Geophysical Research Abstracts
Vol. 19, EGU2017-9929, 2017
EGU General Assembly 2017

Predicting and quantifying soil processes using “geomorphon” landform classification

Zamir Libohova (1), Phillip Owens (2), Philip Schoeneberger (1), Doug Wysocki (1), Curtis Monger (1), and David Lindbo (3)

(1) United States Department of Agriculture, Natural Resources Conservation Service, Soil Scinece Division, National Soil Survey Center, Lincoln, United States (zamir.libohova@lin.usda.gov), (2) United States Department of Agriculture, Agriculture Research Station, Booneville, Arkansas, USA, (3) United States Department of Agriculture, Natural Resources Conservation Service, Soil Scinece Division, Washington, DC, USA

Soil development and behavior vary spatially at multiple observation scales. Predicting and quantifying soil properties and processes via a catena integrates predictable landscape scale variation relevant to both management decisions and soil survey. Soil maps generally convey variation as a set of aggregated soil properties. To provide more detailed, high resolution soil property maps with a link to landscape scale processes, we explore a landform recognition algorithm ”geomorphons” in the GRASS GIS environment. Our main objective is to assess how this landscape model influences selected properties spatially and use this knowledge to improve soil properties property predictions. As an example, Clay:Ca ratio and pH with depth are systematically influenced by slope position as represented by “geomorphons”. Lower ratios of Clay:Ca and pH increase with soil depth are a function of both clay decrease with depth and a carbonate increase. Rate of clay decrease with depth is indicated by the shape of the curve of Clay:Ca ratio and pH with observable differences with slope position. The decreasing Clay:Ca ratio for “summit”, “shoulder”, and “backslope” positions was rapid and occurred within the top 50 cm, whereas the decrease for the “footslope” and “toeslope” positions occurred through a greater soil thickness (150 cm). A similar trend existed for soil pH, suggesting in both cases that subsurface vertical and lateral water movement and surface runoff influence the soil property distribution depending upon and predictable by slope position. The link between process and property distribution at this scale demonstrates the utility of using “Geomorphons”, a landform classification, for quantifying and predicting soil processes based on soil landscape models, which in turn have defined geographic relevance for predictions on broader areas.