

Sediment-eclogite fluid exchanges during subduction in the Tavsanlı zone, Turkey

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Fluid circulations are investigated in the HP-LT (450-500°C, ca. 21 kbar) Tavsanlı zone of west-central Turkey. Fluid exchanges between contrasting lithologies are characterised by bulk-rock and in-situ oxygen isotope analysis of zoned minerals.

The Halilbagi unit consists of omphacite- and glaucophane-dominated rocks alternating with metasedimentary phengite- and quartz-rich layers at a 100m to 100µm scale and thicker abundant marbles, ultramafic lenses are also present. Most minerals are zoned in major and trace elements, garnet and lawsonite in some rocks have oscillatory patterns (Mn in garnet; Cr in lawsonite).

Bulk rock oxygen isotope compositions obtained by laser fluorination are combined with in-situ data from garnet, apatite and zircon measured using SHRIMP ion microprobes. Overall, metabasites record high $\delta^{18}\text{O}_{\text{VSMOW}}$ signatures (10-15‰), which suggests isotopic interaction with fluids that equilibrated with sediments. In a few samples, garnet, apatite and zircon record a core to rim $\delta^{18}\text{O}$ increase of up to 5‰, indicating external fluid influx from metasediments during subduction.

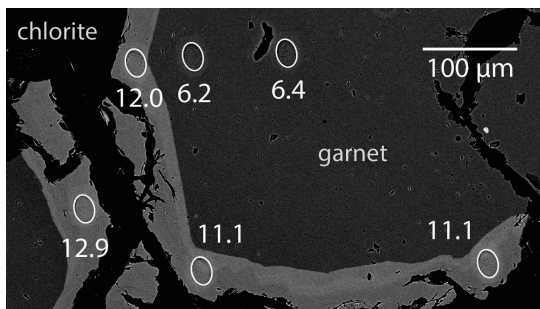


Figure 1: BSE image of a zoned eclogitic garnet with single spot matrix-corrected $\delta^{18}\text{O}_{\text{VSMOW}}$ analyses in ‰.

Oxygen isotope data are combined with classical petrology, trace-elements and U-Pb dating to determine the P-T-t framework of these fluid exchanges (seafloor alteration, syn-subduction or exhumation-related dehydration).