

Jason and I have known each other for a number of years, even working together in the same soil survey office in Santa Fe. About 2 years ago he contacted me wondering about the possibilities of visually tracking Soil Data Join and Recorrelation projects in ArcGIS. I knew it was possible to get into NASIS in a remote sense with LIMS reports so we began development of a toolset. It wasn't long before it dawned on us that we could mine official NASIS data with Soil Data Access. In fact this is what SDA is for. Direct access to SSURGO tabular data. Something else that really made this possible was Steve Peaslee's gSSURGO and SSURGO Download tool box. These geodatabases covering large extents were becoming the norm. So we took off with it.

The tools have been around for a about a year and a half. There has been a lot of work and collaboration during this time. Most recently we added a toolset that gathers spatial data.

For the most part the tools have spread by word of mouth. We wanted to take the opportunity here to let more people know these tools exist and to solicit suggestion for further developmet.

A **SSURGO On-Demand Dynamic Spatial Tools** are for everyone working with soil survey interpretations and properties! Learn about the SSURGO On-Demand Toolbox and how to install and use it. These tools serve as an alternative to Soil Data Viewer and are designed

to process large extents rapidly from data already served on Web Soil Survey. No external tabular data is needed and spatial data is optional. : The SSURGO On-Demand tools offer a one-stop shop for any number of Soil Survey Areas at once State, Region, watershed for any/all interpretations or properties. The SSURGO on-demand tools extend the functionality of gSSURGO and the SSURGO download tools.

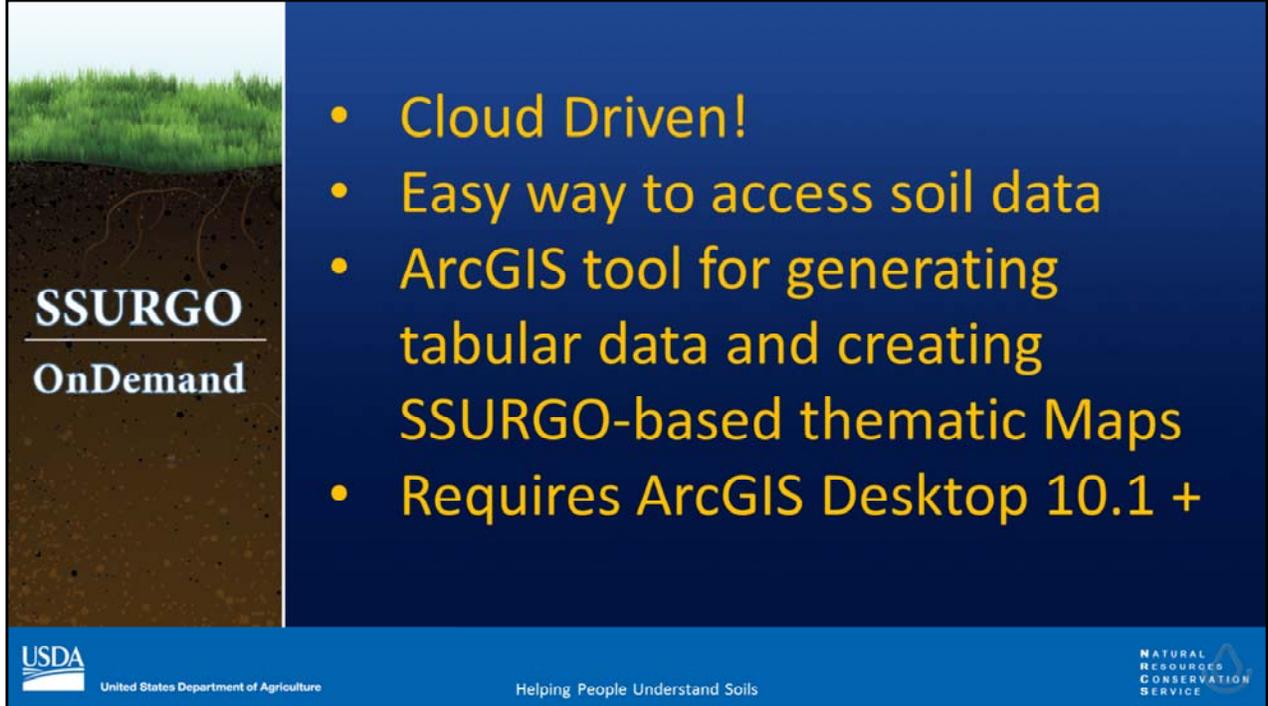
Contact Information:

Charles Ferguson

Soil Scientist, Geospatial Analyst
USDA - NRCS
Mid-Atlantic and Caribbean Regional Office
4407 Bland Rd. Suite 117
Raleigh, NC 27609
Office: 919.873.2137
charles.ferguson@nc.usda.gov

Jason Nemecek

Wisconsin State Soil Scientist
USDA – NRCS
8030 Excelsior Drive, Suite 200
Madison, WI 53717
Office: 608.662.4422; 202
jason.nemecek@wi.usda.gov

The slide features a vertical image on the left showing a cross-section of soil with green grass on top and roots extending into the dark brown soil. The text "SSURGO OnDemand" is overlaid on the image. The main content area is a dark blue rectangle with four bullet points in yellow text. At the bottom, there is a blue footer bar containing the USDA logo and text on the left, the slogan "Helping People Understand Soils" in the center, and the Natural Resources Conservation Service logo on the right.

- Cloud Driven!
- Easy way to access soil data
- ArcGIS tool for generating tabular data and creating SSURGO-based thematic Maps
- Requires ArcGIS Desktop 10.1 +

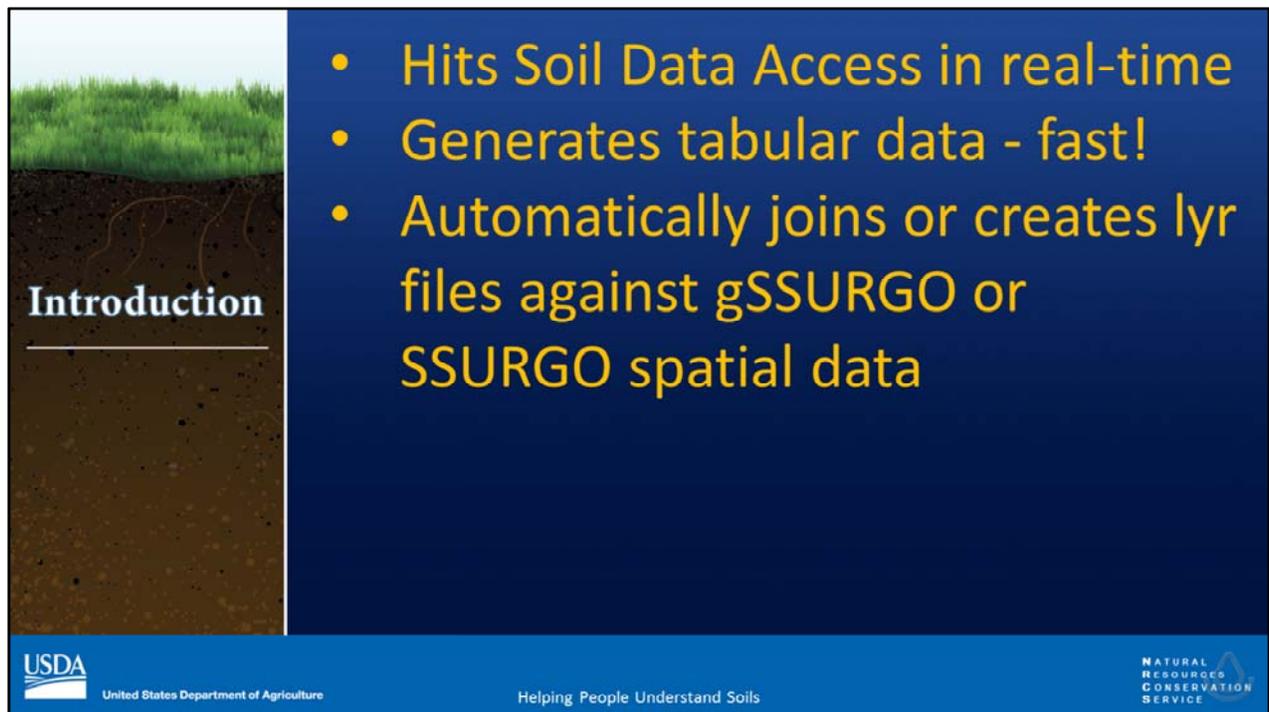
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So what are the tools? The tools are cloud driven. The tools are a ESRI ArcGIS toolbox that run in ArcGIS 10.1 or higher and there is three toolsets that hit Soil Data Access. The tools provides a easy way for someone to access soils data.

A quick overview of two tools that facilitate the download, merging, and analysis of SSURGO datasets into **LARGE** regional datasets using ARCGIS: *SSURGO on Demand Dynamic Spatial Tools for Soil Interpretations and Properties*



The slide features a vertical image on the left showing a cross-section of soil with green grass on top and dark brown soil below. The word "Introduction" is written in white text over the soil image. The main content area is a dark blue rectangle with three yellow bullet points. At the bottom, there is a blue footer bar with logos for USDA and the Natural Resources Conservation Service, along with the text "Helping People Understand Soils".

- Hits Soil Data Access in real-time
- Generates tabular data - fast!
- Automatically joins or creates lyr files against gSSURGO or SSURGO spatial data

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The tool hits soil data access in real time and generates tabular data fast. 2 of the toolsets need spatial but one of the toolsets don't need any data at all. They can usually run entire state under a minute. The Area symbol tools automatically joins or creates lyr files against gSSURGO or SSURGO spatial data. The users are able to select specific properties, depths and interpretations. You basically grabbing what you want.

Introduction

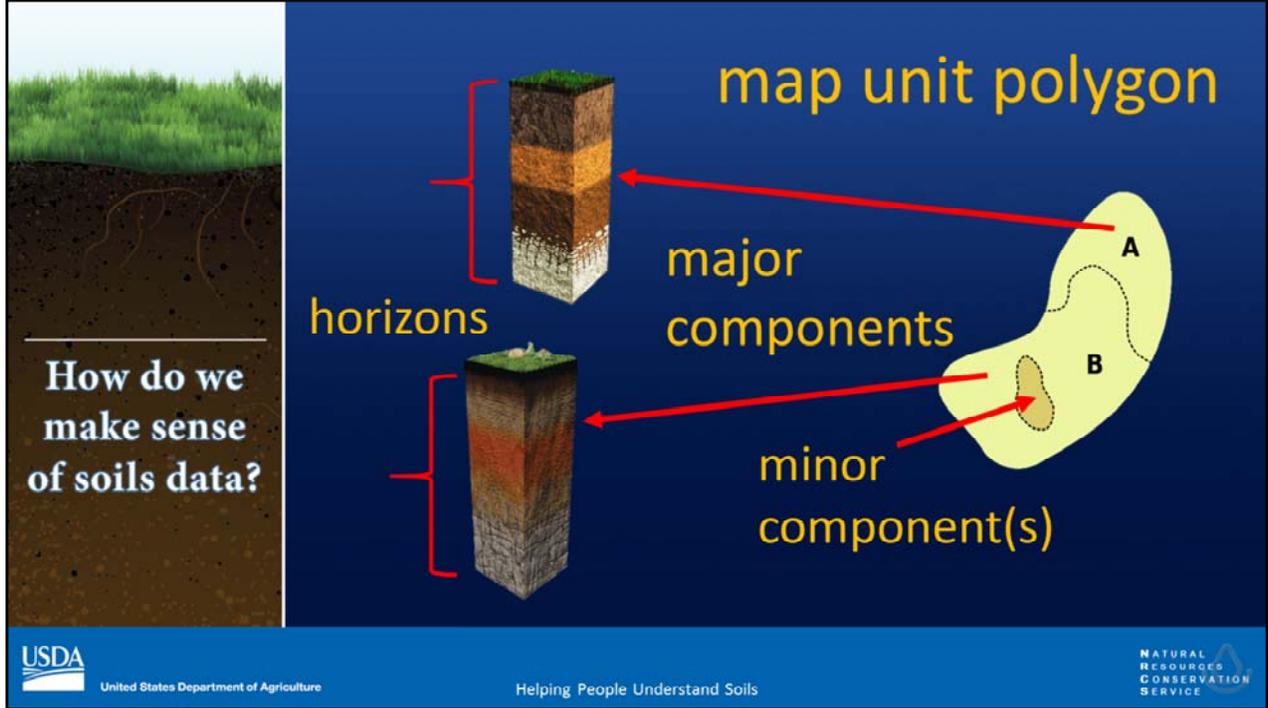
- Similar to Soil Data Viewer
- Works with large extents

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The tools are similar to soil data viewer however it can process large datasets and is not limited to one survey area. It has virtually has all the soil interpretations properties. Same aggregation. You are always getting current data and can run large areas of extent. Sometimes it's a pain to go out an get the data.



Interacting with Soils data can be a complex endeavor. We have this complexity in our database with many to one relationships. These tools alleviate the user from understanding the SSURGO database schema and relationships and provide a way to get to child data and aggregate it to the mapunit level without any post-processing or knowledge of the tabular structure on their part.

However, regardless of what tools are used to interact with the data, ultimately the user is responsible for using the data appropriately for a given application.

How users use the soils data is extremely important

1. Depth
2. Weighted Average
3. Dominate Component
4. Dominant Condition
5. Minimum
6. Maximum
7. Thickest Layer
8. Average
9. Surface Horizon

10. Organic Horizons
11. Mineral Horizons
12. Null
13. No Data
14. Frequency
15. Restrictive Layers
16. Component Percent
17. Major Components
18. Minor Components.
19. All Components
20. Depth range
21. All Horizons

How do we make sense of soils data?

Aggregate / Interpretations
(*component vs mapunit*)

Numeric variables (i.e. Clay, Organic Matter)

- Weighted average

Categorical variables (i.e. T-factor, HSG)

- Dominant condition

Categorical or Numeric variables

- Dominant component

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Any use of soil data to make predictions falls under the broad category that soil scientists call “soil interpretations.” NRCS maintains a set of interpretations in the Web Soil Survey. These include calculated values, such as K and T, and features, such as Hydrologic Soil Groups and Unified Soil Classification. The interpretations also include various ratings of suitability and limitations for land uses.

Soil properties themselves can be divided into two broad categories, intrinsic soil properties and non-intrinsic soil properties. Intrinsic soil properties are those empirical soil properties that are not based on any other soil properties (very fine sand content). Non-intrinsic soil properties tend to be derived from multiple intrinsic soil properties (K-factor). Non-intrinsic soil properties tend to be interpretive in nature. Examples of non-intrinsic soil properties include Farmland Classification, T-Factor and Wind Erodibility Group (WEG).

Dominant Condition: The aggregation method "Dominant Condition" first groups like attribute values for the components in a map unit. For each group, percent composition is set to the sum of the percent composition of all components participating in that group. These groups now represent "conditions" rather than components. The attribute value associated with the group with the highest cumulative percent composition is returned. The example below the second 2 components would be the dominant condition.

Dominant Component: The aggregation method "Dominant Component" returns the attribute value associated with the component with the highest percent composition in the map unit. The result returned by this aggregation method may or may not represent the dominant condition throughout the map unit.

Weighted Average: The aggregation method "Weighted Average" computes a weighted average value for all components in the map unit. Percent composition is the weighting factor. The result returned by this aggregation method represents a weighted average value of the corresponding set classes for the map unit.

The slide features a vertical banner on the left with a soil cross-section image and the text "SSURGO OnDemand Toolbox". The main content area has a dark blue background with the title "Adding the Tools" in yellow. Three screenshots of the ArcToolbox interface are shown, illustrating the process of adding and saving tool settings. The first screenshot shows the "Add Toolbox..." option highlighted in a red box. The second screenshot shows the "Save Settings" and "To Default" options highlighted in red boxes. The third screenshot shows the final state of the toolbox with the "SSURGO On-Demand" folder expanded, listing various tools like "Hydric Count" and "MUAGGATT Generator".

SSURGO OnDemand Toolbox

Adding the Tools

SSURGO QA Toolbox - C
Tracking Analyst Tools

- Add Toolbox...
- Environments...
- Hide Locked Tools
- Save Settings
- Load Settings

SSURGO QA Toolbox - CF
Tracking Analyst Tools

- Add Toolbox...
- Environments...
- Hide Locked Tools
- Save Settings
- Load Settings

- To File
- To Default

SSURGO On-Demand

- Areasymbol
- Additional
 - Hydric Count
 - MUAGGATT Generator
 - Parent Material - Dominant Component
 - Interpretations
 - Properties
- Express
 - Interpretations - AOI
 - Properties - AOI

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Nothing special to do. Right click on white space within ArcToolbox to Add the tools

It's a good idea to save the ArcTool Box setting so you don't have to continually add them.

- No local tabular is needed
- Generates soil property or interpretation tabular data in ArcMap by Soil Survey Area(s)

Areasymbol Toolset

- SSURGO On-Demand
 - Areasymbol
 - Additional
 - Hydric Count
 - MUAGGATT Generator
 - Parent Material - Dominant Component
 - Interpretations**
 - Properties**
 - Express
 - Interpretations - AOI
 - Properties - AOI

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The first tools we want to introduce are the Areasymbol toolset. There is no local tabular is needed and it generates soil property or interpretation tabular data in ArcMap by Soil Survey Area(s)

Areasymbol Toolset

Soil Survey Areas Polygons - Layer

Soil Survey Areas Polygons – Choice List

State Interpretation List Filter
Aggregation Method

State Interpretation Choice List

Output File Geodatabase Location
Join Layer

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Soil Survey Area Polygons Layer
 must have an Areasymbol column
 cannot have an MUKEY field

Output File Geodatabase Location

MUST be a file geodatabase

Join Layer

if a layer is present the tool will automatically add a join between the tabular results this layer (gSSURGO recommended, but will work with polygons)

This layer must have an MUKEY field

if multiple properties are run the property will be the joined table

Soil Survey Areas Polygons - Layer

Soil Survey Areas Polygons – Choice List

Aggregation Method

Soil Property Choice List

Top Depth – cm

Bottom Depth – cm

Min\Max

Output File Geodatabase Location

Join Layer

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Soil Survey Area Polygons Layer
 must have and Areasymbol column
 cannot have an MUKEY field

Enabled if min/max aggregation method selected

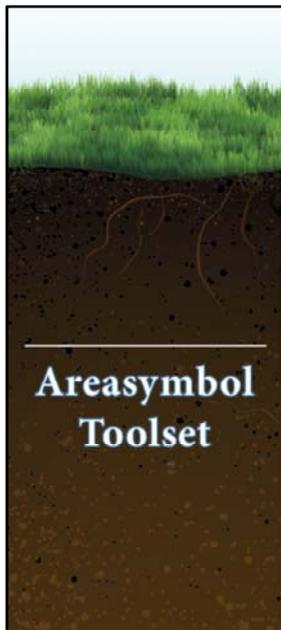
Output File Geodatabase Location

MUST be a file geodatabase

Join Layer

if a layer is present the tool will automatically add a join between the tabular results this layer (gSSURGO recommended, but will work with polygons)

if multiple properties are run the property will be the joined table



Soil Data Access

areasympol	areasympol	name	MUSKY rating	class	
NC183	AB	Alvavista fine sandy loam, 0 to 6 percent slopes, rarely flooded	1711384	1	Very limited
NC183	AgB	Appling gravelly sandy loam, 2 to 6 percent slopes	1377886	0.7	Somewhat limited
NC183	AgB2	Appling gravelly sandy loam, 2 to 6 percent slopes, moderately eroded	1711385	0.7	Somewhat limited
NC183	AgC	Appling gravelly sandy loam, 6 to 10 percent slopes	1377888	1	Very limited
NC183	AgC2	Appling gravelly sandy loam, 6 to 10 percent slopes, moderately eroded	1377889	1	Very limited
NC183	AgB	Appling sandy loam, 2 to 6 percent slopes	1377991	0.83	Somewhat limited
NC183	AgB2	Appling sandy loam, 2 to 6 percent slopes, moderately eroded	1711387	0.7	Somewhat limited
NC183	AgC	Appling sandy loam, 6 to 10 percent slopes	1377993	1	Very limited
NC183	AgC2	Appling sandy loam, 6 to 10 percent slopes, moderately eroded	1711388	1	Very limited
NC183	ApD	Appling sandy loam, 10 to 15 percent slopes	1377990	1	Very limited
NC183	AsB	Appling fine sandy loam, 2 to 6 percent slopes	1377992	0.7	Somewhat limited
NC183	AsB2	Appling fine sandy loam, 2 to 6 percent slopes, moderately eroded	1711389	0.7	Somewhat limited
NC183	AsC	Appling fine sandy loam, 6 to 10 percent slopes	1377994	1	Very limited
NC183	AsC2	Appling fine sandy loam, 6 to 10 percent slopes, moderately eroded	1711390	1	Very limited
NC183	AsA	Augusta fine sandy loam, 0 to 2 percent slopes, occasionally flooded	1711396	1	Very limited
NC183	BaB	Blancombe loamy sand, 0 to 3 percent slopes, frequently flooded	1711397	1	Very limited
NC183	CaB	Carbonton-Buckhannon complex, 2 to 6 percent slopes	1711505	0.88	Somewhat limited
NC183	CaC	Carbonton-Buckhannon complex, 6 to 10 percent slopes	1711506	1	Very limited
NC183	CaD	Carbonton-Buckhannon complex, 10 to 15 percent slopes	1711507	1	Very limited
NC183	CaB	Cecil sandy loam, 2 to 6 percent slopes	137406	0.83	Somewhat limited
NC183	CaB2	Cecil sandy loam, 2 to 6 percent slopes, moderately eroded	1711391	0.7	Somewhat limited
NC183	CaC	Cecil sandy loam, 6 to 10 percent slopes	137408	1	Very limited
NC183	CaC2	Cecil sandy loam, 6 to 10 percent slopes, moderately eroded	1711393	1	Very limited
NC183	CaD	Cecil sandy loam, 10 to 15 percent slopes	137404	1	Very limited
NC183	CaB	Cecil gravelly sandy loam, 2 to 6 percent slopes	137400	0.7	Somewhat limited
NC183	CaB2	Cecil gravelly sandy loam, 2 to 6 percent slopes, moderately eroded	1711394	0.7	Somewhat limited
NC183	CaC	Cecil gravelly sandy loam, 6 to 10 percent slopes	137402	1	Very limited
NC183	CaC2	Cecil gravelly sandy loam, 6 to 10 percent slopes, moderately eroded	1711395	1	Very limited
NC183	ClB1	Cecil clay loam, 2 to 6 percent slopes, severely eroded	137798	0.7	Somewhat limited
NC183	ClC1	Cecil clay loam, 6 to 10 percent slopes, severely eroded	137799	1	Very limited
NC183	ClmA	Cherwell sandy loam, 0 to 2 percent slopes, frequently flooded	1711398	1	Very limited



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Results from a Soil Data Access Query.

Output

Areasymbol
Toolset

Table	Name	Aggregation Method	Depth
tbt	T_AWM_Irrigation_Disposal_of_Wastewater_dom_comp		
tbt	T_AWM_Land_Application_of_Municipal_Sewage_Sludge_dom_comp		
tbt	T_AWM_Manure_and_Food_Processing_Waste_dom_comp		
tbt	T_AWM_Overland_Flow_Process_Treatment_of_Wastewater_dom_comp		
tbt	T_AWM_Rapid_Infiltration_Disposal_of_Wastewater_dom_comp		
tbt	T_AWM_Slow_Rate_Process_Treatment_of_Wastewater_dom_comp		
tbt	T_DHS_Catastrophic_Mortality_Large_Animal_Disposal_Pit_dom_comp		
tbt	T_DHS_Catastrophic_Mortality_Large_Animal_Disposal_Trench_dom_comp		
tbt	T_DHS_Potential_for_Radioactive_Bioaccumulation_dom_comp		
tbt	T_DHS_Potential_for_Radioactive_Sequestration_dom_comp		
tbt	T_DHS_Rubble_and_Debris_Disposal_Large_Scale_Event_dom_comp		
tbt	T_DHS_Site_for_Composting_Facility_Subsurface_dom_comp		
tbt	T_DHS_Site_for_Composting_Facility_Surface_dom_comp		
tbt	T_DHS_Suitability_for_Clay_Lime_Material_dom_comp		
tbt	T_DHS_Suitability_for_Composting_Medium_and_Final_Cover_dom_comp		
tbt	T_ENG_Construction_Materials_Gravel_Source_dom_comp		
tbt	T_ENG_Construction_Materials_Reclamation_dom_comp		
tbt	T_ENG_Construction_Materials_Readfill_dom_comp		
tbt	T_ENG_Construction_Materials_Sand_Source_dom_comp		
tbt	T_ENG_Construction_Materials_Topsoil_dom_comp		

Table	Name	Aggregation Method	Depth
tbt	Available_Water_Capacity_Rep_Value_wtd_avg	avg	13.75
tbt	Bray_1_Phosphate_Rep_Value_wtd_avg	avg	13.75
tbt	Bulk_Density_0.1_bar_H2O_Rep_Value_wtd_avg	avg	13.75
tbt	Bulk_Density_0.3_bar_H2O_Rep_Value_wtd_avg	avg	13.75
tbt	Bulk_Density_15_bar_H2O_Rep_Value_wtd_avg	avg	13.75
tbt	Bulk_Density_oven_dry_Rep_Value_wtd_avg	avg	13.75
tbt	CaCO3_Clay_Rep_Value_wtd_avg	avg	13.75
tbt	Calcium_Carbonate_Rep_Value_wtd_avg	avg	13.75
tbt	Cation_Exchange_Capacity_Rep_Value_wtd_avg	avg	13.75
tbt	Coarse_Sand_Rep_Value_wtd_avg	avg	13.75
tbt	Coarse_Silt_Rep_Value_wtd_avg	avg	13.75
tbt	Effective_Cation_Exchange_Capacity_Rep_Value_wtd_avg	avg	13.75
tbt	Electrical_Conductivity_Rep_Value_wtd_avg	avg	13.75
tbt	Extract_Aluminum_Rep_Value_wtd_avg	avg	13.75
tbt	Extractable_Acidity_Rep_Value_wtd_avg	avg	13.75
tbt	Fine_Sand_Rep_Value_wtd_avg	avg	13.75
tbt	Fine_Silt_Rep_Value_wtd_avg	avg	13.75

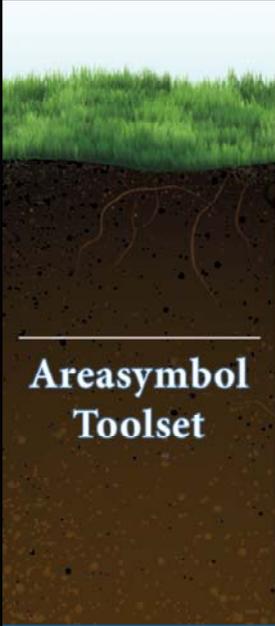
Results are tables, can't stress enough that is all the Areasymbol tools are doing. We are grabbing stored data.

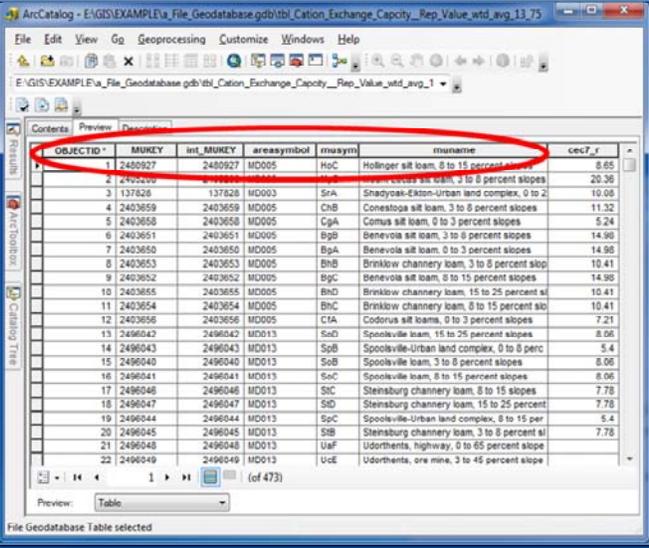
Table names correspond to the Interpretation name and Aggregation method

A **note of caution**: Tool is set to overwrite a table if it finds one with the same name.

These tools piggy back on Soil Data Development Toolbox in that for the most part we are assuming the users have a spatial table already.

Example of Properties Output

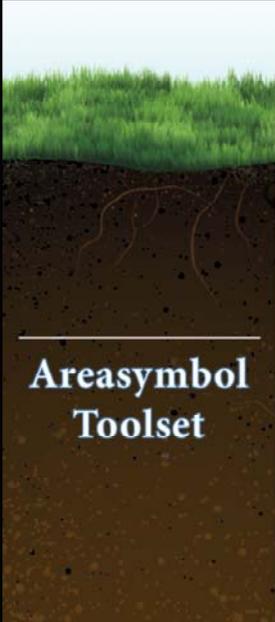




OBJECTID	MUKEY	int_MUKEY	areasymbol	musym	muname	cec7_r
1	240927	240927	MD005	HoC	Holinger silt loam, 8 to 15 percent slopes	8.65
2	240928	240928	MD005	HoB	Holinger silt loam, 3 to 8 percent slopes	20.36
3	137828	137828	MD003	SrA	Shadyoak-Elkton-Urban land complex, 0 to 2 percent slopes	10.08
4	2403659	2403659	MD005	CNB	Conestoga silt loam, 3 to 8 percent slopes	11.32
5	2403658	2403658	MD005	CpA	Comus silt loam, 0 to 3 percent slopes	5.24
6	2403651	2403651	MD005	BgB	Benevola silt loam, 3 to 6 percent slopes	14.90
7	2403650	2403650	MD005	BgA	Benevola silt loam, 0 to 3 percent slopes	14.90
8	2403653	2403653	MD005	BnB	Brinklow channery loam, 3 to 8 percent slopes	10.41
9	2403652	2403652	MD005	BnC	Benevola silt loam, 0 to 15 percent slopes	14.90
10	2403655	2403655	MD005	BnD	Brinklow channery loam, 15 to 25 percent slopes	10.41
11	2403654	2403654	MD005	BnC	Brinklow channery loam, 8 to 15 percent slopes	10.41
12	2403656	2403656	MD005	CtA	Codorus silt loam, 0 to 3 percent slopes	7.21
13	2496042	2496042	MD013	SoD	Spoolville loam, 15 to 25 percent slopes	8.06
14	2496043	2496043	MD013	SpB	Spoolville-Urban land complex, 0 to 8 percent slopes	5.4
15	2496040	2496040	MD013	SoB	Spoolville loam, 3 to 8 percent slopes	8.06
16	2496041	2496041	MD013	SoC	Spoolville loam, 8 to 15 percent slopes	8.06
17	2496046	2496046	MD013	SiC	Stensburg channery loam, 8 to 15 percent slopes	7.78
18	2496047	2496047	MD013	SiD	Stensburg channery loam, 15 to 25 percent slopes	7.78
19	2496044	2496044	MD013	SpC	Spoolville-Urban land complex, 8 to 15 percent slopes	5.4
20	2496045	2496045	MD013	SiB	Stensburg channery loam, 3 to 8 percent slopes	7.78
21	2496048	2496048	MD013	UoF	Udorhents, highway, 0 to 65 percent slopes	
22	2496049	2496049	MD013	UoE	Udorhents, ore mine, 3 to 45 percent slopes	

Here is an example of a table outputted from the Properties tools. In this case I ran the Cation Exchange Property. The output tables will always have 5 core fields embedded: MUKEY, int_MUKEY, areasymbol, musym and muname. These are some of the most desirable fields that users always want. The last field appended to the table will be unique to the property of interest.

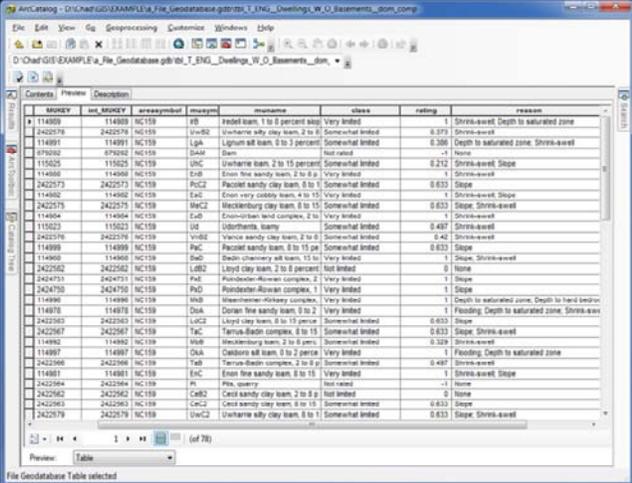
BTW, we included an int_MUKEY for those advanced users that want to link up to the gSSURGO. Those who have done so in the past know that the MUKEY field in the gSSURGO dataset is in integer format. The MUKEY field in the traditional SSURGO dataset is in text format.



**Areasymbol
Toolset**

Output

Interpretations



#	MAPUNIT	AREASYMP	MNAME	CLASS	RATING	REASON
114889	114889 NC159	RB	Reddish loam, 1 to 5 percent clay	Very limited	1	Shrink-swell, Depth to saturated zone
242279	242279 NC159	UwB2	Uncharred silty clay loam, 2 to 8	Somewhat limited	0.375	Shrink-swell
114891	114891 NC159	Lgh	Lignite silty loam, 0 to 3 percent	Somewhat limited	0.388	Depth to saturated zone, Shrink-swell
879282	879282 NC159	DAM	Dam	Not rated	-1	Name
115225	115225 NC159	UHC	Uncharred loam, 2 to 15 percent	Somewhat limited	0.212	Shrink-swell, Slope
114902	114902 NC159	EaB	Even fine sandy loam, 0 to 8	Very limited	1	Shrink-swell
242273	242273 NC159	PCC2	Packclay sandy clay loam, 0 to 1	Somewhat limited	0.633	Slope
114902	114902 NC159	EAC	Even very cobbly loam, 4 to 15	Very limited	1	Shrink-swell, Slope
242275	242275 NC159	MC2	Mackinburg clay loam, 0 to 15	Somewhat limited	0.633	Slope, Shrink-swell
114904	114904 NC159	EaB	Even-urban loam complex, 0 to 1	Very limited	1	Shrink-swell
115227	115227 NC159	UD	Udorthents, heavy	Somewhat limited	0.487	Shrink-swell
242276	242276 NC159	vnB2	Very fine sandy clay loam, 2 to 8	Somewhat limited	0.42	Shrink-swell
114899	114899 NC159	PAC	Packclay sandy loam, 0 to 15 gal	Somewhat limited	0.633	Slope
114905	114905 NC159	DAC	Dickinson silty loam, 15 to 40	Very limited	1	Slope, Shrink-swell
242252	242252 NC159	LB2	Lloyd clay loam, 2 to 8 percent	Not limited	0	Name
242473	242473 NC159	PAE	Panola-Rowan complex, 2	Very limited	1	Slope
242478	242478 NC159	PAC	Panola-Rowan complex, 1	Very limited	1	Slope
114895	114895 NC159	MD	Mendenhall-Rowan complex	Very limited	1	Depth to saturated zone, Depth to hard bedrock
114878	114878 NC159	Dsa	Doran fine sandy loam, 0 to 2	Very limited	1	Flooding, Depth to saturated zone, Shrink-swell
242268	242268 NC159	LCC2	Lloyd clay loam, 0 to 15 percent	Somewhat limited	0.633	Slope
242267	242267 NC159	PAC	Panola-Rowan complex, 0 to 15	Somewhat limited	0.633	Slope, Shrink-swell
114892	114892 NC159	MdB	Mackinburg loam, 2 to 8 perc	Somewhat limited	0.329	Shrink-swell
114897	114897 NC159	Dca	Capitol silty loam, 0 to 2 percent	Very limited	1	Flooding, Depth to saturated zone
242266	242266 NC159	Yab	Yarnall-Rowan complex, 2 to 8	Somewhat limited	0.487	Shrink-swell
114881	114881 NC159	EAC	Even fine sandy loam, 0 to 15	Very limited	1	Shrink-swell, Slope
242269	242269 NC159	U	Uls, quartz	Not rated	-1	Name
242262	242262 NC159	CaB2	Cast sandy clay loam, 2 to 8	Not limited	0	Name
242263	242263 NC159	CaC2	Cast sandy clay loam, 0 to 15	Somewhat limited	0.633	Slope
242278	242278 NC159	UwC2	Uncharred silty clay loam, 0 to 1	Somewhat limited	0.633	Slope, Shrink-swell



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Something UNIQUE to our tools is the addition of the reason column. So, not only do you get a class and rating, you get the reasons WHY each mapunit is not Well Suited or Not Limited. In other words, the tools returns what elements in the interpretation caused the limitation or suitability problem.

**Areasymbol
Toolset**

- ✓ Append 101 Survey Areas to single shapefile
- ✓ Load 101 Survey Areas to NASIS for SSURGO export
- ✓ Import into SSURGO template
- ✗ 4 Soil Data Viewer Queries

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Fortunately, I am connected to the state office geodata server and didn't have to download each of the North Carolina soil survey areas. Similarly, a benefit that I have as a soil scientist is to create a custom SSURGO Export to populate a template database. If I was a private consultant trying to accomplish this I would have had to download each of the 101 soil survey areas and then run the Import module within a SSURGO template database 100 TIMES!!!! This in of itself saved me a TREMENDOUS amount of time.

**Areasymbol
Toolset**

- ✓ Append 101 Survey Areas to 2 shapefiles
- ✓ Load 101 Survey Areas to NASIS for 2 SSURGO exports
- ✓ Import into 2 SSURGO templates
- ✓ 8 Soil Data Viewer Queries

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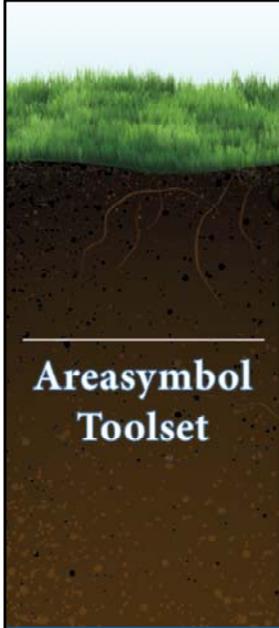
Still with all the benefits I have being connected to the geodataserver and the ability to create my own custom SSURGO exports in NASIS, this whole process, trying it all at once and then having to split it into 2 separate jobs, it took me the better part of a week to get the results. I can't imagine the additional time it would have taken me if I didn't have these benefits...especially if I had to do it twice!!!!

The image shows a screenshot of the 'Areasybol Toolset' interface. On the left, there is a vertical banner with a green grass field above a cross-section of dark brown soil. The text 'Areasybol Toolset' is written in white on the soil background. The main area on the right is a dark blue background with a white window titled 'Properties' that displays the following text:

```
Completed  
 Close the dialog when completed successfully  
Response for om_r on NC193 = OK  
Response for om_r on NC195 = OK  
Response for om_r on NC197 = OK  
Response for om_r on NC199 = OK  
Response for om_r on NC605 = OK  
Response for om_r on NC606 = OK  
Response for om_r on TN640 = OK  
  
Completed script SDAPROPERTIES2...  
Succeeded at Mon Oct 10 12:27:14 2016 (Elapsed Time: 1 minutes 17  
seconds)
```

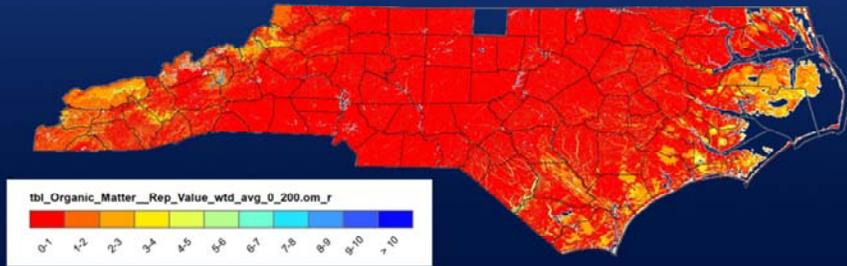
At the bottom of the slide, there is a blue footer bar containing the USDA logo (United States Department of Agriculture) on the left, the text 'Helping People Understand Soils' in the center, and the Natural Resources Conservation Service logo on the right.

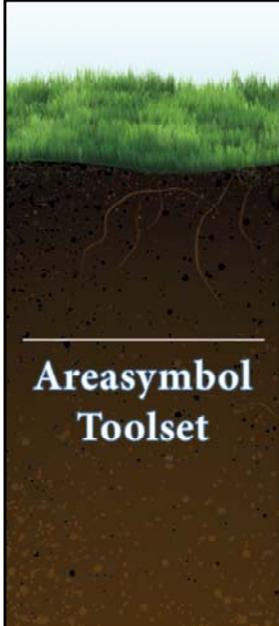
In contrast, using the Areasybol Toolset, I was able to create one of the layers in 1 minute and 17 seconds! The comparison is: before these SSURGO On-Demand Tools the requested job took almost a week. Now it would take TAKEN ME 5 MINUTES.



North Carolina - % Organic Matter

Weighted Average - 0 - 200 cm





Areasymbol
Toolset

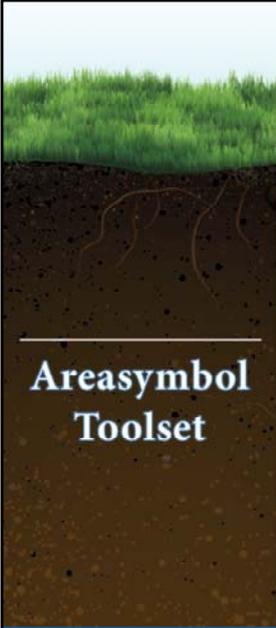
358 SSA

Upper Mississippi River Watershed

Septic Tank Absorption Fields – Dominant Component



Succeeded at Mon Oct 10 11:06:32 2016
(Elapsed Time: 9 minutes 28 seconds)



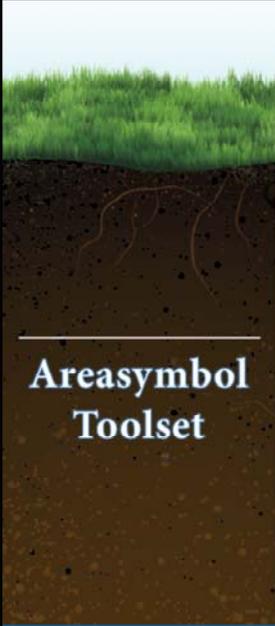
Soil Survey Division – Region 3

Percent sand 10 - 40 cm – Weighted Average

353 SSA



Succeeded at Mon Oct 10 10:36:38 2016
(Elapsed Time: 4 minutes 38 seconds)

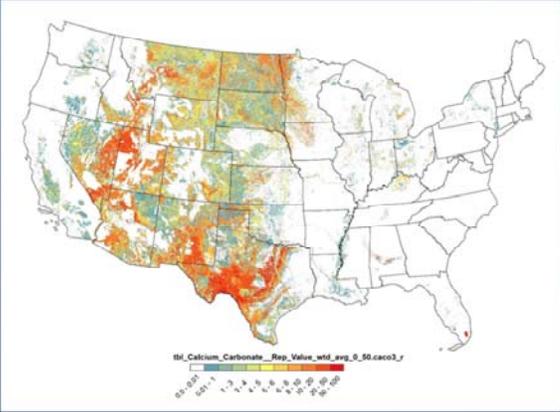


**Areasymbol
Toolset**

CONUS

CaCO₃ Equivalent 10 - 50 cm – Weighted Average

3208 SSA



Succeeded at Tue Oct 11 11:24:01 2016
(Elapsed Time: 33 minutes 29 seconds)



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At roughly 100 interpretations... If all variables stayed constant, You could have the interps for the entire lower 48 in roughly 2.5 days. Keep in mind this is all with 10 or less clicks of the mouse.

Soil Survey Area Layer Sources

Web Soil Survey
<http://websoilsurvey.sc.egov.usda.gov/DataAvailability/SoilDataAvailabilityShapefile.zip>

Areasymbol Toolset

gSSURGO geodatabase

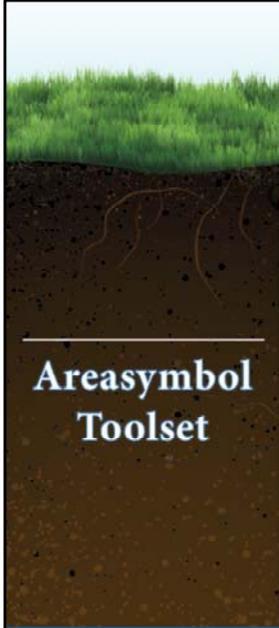
- SAPOLGON layer

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Since the Areasymbol toolset requires an areasymbol field, these are common sources to get a soil survey area layer--

Web Soil Survey – this link lives under the Soil Survey Status Menu

Within Steve Peaslee’s gSSURGO or Soil Data Development Toolbox generated geodatabases and similarly those coming from Adolfo Diaz’s tools for Soil Scientists, the SAPOLYGN layer is the areasymbol layer. If you have one of these geodatabases, you have this layer already. In fact, we almost assume you have one of these geodatabases before you run the Areasymbol Toolset tools. His geodatabases have become the standard in spatial - SSURGO data analysis, and processing.



Areasymbol Toolset



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- No local tabular or spatial data is needed
- Generates data from desired area

Express Toolset

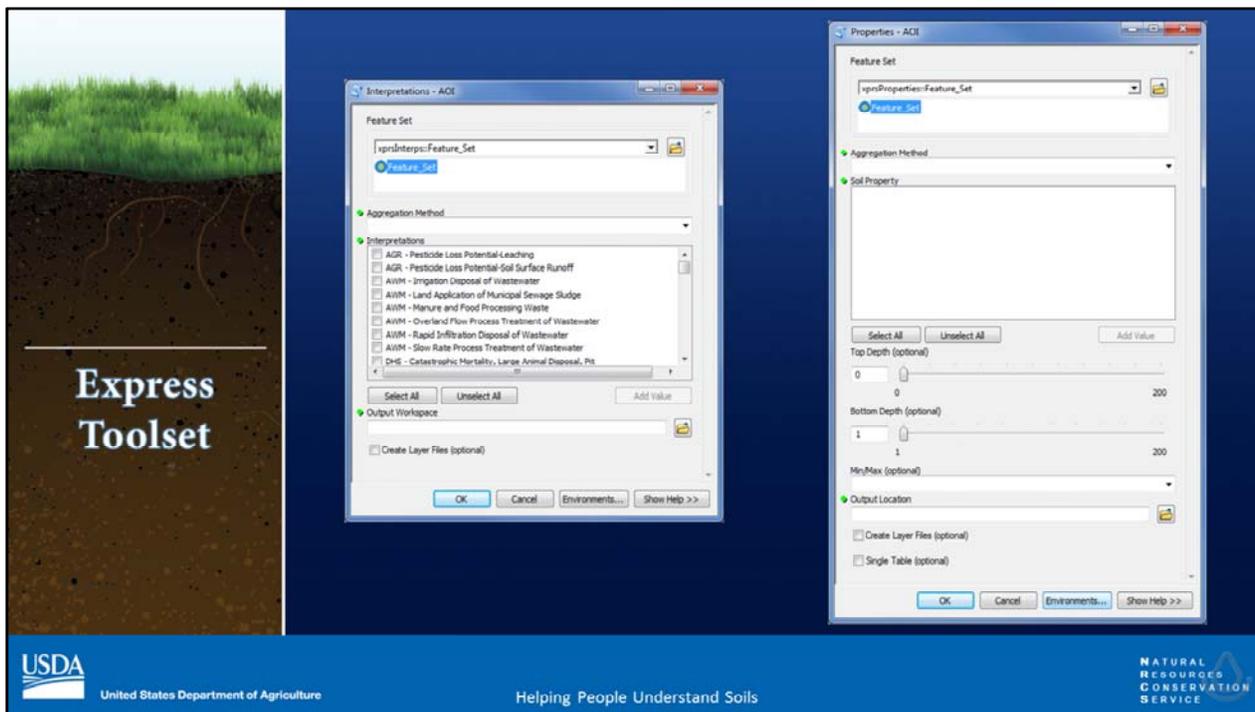
- SSURGO On-Demand
 - Areasymbol
 - Additional
 - Hydric Count
 - MUAGGATT Generator
 - Parent Material - Dominant Component
 - Interpretations
 - Properties
 - Express
 - Interpretations - AOI
 - Properties - AOI

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The express tools require no data at all! No spatial or tabular data is needed.

We don't need any SSURGO information. In essence -- SURRGO free SSURGO. In Soil Data Viewer and the Areasymbol tools you need some sort of reference to SSURGO data to get them to execute. Here you don't

The only difference between the queries sent from the Express Tools is that here we query on mukey vs areasymbol.



The layout is very similar with a few exceptions

Feature Set vs. Areasymbol

Here we have a Feature Set, which is a user driven way to collect coordinates on-screen to define your own Area of Interest. Feature Sets are stored in memory.

They are points that will form a polygon. This means the first point you collect will be copied to be the last point as well to close the polygon. You can use as many points as necessary, however, be careful not to self intersect, this will throw server side error. Additionally, multi-part polygons are not possible.

State Interpretation filter isn't ported over yet. It will, but for now, it's just a list of national interpretations.

Also, since the output is tabular AND vector data, there are different output options.

I have run these at ~400,000 successfully but failed at ~500,000 acres. WSS allows 100,000

Express Toolset Output

Output Interpretations

- a_File_Geodatabase.gdb
 - SSURGO_express_polys
 - SSURGO_express_tbl_ENG_Construction_Materials_Gravel_Source_Dominant_Component
 - SSURGO_express_tbl_ENG_Septic_Tank_Absorption_Fields_Dominant_Component
 - SSURGO_express_tbl_WMS_Pond_Reservoir_Area_Dominant_Component
 - SSURGO_express_polys_ENG_Construction_Materials_Gravel_Source_Dominant_Component.lyr
 - SSURGO_express_polys_ENG_Septic_Tank_Absorption_Fields_Dominant_Component.lyr
 - SSURGO_express_polys_WMS_Pond_Reservoir_Area_Dominant_Component.lyr

No options
Create Layer Files

Properties

EXAMPLE

- a_File_Geodatabase.gdb
 - SSURGO_express_prop_polys
 - SSURGO_express_tbl_claytotal_r_wtd_avg_0_27
 - SSURGO_express_tbl_sandtotal_r_wtd_avg_0_27
 - SSURGO_express_tbl_silttotal_r_wtd_avg_0_27
 - SSURGO_express_polys_claytotal_r_wtd_avg_0_27.lyr
 - SSURGO_express_polys_sandtotal_r_wtd_avg_0_27.lyr
 - SSURGO_express_polys_silttotal_r_wtd_avg_0_27.lyr

No options
Create Layer Files

- a_File_Geodatabase.gdb
 - SSURGO_express_prop_polys
 - SSURGO_express_tbl_multiprops_wtd_avg_0_27
 - SSURGO_express_polys_multiprops_wtd_avg_0_27.lyr

Single Table

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By not selecting any options, you get spatial data and the tabular data. These are automatic.

With Create Layer Files you create the lyr files that set a symbology and the join between the tabular and spatial

Output

Single Table

Express Toolset

id	description	shrubland_p	grassland_p	waterbodies_p	barren_p	forest_p	developed_p	barrenland_p	waterbodies_p	developed_p	barrenland_p	waterbodies_p	developed_p
10000	Apply sandy loam, 2 to 7 percent slopes	0	26.83	23.74	0.18	0	0	1.36	0	0	0	0	1.42
10001	Apply sandy loam, 7 to 15 percent slopes	0	26.83	23.74	0.18	0	0	1.36	0	0	0	0	1.42
10002	Clay sandy loam, 2 to 7 percent slopes	0	24.83	24.84	0.14	0	0	1.4	0	0	0	0	1.47
10003	Intermediate silt loam, 2 to 7 percent slopes	0	27.42	11.82	0.18	0	0	1.4	0	0	0	0	1.48
10004	Non-sandy loam, 15 to 25 percent slopes	0	25.1	18.8	0.22	0	0	1.45	0	0	0	0	1.52
10005	Water	0	0	0	0	0	0	0	0	0	0	0	0

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Using this option, for all of the selected Properties, the results are accumulated into 1 table as opposed to 1 table for each Property. Said another way, if you select 25 properties, instead of 25 tables you get 1 table with 25 property columns.

Otherwise, the output tables from the Express Toolset mimic what was already presented for the Areasymbol Toolset tables both in content and table naming structure.



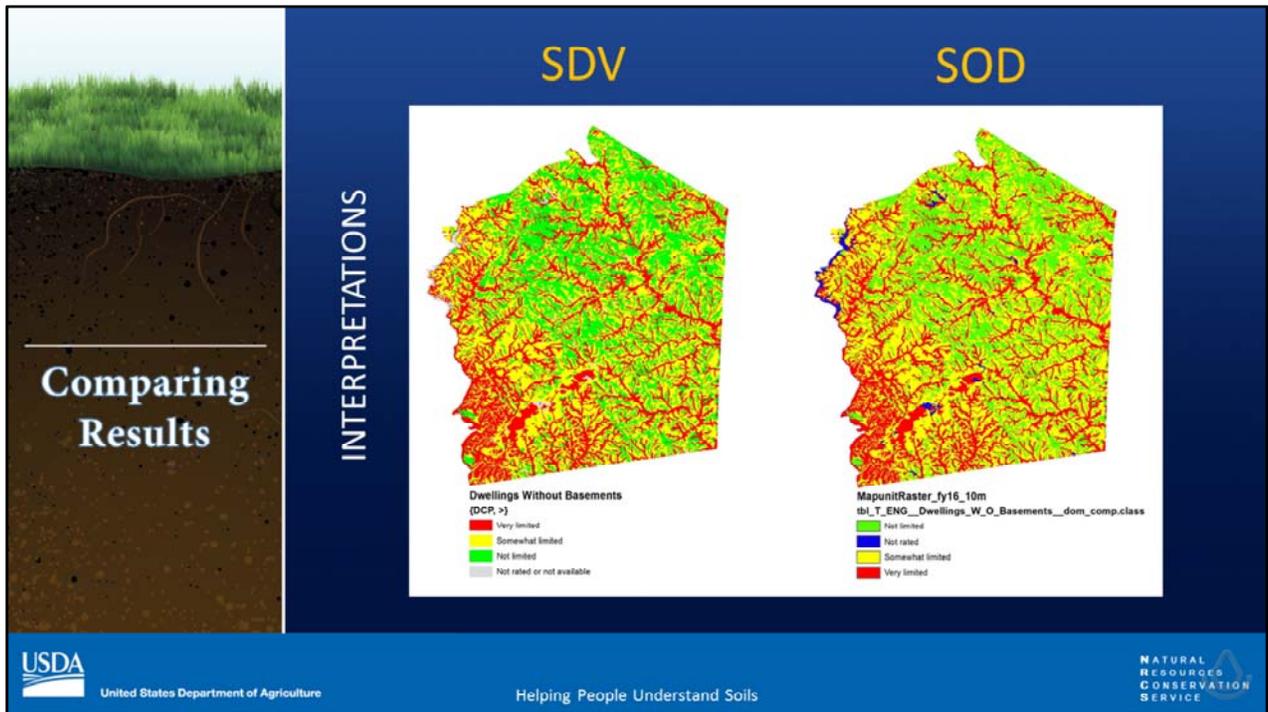
**Express
Toolset**



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Currently Soil Data Viewer is viewed as the gold standard for turning complex SSURGO data into user friendly information. To that, it seems appropriate to compare the results of our tools to SDV. In this example, you can see they are identical.

Where can you get these tools?

- **NRCS WI Soils Webpage**
<http://www.nrcs.usda.gov/wps/portal/nrcs/main/wi/soils/>

NEW! Soil Data Viewer Alternative

NEW Soil Data Viewer Alternative!
 The SSURGO OnDemand Dynamic Spatial Interpretations Tool can process soils data from large geographic areas rapidly and is a one-stop shop for any number of soil survey areas at once for any and all interpretations or properties. It accesses authoritative soils data without the need for downloading external tabular data sets. Please direct questions and comments to Chad Ferguson at charles.ferguson@nrc.usda.gov or Jason Nemecek at jason.nemecek@wi.usda.gov.

Download the tool below and directions:

Python scripts and ArcGIS SSURGO OnDemand toolbox (676 KB ZIP)
 (updated 9/12/2016)

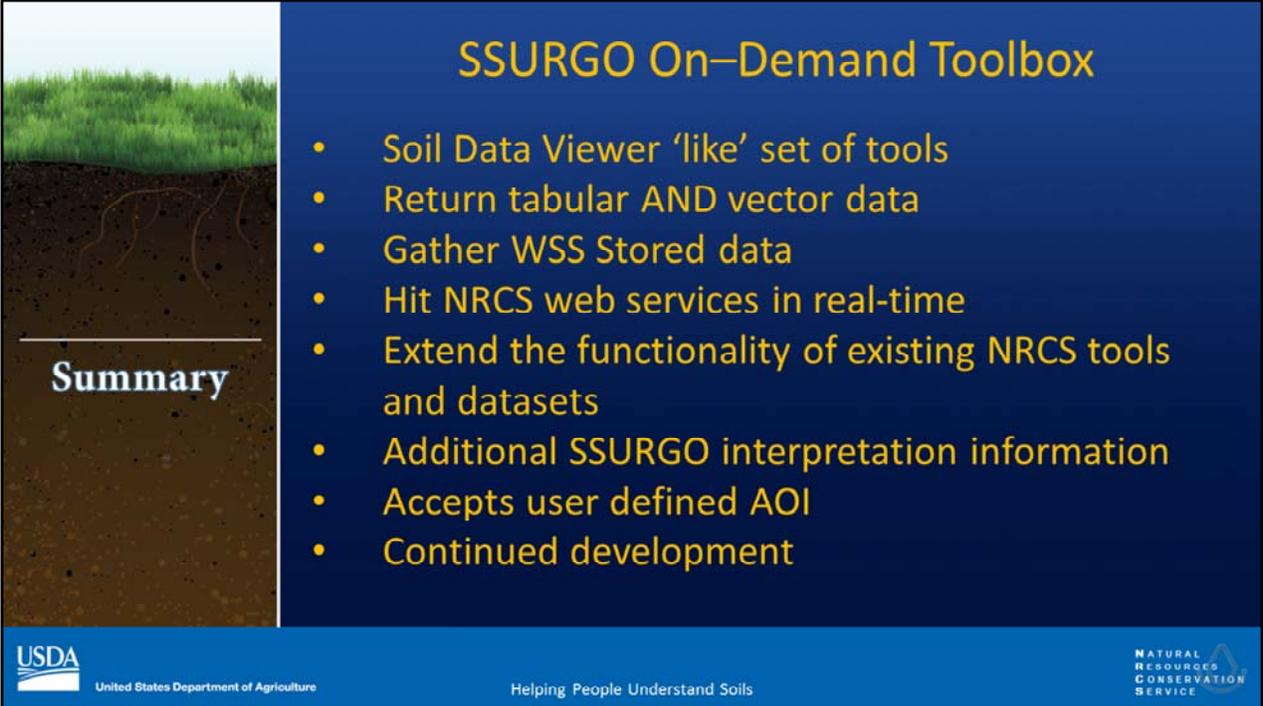
SSURGO OnDemand Dynamic Spatial Interpretations Tool (documentation and instructions) (215 KB)

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We currently have the tools posted to the Wisconsin NRCS soils Webpage. If you google NRCS WI Soils it should get you to the webpage. There you will find a link to download the tools found under the “New Soil Data viewer alternative”



The slide features a blue background with a vertical image on the left showing a cross-section of soil with green grass on top. The word "Summary" is written in white on the left side of the image. The title "SSURGO On-Demand Toolbox" is in yellow at the top right. A bulleted list of features is in yellow text. The footer contains the USDA logo, the text "United States Department of Agriculture", "Helping People Understand Soils", and the Natural Resources Conservation Service logo.

SSURGO On-Demand Toolbox

- Soil Data Viewer 'like' set of tools
- Return tabular AND vector data
- Gather WSS Stored data
- Hit NRCS web services in real-time
- Extend the functionality of existing NRCS tools and datasets
- Additional SSURGO interpretation information
- Accepts user defined AOI
- Continued development

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Soil Data Viewer 'like' set of tools that are faster, can process much larger extents, and arguably easier to use. Like SDV these tools take the complexity of needing to know SSURGO table structures, understanding table relationships, and present them into an easy to navigate menu driven tool

Users can request and receive both tabular and spatial data

Always the most up to date information is retrieved from WSS. For instance, if a survey is committed for the first time or changes are committed to an existing survey outside of the annual refresh in October, these tools will get the latest. Where as static data sets that reside in locations such as a state office geodata directory might not be up to date.

Extend the functionality of existing NRCS tools and datasets. Specifically gSSURGO / Soil Data Development Toolbox

Additional SSURGO interpretation information by providing the 'reason' column, identifying the elements in a mapunit that cause a rating OTHER THAN Well Suited or Not Limited

Supports custom extents

There is always room for improvement. We already have ideas for new tools, added functionality, and of course handling bugs as they surface.



Any Questions?

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