ECLOGITES AND GARNET BEARING PYROXENITES IN THE OSTRONG UNIT OF THE MOLDANUBIAN ZONE (LOWER AUSTRIA): GEOCHEMISTRY AND PETROLOGY

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The petrology and geochemistry of the most southern mafic to ultramafic metamorphic rocks from the Ostrong Unit in the Moldanubian Zone, Lower Austria have been investigated. Based on petrography and bulk-rock geochemistry, eclogites and garnet bearing pyroxenites are clearly distinguishable and show affinity to mid-ocean ridge basalts and non-oceanic continental basalts, respectively. In addition, compositional zoning in garnet from eclogites (Fig. 1) provides crucial information for a two-stage garnet growth including a prograde eclogite-facies and a subsequent granulite-facies stage. Beside of sharp changes of other trace elements (P, Ti, Zr, V, Cr, Ga), the two distinct growth phases are best documented by low Y + HREE concentrations in the garnet core and a sharp increase of these elements at the core-mantle boundary. The core of the garnet crystals contain well preserved omphacite inclusions and have increasing grossular contents from the centre outwards indicating prograde growth during the eclogite-facies stage. Isothermal decompression during exhumation of the rock leads to partial decomposition of the garnet and formation of retrograde phases, probably as kelyphitic rim around the garnet. The newly grown garnet mantle with high Y + HREE content has a chemically heterogeneous composition and is most likely the result of the consumption of the heterogeneous kelephitic rim during the granulite-facies stage. In addition, this HT imprint results in the decomposition of REE-bearing zoisite and the partitioning of Y + HREE into the newly formed garnet mantle. The outermost part of the garnet is chemically homogenous and formed by a different reaction mechanism compared to the garnet mantle. Following the granulite-facies peak, decompression during initial uplift resulted in the development of a symplectitic rim consisting of clinopyroxene + plagioclase ± orthopyroxene ± spinel. The presence of coarse-grained amphibole within the rocks indicate a late amphibolite-facies overprint.

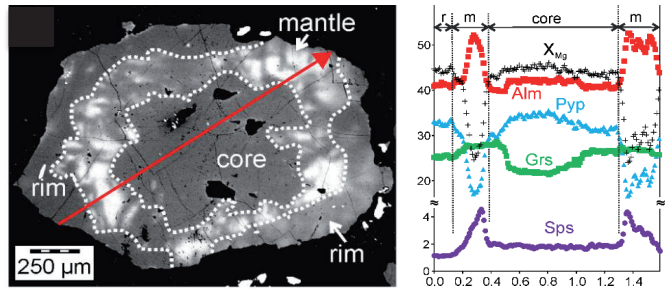

Figure 1. BSE image and major element zoning profile of a representative garnet from an eclogite. Y-axes indicates mol. % of garnet endmembers; x-axes indicate distances in millimetres.