

This report summarizes the committee meetings of the North Central States Soil Planning Conference. The first part of each report outlines any specified charges for the committee and summarizes charges or ideas from recent past meeting discussions. The second part of each committee report identifies what was discussed at this year's meeting and ends with a summary of items for discussion to bring to the national meeting.

New Technology, Chairperson: Stephen Roecker

Charges: **This is usually the easy one since there are more than enough new devices and programs and web apps and procedures to discuss. A problem is often following through on getting the technology transfer out there so that everyone knows about what everyone else is doing.**

2014 Identify potential new technologies to support field activities in the processing of existing digital spatial data.

2014 Identify new technologies and methodologies that can support and/or enhance digital soil survey activities.

2014 Identify the need for soil property maps, the required map scales for soil property maps, and what soil properties to map.

2014 Identify customers who require soil property maps.

2014 Investigate ways and propose methods to provide end users with accuracy measurements for soil maps.

2014 Advance gridded SSURGO.

2014 Appears to be no report in the minutes

2015 Completion of a Soils Layer (Not SSURGO) for All Unmapped Western Lands (Nate Chaney)

2015 Wiki Page for Technology Transfer (Hardware, Software, Training, Processes) (Dylan Beaudette)

2015 General Discussion (Larissa Ford)

2015 Development of Report to General Assembly (B.J. Shoup)

Applied Technology Committee Charges

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2016 North Central Region Highlight of Action Items

1. Investigate cost effective ways of utilizing supercomputing i.e. Amazon, Universities
 - a. Investigating high resolution datasets
 - b. Dave Hoover will be going to Texas Tech in October to discuss supercomputing on the "Hrothgar Array" during the second week of October.
<http://www.depts.ttu.edu/hpcc/about/services.php>
2. Identify customers and pathways through Soil Data Access and other services
 - a. Promote Soil Data Access
 - b. Easier to use query builders for general users
 - c. Copying National Parks Service model for distributing data in many data in different ways
 - d. Analytics of customers
3. Sharing strategies for covariates
 - a. Reduce duplicate processing i.e. digital terrain analysis/lidar
 - b. Sandbox server for developing data distribution interfaces

[\(Also see ""Summary" below\)](#)

COMMITTEE CHARGES

To develop and document procedures, processes, and standards that will be used to integrate GIS, remote sensing, landscape modeling, and other similar technologies into the mainstream of the soil mapping and landscape inventory program. (per 2015 National Conference New Technology Committee)

1. Review and document progress on recommendations from 2015 National report.
2. Review recommendations from 2014 North-Central report.
3. Integrating GIS, remote sensing, landscape modeling, and other similar technologies into Soil Mapping and Interpretations program, create a priority list of National Interpretations as a research agenda need for the next 2 years.
 - a. See Attached Document (Interpretations Generator Enhancements - High Level Business Requirement (HLBR))
4. Evaluate potential for continuous and raster based interpretations.

5. Brief discussion of approach possibly planned revision of Ag Handbook 296.
6. The NCSS Interpretations Standing Committee will be required to report its activities at each National Conference.
7. Identify Outstanding New National Interpretation Projects within the NCSS partnership to present at the National NCSS Conference in forum.

1. Review 2015 National Report

- 2015 National Tech Report

<https://drive.google.com/open?id=1vcHEqBshewK6XINzyYT0UL8IhabSdylkddj2xvzx3vY>

The National Report as usual reviewed the previous years regional conferences reports. Highlights included ongoing projects by other agencies such as NEON and SMAP, both of which are designed to monitor environmental change and whose datasets present opportunities for the Soil Survey Divisions (SSD). NEON is seeking the SSD assistance in soil sampling, but is providing only limited funding. Additional topics of discussion include a review of upgrades to the TEUI toolkit, and the POLARIS disaggregation of CONUS. Similar disaggregation research efforts have been undertaken in the US, most of which were funded by the SSD, but have only been attempted over small spatial extents (e.g. several counties). Lastly the National Report discussed the use of GitHub (<https://github.com/>) as recommended by the Western Report to increase technology transfer and collaboration amongst the NCSS. Since the National Conference GitHub has been embraced by numerous SSD employees, and seen several existing projects linked to the SSD organization (<https://github.com/ncss-tech>), such as the aqp and soilDB R packages.

2. Review 2014 North-Central Report

- No report was found for the 2014 North-Central Regional Conference.

3. Integrate Technology

Data

- Google now provides access to a vast treasure trove of satellite imagery and spatial data via their Google Earth Engine (GEE) application. The GEE greatly simplifies generating raster mosaics and image time series. This data should prove useful in disaggregation SSURGO and monitoring environmental changes (e.g. dynamic soil properties). The GIS Specialist within the SSD were recently given a demo of GEE of Rob Vaughan from USFS-RSAC. Since then a few GIS Specialists have been using GEE to generate raster products. It's worth noting that GEE data is currently only exportable to Google Drive, which is currently set to be banned from Government computers. This will effectively cut off the SSD from this new resource.

Software

- R
 - New functions have been developed for fetching component and ecosite data.
 - Dylan Beaudette has developed a prototype R package to run interps from R. <https://github.com/ncss-tech/interpretation-engine>
 - Tom D’Avello in collaboration with several others developed a SSD training course on “Statistic of Soil Survey” using R. https://github.com/ncss-tech/stats_for_soil_survey
- ArcGIS
 - SSURGO data development tools <https://github.com/ncss-tech/SoilDataDevelopmentToolbox>
 - SSURGO interps under development <https://github.com/cferguso/workingInterps>
 - There has been experimentation using the ESRI *Collector* app to collect points or draw lines on a smart device with GPS capabilities. The maps can be created in our AGOL or Portal NRCS accounts on [arcgis.com](https://www.arcgis.com). The maps can also be used offline on a smart device. There are still issues with trying to take the soil polys offline. They can be taken offline by county. There is also the ability to attach a picture to the feature. The maps can also be used for online web apps and in ArcGIS Pro.
- NASIS
 - Forms? (Kevin)
 - Reports?
 - Interps?
- KSSL database
 - Efforts underway to merge
- Training
 - DSM training classes - Remote Sensing for Soil Survey Applications;
 - Digital Soil Mapping with ArcSIE

Hardware

- What is the status of the VNIR devices used in RaCA?
- Possible use of Hardware in the field Ipads, Bad Elf bluetooth GPS
 - tool for determining percent rock coverage.
- Apps for Data Collection and

Methods

- POLARIS
 - This topic has generated LOTS of discussion, and seems to have spurred the Soils 2026 Initiative. POLARIS took the gSSURGO and disaggregated the map units into a probability distribution of individual soil series for each pixel. This has been a holy grail of digital soil mapping (DSM), as it has identified a unique soil component for each

pixel and provided the uncertainty (i.e. probability) for each pixel. While an impressive effort, an evaluation POLARIS found the current version of SSURGO to be more accurate. However the POLARIS methodology has demonstrated a sincere interest by the research community in a more traditional raster product, which has been relying on STATSGO for CONUS scale models. Currently POLARIS is being used by NOAA for their CONUS models.

Needs

- Update SSURGO metadata
- File sharing platform
 - There is talk of banning Google Drive from USDA computers. We need a platform for sharing large files. The currently accepted platform is Cloud Vault. Blocking Google Drive will prevent us from exporting data from the Google Earth Engine, which is now the world's most powerful remote sensing platform. We need to be operating in the same technology space as our customers, cooperators and competition. Google's tools are much better at fostering collaboration, particularly with our cooperators.
- Soils 2026
 - Initiative to complete mapping of unmapped lands (including Alaska).
 - Part of this initiative, as proposed, will be development of a team of people that will focus a good bit of their time on this project (~50%). In addition, it is assumed that additional skills will be needed for soil scientists and ESD people in support of this effort, so there is an effort at developing several teams of trainers across the country to train staff. The initiative, as proposed, is not an isolated 10 year project, but a reinvigoration of pedology in the soil survey program using all of the data, software, hardware and field-based knowledge available for a continuous process of knowledge discovery.
- System to learn from user online interaction, similar to Google and Amazon
- Supercomputing
 - Develop a cooperative agreement with one of our University Cooperators who have the existing capabilities.\
 - Or setup up an Amazon Web Service
 - USGS offers some of this with via their geoknife R package
- Need standard set of covariates
 - Hosted on the web

Technology Summary

We need to focus and collaborate. Without marching orders for leadership tech projects tend to address local / small needs. We have big challenges.

- Continue development of R packages and Soil Interpretation ArcGIS toolbox.
- Develop better guides for existing soil technology products, such as Web Soil Survey, SDA, File Geodatabases, SoilWeb, soilDB, ISEE
- Seek out supercomputing capabilities with a SSD cooperator

- Develop process to regenerate GlobalSoilMap rasters every fiscal year.
- Assess approaches to disaggregate SSURGO.
- SSA and mu-poly/point/line image pyramids for much faster WMS response (could also be used by WSS)

- Rule evaluation and thematic maps via queries, WFS and WMS
- Ad-hoc queries through WFS and WMS
- Integration of GSSURGO data into SDA
- Branding of SDA versus WSS
- Promote use of SDA REST/POST Services
- Guidance on Soils Data
- More Avenues to Access soils data
- SQL Query Generator
- Learn about public - user profile (Better discovery with USGS)
- Copy NPS on Platform to distribute data/tutorials/ and provide code

<https://www.nps.gov/npmmap/>

- Investigating High Resolution data
- Lists of Terrain Analysis and coordination
- Project to show the results of multiple universities using lidar data to develop predictive soil properties

- Need capability to show origin and reliability of different data fields in NASIS. Could be added to the fields after each property like calculated, manually, measured, verified. Really not that difficult to populate either – just globally fill in all the ones with good support data in an appropriate class that reflects that (wouldn't really be that many), and default everything else to an unverified class until they could be looked at closer. Also, flag any calculations or interpretations that use unverified data fields.

- Need capability in NASIS to show duration of wet layers, rather than just telling users which months it might be present. Differentiation of an Aquic wet layer duration vs an Oxyaquic duration wet layer is really needed and cannot always be known from the taxonomic classification fields in NASIS. There is a lot of good moisture data out there now which can be used to support a short duration and a long duration wet layer class in the choice list. In addition to an unknown duration class where there is not enough data.