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Low-grade metamorphism in the eastern Southern Alps: Distribution, conditions, timing and implications for the tectonics of the Alps and NW Dinarides

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Based on 40Ar/39Ar dating of newly-grown syntectonic metamorphic white mica (sericite), we recognize for the first time the timing of Alpine low-grade metamorphism in the eastern part of the Southalpine unit: (1) A Silurian phyllite of Seeberg inlier located to the south of the Periadriatic fault yields a plateau age at c. 75 Ma suggesting a Late Cretaceous age of previously recognized low-grade (Rantitsch & Rainer, 2003) metamorphism. (2) Within the Tolmin nappe, four sericite plateau ages of mainly Middle Triassic volcanics are at c. 51 Ma (Early Eocene). The Late Cretaceous age in the Seeberg inlier is considered to record ductile deformation during formation of a retro-wedge related to the Eo-Alpine orogeny in the Austroalpine units in the Eastern Alps exposed north of the future Periadriatic fault. The Eocene age at the boundary of very low-grade to low-grade metamorphism in the Tolmin nappe (Rainer et al., 2009) relates to the emplacement of the Southalpine nappe complex onto the Dinarides and is contemporaneous with the initial ductile deformation in the Dinarides during Adria-directed shortening and formation of a siliciclastic flysch belt in front of the SW-directed growing fold-thrust belt (Placer, 2008).
Similar rare Late Cretaceous and dominant Eocene ages within post-Variscan units are virtually more widespread in the Southalpine unit and Dinarides as considered before. These regions include the Collio basin (Feijth, 2002) and the Eder unit (Läufer et al., 1996) in the western and central Southern Alps, in the internal NW Dinarides (Borojević Šoštarić et al., 2012) and the Mid Bosnian Schist Mountains (Pamić et al., 2004) and Lim Paleozoic unit in the central Dinarides (Ilic et al., submitted). Consequently, the Southalpine unit and Dinarides were affected by two stages of metamorphism, Late Cretaceous (ca. 80 to 75 Ma) and Eocene (ca. 51 – 40 Ma), both stages are related to back-thrusting. The ages of metamorphism are different from those in the main body of the Alpine orogen exposed north of the E-trending Periadriatic fault. In previous interpretations, the eastern Southalpine unit was considered to differ in many respects from Alpine units north of the Periadriatic fault including (1) no Alpine metamorphic overprint and, therefore, (2) also no Alpine ductile deformation in contrast to amphibolite- and even eclogite- grade metamorphism (ca. 100 – 85 Ma) in Austroalpine units north of the fault, and by (3) S- to SW-, Adria-directed vergency of the deformation of mostly Eocene to Neogene age in contrast to all units basically directed to the north and northwest, towards the stable European plate. The Southalpine unit is considered as back-thrust of the Middle-Late Eocene plate collision between Stable Europe and the Alpine thrust wedge (Doglioni & Bosellini, 1987). The new data from the eastern part of the Southalpine unit challenge this view and imply a steadily but slowly growing Adria-directed thrust wedge between Maastrichtian and Early Eocene times.

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References

Borojević Šoštarić, S. Neubauer, F., Handler, R., Palinkaš, L. A., 2012. Variscan vs. Alpine tectonothermal events in NW-Dinarides: constraints from 40Ar/39Ar dating. Geologica Carpathica, 63, 441–452.

Doglioni, C., Bosellini, A., 1987. Eoalpine and mesoalpine tectonics in the Southern Alps. Geologische Rundschaus, 76, 735–754.

Feijth, J., 2002. Paleozoic and Mesozoic tectonometamorphic development and geochronology of the Orobic chain (Southern Alps, Lombardy, Italy). PhD thesis, Faculty of Engineering and Applied Geosciences, Technical University of Berlin, 136 p.

Ilić, A., Neubauer, F., Handler, R. (submitted). Formation of a structural dome due to transpression: The Lim unit in Central Dinarides. Journal of Structural Geology.

Läufer, A.L., Frisch, W., Steinitz, G., Loeschke, J., 1997. Exhumed fault-bounded Alpine blocks along the Periadriatic lineament: the Eder unit (Carnic Alps, Austria). Geologische Rundschau, 86, 612–626.

Pamić, J., Balogh, K., Hrvatović, H., Balen, D., Jurković, I., Palinkaš, L., 2004. K-Ar and Ar-Ar dating of the palaeozoic metamorphic complex from the Mid-Bosnian Schist Mts., central Dinarides, Bosnia and Hercegovina. Mineralogy and Petrology, 82, 65 Borojević Šoštarić 79.

Placer, L., 2008. Principles of the tectonic subdivision of Slovenia. Geologija 51/2, 205–217.

Rantitsch, G., Rainer, T., 2003. Thermal modeling of Carboniferous to Triassic sediments of the Karawanken Range (Southern Alps) as a tool for paleogeographic reconstructions in the Alpine–Dinaridic–Pannonian realm. International Journal of Earth Sciences, 92, 195–209.

Rainer, T., Sachsenhofer, R. F., Rantitsch G., Herlec, U., Vrabec, M., 2009. Organic maturity trends across the Variscan discordance in the Alpine-Dinaric Transition Zone (Slovenia, Austria, Italy): Variscan versus Alpidic thermal overprint. Austrian Journal of Earth Sciences, 102, 120–133.