Spatial variability of weathering rates in a forested hillslope

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To define the spatial variability of base cation (BC) supply from weathering on a hillslope scale we investigated three sets of weathering equations of varying complexity: *PROFILE* [1], *Transition-State Theory [2]* [TST] and the *Palandri & Kharaka* [3] database. We investigated their responses to chemical gradients of pH, aluminium and DOC (dissolved organic carbon). We also used the three sets of equations to calculate the in-situ weathering rates in a hillslope profile in Northern Sweden (riparian/transition/upslope).The weathering rates per unit of mineral surface area was highest in the low pH, organic rich riparian zone. However, the strength of the response to chemical gradients differed significantly, with the PROFILE equations showing the weakest response, and the TST equations showing the strongest response. The total weathering flux was however almost identical from all three sets of equations ($r > +0.97$ for 20 monitored points). Thus, for this site, soil texture is a more important parameter for estimates of BC supply than weathering rates. Even if weathering was lower in the riparian zone due to lower mineral content, significant weathering still took place in the whole monitored part of the hillslope, with especially high fluxes from the transition zone, due to a finer soil texture.

[1] Sverdrup & Warfvinge (1993), *Applied Geochemistry* **8**, 273-283. [2] Oelkers, Schott & Devidal (1994), *Geochim. Cosmochim. Acta* **58**(**9**), 2011-2024. [3] Palandri & Kharaka (2004), Open file report 2004-1068, US Geological Survey