

Silicon isotopic fractionation in laterites from Guangdong, South China

YUAN-HONG LI¹, HUI-MIN YU¹, XIAO-FENG GU¹, FANG HUANG¹

¹ School of Earth and Space Sciences, University of Science and Technology of China, Hefei, Anhui, 230026, China

□*correspondence: liyuanh@mail.ustc.edu.cn)

Laterites cover one third of the continental crust [1]. During the formation of laterites, elements are intensely transported from the crust to river and oceans. Silicon shows remarkably isotope fractionation during weathering processes [2]. Therefore, Si isotopes can be used to estimate the amount and isotopic composition of Si that is leached out from the solid earth[3].

Here, we present Si isotope data for a tropical laterite profile originated from intensively weathered basalts in Guangdong, South China. Isotopic data was measured by MC-ICP-MS at the University of Science and Technology of China, with long-term $\delta^{30}\text{Si}$ precision within 0.05‰ (2SD). The profile shows a decreased trend of Si depletion with τ_{Si} ($\tau_{\text{Si}} = [\text{Si}]_{\text{laterite}} \times [\text{Th}]_{\text{bedrock}} / [\text{Th}]_{\text{laterite}} \times [\text{Si}]_{\text{bedrock}} - 1$) down to -0.83 in the surface soils. $\delta^{30}\text{Si}$ of whole profile ranges from -1.79‰ to -2.45‰, lighter than that of basaltic bedrocks. The profile displays two distinct trends of $\delta^{30}\text{Si}$. The upper layer (0-350cm) shows a negative correlation between $\delta^{30}\text{Si}$ and τ_{Si} . This is opposite to the trend in the lower layer (350-450cm) with incompletely weathered rocks, reflecting the effect of different mineralogy and weathering extent. Finally, the weighted average $\delta^{30}\text{Si}$ of the laterite profile is $-2.06 \pm 0.05\text{‰}$. Mass balance calculation shows that 79.2% of Si with an average $\delta^{30}\text{Si}$ of $0.54 \pm 0.05\text{‰}$ was leached from bedrock during laterite formation, which could have big impacts on Si budget and isotope composition in river and ocean systems.

[1] Tardy, Y. (1997). A. A. Balkema, Rotterdam, 408 pp.

[2] Ziegler, K. *et al.* (2005). GCA, 69, 4597–4610.

[3] Georg, R.B. *et al.* (2006). EPSL, 249, 290–306.