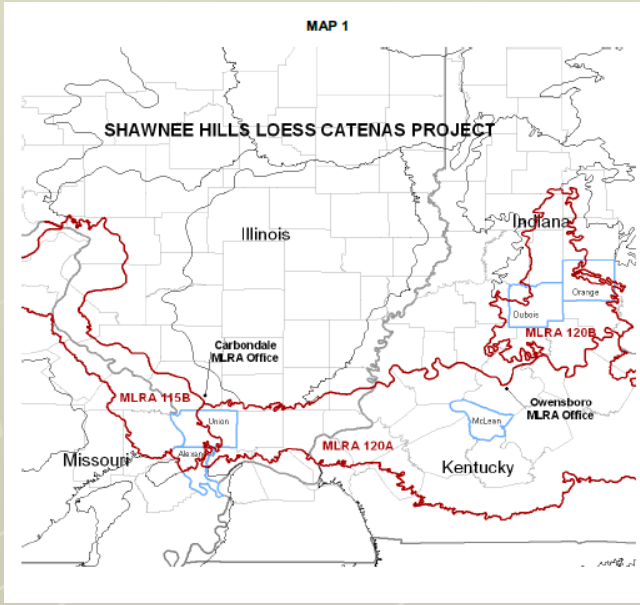
The Shawnee Hills Project and Soil Systems Research

Larry T. West
National Leader – Soil Survey Research and Laboratory

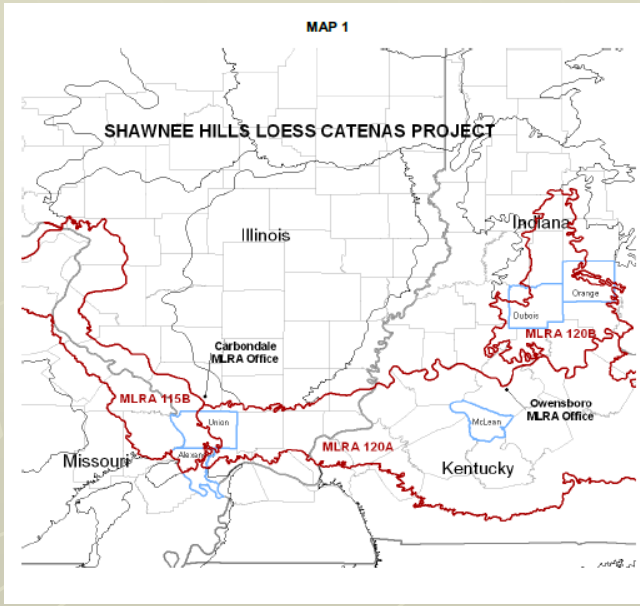
Soil Systems

- Recurring group of soils that occupy the landscape from the interstream divide to the stream
- Similar parent materials, geomorphology, local relief, hydrology, and climate
- Expected to respond in relatively consistent ways across its extent
- Size may range from a few 1,000 hectares to 100's of km^2
- Same or similar concept as a "benchmark landscape"
  - "Soil System" places emphasis on processes and interactions in and among soils on the landscape



Soil Systems Research

- Emphasis is elucidation and documentation of important soil and landscape characteristics, processes, relationships, and responses
- Improved understanding of patterns of
  - landscape-scale pedogenesis
  - connectivity among soils and properties
  - soil property response to disturbance
- Accessory goal is to provide sites with extensive data for hands-on training
- Research type and focus will vary depending on site characteristics and important questions identified by local soil scientists and cooperators
- Research results, models, and related information should be applicable over the extent of the soil system



Global Objectives

- Develop models of genesis and landscape distribution of soils, diagnostic horizons, and soil features as related to parent material, climate, and geomorphology
- Describe properties of soils including spatial variability of static and dynamic properties
- Develop relationships among static properties, dynamic properties, and ecosystem characteristics
- Evaluate simulation models and pedotransfer functions for prediction of soil properties and behavior
- Establish sites with extensive data for hands-on training and field experience in
  - sample design and collection
  - soil-landscape analysis
  - digital and classical soil survey techniques

Approach

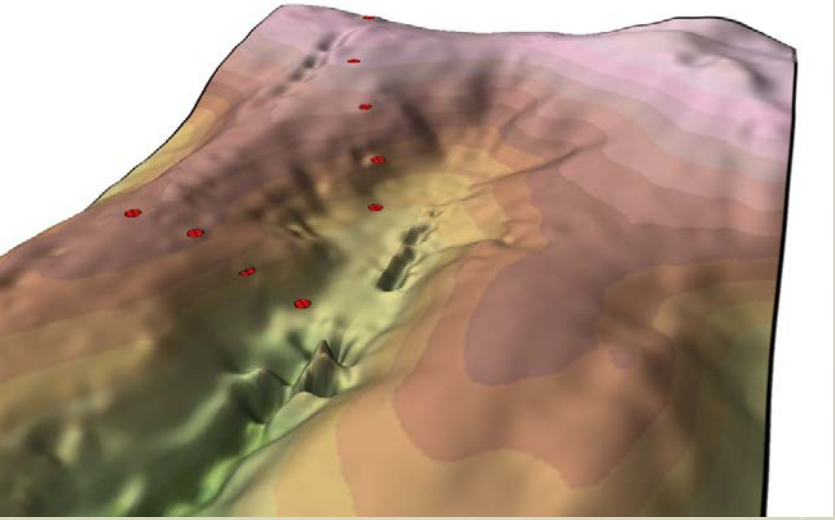
- Overall objective and area identified from
  - Locally identified needs
  - NRCS initiatives/issues
  - SSD needs
- Initial projects identified locally
  - Later projects cooperatively defined
- Cooperative projects that involve
  - Local soil scientists
  - NSSC soil scientists
  - Cooperators
- 5-10 year duration for overall project

Current Projects

- Shawnee Hills (IL, IN, KY) – the mother project
  - Variable loess thickness
  - Genesis
  - Properties
  - Management effects
- Salinity and sodicity in the northern Great Plains
  - Distribution/landscape relationships
  - Genesis
  - Impact on ecosystems
- Bay-Delta region of CA
  - Sacramento and San Joaquin River watersheds
    - Water quantity and quality
  - Impact of soil characteristics, distribution, and management modifications on landscape hydrology

Shawnee Hills Cooperators

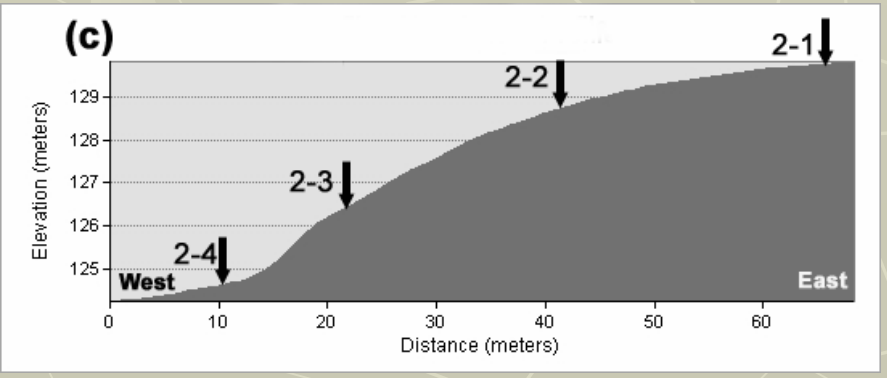
NRCS MLRA Offices/MO/State offices (IL, IN, KY) Sam Indorante, Matt McCauley
Univ of KY Brad Lee
Purdue Univ Philip Owens
NRCS NSSC Mike Wilson, Phil Schoeneberger, Zamir Libohova
USFS John Kabrick
KY Geological Survey Ron Counts
IL Geological Survey Leon Follmer
USGS Tanja Williamson
Southern Illinois University

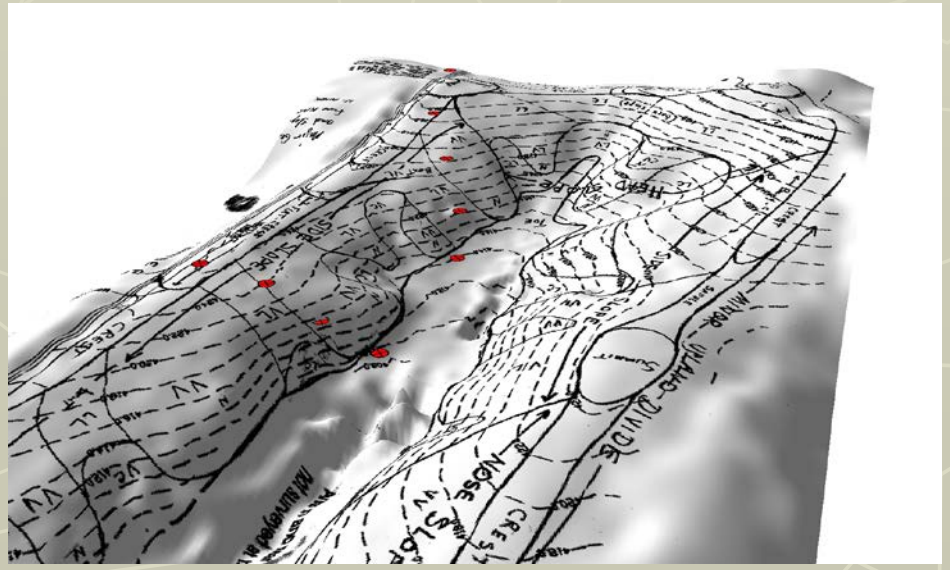


- Topographic survey (60 cm contours) / digital elevation model constructed
- Landscape segmented into geomorphic components
- Pedon sampling of two transects / nine sites representing different hillslope profile positions across landscape contours.

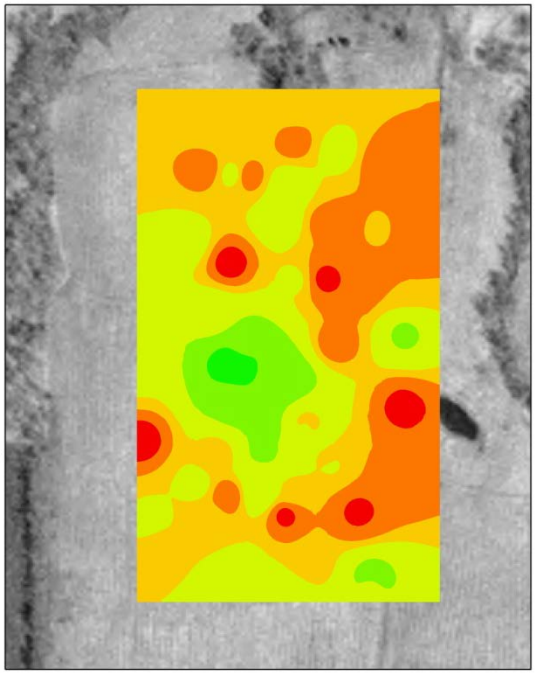
EXAMPLE:

Morgan Pond Site, Illinois



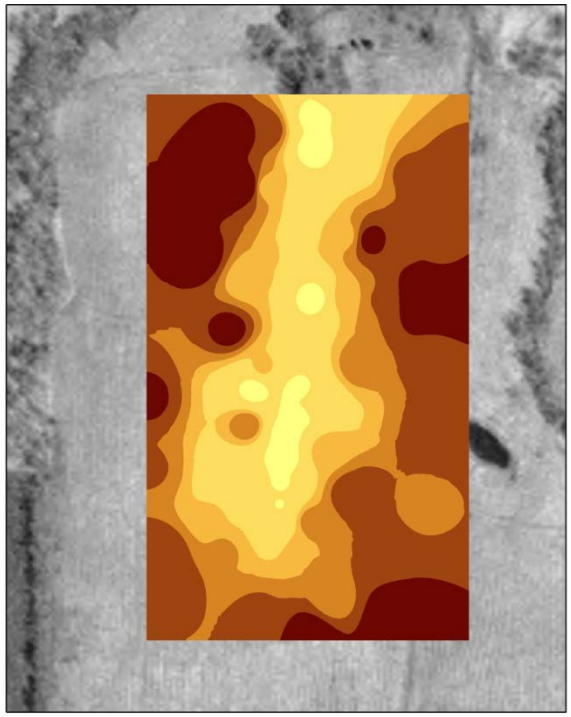


pH



B hor pH(H2O)
- <5
- 5.0 - 5.5
- 5.5 - 6.0
- 6.0 - 7.0
- 7.0 - 8.0
- 8.0 - 9.5

Clay



B hor - clay
- 16 - 18
- 18 - 24
- 24 - 26
- 26 - 28
- 28 - 30
- 30 - 34

Electrical Conductivity

B hor-2:1EC
- 0.03 - 0.06
- 0.06 - 0.09
- 0.09 - 0.13
- 0.13 - 0.20
- 0.20 - 0.32
- 0.32 - 0.50

Landscape distribution of selected properties

Funding

- Core funding for NRCS activities
  - Field assistance
  - Laboratory analysis
- Limited funds may be (have been) available to support related cooperator projects
  - UKY
  - Purdue
  - NDSU
  - UC-Davis

Potential Future Projects in South

- Expansion of salinity and sodicity project
- Plinthite
- Spodosol landscapes
- Many others

- Challenge is funds, time, and people