From the mineral CPOs and particular elastic moduli and volume fractions, the CPO-related contribution to bulk rock elastic anisotropy was estimated. P-wave velocity distributions of the eclogite samples exhibit rather low anisotropies of 1-2 %, which are mainly caused by the omphacite CPO. The growth of retrogressed mineral assemblages, specifically hornblende, causes a slight anisotropy increase up to 3 %. P-wave anisotropy of the paragneisses approximates 7 %. It is mainly caused by the muscovite CPO, because the minimum velocity parallels the foliation normal. In metasediments containing only very small amounts of muscovite the elastic anisotropy is around 5 % and mainly caused by the quartz CPO.

From the compilation of all these data comprehensive information on the internal architecture, elastic anisotropy, accumulated bulk strain and strain partitioning within the Tauern Window subduction channel is expected. A more detailed model of subduction channel deformation may result, which could be compared to already existing models.

Alpine metamorphism in the continental Etirol-Levaz slice (Western Alps, Italy) – Insights from petrological, thermodynamic and geochronological investigations

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The Etirol-Levaz slice in the western Valtournenche of Italy is a continental fragment trapped between two oceanic units, the eclogite-facies Zermatt-Saas Zone in the footwall and the greenschist-facies Combin Zone in the hanging wall. It has been interpreted as an extensional allochthon derived from the Adriatic continental margin and stranded inside the Piemont-Ligurian oceanic domain during Jurassic rifting. The slice consists of pre-Mesozoic high-grade gneisses, micaschists and metabasics which have been overprinted under eclogite-facies conditions during Early Tertiary Alpine subduction. We analyse metabasic and metasedimentary rocks in terms of their chemical and mineral compositions and focus on mafic eclogites of which two samples are dated with the Lu-Hf geochronometer. Distribution maps of major bivalent cations in garnets are used to identify zonation patterns and to distinguish between different garnet generations.

Eclogites generally consist of the assemblage garnet + omphacite ± epidote ± amphibole ± phengite ± quartz. In one sample, garnets have compositions of Alm52-61 Grs18-41 Prp5-22 Sps0.5-2 and display typical growth zoning. Some garnet grains are brittlely fractured, strongly corroded and overgrown by epidote. Amphibole occurs as a major phase in the matrix and shows a progressive evolution from glaucophane in the core to pargasitic hornblende towards the rim. Amphibole grains are often truncated by epidote veins. Another sample shows a particular Ca-rich bulk composition (18.3 wt% Ca) and displays two distinct garnet generations. Perfectly euhedral cores show compositions of Grs42-45 Alm47-51 Prp3-6 Sps2-7 and typical prograde growth zoning. These cores are overgrown by irregularly shaped rims characterised by an initial rise in Mn and the Fe-Mg ratio. Omphacite in this sample with jadeite-contents of 19-28 mol% apparently has been fractured and annealed by jadeite-poor (7-12 mol%) omphacite suggesting brittle behaviour at eclogite-facies conditions or brittle deformation between two high-pressure stages.

We constrain pressure and temperature conditions for prograde, peak and retrograde mineral assemblages using equilibrium phase diagrams. Preliminary results suggest that high-pressure rocks of the Etirol-Levaz slice record equilibration at different metamorphic stages along a single Alpine metamorphic cycle. We also use thermodynamic modelling of mineral growth during prescribed PT paths to unravel the significance of observed garnet zonation patterns. Application of Lu-Hf geochronometry is used to further constrain the timing of Alpine high-pressure metamorphism in the Etirol-Levaz slice.