

Experimental study of serpentine dehydration

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Serpentinites are rocks formed at the oceanic floor by peridotite hydration; they are carriers of significant amounts of water to the mantle wedge via oceanic lithosphere subduction. Antigorite is the high temperature phase of the serpentine group, it can contain up to 13 wt% water and carries ferric iron. Its breakdown at depth involves water release and contributes to the mantle wedge partial melting.

In this study, phase relationships occurring at the dehydration of natural antigorite have been experimentally investigated at 3 GPa as a function of temperature and time. Experiments of natural antigorite dehydration have been conducted in a multi-anvil apparatus at the Laboratoire Magmas et Volcans in Clermont-Ferrand, France. Most of the experiments were performed in the chlorite stability field (700°C) for durations from 3 to 12 hours. The initial antigorite contains inherited oxides minerals such as spinel, chromite and magnetite; we were therefore able to characterize both oxides and silicate phases (remaining antigorite, enstatite, olivine, and chlorite) according to different run duration and temperature of experiments.

We will present our results on the iron distribution between the different phases and compare to natural samples in order to understand the speciation of iron in the course of dehydrating serpentinite.