Do deeper roots enhance weathering at depth in woody-encroached grasslands?

PAMELA L. SULLIVAN[1] , LI LI[2], G.L. MACPHERSON[3], MARVIN WES STOPS[1], WALTER DODDS [4]

[1]University of Kansas, Lawnrence KS, USA, *plsullivan @ku.edu, glmac@ku.edu and m771s624@ku.edu
[2] Penn State, State College PA, USA, lili@engr.psu.edu
[3] Kansas State University, Manhattan KS, USA wkdodds@ksu.edu

Grasslands cover approximately 20% of terrestrial land surface. Woody encroachment has been globally observed in these grasslands significantly altering the water and carbon (C) dynamics of these systems, including their switch from C neutral to C sinks. Here we explore how woody encroachment influences water and C dynamics and thus, weathering at depth, at the Konza Prairie Biological Station (LTER), a remnant tall grass prairie. Specifically we focus on two adjacent, well-characterized watersheds (~126 ha each) with one dominated by grass and the other being encroached by woody vegetation. Given these watersheds are underlain by the same Permian-aged repeating sequence of limestone and mudstone they offer the ability to detangle the influence of root system architecture on watershed scale subsoil C dynamics and chemical weathering.

To address these questions surface and subsurface measurements of water and biogeochemical fluxes are being collected across both watersheds and a new ecohydrologic-biogeochemistry modeling tool, Biome-RT-Flux-PIHM, is being developed. Initial analyses of the stream water discharge solute concentrations from the grassland and woody-encroached watershed demonstrate differing concentration-discharge behaviour for Ca^{2+} and Si. The woody-encroached watershed demonstrates chemostatic behaviour for these elements while the grassland watershed demonstrates dilution behaviour.