National Soil Survey Center
Soil Survey Laboratory

Integrating NCSS Laboratory Data and NASIS
June 6, 2015

Henry Ferguson, soil scientist NSSC
Diagram of the Data Mining Process

- NASIS Site
  Managed by SDQS

- MLRA SSO Owned
  NASIS
  Pedon
  Containing
  Correlated Classification
  Taxonomic History Table

- Sampled As Pedon
  Owned by KSSL

- NCSS Lab Layer Table in NASIS

- Classification
  Laboratory
  Data in the
  Data Sheet
  Measured/
  Default/
  Calculated

- Pedon Description

- Implemented
- Not Implemented
Data Mining Reports in NASIS

Site_Laboratory_Locations_Overlaps_Classifications

Update_NCSS_Lab_Pedon_recordIDS_from_NASIS
Link between KSSL and SSO Pedons

Certified
MLRA SSO Owned
NASIS Pedon
Containing Correlated Classification

Laboratory Sample Number creates the link

Laboratory Data in the Data Sheet

KSSL Owned Sampled As Pedon

NCSS Lab Pedon Table in NASIS
Lab Sample Number

- Links Pedons to the Laboratory data
- Provides the most Current Description
- Links to the NASIS Lab Pedon Table
- Links to the NASIS Pedon/Site

- Accidental or intentional “Junk” in the Lab Sample Number field can result in erroneous data being distributed to the public.
A common site owned by SDQS
Membership in group controlled by SDQS

- KSSL Owned
  - Sampled As Pedon
- NASIS Site
  - SDQS Owned
  - Certified MLRA SSO Owned
  - NASIS
  - Pedon
  - Containing Correlated Classification
  - Taxonomic History Table
- MLRA SSO Owned
Jason Nemecek added the map to the laboratory pedon description report. You can immediately see if the correction you made to a location in NASIS makes sense by running the pedon description report.
This Google Fusion Map was posted March 10, 2015
This Google Fusion Map was posted March 10, 2015. It will be updated every 3 to 6 months corresponding to the Microsoft ACCESS Database release.
Locations Corrected in Two Weeks Post Google Fusion Update/Release

- Where the points were
- Where they were moved to
The Latest Classification Available

Classification

RO/SSO Owned
NASIS
Pedon
Containing
Correlated Classification
Taxonomic History Table
NASIS 6.2

Laboratory Data in the Data Sheet

Pedon Description

Classifications

RO/SSO owned
How often is the Laboratory Database synchronized with NASIS?

• It depends upon the number of projects moving through the laboratory.

• The goal is once every 3 months or less

• Up until now it has been every 6 months or more
What products are updated?

1. The National Cooperative Soil Survey Web Site location and classification Tables
2. The Google Fusion Map of the locations
3. The ACCESS database
4. The NASIS NCSS Lab Pedon and NASIS NCSS Lab Layer tables
How are they different

- Laboratory Information Management System post 2000
- NCSS_Soil_Characterization_Database
  - i multiple rows (moist and dry)
  - ii negative values converted to TR (-) 0
  - iii percent greater than 100 (not so much anymore)
  - iv text and numbers on reports
How are they different

• ACCESS Database
  • i multiple rows (moist and dry)
  • ii negative values
  • iii numerical fields for results

• NASIS Lab Layer Table
  • i single row per sample (moist or dry)
  • ii no negative values
  • iii no text so values are either null or 0

• Most percents restricted to 100% or less
Hints to using the NCSS_Lab_Layer Table in NASIS

Response Times

• Open empty Table   23 sec

• Load  and view 190 records (open table)  22 sec

• Load 388,499 records (open table)     3 minutes

• Load view 388,499 from (closed table) > 2 hours
ODBC connections allow you to link databases.
Local NASIS to the laboratory database

http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/survey/?cid=nrcs142p2_054322#database_gen

**Soil Databases, General**

How to Create an ODBC Connection and Setup SoilDB for Use with R (PDF; 50 KB)
What is left to do?

• Better capture the original horizon designations and current horizon designations

• Better capture the standardized sample depths based upon the post 1995 pedon description standards
Current Horizon Designations from MLRA SSO Pedon

NCSS Lab Layer Table in NASIS

KSSL Owned Sampled As Pedon

Laboratory Data in the Data Sheet

RO/SSO Owned Pedon Description
Populate the Lab Sample # in the Pedon Horizon Sample Table

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<tr>
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<td>95P03524</td>
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</table>
Horizon Designations and Depths

Pedon ID: 79VT025002

Sampled as on Jun 01, 1979:
Revised to correlated on Oct 01, 1984:

Marlow; Thixotropic Cryic or Typic Fragiorthod
Mundai; Coarse-loamy, mixed, frigid Typic Haplorthod

WINDHAM COUNTY
Lat: 42° 58' 30.00" north Long: 72° 50' 15.00" west MLRA: 144B

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<th>Layer</th>
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<th>Depth (cm)</th>
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<th>Field Label 2</th>
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<td>C</td>
<td>145-226</td>
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</table>
How to modify the horizon designations and depths

Load your pedons into NASIS an run these reports

- NCSS_Lab_Layer_hznamecurrent_update
- NCSS_Lab_Layer_hznameoriginal_update
- NCSS_Layer_laboratory_table_depths_update

Send the results to me at henry.Ferguson@lin.usda.gov
Distribution Products
Welcome

Welcome to the website for the National Cooperative Soil Survey (NCSS) Soil Characterization Database. This application allows you to generate, print, Survey Center (NSSC) Kellogg Soil Survey Laboratory (KSSL) and cooperating laboratories. The data are stored and maintained by the NSSC-KSSL. Do other applications.

If you are a first-time user, please read the Data Usage information before accessing the database.

Sign up for E-mail updates on the NCSS Lab Data Mart

NCSS Soil Characterization Basic Query

[Clear All Search Criteria]

Site Information

Country: 
State or Other Administrative Division: 
County: 

[Submit]
The whole soil bulk density was not measured. It was calculated using 1.45 g/cc as the 1/3 bar bulk density of the less-than-2-mm fraction for mineral soils.
Google Fusion Map which can be used for Quality Assurance
A Complete Copy of the National Database is Available in Microsoft ACCESS format from the Laboratory Website

National Cooperative Soil Survey Microsoft Access Database

A Microsoft Access database that contains the most commonly requested data in addition to commonly requested data, the Access database includes metadata on common columns. Users that wish to obtain the original data, which is separate from the Access database, can download the Soil Characterization Database (Zip file; 1.1 MB).
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<th>Bottom...</th>
<th>Lab Text...</th>
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<td>7.2</td>
<td>20.4</td>
<td>35.1</td>
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</table>
Morphological Data in Analysis PC
NSSC Pangea Reports

PEDON - AnalysisPC uncoded DataDump with placeholder
PEDON - AnalysisPC uncoded DataDump with support data
PEDON - Color - count
PEDON - Compare Lab Pedon Num vs Lab Hz Num
PEDON - Component Pedons within a Legend and DMUs (REAL)
PEDON - Count pedons by site
PEDON - DATA DUMP (limited aggregation w/ est. clay, sand)
PEDON - Description, table format
PEDON - Horizon level analysis data dump
PEDON - Pedon Desc (engl) w/format & unformat notes
The Analysis tools from Pedon PC Plus have been included in Pedon PC.
The report to populate Pedon PC is in NSSC Pangea

NSSC_Pangea_Reports

PEDON - Pedon Table (export)
PEDON - Pedon_PC_6.1_6.2_coded_export
PEDON - PedonPC export - localcomponent
PEDON - Review lab sample numbers
PEDON - Site and Mapunit Name (export)
PEDON - Site Overlaps validation
PEDON - Site Text
Use the `fetchNASISLabData()` in R

**Summarizing labdata with R**

```r
quantile(lh$claytotmeasured, na.rm=TRUE)
```

```
0%  25%  50%  75%  100%
2.0 10.9 16.9 23.3 39.2
```

```r
bwplot(claytotmeasured~genhz, data=lh)
```
Nine Steps to Report Creation

1. Click on the "Advanced Query" link, which is on the menu in the top left corner of this page. The link goes to the NCCS Soil Characterization Advanced Data Query Interface, which can be used to search for specific criteria.

2. Once the page is fully loaded, select or enter the search criteria for the categories desired.

Notes concerning search criteria entry:

a. In the Project Information section, the choice list for State or Other Administrative Division contains entries specific to the selection in the Country choice list. Selecting a different country will reload the page with revised choice lists for State or Other Administrative Division.

b. When selecting any date as a criterion, at least one year must be provided. If a year is provided only on the left side of the date range, the search will return all data with dates smaller then December 31st of the year provided. Also, if a month is provided without a day of the month for the left side of the range or the last day of the month for the right side, the search will return all data matching the criteria with dates less then December 31st of the year provided.

c. All text entry fields are case insensitive and are automatically considered to be wildcard searches. For example: if you enter "urban soils" in the box for Submitted Name under Project Information, "urban soils study part 2" would result in a positive match.

3. Once all the desired criteria are entered, click the "Execute Query" button located at the bottom of the page to retrieve a list of pedons from the database.

4. If the query does not return any pedons or does not return the desired pedons, use the "Return to Last Data Interface" button at the top of the page to return to the query interface. All the selection criteria will be retained.

5. Select different criteria to change the search.

The "Check All" button at the top of page selects the entire list of pedons returned from a search. Pedons can be included or excluded individually by clicking on or off the individual check box. The "Check All" button changes into an "Uncheck All" button. The "rc" column is the row number and record.
Documentation - Links to Laboratory Manuals

Links

The Kellogg Soil Survey Laboratory (KSSL) at the National Soil Survey Center (NSSC) is responsible for processing soil and plant samples for the National Cooperative Soil Survey (NCSS). The KSSL data are provided in reports (for example, Primary and Summary Reports, Analytical Results Reports, Analytical System Reports, and Analytical System Data) for NCSS soil characterization databases. These reports are used to transmit information to the users of the data. It follows that these reports are best used in conjunction with laboratory manuals describing the methods used to analyze the soils.

Soil Survey Laboratory Methods Manual
Soil Survey Laboratory Investigations Report No. 42

The "Soil Survey Laboratory Methods Manual" (SSLM 42) describes the methods used by the Kellogg Soil Survey Laboratory (KSSL) for the National Cooperative Soil Survey (NCSS) Soil Characterization Database.

Soil Survey Laboratory Information Manual
Soil Survey Laboratory Investigations Report No. 45

The "Soil Survey Laboratory Information Manual" (SSLM 45) follows the same topical outline as the "Soil Survey Laboratory Methods Manual" (SSLM 42), with more detailed discussions of the use and application of the resulting data.

Soil survey data, including pedon characterization data, are used more appropriately when the operations are described in pedon characterization data reports and thereby maximizes user understanding of the data. This document is not intended to be used in place of laboratory manuals describing the methods used to analyze the soils.

Soil Survey Field and Laboratory Methods Manual
Soil Survey Laboratory Investigations Report No. 51

The "Soil Survey Field and Laboratory Methods Manual" (SSLM 51) serves as a reference for scientists in soil survey offices and for field and laboratory personnel in interpreting the standard operating procedures for soil survey field and laboratory procedures. The combined documentation of standard operating procedures ensures continuity in the analytical procedures and data quality of the NCSS and maintains consistency in the use of soil survey methods.
NCSS_Analyte_Procedure table includes page reference and url to the Soil Laboratory Information Manual 42 Version 5

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NSSC Soil Correlation Course
Correlation

- Analysis PC
  - Setup (PDF; 422 KB)
  - Add or Modify a Query (PDF; 313 KB)

- Similar/Dissimilar Guide for Mapunit Components
  - Guidelines for MQ14
  - Guidelines for MQ10

- Soil Cantonas
  - Connecticut example of a soils key (PDF; 92 KB)
  - New Hampshire example of a soils key (PDF; 88 KB)

- Populating Map Unit Data: Taxonomic Classes and Map Unit Components
  - Soil Survey Technical Note No. 4 (DOC; 642 KB)

Interpretations
Ask NSSC or your local MO for Assistance
• Questions?