Virtual Profiles – Generating Diagrams of Soils from Written Profile Descriptions

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Introduction

In the fall of 2005, we first introduced rugged Tablet PCs equipped with GPS receivers and GIS software into our soils curriculum to provide students with a variety of maps while we are in the field. Various thematic maps derived from the SSURGO soils data set are the centerpiece of our GIS data sets. The technology is now fully integrated into AGRY 565, *Soil Classification, Genesis, and Survey,* and we are beginning to use it in our introductory soils course, AGRY 255, *Soil Science.* Student response has been very enthusiastic.

With the new technology, our emphasis has shifted somewhat from the traditional focus on examining individual pedons and on how soils vary within the local landscape, to how soils relate to larger scale landscape features that may play out over many miles.

GIS software allows one to link any external program to any spatial feature. Here we describe our initial attempts at linking soil polygons to diagrams of the dominant soil. We can only examine a small number of physical soil pits during a semester, but students can examine an unlimited number of "virtual" pits.

Hardware & Software

- Hammerhead X^treme rugged tablet PCs
    - All-Vis display (sunlight readable)
    - Internal Garmin GPS
    - 40 - 60 GB hard drive
    - Windows XP Tablet Edition
    - http://www.drs-ts.com/

- ArcGIS 9.2

GIS Data Layers

- Digital Elevation Model
    - Indiana Spatial Data Portal (http://gis.iu.edu)
    - hillshade for topography, color ramp for elevation
- SSURGO Soils Data
    - Soil Data Mart (http://soildatamart.nrcs.usda.gov/)
    - Thematic maps of soil parent material, loess depth, drainage class, prairie versus forest soils, etc.
- Color Aerial Photography
    - Indiana Spatial Data Portal
    - 6" resolution, MrSID compression
- Roads, county outlines, surficial geology, bedrock geology, bedrock topography, etc.
    - Indiana Geological Survey (http://igs.indiana.edu)

Implementation
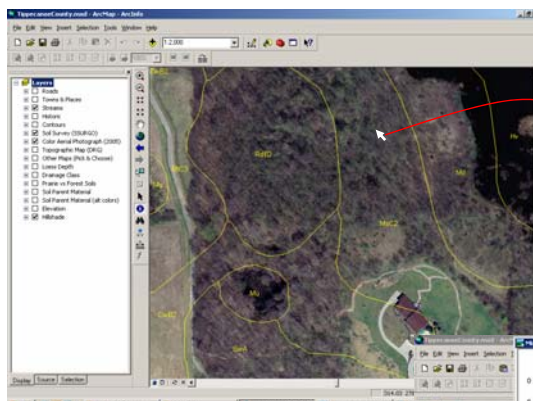
- students use Tablet PCs
    - while we drive to field sites during weekly labs
    - on 2, all-day field trips
- GPS shows position on map at all times
- two students per Tablet PC maximizes learning
- worksheets guide students to specific information

Acknowledgements

Linking Polygons to Soil Profile Diagrams

Approach

Generate profile diagrams from official series descriptions.

clicking on polygon brings up diagram of soil profile

Challenges
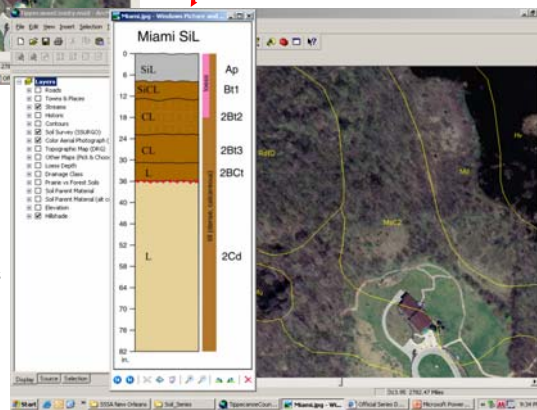
Symbolizing the complex nature of soils as clearly as possible.

Using Munsell color notations to show the overall color of the profile – color differences are often too subtle to display clearly on the computer screen.

Devising an approach to symbolize major differences in soil structure.
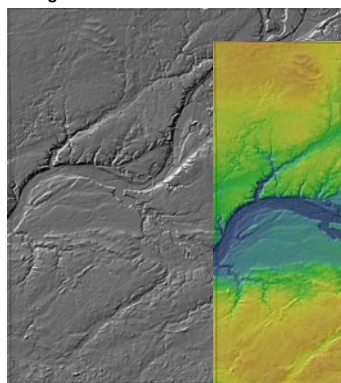
Showing limiting layers, and soil parent material changes.

Illustrating ranges in properties such as depths of horizons, loess thickness, and solum thickness.
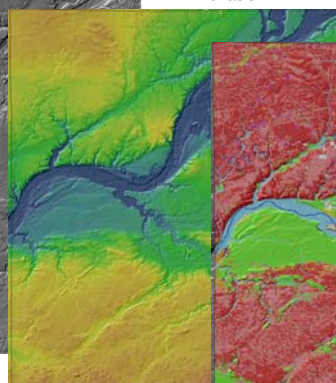
Examples of Spatial Information Available to Students in the Field
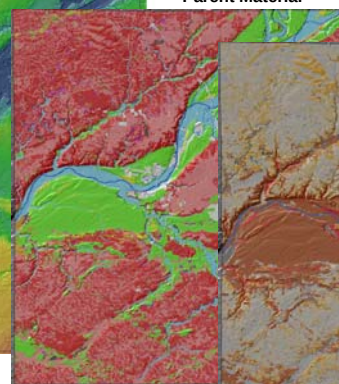
Digital Elevation Model as Hillshade
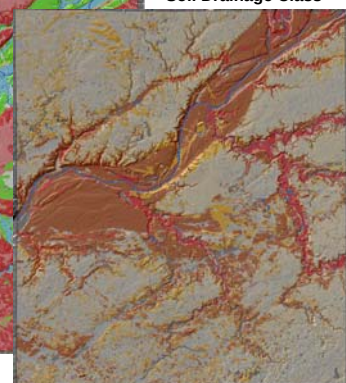
Elevation
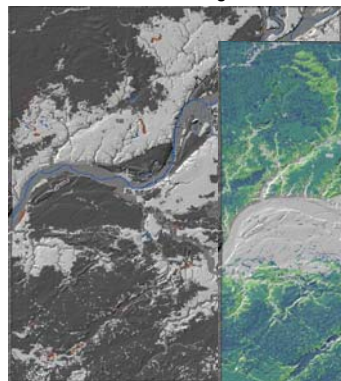
"Dominant" Soil Parent Material
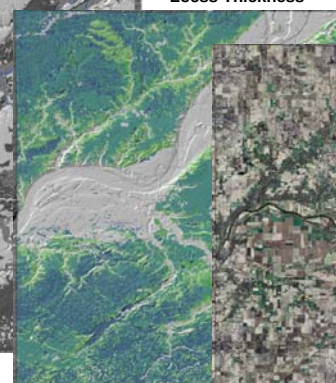
Soil Drainage Class

Pre-settlement Vegetation

Loess Thickness

Aerial Photography