SSURGO On Demand (SOD) Installation and User Guide

August 2023

Table of Contents

1. Overview

SSURGO On Demand (SOD) is a Python-based tool that aggregates SSURGO data within the SQLite SSURGO Template database to produce new tables that can be joined to the SSURGO polygons in GIS. The SQLite SSURGO Template database is complex, with over 75 interrelated tables. SOD provides access to the data in these tables, while shielding you from the complexity of the database.

This guide will provide instructions for downloading SOD, provide tool user instructions, and address how to work with the output in GIS.
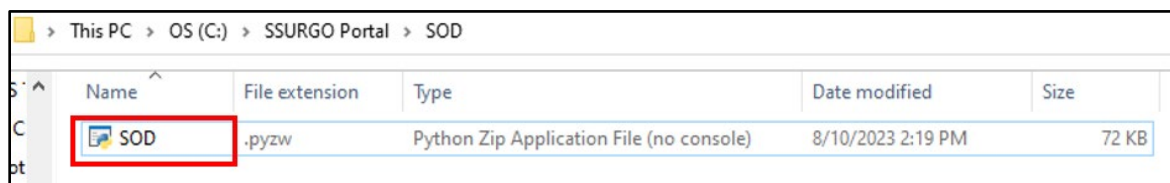
This guide assumes the following:

- Your operating system is Windows 10 or greater.
- You have installed Python 3.10.2 according to the *SSURGO Portal Installation Guide* or *Quick Start Guide*. Python 3.9 or 3.11 should also work, but the screen shots and instructions reference version 3.10.2.
- You have a populated SQLite SSURGO Template database.

2. SOD Installation

To install SOD, complete the following steps:

1. Download SOD.zip from the [SSURGO Portal webpage](#) to the directory of your choice and unzip (extract) the contents.
2. Unzip (i.e., extract) the **SOD.zip** file to anywhere on your computer.

> This PC > OS (C:) > SSURGO Portal > SOD

Name	File extension	Type	Date modified	Size
SOD	.pyzw	Python Zip Application File (no console)	8/10/2023 2:19 PM	72 KB

Note: *You should see this file with a .pyzw extension after unzipping (extracting) it.*

3. Using SOD

This section assumes you have unzipped SOD and have a populated SQLite SSURGO template database, which is needed as an input. Refer to the *SSURGO Portal Quick Start Guide* or *SSURGO Portal User Guide* for instructions on how to create a populated database.

3.1. Primary SOD Window

1. Navigate to the SOD.pyzw file you unzipped (extracted) and open the file. After it opens, you should see this window.
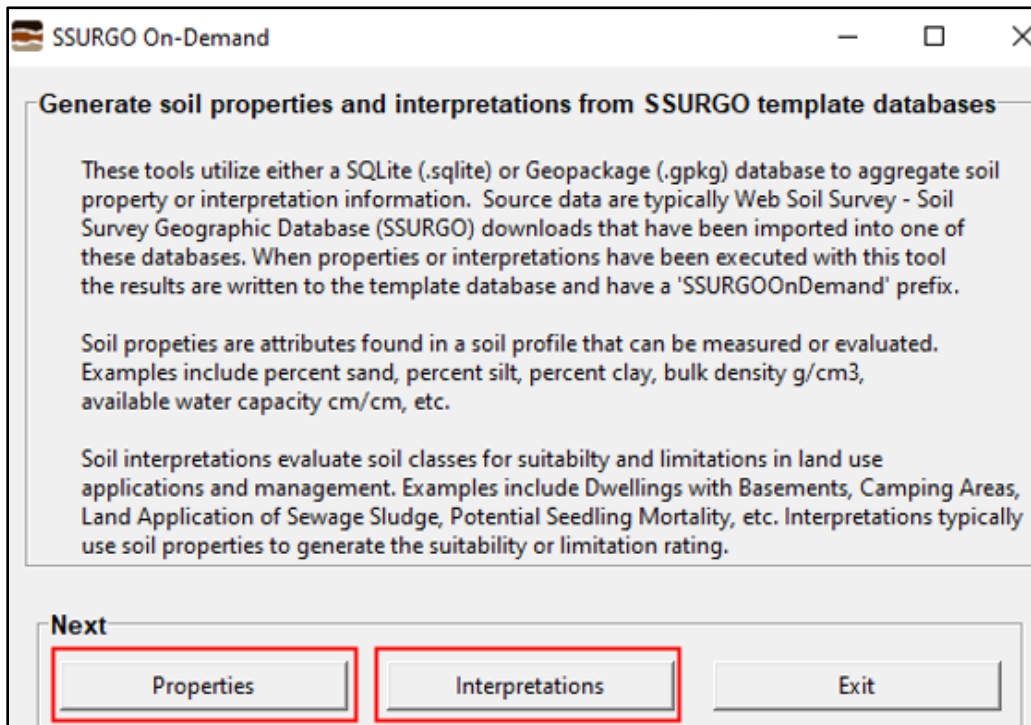
This window presents three buttons:

a. **Properties**

- Clicking **Properties** will open a new window that presents lists of soil properties, aggregation methods, and, when applicable, an option to set horizon depths, or min/max selections.

- Soil properties include chemical and physical soil data, such as clay or pH, as well as things such as soil taxonomic classification or drainage class.
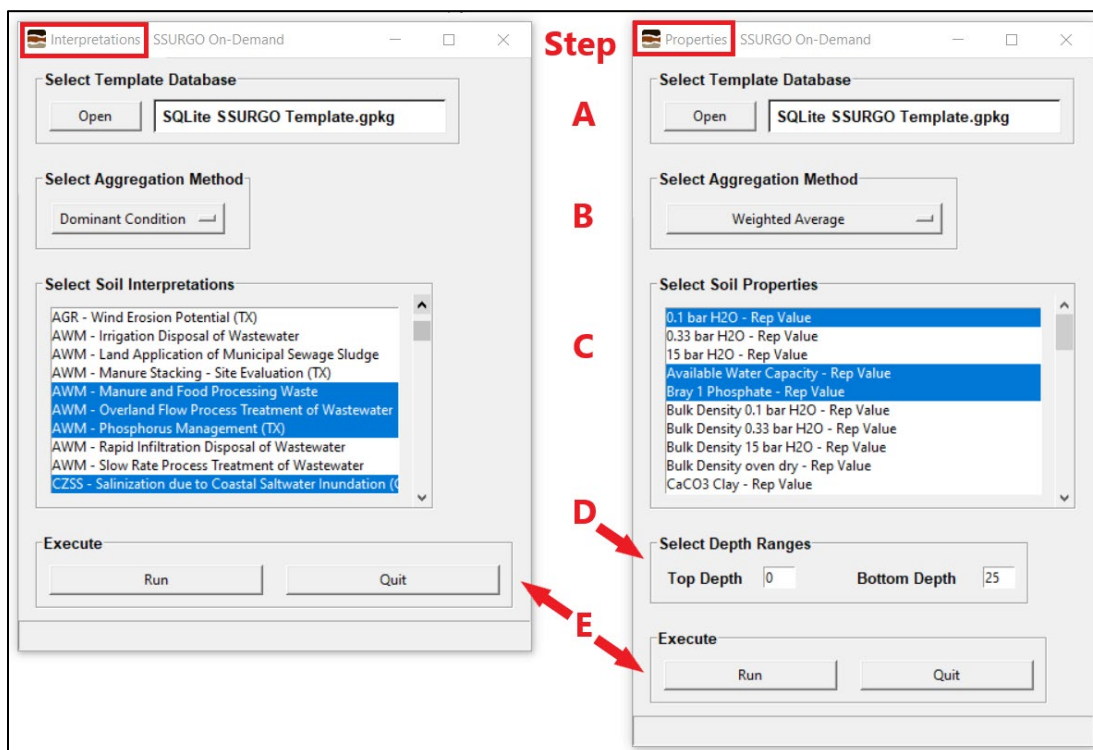
b. **Interpretations**

- Clicking **Interpretations** will open a new window that presents lists of soil interpretations and aggregation methods.

- Soil interpretations were created by the USDA, Natural Resources Conservation Service (NRCS) to indicate suitability of the soil for certain land uses or practices. The interpretations ratings are generated based on the soil properties. For example, you may be interested in the suitability of soil for building a dwelling with a basement.

Natural Resources Conservation Service

U.S. DEPARTMENT OF AGRICULTURE

  c. **Exit**
     • Closes SOD

3.2. Secondary SOD Windows: Properties and Interpretations

1. In the primary SOD window, click on **Properties** or **Interpretations**. Properties are soil properties such as sand, silt, clay, bulk density, drainage class, etc. Interpretations are ratings about how to use the land based on the soil properties. For example, suitability for dwelling with basements.

   Refer to the diagram below for the steps that follow.

Note: *You can have both the **Interpretations** and the **Properties** windows open at the same time.*

  a. Click **Open** to select a populated **SQLite SSURGO Template** database.
     • After you select the database, the database file name will appear next to the **Open** button. The entire file path will appear in a tooltip when the cursor hovers over the file name label.
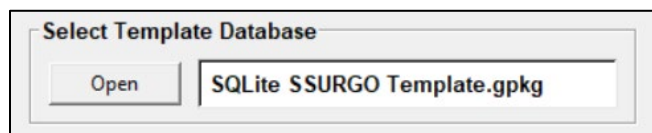
- If you select **Interpretations**, the database will also initialize the **Select Soil Interpretations** list. The list will populate with interpretations that pertain to the geographic extent of the soil survey datasets in the SSURGO Template database.

b. **Select Aggregation Method**

- **Interpretations** contains the following choices. Typically, you will want to select **Dominant Condition**.
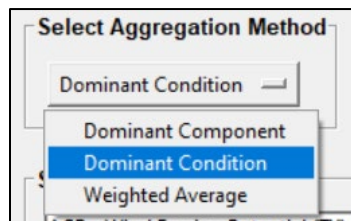
- **Properties** contains the following choices, which may be either numeric or categorical: **Weighted Average - Numeric**, **Dominant Component - Numeric**, **Minimum/Maximum – Numeric**, **Dominant Component – Categorical**, and **Dominant Condition - Categorical**. Weighted average is the most common for numeric data and dominant condition is the most common method for categorical data.
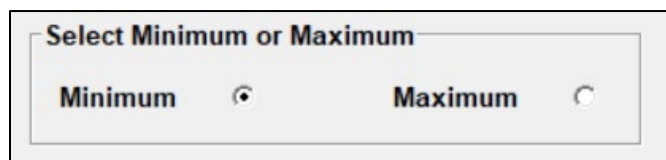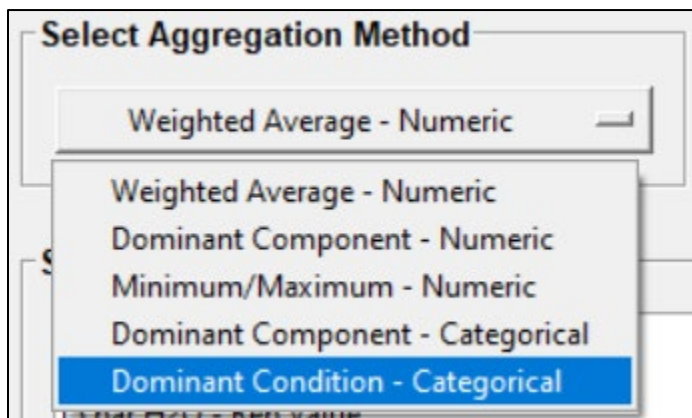

- In contrast to the **Soil Interpretations** list being dependent on the database file (described above), the **Soil Properties** list in the **Properties** tool changes depending on the aggregation method. Numeric properties populate numeric aggregation methods, and categorical properties populate categorical aggregation methods.

c. Select one or more options from **Select Soil Properties** or **Select Soil Interpretations**. Currently, you are required to make individual mouse clicks to select each item.

d. For **Properties**, you may be required to enter an additional tool parameter, depending on the **Aggregation Method**.

- **Weighted Average - Numeric** and **Dominant Component - Numeric** aggregation methods require **Top Depth** and **Bottom Depth** values. These depths correspond to soil horizon depths. To include all soil horizons, the top depth must be 0 cm and the bottom depth must be 200 cm, which are the default values (as indicated by the grey text). Alternatively, you can enter a customized range. For example, you may want to just analyze the upper 25 cm. In that case, enter 0 as the top depth and 25 as the bottom depth.

Select Depth Ranges

Top Depth 0   **Bottom Depth** 25

- The **Minimum/Maximum** aggregation method requires you to select either **Minimum** or **Maximum**.

Select Minimum or Maximum

Minimum ⦿   **Maximum** ○

Note: *The **Dominant Component - Categorical** and **Dominant Condition - Categorical** aggregation methods do not require an additional parameter.*

e. **Execute** the SOD tool.
- **Run** will launch the tool. A message will appear at the bottom of the tool to provide processing status. After the tool completes, a pop-up box will alert the user. Clicking **Ok** in the pop-up box resets the status message, deselects all **Select Soil Interpretations/Properties** choices, and sets the Depth Ranges (if applicable).

Execute

Run   Quit

➡ Processing 2 of 2

- **Quit** will close the **Properties** or **Interpretations** window, but the primary SOD Window will remain open. Currently, the **Quit** button is unresponsive after you launch **Run**.

4. Using the Output in GIS

After the ratings have run, navigate to the database in a GIS application, such as ArcMap, ArcGIS Pro, or QGIS, and add the tables that start with **main.SSURGOOnDemand.**
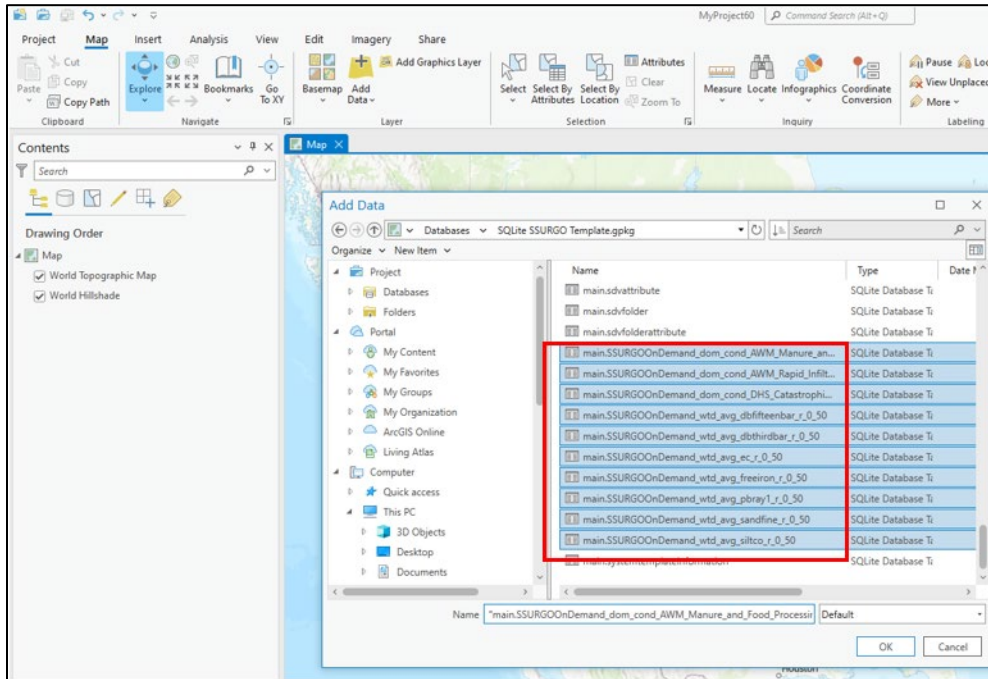
Join the main.SSURGOOnDemand tables to the main.mupolgyon on MUKEY and then symbolize. Below is an example of a 1/3 bar bulk density map for West Virginia.
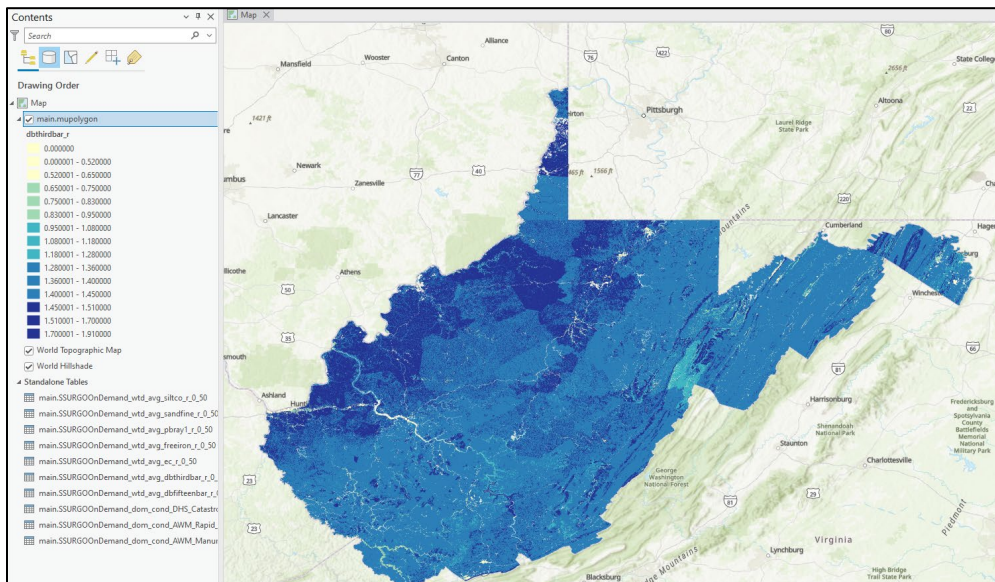
Note: *You can use the database file in other applications, such as DB Browser, R, etc.*

USDA is an equal opportunity provider, employer, and lender.