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# Towards Higher Precision $\Delta'^{17}O$ with Large Geometry Mass Spectrometers

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Demonstrating per-meg level (ppm) precision in the measurement of $\Delta'^{17}O$ is required for many applications in triple oxygen isotope cosmochemistry. Yet, there remains ongoing debate regarding the $\Delta'^{17}O$ values of widely used silicate standards, such as San Carlos (SC) olivine, on the VSMOW-SLAP scale, for example. Advancements in large-geometry isotope ratio mass spectrometry (IRMS) have enabled unparalleled high-mass-resolution analysis of isotopologue ratios of gas samples free from trace isobaric interferences [1]. This technology may be useful in establishing robust, accurate, and precise $\Delta'^{17}O$ measurements of extraterrestrial samples. Here we present our investigation of the use of a large-geometry mass spectrometer for the precise and accurate determination of $\Delta'^{17}O$ values for rock samples using laser-assisted fluorination. For these experiments we use the Panorama gas-source double-focussing IRMS instrument (See Figure 1). We find that a number of parameters, including collector slit configurations and major ion beam intensity, can cause large variations (i.e. > 50ppm deviations) in measured $\Delta'^{17}O$ values if not controlled from analysis to analysis. An application of high-precision oxygen analysis is the investigation of potential differences between $\Delta'^{17}O$ for Earth and Moon. In order to better constrain lunar formation models, we are investigating whether or not there is an oxygen isotopic distinction between lunar and terrestrial mantle using our newly developed method. Here we present first results for oxygen isotope analyses performed using laser fluorination on SC olivine, representing a proxy for terrestrial mantle, and Apollo 15 lunar volcanic green glass (15427,42), which is believed to represent near-primary lunar magmas [2]. These preliminary results (See Figure 2) do not show resolvable differences in $\Delta'^{17}O$ values between the Earth and Lunar mantles, but more analyses are required to reach definitive conclusions.

[1] E. D. Young et al. (2016) *International Journal of Mass Spectrometry*, 401, 1-10.

[2] C.K. Shearer et al. (1993) Geochim. Cosmochim. Acta 57, 4785–4812.

Figure 1

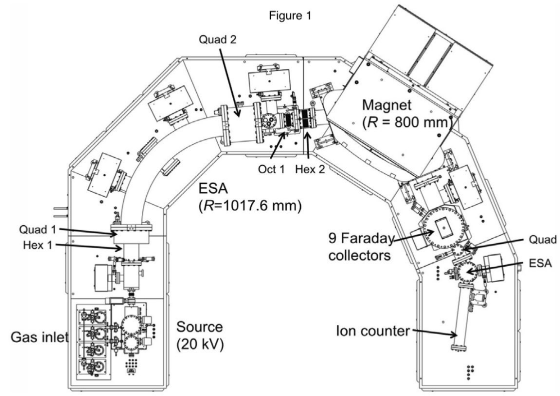


Figure 2