After Raman analysis, MI were remounted in crystal bond and polished to expose the glass for Secondary Ion Mass Spectrometry analysis (SIMS). Samples were mounted in epoxy that was poured in 1” OD, ½” ID and 4 mm thick Aluminum rings to minimize OH- backgrounds for the instrument (enhancing vacuum conditions) and the mounts were then outgassed in a JEOL SEM vacuum specimen chamber for 72 hrs. The mounts were then gold-coated. SIMS analysis was conducted at the Northeast National Ion Microprobe Facility (NENIMF) at Woods Hole Oceanographic Institution using a CAMECA IMS 1280 Secondary Ion Mass spectrometer. The mount was outgassed in the outer vacuum chamber for a minimum of 10 hrs. prior to analysis. A 1nA 133Cs+ primary beam was accelerated at 10kV and was focused and rastered to a diameter of < 20 µm. Secondary ions of 12C-, 16O1H-, 19F-, and 30Si-,31P- , 32S-, and 35Cl- were extracted from the sample at a -10kV voltage potential. To significantly reduce volatile background contribution from the sample surface, a pre-sputter of 200 seconds was used prior to measurement. A square field aperture in the secondary ion column was set to 600 µm X 600 µm in order to block secondary ions from outside the innermost ~6 X 6 µm of the magnified ion image, thereby sampling the innermost and deepest portion of the sputtering crater. Entrance and exit slits in the mass spectrometer were set to achieve a mass resolving power >6000, sufficient to separate 32S- from 31P1H- and 16O2-, 16O1H from 17O, and all hydride interferences.All secondary ion abundances were measured on an ion counting ETP electron multiplier over five measurement cycles, with count times ranging from 5 to 10 seconds. CO2, H2O, S, Cl and F concentrations on the MI glasses were calculated from linear calibrations derived by measuring natural and synthetic basaltic glasses of known volatile concentrations. Volatile backgrounds were determined by measuring Basaltic glass 519 (necessary to correct for high OH background due to epoxy mounts), synthetic Suprasil SiO2 glass (with negligible CO2, H2O, F, and S) and Herasil SiO2 glass and synthetic forsterite (with negligible Cl). Data reduction, including 2 sigma ratio filtering, electron multiplier dead-time correction, and time interpolation, utilized in-house matlab code at NENIMF. We report error as 2σ for measurements, including analytical measurement precision and error on the standard calibration curves.