Permian volcanoclastic sequences infill intermontane basins and are the oldest sedimentary rocks uncoformably capping the basement (Berra et al., 2016; Zanoni & Spalla, 2018 and refs therein). These sequences consist of volcanites overlaid by lacustrine sandstone and alluvial fan conglomerates. According to radiometric constraints, the age of the conglomerates is more recent westward. These conglomerates contain pebble- to boulder-sized crystalline clasts. The metamorphic evolution recorded in clasts are related to the Variscan orogeny and revealed that the thermal maturity of orogenic traces increases westward, likewise the general record in the metamorphic basement, indicating that conglomerates were fed by the erosion of tectono-metamorphic units similar to those exposed today. In the westernmost conglomerate, clasts recorded high-temperature metamorphism and some derive even from late-Variscan intrusives and later tourmalinite-breccia. Since the conglomerates rejuvenate westward with the increase of orogenic maturity in clasts, we speculate that the post-Variscan lithosphere was affected by westward propagating extension, also responsible for intermontane wrenching. To test this hypothesis, we started 2D numerical simulations on the thermo-mechanical evolution of the lithosphere affected by westward propagating extension.

Berra, F., Felletti, F. & Tessarollo, A. (2016): Stratigraphic architecture of a transtensional continental basin in low-altitude semiarid conditions: The Permian succession of the central Orobic basin (Southern Alps, Italy). J. Sediment. Res., 86, 408-429.

Spalla, M.I., Zanoni, D., Marotta, A.M., Rebay, G., Roda, M., Zucali, M. & Gosso, G. (2014): The transition from Variscan collision to continental break-up in the Alps: insights from the comparison between natural data and numerical model predictions. Geol. Soc. London Spec. Publ., 405, 363-400.

Zanoni, D. & Spalla, M.I. (2018): The Variscan evolution in the basement cobbles of the Permian Ponteranica Formation by microstructural and petrologic analysis. Ital. J. Geosci., 137, https://doi.org/10.3301/IJG.2018.12.