Fluid transport and metasomatism along the subduction interface: Insights from W. Alps high-pressure ophiolites

S. ANGIBOUST[1], T. PETTKE[2], C.-J. DE HOOG[3], J. GLODNY[1] AND O. ONCKEN[1]

[1]GFZ Potsdam, Telegrafenberg, 14473 Potsdam, Germany (samuel@gfz-potsdam.de)

[2]Institute of Geological Sciences, Bern University, 3012 Bern, Switzerland

[3]School of Geosciences, Edinburgh University, EH93JW Edinburgh, UK

We herein present two field examples documenting fluid flow along the subduction interface during high pressure metamorphism associated with the subduction of the Tethyan seafloor during Eocene times. Both localities, now exposed in Western Alps (Dent Blanche massif and Monviso ophiolite), exhibit exhumed subduction interface segments of ca. 35km and ca. 75km depth, respectively. In the Dent Blanche region, petrological and geochemical evidence points to the infiltration of a sediment-derived fluid along interface-parallel fluid pathways, only few meters within the subduction interface hanging wall. The Monviso case represents an almost continuous fragment of eclogitized upper oceanic lithosphere. Fragments of mylonitic mafic eclogites were dragged along eclogite-facies shear zones and disseminated within serpentinite schists where they grew metasomatic rinds formed during lawsonite-eclogite facies metamorphism. Chemical and isotopic arguments point to a massive, fluid-mediated element transfer along with deformation, possibly originating from deeper antigorite breakdown fluids.

These two field examples, which exhibit striking depth-independent similarities in terms of fluid transport properties, constitute precious natural analogues to understand how volatiles are moving and redistributed in the subduction factory.