

Fluid inclusions of ophicarbonates in the Apennine Mountains, Italy

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The Bracco ophicarbonate from the Apennines, Italy, is studied for petrography and microthermometry of fluid inclusions in the calcite. The studied serpentinite body is a part of an ophiolite that has undergone relatively low grade metamorphism, considered to be pumpellyite facies, and retains hydrothermal metamorphic vein textures and seafloor depositional textures that may record interactions with Jurassic seawater and mantle peridotite/ serpentinite (Cannao et al., 2020, in Chemical Geology).

Raman spectroscopy and micro-XRF analysis indicate that the rocks are mainly composed of antigorite, lizardite, and calcite. We performed microthermometry of saline fluid inclusions in relatively large crystals of calcite veins. Other fine-grained calcite crystals also exist, but microthermometry of their fluid inclusions has been difficult up to now. We also have sedimentary ophicarbonate (Cannao et al., 2020) in the same outcrop, and we would like to obtain data on these fluid inclusions in the future.

Microthermometry results show that the salinity estimated from freezing point depression is 5.0 ± 1.8 NaCl wt% (n=9) and the homogenization temperature between gas and liquid phases is $179 \pm 16^\circ\text{C}$ (n=9). The salinity varies from 1 to 8 NaCl wt% within a thin section, and even within a crystal there are 3 NaCl wt% variations, indicating that saline fluids with such degrees of variation existed during the carbonation of the serpentinite.

We would like to discuss the carbonation process of serpentinite at the seafloor by comparing the salinity and homogenization temperature of fluid inclusions in calcite in ophiolites from low grade metamorphic regions in the Western Alps reported by Inukai et al. (2023, Mineralogical Society Abstracts) and other previous studies.

Keywords: fluid inclusions, serpentinite, seawater, carbon dioxide, ophicarbonate

