#0026

Cadmium stable isotopes in the lunar regolith

W. ABOUCHAMI*, F. WOMBACHER, S.J.G. GALER

*Institute of Mineralogy and Petrology, Cologne, Germany
wafa.abouchami@mpic.de

The Earth-Moon couple shares common isotopic signatures (e.g., O, Ti), while those of some volatile elements (e.g., K, Zn, Ga) do differ. We present TIMS double-spike stable Cd isotope data on lunar samples, with up to a 20-fold improvement in analytical precision compared to previous datasets. Our results show large stable Cd isotope fractionation of up to ~50 epsilon·Da^{-1}, significantly greater than those of terrestrial samples and carbonaceous chondrites analyzed alongside. The positive correlation between stable Cd isotope fractionation, maturity index and grain size of lunar soils is consistent with volatile element loss during meteoroid bombardment, which is further supported by a positive correlation with ^{113}Cd (n,γ) ^{114}Cd neutron capture effects. By contrast, Apollo 17 orange glass soil displays a distinctive light Cd isotope signature, acquired from either kinetic condensation or an isotopically light Cd-rich vapor released during volcanic fire fountaining. Additional data will help refining these initial results to further constrain the sources, origin and processes controlling the volatile element budget of the lunar regolith as well as trace its cosmic ray exposure history.

Cite abstract as:
Abouchami, W., Wombacher, F., Galer, S.J.G. (2021) Cadmium stable isotopes in the lunar regolith. Paneth Kolloquium, Online (Germany), abstract URL: https://paneth.eu/PanethKolloquium/2021/0026.pdf (abstract #0026).