Rates and trends in *in situ* chemical weathering in a tropical soil, Basse Terre Island, Guadeloupe

MURPHY, MARIAH[1], SAK, PETER B.[1], MA, LIN[2], GAILLARDET, JEROME[3], DANIEL, CHRIS G.[4] AND BRANTLEY AND SUSAN L.[5]

[1]Dickinson College, Carlisle, PA 17013 USA
[2]University of Texas at El Paso, El Paso, TX 79968 USA
[3]Institut de Physique du Globe de Paris, Paris, France
[4]Bucknell University, Lewisburg , PA 17837 USA
[5]Pennsylvania State University, University Park, PA, USA

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^{-1}, broadly consistent with rind advance rates calculated elsewhere on Basse Terre Island. The overlying indurated crust is 72 ka and the enveloping ~ 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 ≈ Ca > Mg ≈ Na ≈ Mn > Al > K ≈ Ba ≈ Si > P > Ti. The <1000 μm 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.