

Depth of Soil in the Goss-Gasconade-Rock Outcrop Complex in  
Callaway County, Missouri Using the  
Soil Land Inference Model (SoLIM)

Abstract

This study utilizes SoLIM (Soil Land Inference Model) to find the depth of soil in the Goss-Gasconade-Rock outcrop complex in Callaway County, Missouri. The attributes of the rugged terrain and the diverse vegetation within the soils complex are indicators of soil depth. Shallow soils and deep soils are modeled using combinations of the environmental indicators and fuzzy logic. Accuracy of the model is determined through field verification. First, environmental information specific to the study area is obtained through an interview with a soil scientist with local expertise in the soil-environmental relationship. Then, two tacit points are designated using 3dMapper software to represent the depth classes: shallow (0 to 20 inches), and deep (greater than 21 inches). These points are used by the case-based reasoning (CBR) inference engine so environmental variables such as slope, aspect, vegetation, landuse/landcover, curvature, and relative position generate individual raster-based fuzzy membership maps of soil depth class. During the process fuzzy membership maps are refined numerous times in order to capture the soil scientist's vision of the soil landscape. Hardened soil maps are created from the integration of the fuzzy membership maps ultimately modeling the depth of soil. Forty-two field sample points validated against the hardened soil map using SoLIM's error matrix find 52% accuracy of the model. Conclusively, data resolution, number of

field sample points, and alteration of the fuzzy membership map for shallow soils on northern aspects may increase accuracy of depth of soil modeled.