

Research Priorities Committee Report

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Charges:

1. Identify and evaluate research needed in the South Region to accomplish soil surveys:
 - A. Class criteria for gypsum content in soil interpretations
 - i. At what gypsum content does piping occur within the soil
 - ii. At what gypsum content does cavern formation occur in soils
 - B. The “new soil survey” needs sampling requirements for dynamic soil properties. Identify existing data sets in the Southern Region that can be used to determine the spatial variability of near surface dynamic soil properties.
 - C. Identify and/or suggest methods to predict highly variable soil properties such as infiltration from less costly measures
2. Identify known elements of groundwater Spodosol formation and develop models to predict their occurrence in landscapes.
3. Evaluate and identify ways to integrate soil spectroscopy tools into soil survey activities.

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 - A. **Class criteria for gypsum content in soil interpretations.**
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Findings:

- i. Piping – in dry climates (<5"/yr), piping is not prevalent; with higher rainfall and irrigation, piping occurs at gypsum contents of 1-5%, especially in siltier soils
- ii. Cavern formation – time-dependent and water dependent, >15% gypsum will get cavern formation; >60% gypsum cavern formation decreases

Recommendations:

- Reports from South and West Research Priorities/Needs committees and from University research studies will be combined and presented to the National Leader for Soil Interpretations for interpretation development and testing.

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Findings:

Sampling requirements:

- First DSP study on agricultural soils just completed in Texas – once these results are compiled, methods that may need further study can be identified; one that has already been recognized is estimating aggregate stability in the field
- Is geomorphic position part of the DSP sampling protocol? If not, this should be part of the sampling requirements or emphasized.
- Soil moisture needs to be better quantified at time of sampling, could cause errors in C estimates, bulk density
- Evaluate methods of estimating bulk density, Ksat

Identify existing datasets:

- ARS, NRCS grazing, no-till, etc. studies, Forest Service, USGS, university research projects, agricultural experiment stations, tillage experts, state foresters – all these were identified as potential sources for DSP data

Recommendations:

- Continue to refine sampling requirements via research, testing, and detailed field studies.
- Search the literature for DSP datasets.

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Findings:

- Texas Tech – estimating infiltration from soil temperature in playa lakes
- TAMU – using resistivity to measure infiltration in medium-textured soils

Questions:

- Could these techniques be used in estimating stormwater runoff infiltration in the east (preferential flow is an issue)?
- Are there other methods to estimate organic matter/carbon other than VNIR?

Recommendations:

- Continue to refine sampling requirements via research and detailed field studies.

2. Identify known elements of groundwater Spodosol formation and develop models to predict their occurrence in landscapes.

Findings:

- University of Florida has submitted a research proposal to study groundwater Spodosols across a sandhills/ flatwoods landscape
- NC State is also interested in pursuing research in this area
- Similar soil landscapes occur all along the Atlantic Coast and possibly Gulf Coast coastal plains

Recommendations:

- Continue to support and encourage the NSSC to provide research funds for the study of groundwater Spodosols in benchmark soilscapes in the South region.

3. Evaluate and identify ways to integrate soil spectroscopy tools into soil survey activities.

Findings:

- Develop proximal sensing tools to facilitate soil survey activities
 - investigate methods for optimizing VNIR spectral libraries for regional applications or specific mapping campaigns
 - design field sensors for specific soil survey use
 - identify and test new sensor technologies that may show promise

Discussion:

- Can VNIR be used to determine mineralogy (kaolinitic, illitic, smectitic)? Yes. TAMU has used VNIR to estimate mineralogy.
- NSSC is running VNIR on all samples that come through the lab

Recommendations:

- Continue to identify, develop, and research other uses for soil spectroscopy tools.

Suggestions for further Research Priorities.

- Validating soil hydraulic properties on benchmark soils.
- How does climate change affect soil properties?
 - How soil properties change – water tables (coastal areas with sea level rise), in Piedmont with storm events there is an effect on water table fluctuations
 - Climate change effects on cracking in Vertisols
 - Saltwater intrusion
- Oxyaquic concept not consistently used; what soil properties should be used to define or predict oxyaquic?
- Relict features are not well-defined especially in relationship to determining seasonal high water tables.
- Urban soils
 - Predicting compaction, relating to runoff
 - Storm water design -- how and where to evaluate the soil (A vs. B vs C horizon etc); dispersal of clay
 - Low-impact development; objective is to maintain hydrology, soils typically are not considered
 - Very fine sands – distinctions between vfs and silt
 - Urban development and its effect on surface and drinking water quantity, quality, and distribution
 - Loss of prime farmland soils
 - Wastewater treatment and dispersal
- Fate and transport of pollutants in both terrestrial and subaqueous environments
- Data mining from the Soil Mechanics lab
- Reinvigorate the soil geomorphology studies on large-scale physiographic, higher land use intensity areas to incorporate new technologies; suggestions are:
 - Texas-Louisiana Gulf Coastal Plain
 - Edwards Plateau
 - Cumberland Plateau
 - I-85 corridor in the eastern Piedmont (Richmond-Atlanta)