# Stable Ca and radiogenic Sr isotopic compositions during continental weathering in a vegetation-sparse region of South China

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Continental weathering is an important process that regulates atmospheric $CO_2$, oceanic pH, and ultimately the climate, and thus links the lithosphere, hydrosphere, biosphere, and atmosphere. Calcium is a fluid-mobile, nutrient-essential and rock-forming element that can migrate easily among the major geochemical reservoirs, implying that Ca isotopes can be potentially used to trace geological processes in the Earth surface.

Here, a coupled study of Ca and Sr isotopes on a well-developed marine carbonate weathering profile was investigated in a vegetation-sparse region of South China. The element Sr is an analogue for Ca due to its similar ionic size and charge, but the processes controlling isotopic variability for Ca and Sr differ in some certain respects. Thus, a study of Ca and Sr isotope ratios will be helpful to decipher the source-related Ca isotopic variations and subsequent fractionation due to vegetation or adsorption.

Leaching experiments were performed on crushed powders from the top (soil) to the bottom (bedrock) at room temperature. Two successive extractions were carried out with 1 N ammonium acetate ($NH_4Ac$) and 0.5 N acetic acid (HAc). This first step is to obtain exchangeable fraction, and the second step is to dissolve carbonates and remove metals adsorbed onto the outer-spherical sites of soil particles. The residues represent accumulates of insoluble silicates. $\delta^{44/40}Ca$ of $NH_4Ac$ leachates are higher than the residues, contrary to the trend of Sr isotopes. $\delta^{44/40}Ca$ of HAc leachates varied in a narrow range from 0.52 to 0.74‰, except one topsoil (0.16‰). $\delta^{44/40}Ca$ of the residues below 1.4 m is around 0.51‰, but showed a sharp decrease between 1.4 m and 0.2 m (-0.98‰). Our preliminary results demonstrated that the two topsoil (0~0.2 m) are most likely affected by atmospheric deposition and/or plant uptake, while Ca isotopic variations in samples are likely related with adsorption or desorption onto clay minerals below 0.2 m. This work will be helpful to understand the behavior of Ca isotopes and Ca cycles during continental weathering.