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FI INVESTIGATIONS ON HP-ROCKS FROM THE LOWER ENGADINE WINDOW Ű NEW INSIGHTS ON ITS LATE TECTONO-METAMORPHIC EVOLUTION

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Fluid inclusions studies in metamorphic rocks allow to reconstruct not only the chemistry of the fluids enabling and/or supporting metamorphic reactions but also the late metamorphic evolution of orogenesis. Therefore late, discordant quarz-calcite veins were investigated using FI-techniques. The Engadine Window which is exposed at the Swiss-Austrian-border exposes the penninic units of the Western Alps as a tectonic window within the Austroalpine nappes of the Eastern Alps. The nappes of the Engadine window underwent metamorphism and deformation during Tertiary times (THÖNI 1981, BERTLE 2000). The highest unit (Fimber unit) and the core of the window (= Zone of Pfunds) suffered HP-LT-metamorphism. P-T-conditions for parts of the Zone of Pfunds at the region of Piz Mundin are at 13-15 kbar at 380°C (BOUSQUET et al. 2002) indicated by the occurrence of carpholite and glaucophane. The late metamorphic history is not very well constrained. There exist only a few FI-data published in an abstract by STÖCKHERT et al. 1990 and some unpublished data in RING 1989. During the ongoing mapping campaign of the first author samples from the Fimber unit and the Zone of Pfunds were collected and investigated using a LINKHAM freezing-cooling-stage. The investigated veins are discordant in respect to the mainfoliation of the rocks and show nice cristalls of quarz, calcite and sometimes feldspar (adularia). Structural data implie that the investigated veins correspond to a set of acjoints that correlate to the late updoming of the large "Engadiner Gewölbe" (Engadin anticlinal structure, MATTMÜLLER 1996). All investigated veins (from all tectonic units) show the same relationship to the anticlinal structure. FI-investigations show,

that a large amount of the primary FI are decrepitated, however it was possible to find enough to provide a serious statistical data set. FI from Piz Mundin in the core of the Engadine window exhibit at the base of the vein quarz at the contact to the host rock (blueschist) epidote-clinozoisite cristalls. Futheron amphibole is visible. It is common at the base of the vein quarz and decreases towards the middle of the vein. FI are H2O-rich and indicate high pressure of trapping. Quarzes from the upper most part of the Zone of Pfunds from S of Zeblasjoch (W of Samnaun Dorf) show two main groups of primary FI which could be differentiated at room temperature: homogenous FI and such with a bubble. All FI were frozen at max. temperatures of ca. -56 °C. Bigger FI show cracking due to cristallisation pressure (build up of "wings"), the cracks however closed again during heating, so that the FI remained closed. Initial melting started between -20 °C (first recristallisation signs) and -9 °C, final melting was observable at -1 °C to 0 °C. Then the FI was a.) homogenous or b.) showed a bubble. Homogenisation Temp. of the inclusions with bubble were in the range of 70 to 150 °C , most of them between 70 and 80 °C and 110 - 125 °C. The data indicate a more or less pure H_2O-system for the FI under high pressure. Assuming a cristallisation temperature of the cristalls of about 200 to 250 °C and a density of the FI between 0,97 and 1,0 g/cm^3 pressures of 2,5 to 4,5 Kbar are indicated. The same P-T-conditions (same chemistry and melting & homog. Temp.) could be derived from FI in quarz from the Salaaser Kopf (Idalpe) for the late metamorphic evolution of the Fimber unit, indicating that the late metamorphic history of both units is the same. It is concluded that opening of the veins and first cristallisation of vein quarz corresponds to the first signs of updoming of the Engadine anticlinal structure. Updoming of the anticline started when the whole nappe stack was covered by the Austroalpine nappes. Therefore FI show such high pressures for trapping of the fluid.

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