

**THERMOBAROMETRIC CONSTRAINTS ON THE EO-ALPINE METAMORPHIC  
OVERPRINT IN THE AUSTRALPINE NAPPE STACK  
NORTH OF THE TAUERN WINDOW FROM A METAPEGMATITE DIKE  
IN THE KELLERJOCHGNEISS (NORTHERN ZILLERTAL, TYROL, AUSTRIA)**

**A. Piber & P. Tropper**

Institute of Mineralogy and Petrography  
University of Innsbruck, Innrain 52, A-6020 Innsbruck, Austria

This investigation is part of the ongoing project on the tectonometamorphic evolution of the Austroalpine nappes in the northern Zillertal area, Eastern Alps. The units studied are the Wildschönau Schists in the tectonically highest position, the Kellerjochgneiss and the underlying Innsbruck Quartzphyllite in the tectonically lowest position. These units show a polymetamorphic evolution with a pre-Alpine metamorphic overprint (Variscan and/or Permian) and a pervasive Eo-Alpine metamorphic overprint under low- to high greenschist facies conditions [1]. Within the Kellerjochgneiss a small strongly deformed meta-pegmatite dike occurs. Field relations indicate that the pegmatite intersects the Kellerjochgneiss discordant and it contains the mineral assemblage of muscovite + biotite + albite + chlorite + quartz + garnet<sub>1</sub> (Alm<sub>68</sub>Spess<sub>27</sub>Pyr<sub>3</sub>Gro<sub>2</sub>) + garnet<sub>2</sub> (Gro<sub>52</sub>Alm<sub>33</sub>Spess<sub>15</sub>) ± stilpnomelane. Textural investigations reveal a protolith assemblage comprised of K-feldspar, quartz and garnet. These garnets (garnet<sub>1</sub>) are essentially almandine-spessartine solid solutions, which is comparable to garnet compositions from other pegmatites from the Eastern Alps (e.g. Koralm Crystalline complex; [2]).

Thermobarometry of the metapegmatite was performed by calculating invariant points within the Eo-Alpine assemblage garnet<sub>2</sub> + muscovite + stilpnomelane + albite + chlorite + biotite with the program TWQ v1.02 [3] using the data bases of [3] and [4]. In addition, the empirically calibrated muscovite + chlorite + stilpnomelane + quartz thermobarometer by [5] was applied. Thermobarometry with TWQ v1.02 with the data base of [3] yields pressures ranging from 5.5 to 7.2 kbar and temperatures ranging from 292 to 380°C. Calculations with the data base of [4] including Fe-Stilpnomelane yield pressures of 6.7 to 7.9 kbar and temperatures of 330 to 354°C. These data are in good agreement with the P-T data from the Kellerjochgneiss [1]. Thermobarometric calculations performed with THERMOCALC v2.07 with the data base of [6] yield pressures ranging from 3.8 to 8.5 kbar and temperatures of 284 to 378°C. Application of the empirically calibrated muscovite + chlorite + stilpnomelane + quartz thermobarometer by [5] yields pressures ranging from 6.5 to 7.4 kbar and temperatures ranging from 289 to 314°C.

Thermobarometric data from the northern Zillertal area reveal a wide range of pressures which can be the result of a mixture of two metamorphic stages or a lack of complete reequilibration during the latest Eo-Alpine metamorphic event.

Thermobarometric investigations in this area were mostly performed on samples from the Kellerjochgneiss on synkinematically grown minerals, which constitute the predominant foliation (S2) in these rocks. The P-T results from these lithologies can therefore be directly related to the West-directed thrusting during the Eo-Alpine metamorphic overprint indicating that deformation took place under greenschist-facies conditions. The data also indicate that the Kellerjochgneiss seems to have been metamorphosed under slightly higher pressures ( $6 \pm 2$  kbar) than the Innsbruck Quartzphyllite and the Wildschönau Schists ( $5 \pm 1$  kbar) [1].

#### **References**

- [1] PIBER, A. (2002): Unpubl. MSc Thesis, Univ. Innsbruck, 269 p.
- [2] THÖNI, M. & MILLER, C. (2000): SMPM, 80, 169-186.
- [3] BERMAN, R. G (1992): written comm.
- [4] MASSONNE, H. J. (1998): written comm.
- [5] CURRIE, K. L. & VAN STAAL, C. R. (1999): J. Metam. Geol. 17, 613-620.
- [6] HOLLAND, T. J. B. & POWELL, R. (1998): J. Metam. Geol. 16: 309-343.