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Stable calcium isotope fractionation during chemical weathering.

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The Cayce diabase saprolite in South Carolina is well-characterized in terms of its geochemical and isotopic compositions and provides insights into the effects of chemical weathering [1-3]. Here, we report preliminary stable Ca isotope data, measured using double spike (^{43}Ca-^{48}Ca) TIMS (Thermo Scientific, Triton Plus), at the Centre for Earth Sciences, IISc, Bangalore, to understand the behaviour of Ca isotopes during continental weathering. The saprolite samples (n = 10) show wide variability in $\delta^{44/40}Ca_{SRM915a}$ values which range from 0.96‰ (±0.13, 2SD) in the unweathered parent rock to 1.26‰ (±0.10, 2SD). The $\delta^{44/40}$Ca values positively correlate with Chemical Index of Alteration (CIA, 45-95) and negatively correlate with Al normalized Ca concentration and bulk density (3–0.8 g/cm^3). These trends indicate that the lighter isotopes of Ca are preferentially leached into the hydrosphere, driving the $\delta^{44/40}$Ca of the regolith to values higher than the unweathered parent rock. Additionally, the saprolite samples display a positive correlation between $\delta^{44/40}$Ca and δ^{26}Mg and a negative correlation between $\delta^{44/40}$Ca and δ^{7}Li, indicating that some clay minerals preferentially take up the heavier isotopes of Ca.

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