

Revisiting Soil-Terrain Relationships at a Long-Term Agroecosystem Study Site

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Abstract. Landscape topography is considered a major controlling factor in soil development and, therefore, several attempts have been made to relate various soil properties to terrain attributes. The often cited study of Moore *et al.* (1993) related soil attributes to the terrain based on a 15.24-m grid of elevations along a 5.4-ha agricultural hillslope in Sterling, Colorado, USA. However, terrain attributes derived from grid digital elevation models (DEM) are sensitive to the grid cell size. A recent global positioning system survey of the Sterling site produced a 3-m grid DEM and the analyses of the 1993 study were repeated and extended using this new DEM. Surface soil attributes of A-horizon thickness, extractable P (ppm), pH, and the percentages of organic matter, sand, silt, and clay were related to the terrain attributes of slope, aspect, wetness index, stream power index, and sediment transport capacity index at 231 locations using both DEMs. Correlation coefficients between soil and terrain attributes based on univariate linear regressions were generally not improved by decreasing the grid cell size of the DEM. Additional terrain attributes, not included in the 1993 study, of elevation and potential solar radiation index produced the highest correlations (-0.57, -0.65) with organic matter and pH, respectively. Correlations between soil and terrain attributes were generally reduced when moving to subsurface soil layers.

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