Assessment of tracer volatile element transfer in a mafic crust of a subduction zone from alpine ophiolites.

K. T. Koga, F. Catani, C. Nicollet, B. Debret and Van Den Bleeken

Université Blaise Pascal, Laboratoire Magmas et Volcans,
UMR6524, 5 rue Kessler, 63038, Clermont-Ferrand, France

Alpine ophiolites provide an analog material to study prograde evolutions of a subducting ocean lithosphere and its geochemical consequences. Many previous studies have investigated to various element depletions and estimated fluid composition released along a down going slab. This work focuses on the transfer of F, Cl, Li and B, from the time of the formation of mafic oceanic crust to the depth of eclogite facies where nearly all of H2O bearing minerals are decomposed. Specifically, we have focused on the amphibole compositions in mafic rocks from Chenaillet, Queyras, and Viso. Because we suspect that whole rock geochemical signature is an average representation of multiple metamorphic events, we have focused on the grain-scale microanalysis to characterize specific mineral reaction and the evolution of amphibole compositions in consequence. Major element compositions were determined by an electron microprobe. SIMS 1270 is used for F and Cl measurements, and SIMS 7f is used for B and Li. Our preliminary data shows that all, F, Cl, and B reduce their abundance with an increase of metamorphic grade, and as the amphiboles transform to their high pressure variety. We found that F incorporation into amphibole is a function of temperature with higher temperature amphiboles richer in F. We also detected very little signals from ilmenite and rutile. Approximately 5 to 10 times less F and Cl are found in titanite compared to paragenetic amphibole. Phengite can be a significant repository for F but not for Cl.