Rates and trends in \textit{in situ} chemical weathering in a tropical soil, Basse Terre Island, Guadeloupe

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We present chemical and U-series isotope analyses of an oriented weathering clast collected from the B horizon of weathered Quaternary volcanoclastic debris flow on Basse Terre Island, Guadeloupe. The sample consists of an unweathered andesitic core overlain by a weathering rind, an indurated crust that separates the rind from the overlying soil matrix. U/Th disequilibria dating indicate that rind age increases away from the core-rind boundary to a maximum of 66 ka. This translates to a rind-advance rate of 0.2 mm yr\textsuperscript{-1}, broadly consistent with rind advance rates calculated elsewhere on Basse Terre Island. The overlying indurated crust is 72 ka and the enveloping \textasciitilde 270 ka matrix material.

Elemental variations are constrained by a bulk ICP-AES vertical transect spanning from the core to the overlying soil matrix and parallel electron microprobe transections. The hierarchy of elemental loss across the core-rind boundary varies in the order Sr \textasciitilde Ca > Mg \textasciitilde Na \textasciitilde Mn > Al > K \textasciitilde Ba \textasciitilde Si > P > Ti. The \textasciitilde 1000 \mu m wide reaction front at the rind-soil interface is marked by an indurated horizon with Fe and Mn enrichment, followed by the enrichment of Mn, Ba, Al, Mg and K in the soil.

Unlike previously studied clasts, the preservation of the rind-soil interface permits characterization of weathering reactions between the weathering core, the rind, and the surrounding soil matrix, shedding insights into communication between the enveloping weathering rind and host regolith.