Variably fractionated lithophile alkali metals and alkali earths in (exo)planetary contexts.

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Moderately volatile- and refractory lithophile elements (MVLEs; RLEs) are strongly depleted and fractionated in the Moon compared to Earth and model bulk Mars, Venus and Mercury. The latter plot in a 'planetary' field, along with carbonaceous and non-carbonaceous chondrites and achondrites. Comparison between solar-corrected 'planetary' MVLEs and RLEs for meteorites and comets (Halley, 67P, Wild2) show differences: Earth's $\log_{10}$ [K/Na] and $\log_{10}$ [Ca/Na] +0.1958 and +0.7416, respectively, whereas the Moon is -0.0312, and +1.6697 and plots with Angrites in a 'lunar' field. Vestoids are in-between 'planetary' and 'lunar'. Recent atmospheric retrieval data for K+Na/Ca in a hot (>2100K) jovian exoplanet (WASP-76b; [1]) normalized to its host F7 star, indicates a stellar abundance mirror. White dwarf (WD) surface pollutants may originate from late infall of rocky bodies. Some variably fractionated MVLE+RLE compositions [2] instead comport with icy objects, reconciling dynamical problems.

[1] Pelletier, S. et al. (2023) Nature 619, 491–494.

[2] Williams, J.T. et al. (2024) A&A 691, A352.