Barium isotope composition of a laterite profile derived from extremely weathered basalt

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Barium (Ba) is a mobile element during continent weathering. Ba isotopes are fractionated during Ba transporting between minerals and aqueous solutions [1]. However, the machanisms for Ba isotope fractionation are still not clear. Here we report Ba isotope composition of a laterite profile from Zhanjiang, Guangdong Province, China. As products of strongly weathered basalts, laterites are oxidized Fe-rich soils with signficant loss of alkaline earth elements during the weathering.

Ba isotopes were analyzed on a Neptune Plus MC-ICP-MS at the University of Science and Technology of China (USTC). The long term precision of $\delta^{137/134}$Ba is better than 0.05‰ (2SD) [2]. Ba was strongly lost during weathering based on the lower Ba/Th of soils than the bed rock. The surface soils have the heavest $\delta^{137/134}$Ba (0.04±0.05‰) and almost the lowest Ba/Th in the lateites, which might be due to by growth of plants [3]. The subsurface soils have a large variation of $\delta^{137/134}$Ba from 0.01 to -0.23‰, lighter than the base rock (0.04±0.031‰) and river water (-0.01‰ to 0.31‰) [4]. Particularly, the 160-170cm horizons have the lightest $\delta^{137/134}$Ba (-0.23±0.04‰) with the highest Fe content, suggesting that heavy Ba isotopes were preferentially removed during Ba lost, leaving a residue enriched with light Ba isotopes. The negative correlation between $\delta^{137/134}$Ba and Fe contents indicates that the Fe (oxyhydr)oxides may prefer lighter Ba isotopes.

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