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課題名　Quantitative analysis of bulk hydrogen in apatite and biotite

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Hydrogen manometry was performed on a series of natural gem quality apatite crystals, with the aim of developing a set of mineral standards for subsequent ion microprobe analysis. Preliminary test runs on multiple aliquots of the same sample showed that very fine-grained powders (38-75 μm) had the potential to adsorb significant amounts of H_2O under the local atmospheric conditions, while use of larger particle sizes (>150 μm) resulted in incomplete devolatilisation. We therefore used powders with intermediate grainsize (75-150 μm). Total H_2 contents were analysed in 11 natural apatites using hydrogen manometry, resulting in blank-corrected concentrations of 0.01 to 0.78 wt% H_2O. Tests showed that evolution of F and Cl species from the apatites did not contribute to the gas volumes measured.

In addition, we performed a number of tests to validate the accuracy of the technique, following the recent suggestion that high fH_2O in the Pt crucible during heating can result in partial absorption of H_2O by the crucible (Clog et al. 2012). During these experiments, the expected H_2O concentrations were obtained from stoichiometric $Mg(OH)_2$ and $Ca(OH)_2$, which thermally decompose at approximately 400 ℃ and 550 ℃ respectively. This suggests that, at least up to moderate temperatures, the analytical techniques used (i.e., employing a liquid N_2 trap in order to condense the gases rapidly and prevent development of high fH_2O in the crucible) result in data that are accurate, as well as very precise. The data resulting from this collaboration are currently being used to develop secondary ion mass spectrometry (ion microprobe) calibration for the determination of H_2O in natural and experimental apatites.

(please use this area to describe your results)