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Devolatilization of carbon-bearing serpentine in the slab: Implications for the deep carbon cycle

GEETH MANTHILAKE[1], MAINAK MOOKHERJEE[2] AND NOBUYOSHI MIYAJIMA[3]

[1]Universite Clermont Auvergne

[2]Florida State University

[3]Universität Bayreuth

Presenting Author: Geeth.MANTHILAKE@uca.fr

The dehydration and decarbonation in the subducting slab are intricately related and the knowledge of the physical properties of the resulting C-H-O bearing phases are crucial to interpret the petrological, geochemical, and geophysical processes associated with subduction zones. In this study, we investigate the progressive devolatilization of carbonate-bearing serpentine-polymorph chrysotile, with *in situ* electrical conductivity measurements at high pressures and temperatures. The C-H-O fluid produced by carbonated chrysotile exhibits high electrical conductivity compared to carbon-free aqueous fluids and can be an excellent indicator of the migration of carbon in subduction zones. The crystallization of diamond and graphite indicates that the C-H-O fluids are responsible for the recycling of carbon in the wedge mantle. The carbonate and chrysotile bearing assemblages stabilize dolomite during the devolatilization process. This unique dolomite forming mechanism in chrysotile in subduction slabs may facilitate the transport of carbon into the deep mantle.