

Reconstruction of polycyclic metamorphism using garnet isopleth thermobarometry and distribution of REE in polyphase garnet porphyroblasts of the Eastern Alps

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The Rappold and Wölz Units are located in the Wölz Tauern, east of the Tauern Window and belong to the Austroalpine basement. The units primarily consist of amphibolites, marbles and micaschists. The polyphase garnets of the micaschists show two distinct growth zones: a Permian garnet core and an Eo-Alpine rim (Schuster & Thöni 1996, Hoinkes et al. 1992). Both zones differ in their chemical composition. The rare P-T determinations of garnet cores indicate high temperature – low pressure conditions during Permian event for the Wölz type (e.g. Gaidies et al. 2006). We use garnet isopleth thermobarometry to calculate P-T conditions for the first and second growth zones of the Wölz type garnets. Results yield about 560 +/- 10 °C and 4.5 +/- 0.5kbar for the increments of the first garnet generation of the Wölz unit and confirm HT/LP conditions of the Permian metamorphic event. The second garnet generation started to grow at 560 +/-10°C and 7 +/- 0.5kbar. Moreover the element distribution of Y in accessory mineral phases such as monazite and xenotime should give information about the detailed polymetamorphism history, which may be obliterated in major element distributions. The presence of two Y- annuli in garnet cores from the Rappold complex, possibly caused by slow garnet growth rates or breakdown of Y- enriched phases (e.g. Hickmott et al.; 1987, Hickmott and Spear, 1992), give evidence for a complex pre- Alpine metamorphic history.

References

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Abs. No. **473**
Meeting: **DMG 2008**
submitted by: **Gawronski, Timo**
email: **gawronsk@zedat.fu-berlin.de**
date: **2008-06-18**
Req. presentation: **Poster**
Req. session: **S07**