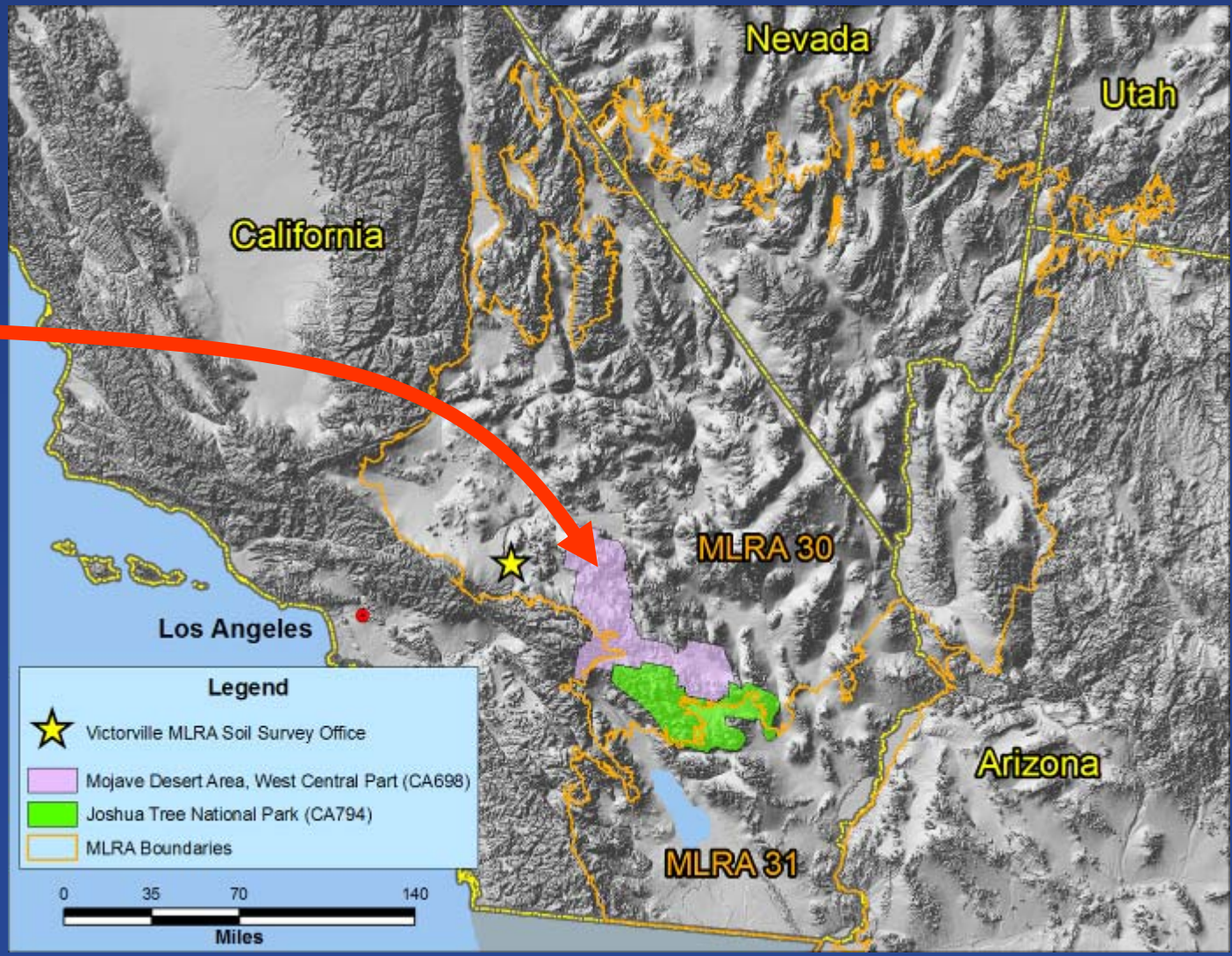
Update on the Mojave Desert Digital Soil Mapping Project

A National NCSS Operational Initiative

Natural Resources Conservation Service - California

DSM Operational Initiative

- Two soil survey areas
- Initial focus: about 960,000 acres



Background Terms

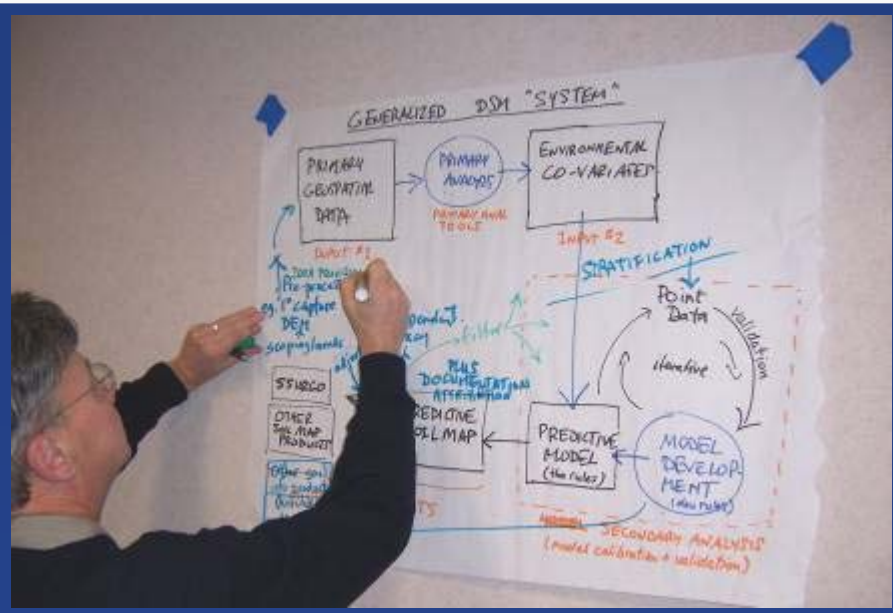
- DSM = Digital Soil Mapping
- The use of field soils data, digital raster soil-forming factor data, and statistical modeling methods to estimate the distribution of soil properties over the landscape
- Used as pre-mapping inputs to plan field work and to increase efficiency and quality

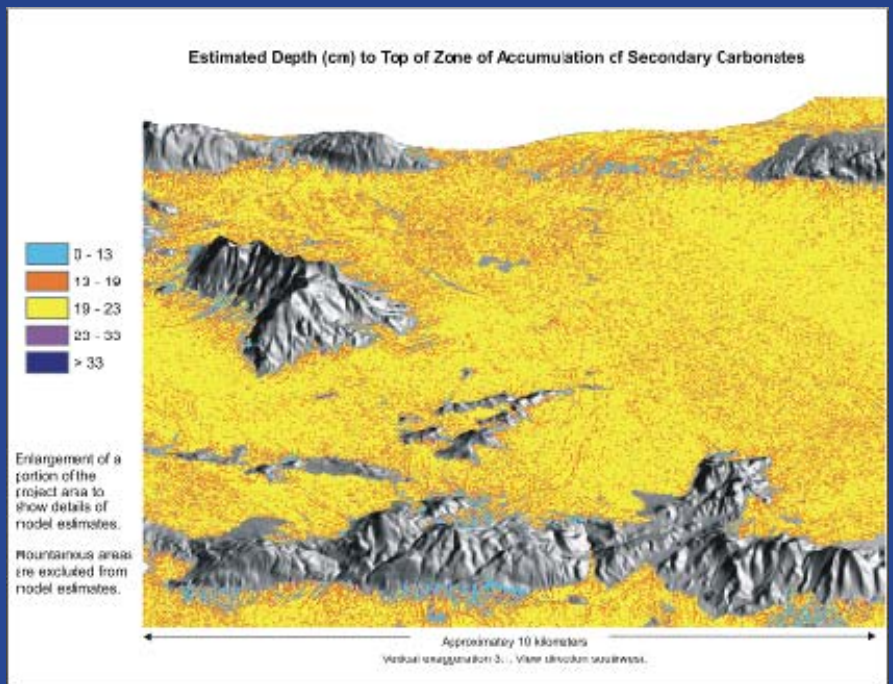
DSM

- **Digital Soil Mapping is the creation and the population of a geographically referenced soil databases generated at a given resolution by using field and laboratory observation methods coupled with environmental data through quantitative relationships.**
  - **IUSS DSM Working Group**

Background

- DSM papers presented at the two Global Workshops on DSM
  - Montpellier, France 2004
  - Rio de Janeiro, Brazil 2006
- U.S. DSM coordination meeting
  - Davis, CA January 2007
  - Mojave Desert selected as first NCSS Operational Initiative DSM Project


GENERALIZED DSM "SYSTEM"
PRIMARY GEOSPATIAL DATA
PRIMARY ANALYSIS
ENVIRONMENTAL CO-VARIATES
STRATIFICATION
Point Data
Iterative
Validation
SSURGO
PREDICTIVE MODEL
MODEL DEVELOPMENT
SECONDARY ANALYSES


Estimated Depth (cm) to Top of Zone of Accumulation of Secondary Carbonates
0 - 13
13 - 19
19 - 23
23 - 33
> 33
Enlargement of a portion of the project area to show details of model estimates.
Mountainous areas are excluded from model estimates.
Approximately 10 kilometers

Objectives

- **To actively implement Digital Soil Mapping (DSM) in a production soil survey environment in order to:**

- **Demonstrate the utility of DSM in a production setting;**

- **Provide training to soil survey crews in DSM methods in order to develop several fully-functioning DSM soil scientists;**

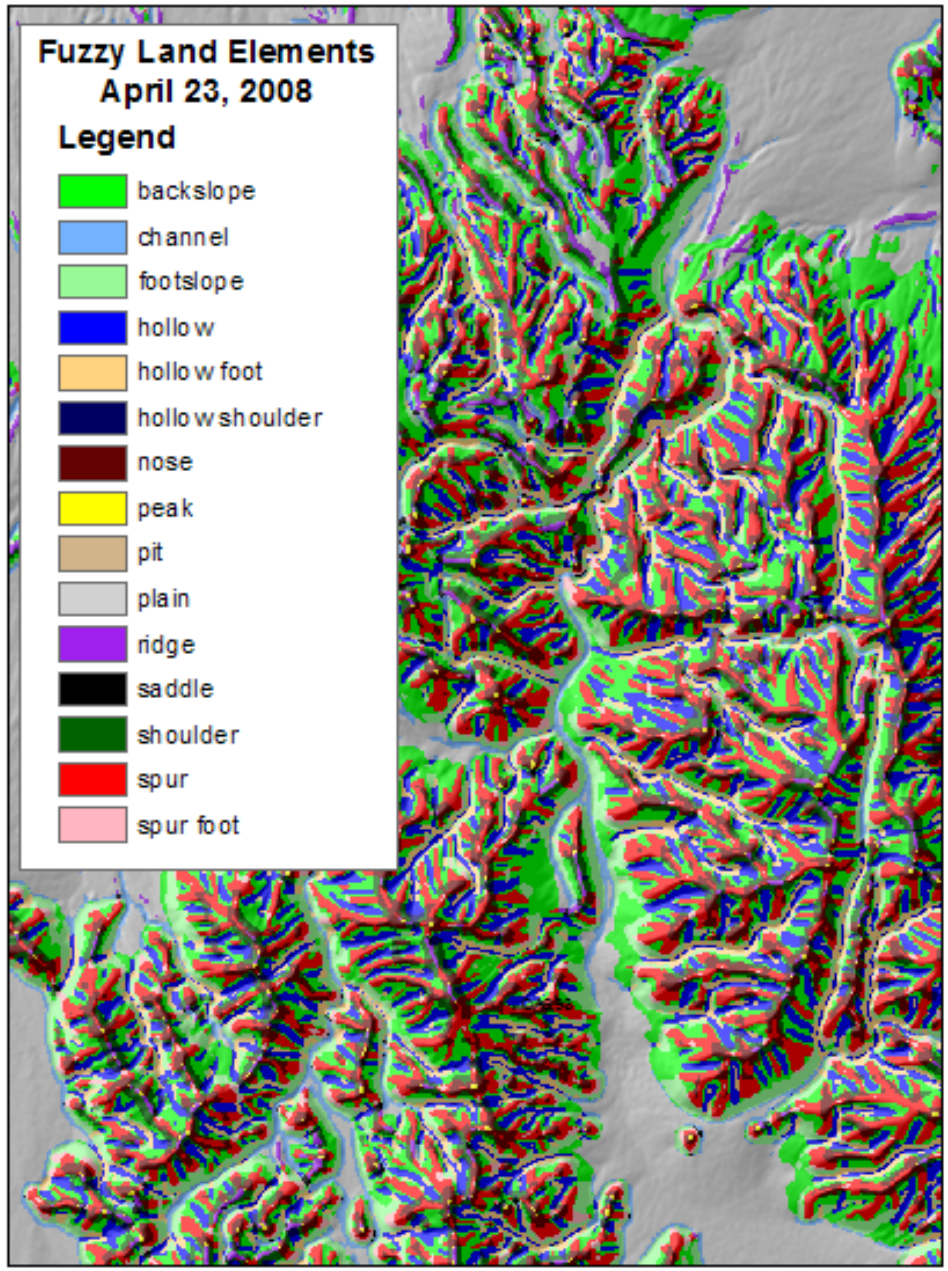
Objectives

- Develop detailed instructions for implementing successful methods;
- Provide useful soil information products to augment the current SSURGO product;
- Document experiences for future reference;

Objectives

- Develop a framework for supporting DSM Initiatives;
- Publish and present results.
- Field soil scientists will be able to apply DSM methods themselves, as normal operating procedures, as a result of this Initiative

Accomplishments



Accomplishments

- Developed project plan and timeline
- NRCS hired two new soil scientists with DSM education
  - Stephen Roecker, Victorville - Mojave
  - Bob Brown, Sonora – Central Sierra
- They will develop and implement DSM on two soil survey crews

Accomplishments

- Acquired Interferrometric Synthetic Aperture Radar (IFSAR) elevation data
  - 5 meter resolution
- Obtained Advanced Spaceborne Thermal Emission and Reflection Radiometer (ASTER) satellite images
- Remote sensing software provided

Accomplishments

- Mosaicked and resampled elevation data for >2 million acres

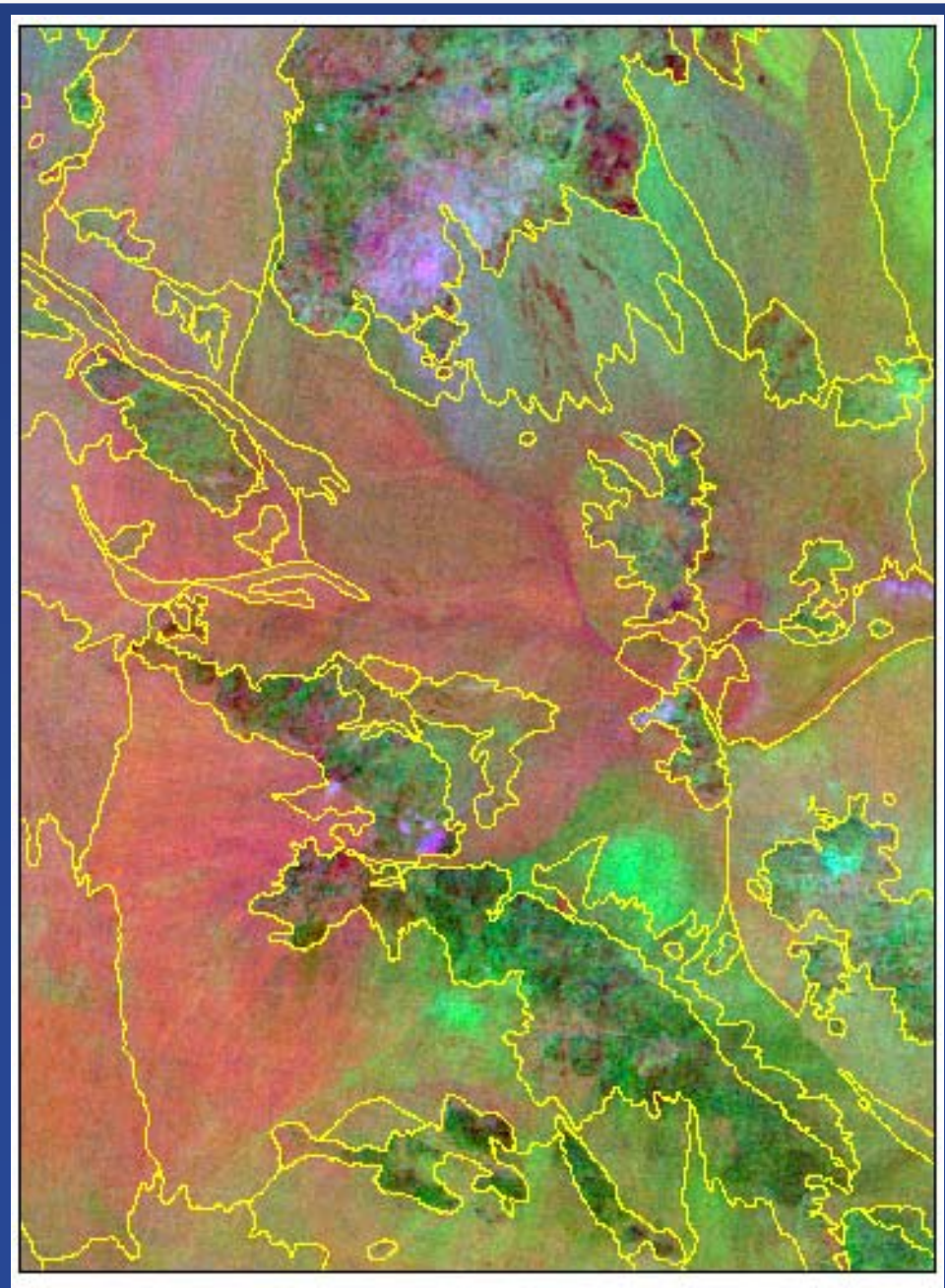
- Calculated elevation derivatives
  - Fuzzy Land Elements (Schmidt and Hewitt)
  - Ruggedness Index (Riley et al)
  - Slope Position (Hatfield)
  - Other derivatives

Accomplishments

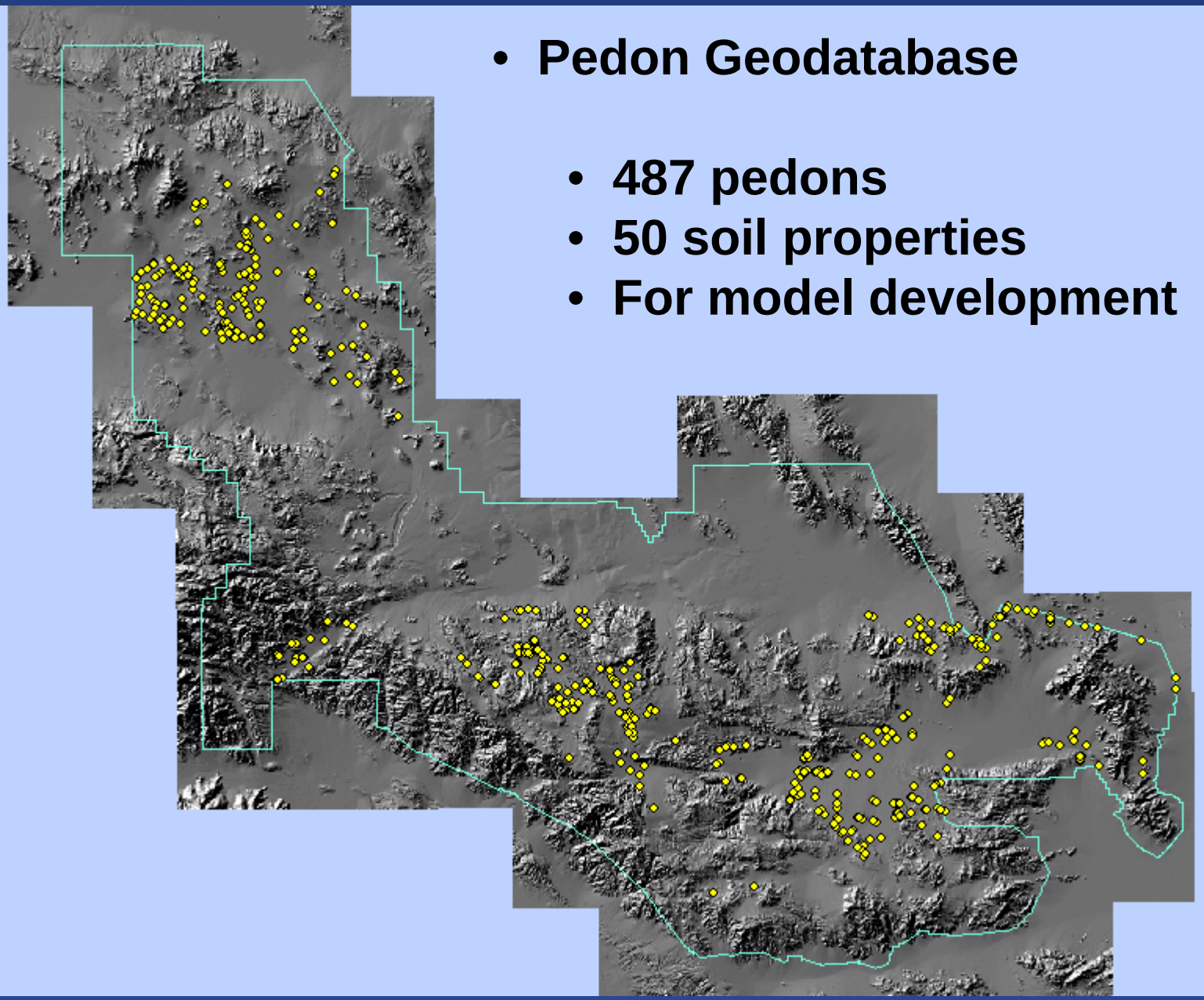
- **Built soil pedon point geodatabase with soil property attributes**
  - **Dependent variable data to build models**
- **Mosaicked ASTER and Landsat 7 satellite images**
  - **Christine Blinn, Virginia Tech**

Example Band Ratio Image

- Landsat 5 soil enhancement band ratio image
- SSURGO soil polygons for evaluation
- Used for pre-mapping and model inputs



- **Pedon Geodatabase**
  - **487 pedons**
  - **50 soil properties**
  - **For model development**

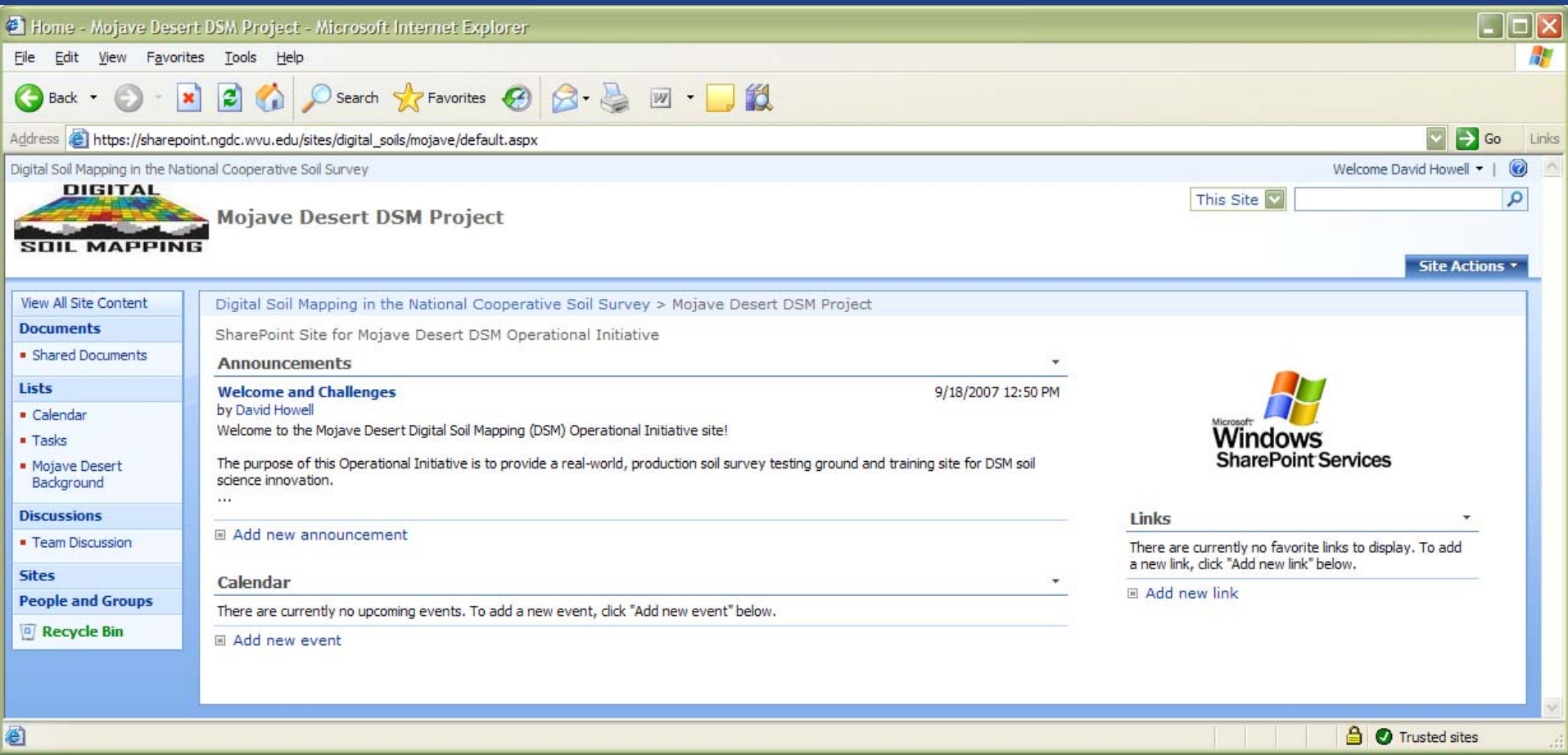


Accomplishments

- Coordination and planning meetings
  - Sampling plan
  - Custom Satellite band ratios
  - Modeling domain stratification
- Participation on U.S. DSM Working Group
- Coordination with International Union of Soil Sciences DSM Working Group

Site for Collaboration and Data

Amanda Moore, NRCS National Geospatial Development Center Morgantown, WV

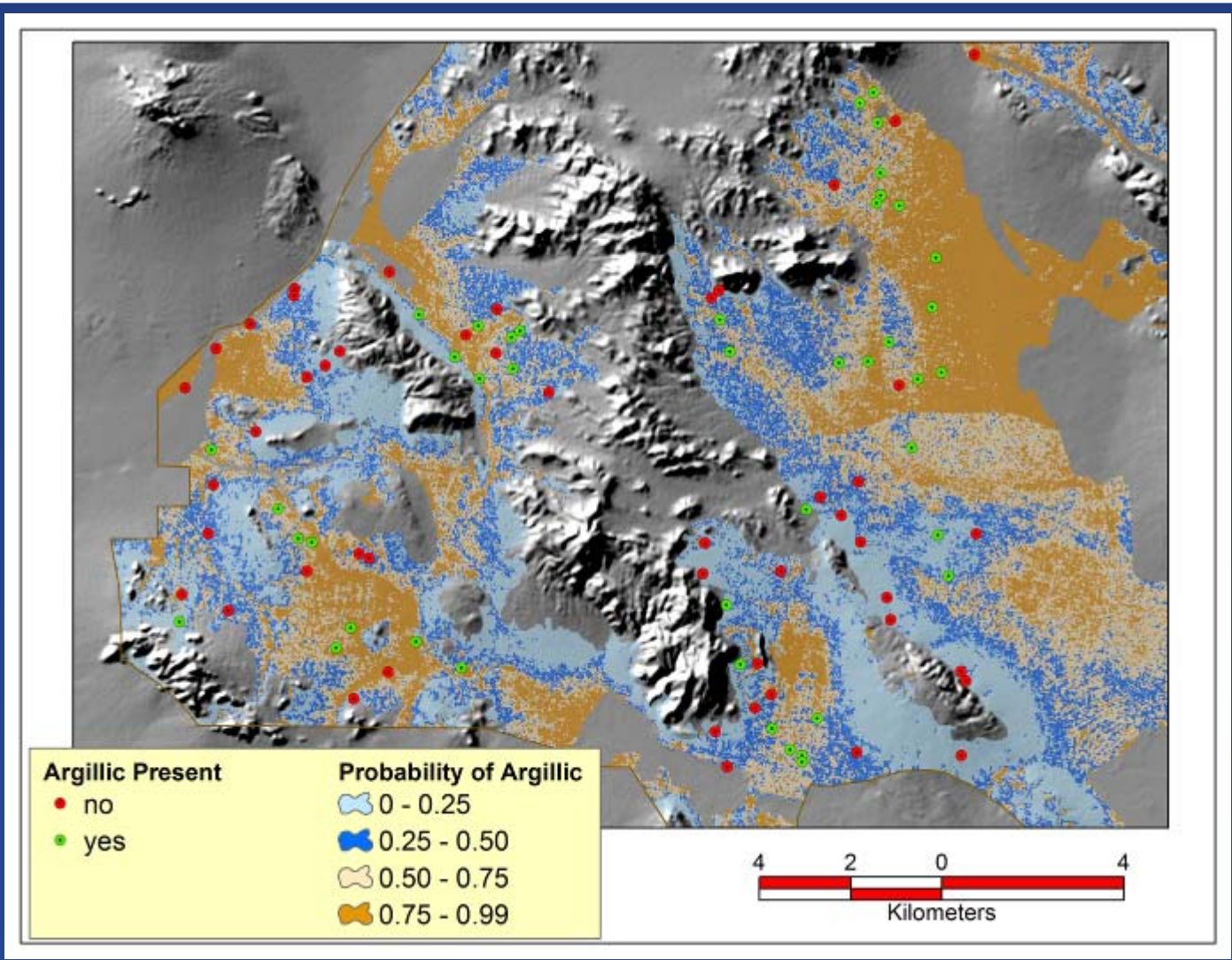


Current Activities

- Evaluation of Latin Hypercube sampling methodology
- Comparison of DSM and traditional soil mapping results, **Joshua Tree National Park – Roecker**
- Model profile depth and presence/absence of argillic horizons, **Central Sierra - Brown**

Activities

- Results will be presented in papers at
  - DSM USA 2008 Logan, UT
  - SSSA Houston, TX
- Pursuing NRCS certification of statistics software - R


Argillic Present
no
yes
Probability of Argillic
0 - 0.25
0.25 - 0.50
0.50 - 0.75
0.75 - 0.99
4 2 0 4
Kilometers

Thank You!