

A whole scale volatile depleted lunar interior

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The extent of moderately volatile elements (MVE) depletion and its effects on the Moon's evolutionary history remain contentious, partly due to biased sampling from the Procellarum KREEP Terrane (PKT). In this study, we analyzed the Zn and K isotope compositions of a series of lunar basaltic meteorites, which vary in Th content and likely represent a broader sampling range than previous studies, including samples from the far side of the Moon. Our findings indicate remarkably consistent Zn and K isotope compositions across all lunar basalt types, despite significant variations in Th content. This consistency suggests a relatively homogeneous isotopic composition of volatile elements within the Moon, unaffected by subsequent impact events that formed major basins. Our results suggest that the estimates of MVE abundance and isotopic compositions from the Apollo returned samples are likely representative of the bulk Moon, supporting a globally volatile-depleted lunar interior.

