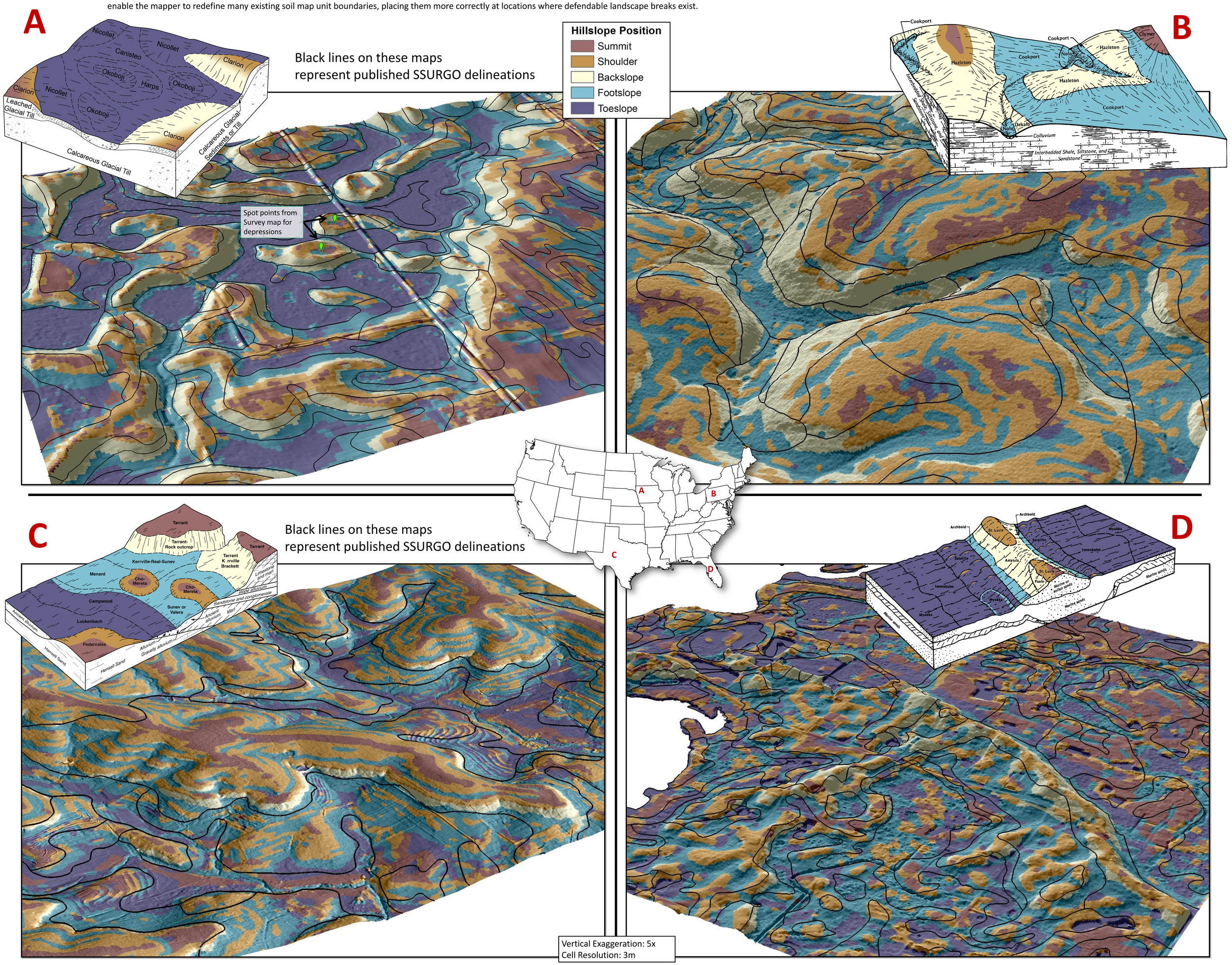
Digital Classification of Hillslope Position for Defining Soil Map Units

Bradley A. Miller[1] and Randall J. Schaetzl[2]

SUMMARY

Classification of hillslope position has a long history in soil geomorphology. And at the scale of most county-level soil maps, most soil boundaries are based on topography. However, the inability to accurately and efficiently delineate topographic breaks associated with hillslope elements – either due to lack of sufficient topographic resolution or the proper technology to develop/model them – limits soil mapping accuracy and precision. We present a model for classifying hillslope position that objectively and quantitatively classifies high-resolution elevation data into the five major hillslope positions. It was calibrated and validated on soil scientists' observations in the field and was then applied to the landscapes shown below. In other words, the analysis scales of the land-surface derivatives and the classification breaks are similar for all of the examples shown below.

The results of the model are base maps that can be used to (1) improve research on toposequences by providing explicit definitions of each hillslope element's location, (2) facilitate the disaggregation of soils currently mapped as complexes due to topographic variation, and (3) identify map unit inclusions in areas of subtle topographic variation. The base maps developed by the model can also help identify areas of possible mismapping, especially where soil boundaries cross topographic breaks. This information can enable the mapper to redefine many existing soil map unit boundaries, placing them more correctly at locations where defendable landscape breaks exist.



For more information see:
Miller, B.A. and R.J. Schaetzl. Digital classification of hillslope position. Soil Science Society of America Journal. under review.

http://www.geographer-miller.com/relief-analysis-toolbox/

[1] Leibniz-Centre for Agricultural Landscape Research (ZALF), Müncheberg, Germany

[2] Michigan State University, East Lansing, MI

MICHIGAN STATE UNIVERSITY

zalf Leibniz-Zentrum für Agrarlandschaftsforschung (ZALF) e.V.