



Electron Backscattered Diffraction studies on omphacite in eclogites of the Tauern Window: Implications for the exhumation of the Eclogite Zone (Austrian Alps)

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For testing the hypothesis that the deeply exhumed Eclogite Zone in the Eastern Alps represents an extrusion wedge characterized by a top-N thrust fault at its base and a top-S normal fault at its top we collected deformed eclogite samples from the bounding faults of the Eclogite Zone assuming that the omphacite textures should reflect the change in the kinematics of the bounding faults at great depths. We also mapped kinematic indicators from garnet mica schists in which the eclogites are embedded

The Eclogite Zone of the Austrian Alps is part of the Pennine nappe edifice of the Tauern Window. The Eclogite Zone is sandwiched between metasedimentary rocks of the Venediger Nappe below and ophiolitic rocks of the Glockner Nappe above. While maximum pressures of the surrounding units were 10-12 kbar, the Eclogite Zone was subjected to pressures of up to 20-25 kbar. Eclogites occur as lenses with a maximum size of 1000 m by 700 m and are embedded in a garnet mica schist matrix. The garnet mica schist shows top-N kinematic indicators at the base of the Eclogite Zone and sinistral strike-slip with a very moderate normal slip component at its top. These kinematic indicators formed at mid-crustal depths. P-T analysis in combination with Rb/Sr multi-mineral dating indicate a minimum exhumation rate of 40 mm/yr for the Eclogite Zone and that the peak of eclogite-facies metamorphism largely overlapped in time with the formation of the mid-crustal kinematic indicators in the garnet-mica schist.

Lattice preferred orientation patterns measured by Electron Backscattered Diffraction (EBSD) do not show significant changes in omphacite fabrics across the entire Eclogite Zone. Across the entire study area fabrics show pronouncedly symmetric patterns, only in a few cases a slight asymmetry is observed. Omphacite textures are characterized by an alignment of $\{010\}$ and $\{110\}$ with the foliation plane and a maximum of $\langle 001 \rangle$ close to the lineation. These patterns are indicative of deformation by intracrystalline glide on the $(010) [001]$ and $(110) [001]$ slip systems.

We interpret the difference between the symmetric omphacite LPO patterns and the kinematic indicators recorded by the garnet mica schists to reflect strain partitioning during exhumation and that the LPO patterns represent a prograde, underplating-related texture that has been preserved during the exhumation process. The deformation of the eclogites thus does not provide any information as to the kinematics of their initial exhumation from great depths. However, because of very fast exhumation the mid-crustal kinematic indicators in the garnet mica schist probably reflect the kinematics of exhumation of the Eclogite Zone from great depths.