

## **AUTOMATED SEM-EDS METHODS IN SUPPORT OF EMP-MONAZITE DATING AND P-T PATH RECONSTRUCTION IN THE POLYMETAMORPHIC GARNET MICASCHISTS OF THE AUSTROALPINE SAUALPE ECLOGITE UNIT**

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Polymetamorphic micaschists from the Austroalpine Saualpe Eclogite Unit display complex microstructural and mineral-chemical relationships. Numerous complete thin sections were studied by automated scanning electron microscopy with spare phase search (SPL) for monazite and energy dispersive spectral mapping (GXMAP) of garnet. The spectral maps allow to resolve garnet semi-quantitative Fe-Mg-Mn-Ca zonation trends in various combinations and to define locations of electron microprobe analyses. Two garnet porphyroblast generations and several monazite populations have been revealed in the low-Ca and high-Al-metapelites. The EMP Th-U-Pb monazite dating identified low-Y Cretaceous (80-100 Ma), and high-Y Permian (250-270 Ma) and Carboniferous (310-320 Ma) age groups which are variably distributed in the samples. Coronas of apatite and allanite around large Permian monazites signal a retrogressive stage. Garnet 1 porphyroblasts enclosing mica, plagioclase and quartz display increasing XMg and constant XCa at decreasing Mn contents. They crystallised during a M1 prograde metamorphism at increasing pressure and temperature up to ~650 °C/6 - 8 kbar. Carboniferous and Permian monazite crystallised along the margin of garnet 1. This microstructure in combination with the retrogressive monazite coronas suggest a Carboniferous-to-Early-Permian age for the M1 event, not yet reported from the unit. The M2 event with garnet 2 postdates the corona formation around Permian monazites. Garnet 2 displays complex zonation trends with high Mg and Ca contents at always low Mn contents. This can be sorted into trend Grt2-1 with increasing XCa at decreasing XMg, then trend Grt2-2 with increasing XCa at increasing XMg, and finally Grt2-3, with decreasing XCa at increasing XMg. Garnet 2 crystallised at the well-known Cretaceous eclogite event (Thöni et al. 2008). Maximum temperatures at 750 °C/14 kbar were passed during decreasing pressure. Cretaceous monazites then crystallised in large grains and also in satellite structures (Finger et al. 2016). The two prograde metamorphic events in the Saualpe Eclogite Unit are related to continental collisions under different thermal regimes.

Finger F, Krenn E, Schulz B, Harlov DE, Schiller D, 2016. *American Mineral.* 101, 1094-1103.

Thöni M, Miller C, Blichert-Toft J, Whitehouse, MJ, Konzett J, Zanetti A, 2008. *J. Metam. Geol.* 26, 561-581.