

THE POLYMETAMORPHIC EVOLUTION OF CRETACEOUS HP ROCKS FROM THE TEXEL COMPLEX (AUSTRALPINE UNITS, EASTERN ALPS): PETROLOGICAL AND GEOCHRONOLOGICAL CONSTRAINTS

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New mineral chemical and (micro)structural investigations combined with geochronological data of HP metamorphic rocks from the Texel Complex (TC, SÖLVA et al., 2005) evidence a polymetamorphic evolution and constrain the age and PT conditions of HP-metamorphism.

All major mineral phases except for Grt-cores in metasediments and Bt-bearing orthogneisses and Kfs-clasts had (re)equilibrated during or after the P-peak. Conventional thermobarometry using Grt – Omp ± Ab assemblages gave peak PT results of 560 - 610 °C / 1.2 - 1.4 GPa, which correspond to data by HOINKES et al. (1991). Intergrowths of Ab and Omp justify using Jd-Ab-Qtz barometry. Mineral zoning trends indicate a clockwise PT path close to Pmax.

All lithologies show two Grt growth stages separated by a stage of Grt-resorption. Within eclogite both the Grt core and rim were in equilibrium with Omp, and Grt-consumption was related with Omp-producing mineral reactions and deformation. The entire Grt-growth in eclogite is thus assigned to the HP event. Consistently, Sm-Nd data of 6 Grt-fractions (hand-picked fractions, HCl-leachates and residues) of eclogite sample HK11200 gave 82 ± 9 Ma (MSWD = 1.6, $\epsilon_{Nd}(t) = +5.4$) reflecting Upper Cretaceous isotopic equilibration of Grt and its inclusions. In contrast, data from Grt-two-mica-gneiss and Amp-Bt-Pl orthogneiss indicate the presence of significantly older mineral relics (Grt cores or inclusions) which were not isotopically equilibrated during the Cretaceous event. In line with compositional evidences of two-stage Grt growth in metasediments and tonalitic orthogneisses, these data may reflect pre-Cretaceous magmatic and / or metamorphic processes in the TC.

Apart from deformational inclusion fabrics in Grt core domains, the dominating foliation and a new compositional layering formed at eclogite facies conditions (D1). The orientation of related stretching lineations, which are reflected by HP phases, and fold axes of intrafolial folds, scatter SW to NW due to subsequent (re)folding with N-S (D2) and E-W trending (D3) axes at amphibolite facies conditions. All major deformational structures are related with Cretaceous SE-directed extrusion of the HP rocks (SÖLVA et al., 2005). Rb-Sr Bt-WR ages of Grt-two-mica-gneiss and Amp-Bt-Pl orthogneiss are at 73.1 ± 0.7 Ma respectively 78.1 ± 0.8 Ma. Along with mica-ages from the wider study area they are interpreted as to reflect the time of cooling below ~300 °C. Despite of the evidences of pre-Cretaceous mineral relics the predominating deformational and metamorphic imprint of the TC is confined to the Upper Cretaceous.

References

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