SoilGrids — global gridded soil information based on automated soil mapping

ISRIC World Soil Information

About

To address the growing demand for consistent and comprehensive soil data, ISRIC has developed SoilGrids1km — a global 3D soil information system at 1 km resolution. SoilGrids1km was produced using the **Global Soil Information Facilities** (GSIF), which was recently developed at ISRIC as a framework and platform to support widespread, open collaboration in the assembly, collation and production of soil information (DOI: 10.1371/journal.pone.0105992).

GSIF framework has already been used to produce 3D soil property maps for Africa at 1 km resolution for the needs to the AfSIS project. The same methodology is now used to produce updatable soil property and class maps of the whole world —— SoilGrids1km.

The mapping framework

SoilGrids1km (www.soilgrids.org) is a collection of updatable soil property and class maps of the world at relatively coarse resolution of 1 km. This is the output data-component of GSIF. The spatial predictions of soil properties and classes in SoilGrids1km are generated using automated soil mapping (based on input data coming from the WorldSoilProfiles.org database and WorldGrids.org) with no user intervention, and can therefore be regularly updated as the new soil samples arrive. These are hence referred to as the *"updatable soil property and class maps"*.
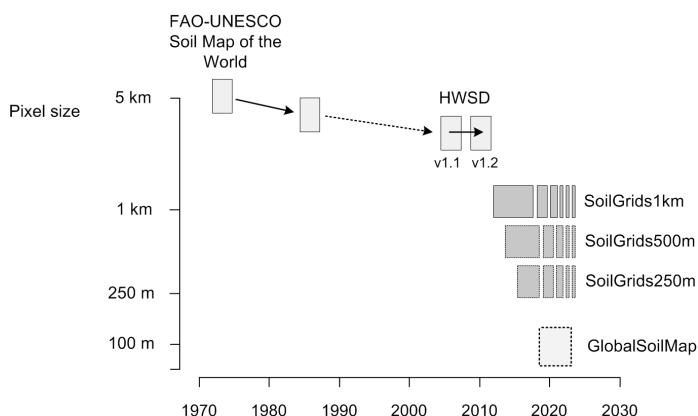

Fig. 1: SoilGrids products in relation to the Harmonized World Soil Database (HWSD), and the GlobalSoilMap products. SoilGrids1km the first of a planned series of global map products produced using automated global soil mapping.

Targeted soil properties and classes

SoilGrids1km is currently comprised of spatial predictions for a selection of soil properties: soil organic carbon (g kg^{-1}), soil pH (-), texture fractions (%), bulk density (kg m^{-3}), cation-exchange capacity (cmol kg^{-1}) of the fine earth fraction, coarse fragments (%), soil organic carbon stock (tonnes per ha), depth to bedrock (in cm), FAO World Reference Base soil groups, and USDA Soil Taxonomy suborders.
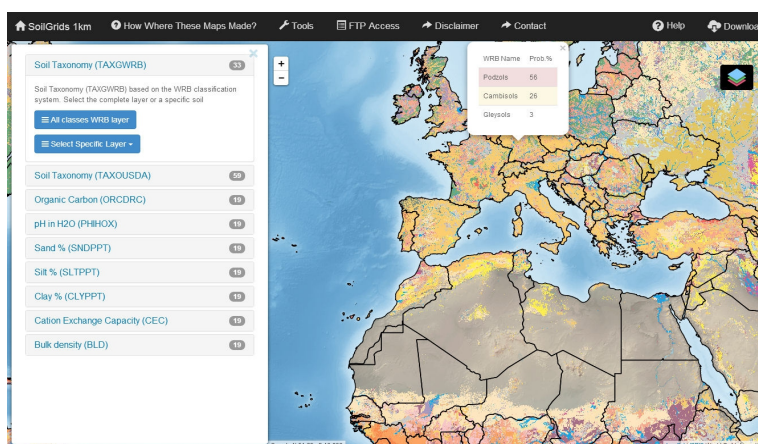

Fig. 2: SoilGrids.org data portal allows interactive download of tiled images.

How to contribute?

Within SoilGrids project, there is a clear intention to gradually improve predictions by incorporating more shared soil profiled data and by improving the models used. We hope to produce and distribute increasingly accurate maps after every run (in 2015, it is anticipated that the maps will be updated typically once a month). Therefore, consider contributing data to help us improve the predictions incrementally.

To improve predictions for your country or region, consider contributing soil profile data. You can also submit your predictions of same properties / classes and we will integrate (merge) your predictions with the existing SoilGrids1km. This is referred to as the "SoilGrids1km+" product. See www.soilgrids.org for more info.
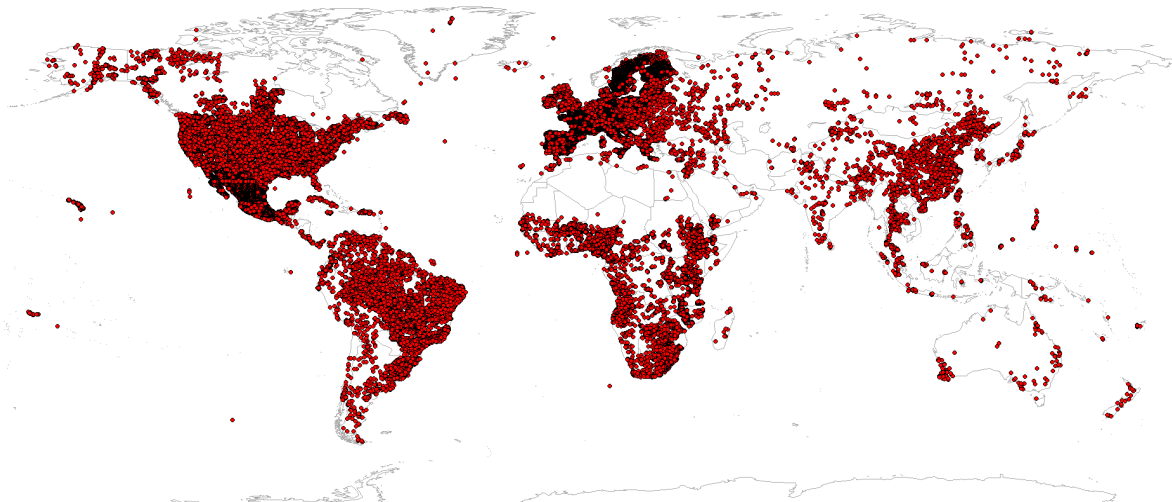
Fig. 3: Global distribution of some of the most extensive soil profile databases.

Why contribute?

The most important input for producing SoilGrids1km are the field observations and/or laboratory measurements of soil properties. Whether legacy data or spectral scans of soil samples, we are interested in integrating and facilitating any field observations we can find.

A compilation of soil profiles in Fig. 3 shows about 100,000 points. The number of soil profiles released to the public is constantly growing. National and regional soil data agencies are now invited to contribute their point data to help improve the prediction accuracy of SoilGrids1km locally in their countries.

Where / how can I access these maps?

You can access, download and import SoilGrids1km via http://soilgrids.org (Web Mapping Service available at http://wms3.isric.org/geoserver/soilgrids1km/wms) or via FTP service: FTP: ftp.soilgrids.org (username: soilgrids; password: soilgrids).

SoilGrids1km are publicly available also through a mobile device App called **SoilInfo App**. SoilInfo App allows anyone in the world to query the basic soil properties and classes based on the GSP coordinates i.e. directly on the field. Our motto is therefore: **"free access to global soil data anywhere anytime"**.

SoilInfo App has been inspired by the SoilWeb App developed by Dylan Beaudette (NRCS) and used in the USA to query NRCS produced soil (spatial) data products.

Other soil mapping modes

GSIF framework supports three soil mapping frameworks:

- Global soil mapping using global models (i.e. mapping toward SoilGrids1km product),
- Soil mapping at state, national and regional levels using local models,
- On-demand mapping i.e. mapping controlled by the users.

GSIF is intended to facilitate global soil data initiatives and to serve as a bridge between global and local soil mapping. Contact us for applying the facilities together with you to generate predictions for your area of interest.

What do I do next?

If your organization is in possesion of a soil profile observation database consider joining the SoilGrids1km production team.

Agencies that contribute >1000 profile observations or soil samples for an area of at least 10,000 km^2, can be listed as a co-autoring organization on the main SoilGrids1km web-mapping portal.

Medium (200-1000 points) to small size (<200 points) contributors are invited to submit their data directly via the WorldSoilProfiles.org data portal, or by contacting the GSIF development team (e-mail: jorge.mendesdejesus@wur.nl).

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