

THERMOBAROMETRY OF KYANITE ECLOGITES FROM THE HOHE TAUERN WINDOW, AUSTRIA

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P-T data of five kyanite eclogites from the Mesozoic sedimentary – magmatic unit of the Hohe Tauern Eclogite Zone are based dominantly on the metamorphic peak assemblage garnet + omphacite + phengite + kyanite + quartz. According to recent calibrations (1 = THERMOCALC 3.21, data set Nov. 2002, POWELL & HOLLAND, 1998; 2 = GCPKS.xls Thermobarometry, KROGH RAVNA et al., 2004; 3 = PTGIBBS, BRANDELIK & MASSONNE, 2004) pressures about 25 kbar result from 1 whereas calibrations 2 and 3 result in generally higher values, in part in the stability field of coesite. This contrasts with generally lower pressures according to calibration 4 (WATERS & MARTIN, 1993, updated 1996) and with the absence of textural indications of a former presence of coesite. Temperatures according to calibrations 1 and 3 are in the range of 595 - 675 °C with calibration 2 ranging up to 715 °C. However a relatively large spread resulting from different calibrations and from different domains of each sample is noticeable.

Additional members of the peak assemblage in some samples are talc and magnesite and are calculated as stable in a very H₂O-rich fluid.

The presence of lawsonite along the prograde path is inferred from rectangular pseudomorphs consisting mainly of clinozoisite and paragonite. Other inclusions are omphacite, amphiboles (barroisite, pargasite), rutile and sometimes titanite, ilmenite and carbonates.

Retrograde paragonite in part rimming kyanite is calculated as product of a reaction at lower pressure and the stability of matrix zoisite is also restricted to such lower values. Matrix amphiboles are dominantly barroisite – pargasite, rare glaucophane is restricted to rock compositions with low Ca / Na ratio.

Prograde garnet zonation is characterized by strong increase of pyrope, decrease of almandine and generally moderate decrease of grossular and spessartine components. Minor retrograde rims with reversed zoning are partly observed. THERMOCALC modelling of pseudosections in the simplified NCFMASH system including stepwise garnet fractionation results in better agreement with the observed zoning pattern than former calculations using a more simplified fractionation.

References

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