

New standards for measuring water in the mantle via SIMS

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The presence of minute amounts of water in nominally anhydrous minerals (NAMs) can have large effects on the thermodynamic and rheological properties of the mantle (e.g. [1]), and precise and accurate measurements are required to quantify these effects. In the last decade, SIMS has become a mainstream method for measuring water in NAMs. SIMS is necessarily dependent on standards with known concentrations of water, however, and very few standards exist to measure water in mantle minerals. Here, we present new water data on homogenous natural samples of olivine, orthopyroxene, and clinopyroxene that can be used as standards.

SIMS measurements were made on the Cameca 6f ion probe at the Carnegie Institution for Science. 6-10 points per grain on multiple grains per sample were measured using existing SIMS standards and protocols [2] [3]. Uncertainties associated with the calibration curve and drift correction factor were propagated into the reported water concentrations. Samples were considered homogeneous if the propagated intergranular standard deviation was less than 5%. Intragranular standard deviation was typically less than 3%. Water contents in orthopyroxene and clinopyroxene cover ranges of 50-250 and 10-450 ppm, respectively, and most olivines have less than 15 ppm. FTIR will be used to independently estimate water contents and confirm the suitability of these samples as standards.

[1] Hirth and Kohlstedt (2003) *Geophys. Mono. Series* **138**, 83-105 [2] Koga *et al* (2003) *Geochem. Geophys. Geosyst.* **4**, 1-20 [3] Aubaud *et al* (2007) *Am. Min.* **92**, 811-828