THE POLYMETAMORPHIC EVOLUTION OF THE AUSTROALPINE BASEMENT UNITS (MATSCH NAPPE, ÖTZTAL COMPLEX) IN THE VINSCHGAU/SOUTH TYROL

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The currently mapped sheet Schlanders (CARG 012) offers the chance to carefully investigate the above mentioned units and their tectonic contacts and to implement them into a tectonic model based on new petrological, geochronological and structural data. The Austroalpine nappe stack in the investigated area, located in the Vinschgau area (Southern Tyrol), comprises from bottom to top the Campo-Ortler (COC), the Texel (TC), the Ötztal (ÖC) complexes and the Matsch (M) nappe. These Austroalpine basement units in the Vinschgau valley (e.g. Matsch Nappe, Ötztal Complex) show a clear polymetamorphic evolution history which can be well reconstructed using the spatial distribution of the alumosilicates, the chloritoid-isograd and the observation of chemical zoning patterns in garnets, which depending on the geographical position and the geological setting, exhibit single-phase, two-phase or even three-phase compositions. Especially in the Matsch Unit, a clear spatial distribution of garnet zoning can be observed: in the west, the garnets show only a Variscan composition (Grt I) with a very small eo-Alpine growth rim (Grt II). Further to the east, into the Ötztal Complex, the proportion of this Grt II rim increases until only a residue of the older core Grt I remains. Special attention must be paid to the eastern part of the Matsch Unit where the garnets surprisingly show a third very low calcium generation (Grt Ib), which occurs between the Variscan core Grt I and the eo-Alpine rim Grt II. Since this Grt Ib distribution spatially correlates well with the occurrence of leucocratic othogneisses and pegmatites, a Permian age is supposed (still needs to be confirmed).
All three aluminum silicates also occur in the mapped area. Andalusite and sillimanite show a clear geographical distribution, where andalusite occurs in the western part and sillimanite occurs in the eastern part of the Matsch Nappe. Relic kyanite occurs only isolated in the western part of the region and is thought to represent a relic from the Variscan metamorphic event. The geographical distribution of the aluminum silicates indicates a change of Permian P/T conditions from west towards east, which also correlates well with the occurrence of these leucocratic orthogneisses. Geothermobarometry yielded a strong increase in eo-Alpine temperature conditions of 500°C to 650°C at pressures of 0.80-1.2 GPa in accordance with previous estimates from HAAS (1984) and HABLER et al. (2009).

HABLER, G., THÖNI, M., GRASEMANN, B. (2009): Mineral. Petrol., 97, 149.
HAAS, R. (1985): Unpubl. Ph.D. Thesis, University of Innsbruck.