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THE POLYMETAMORPHIC EVOLUTION OF THE AUSTROALPINE INNSBRUCK QUARTZPHYLLITE COMPLEX

Piber, A. & Tropper, P.

Faculty of Geo- and Atmospheric Sciences, Institute of Mineralogy and Petrography, University of Innsbruck, Innrain 52, A-6020 Innsbruck, Austria
e-mail: peter.tropper@uibk.ac.at

The Innsbruck Quartzphyllite Complex (IQP) is part of the Austroalpine basement nappes north of the Tauern Window. The quartzphyllites from the westernmost IQP contain the mineral assemblage muscovite + plagioclase + quartz ± chlorite ± biotite ± garnet ± clinozoisite. In the central part of the western IQP garnet-mica-schists with the mineral assemblage muscovite + chlorite + garnet + plagioclase occur. In contrast, the quartzphyllites of the eastern IQP, located in the Zillertal area, contain the mineral assemblage muscovite + albite + quartz + chlorite ± biotite.

Application of the garnet – biotite thermometer and the garnet – plagioclase – muscovite – quartz barometer, yields temperatures between 470°C and 525°C at pressures ranging from 6.6 to 8.9 kbar for samples from the western IQP underneath the Patscherkofel Crystalline Complex (PCC). Thermobarometric calculations with multi-equilibrium thermobarometry yield pressures of 8.2 – 10.5 kbar and temperatures of 458 – 523°C for the same samples. Based on phengite-chlorite-quartz thermobarometry *P-T* calculations resulted in 500 ± 50°C and 4.5 ± 2 kbar for the garnet mica schist of the central part of the western IQP. *P-T* estimates obtained with multi-equilibrium thermobarometry of a biotite-bearing quartzphyllite sample from the eastern IQP range from 3.8 – 5.9 kbar and 296 – 325°C. Lack of biotite in most of the samples of the eastern IQP prohibits calculations of invariant intersections. Consequently, only limiting pressure estimates of 3.5 to 6 kbar in a temperature range of 300 – 400°C, based on the reaction paragonite + celadonite = muscovite + albite + clinochlore + quartz + H_2O, can be obtained. Greenschist intercalations of the eastern IQP contain the mineral assemblage amphibole + biotite + clinozoisite + plagioclase + quartz. *P-T* conditions of 360 ± 45°C and 5.4 ± 2.0 kbar, based on the application of multi-equilibrium thermobarometry, were obtained.

Geochronological data indicate a polymetamorphic evolution of the IQP, namely a Permian and an Eo-Alpine metamorphic overprint; this is also in agreement with discontinuous chemical zoning in minerals such as plagioclase from the western IQP. In the eastern IQP, geochronological data also point to a pervasive Permian metamorphic event and local Eo-Alpine re-juvination. Based on microstructural evidence and the low temperature nature of the Eo-Alpine metamorphic overprint, it is thought that the *P-T* data from the eastern IQP therefore represent the Eo-Alpine metamorphic overprint. In contrast, geochronological data and thermobarometric data indicate that the Permian event is mainly manifested in the garnet-mica-schists in the central parts of the western IQP.