THE EO-ALPINE HIGH-PRESSURE BELT IN THE EASTERN ALPS: A KINEMATIC EXHUMATION MODEL AND ITS TECTONIC IMPLICATIONS

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The eo-Alpine (Cretaceous) collision between the Austroalpine and the Adriatic microplates caused subduction and subsequent exhumation of HP-rocks along the so called eo-Alpine high-pressure belt (EHB). The EHB is an about 400 km long E-W striking zone restricted to the southern part of the Austroalpine realm in the Eastern Alps. HP-rocks occur at several locations within a ductile high-strain zone and show a rather uniform cooling age pattern related to exhumation between roughly 110 and 70 Ma (THÖNI, 1999). MORB-type rocks in the easternmost occurrences are the only evidence of the presence of oceanic crust. This observation could be interpreted as an oceanic subduction in the eastern part linked to continental subduction in the western part.

Recent data from a multidisciplinary approach provide new insights into the exhumation history of the western part of the EHB (SÖLVA et al., 2005). Within the Texel Gruppe (Northern Italy), HP-rocks were extruded SE-ward in the central part of a ca. 20 km thick eo-Alpine transpressive high-strain zone, which was active from 95 70 Ma exhuming rocks from eclogite facies to sub-surface conditions.

Similar geochronological and structural data from other parts of the EHB suggest that a similar mechanism may be responsible for exhumation along the whole Cretaceous belt. The presence of a continuous collision zone, but single HP-occurrences with different maximum burial depths indicates that vertical motion varied substantially along-strike.

In the Koralpe/Saualpe/Pohorje (KSP) complex, representing the largest occurrence of HP-rocks within the eastern part of the EHB, structural data point to northwestward thrusting of the HP-unit onto low-metamorphic units, opposite to the extrusion direction within the western EHB. Lower and upper plate within the subduction/exhumation zone must therefore switch their relative position somewhere in between the Texel complex and the KSP complex.

An oblique continental collision zone with irregular plate boundaries and along-strike changes in crustal rheologies may explain (i) the differences in vertical motion along the EHB and (ii) the flip in polarity of hanging wall and footwall. In this scenario HP-rocks are located at "restraining bends" in a steep ductile shear zone with lateral and vertical displacement (e.g. CAMACHO & McDOUGALL, 2000), accompanied by shortening across the shear zone.

References

CAMACHO, A. & MCDOUGALL, I., (2000): Intracratonic, strike-slip partitioned transpression and the formation and exhumation of eclogite facies rocks: an example from the Musgrave Block, central Australia. Tectonics, 19, 978-996.

SÖLVA, H., GRASEMANN, B., THÖNI, M., THIEDE, R. & HABLER, G. (2005): The Schneeberg Normal Fault Zone: normal faulting associated with Cretaceous SE-directed extrusion in the Eastern Alps (Italy/Austria), Tectonophysics, in press.

THÖNI, M. (1999): A review of geochronological data from the Eastern Alps. SMPM, 79, 209-230.