



# Dados abertos para a ciência do solo

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# ISRIC - International Soil Reference and Information Center

- As the custodian of global soil information we produce, gather, compile and serve quality-assured soil information together with our partners at global, national and regional levels. We stimulate the use of this information to address global challenges through capacity building, awareness raising and direct cooperation with users and clients.
- Founded in 1966 as the 'International Soil Museum' (linked the FAO soil map of the world); initiative of the International Soil Science Society, adopted by UNESCO General Council.
- Certified as World Data Center for Soils by International Council for Science.

World Soil Museum



Spring School

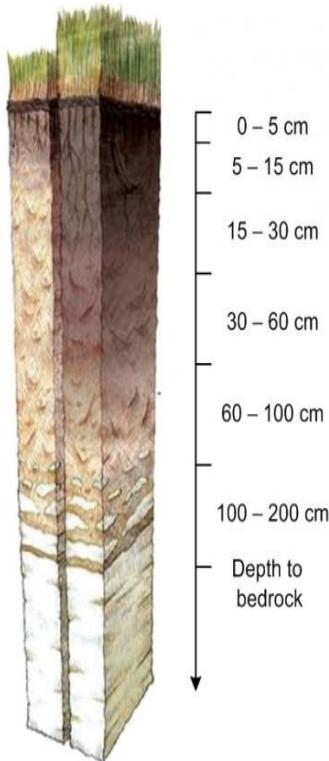


Library

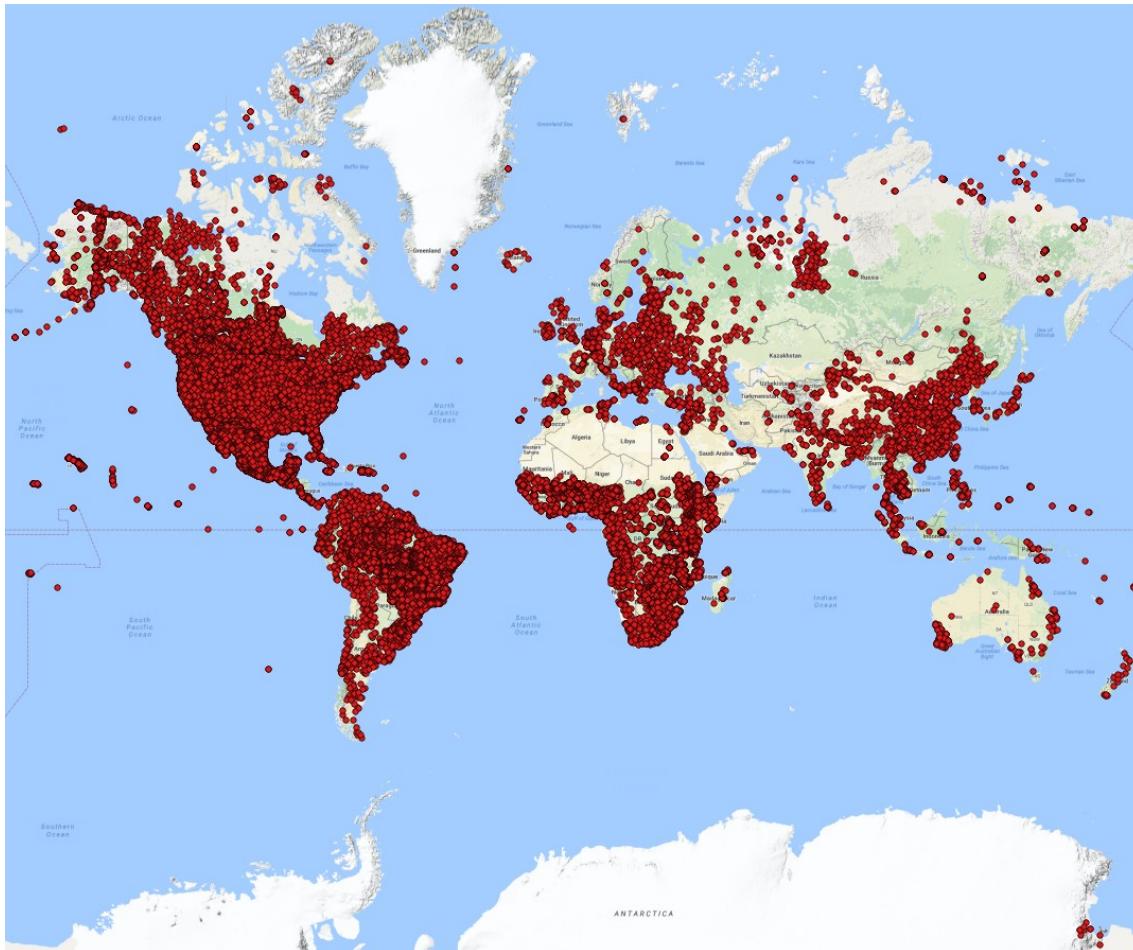


# Point data (observations)

Point data in WoSIS database has several soil physical and chemical properties (pH, carbon, texture,...) at different depths.



# World Soil Information Service (WoSIS)



- **126 589** unique profiles
- **110 897** profiles with geometry
- **30 million** soil properties measurements
- **4 million** soil properties measurements being served through WFS
- **11** soil properties being served through WFS:
  - Bulk density
  - Calcium carbonate
  - Carbon (Total and Organic)
  - Coarse fragments
  - pH
  - Water retention
  - Texture (Sand, Silt and Clay)
  - Cation exchange capacity
  - Electrical conductivity
  - Classification: FAO, WRB, USDA
  - Depth of soil (sampled)

# World Soil Information Service (WoSIS)

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**Latest (dynamic) dataset:** This dataset contains the most recent complement of standardised soil data served from WoSIS. Being dynamic, the dataset will grow once new point data are standardised, additional soil properties are considered, and/or when possible corrections are required. The latest dataset is served through an OGC-compliant WFS (Web Feature Service). The point data can be accessed from GIS or R.

**Snapshot (static) dataset:** These are a representation of the complement of standardised data available at a given moment (e.g. July 2016). Each snapshot is given a unique name and digital object identifier (doi) for consistent citation purposes. So far, one snapshot has been released. Served as a zipped txt files. Methodological details are provided in a paper in Earth System Data Journal.



# WoSIS - peer review

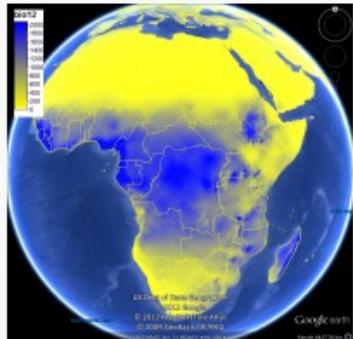
The screenshot shows the homepage of the *Earth System Science Data* journal. At the top, there's a sidebar for manuscript submission and tracking. Below it is a navigation menu with links to About, Editorial board, Articles, Special issues, Subscribe to alerts, Peer review, Living data process, For authors, and For reviewers. A login form for User ID and Password is also present. On the right side, there's a sidebar for Copernicus Publications, featuring a search bar, download options for PDF and XML, a short summary about soil as an ecosystem provider, and citation links for BibTeX and EndNote. The main content area displays the article "WoSIS: providing standardised soil profile data for the world" by Niels H. Batjes, Elio Ribeiro, Ad van Oostrum, Johan Leenaars, Tom Hengl, and Jorge Mendes de Jesus. The article was received on 22 Jul 2016, discussed from 21 Oct 2016, revised on 19 Dec 2016, accepted on 22 Dec 2016, and published on 17 Jan 2017. The abstract discusses the aim of the World Soil Information Service (WoSIS) to serve quality-assessed, georeferenced soil data to the international community. It highlights the development of procedures for legacy point data with special attention to soil analytical and physical properties. The full WoSIS database contains over 31 million soil records, with 96,000 georeferenced within defined limits. The data lineage is determined by the initial studies, and the data is made available through ISRIC WDC-Soils.



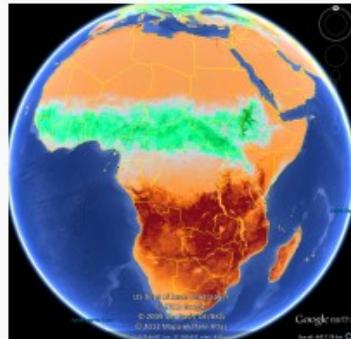
# Raster data (covariates)

Global layers of geo/biophysical explanatory variables used as input in the model

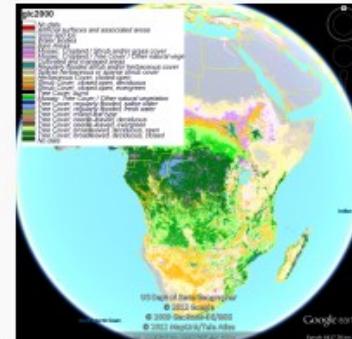
Climatic images



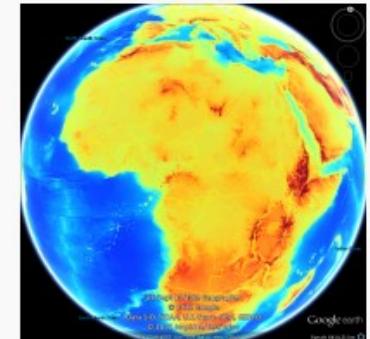
MODIS products



Land cover / land use



DEM-derived parameters

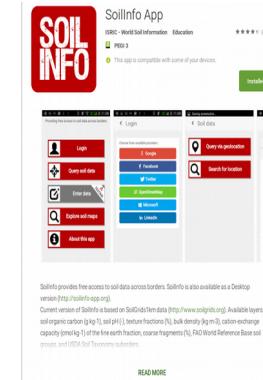
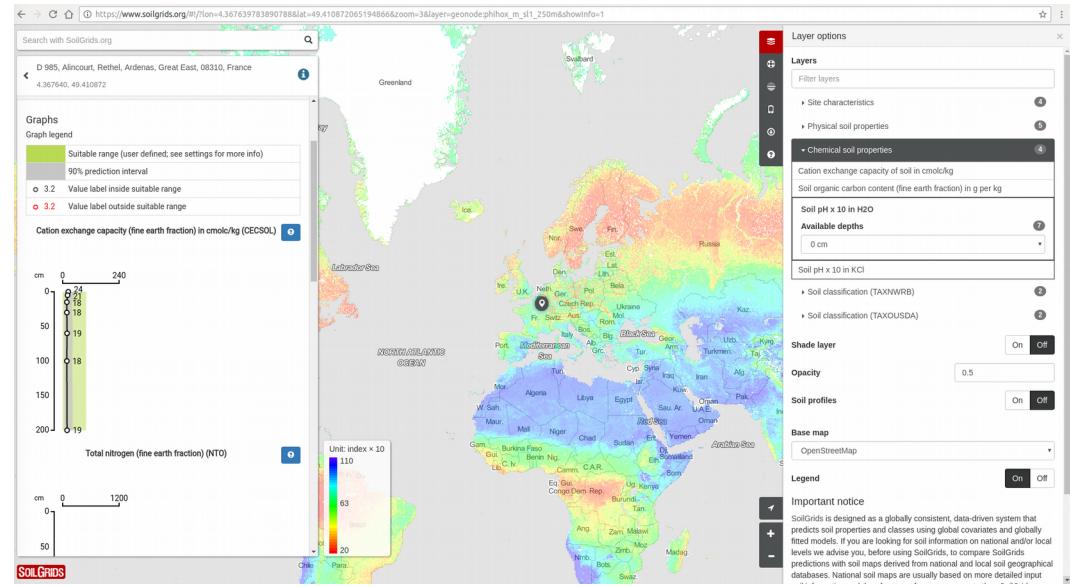


Raster data can be found at [worldgrids.org](http://worldgrids.org)



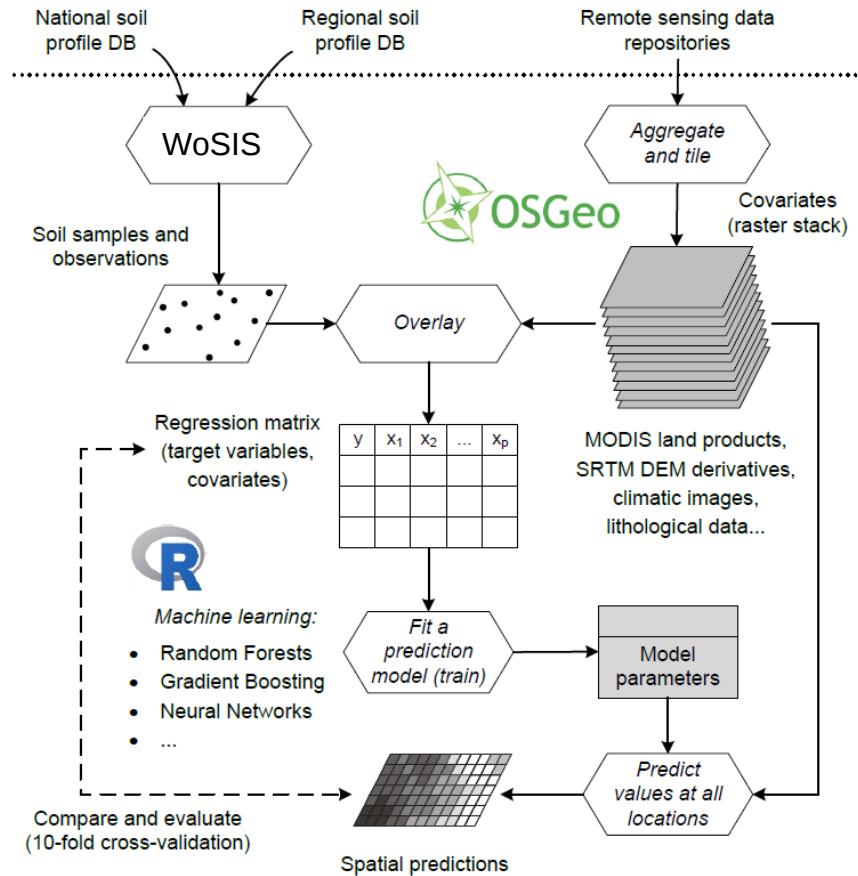
# SoilGrids - Raster data (predictions)

- Global scale at 250 m resolution
- Set of global soil property and class maps
- 7 depths up to 2 m
- Automated digital soil mapping
- Modeling and mapping framework based on Machine Learning
- Available by WMS/WCS/FTP and SoillInfo app





# SoilGrids - Raster data (predictions)





# SoilGrids - peer review

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RESEARCH ARTICLE

## SoilGrids1km — Global Soil Information Based on Automated Mapping

Tomislav Hengl, Jorge Mendes de Jesus, Robert A. MacMillan, Niels H. Batjes, Gerard B. M. Heuvelink, Eloi Ribeiro, Alessandro Samuel-Rosa, Bas Kempen, Johan G. B. Leenaars, Markus G. Walsh, Maria Ruierez Gonzalez

Published: August 29, 2014 • <https://doi.org/10.1371/journal.pone.0105992>

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Correction Abstract

Introduction Materials and Methods Results Discussion Acknowledgments Author Contributions References

Correction

1 Dec 2014: The PLOS ONE Staff (2014) Correction: SoilGrids1km — Global Soil Information Based on Automated Mapping. PLOS ONE 9(12): e114788. <https://doi.org/10.1371/journal.pone.0114788> | [View correction](#)

Abstract

Background

Soils are widely recognized as a non-renewable natural resource and as biophysical carbon

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# SoilGrids - peer review

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## SoilGrids250m: Global gridded soil information based on machine learning

Tomislav Hengl , Jorge Mendes de Jesus, Gerard B. M. Heuvelink, Maria Ruiperez Gonzalez, Milan Kilibarda, Aleksandar Blagotić, Wei Shangguan, Marvin N. Wright, Xiaoyuan Geng, Bernhard Bauer-Marschallinger, Mario Antonio Guevara, Rodrigo Vargas, Robert A. MacMillan, [ ... ]. Bas Kempen [ [view all](#) ]

Published: February 16, 2017 • <https://doi.org/10.1371/journal.pone.0169748>

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**Abstract**

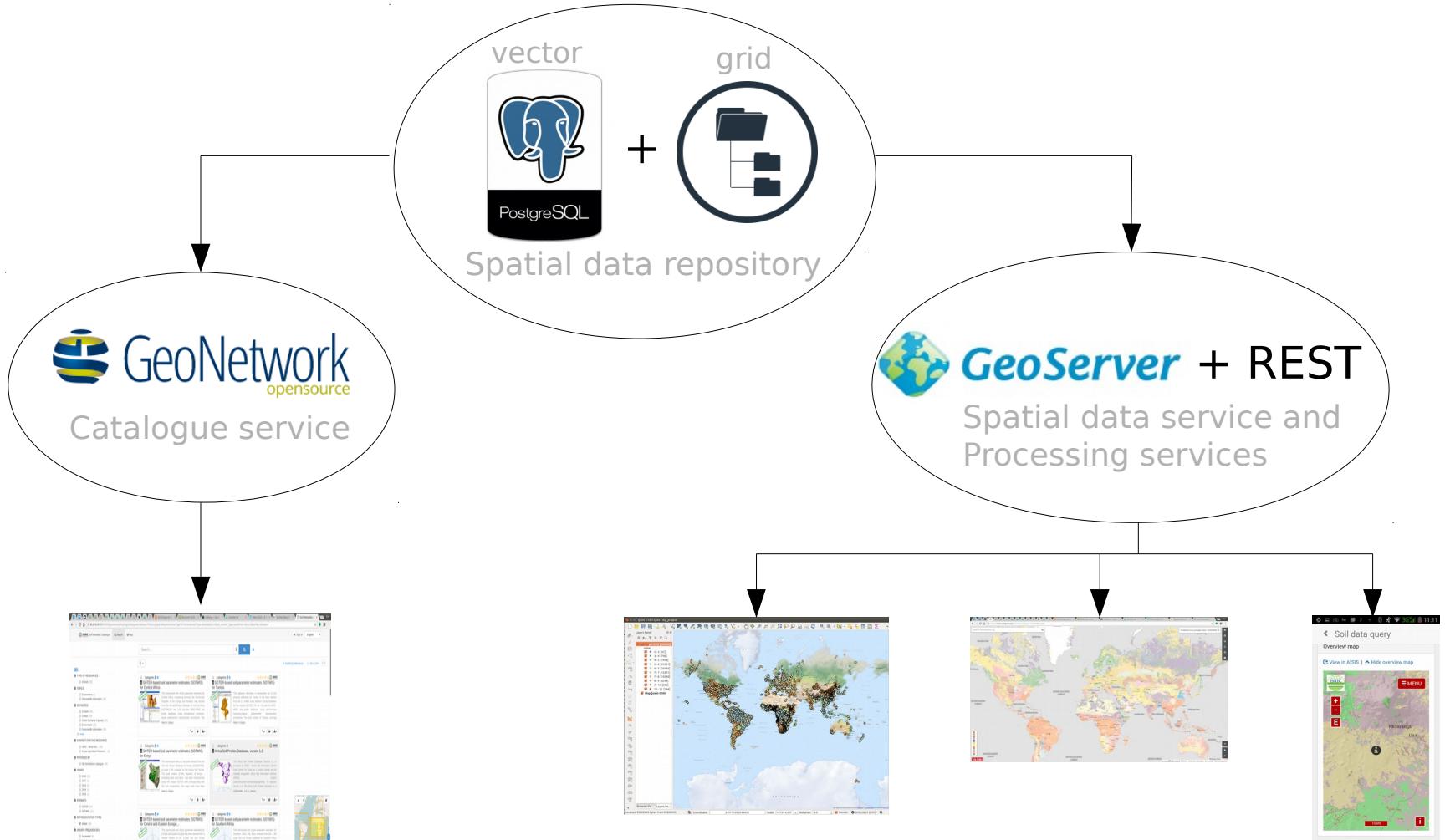
Introduction  
Methods and materials  
Results  
Discussion  
Conclusions  
Acknowledgments  
Author Contributions  
References

**Abstract**

This paper describes the technical development and accuracy assessment of the most recent and improved version of the SoilGrids system at 250m resolution (June 2016 update). SoilGrids provides global predictions for standard numeric soil properties (organic carbon, bulk density, Cation Exchange Capacity (CEC), pH, soil texture fractions and coarse fragments) at seven standard depths (0, 5, 15, 30, 60, 100 and 200 cm), in addition to predictions of depth to bedrock and distribution of soil classes based on the World Reference Base (WRB) and USDA classification systems (ca. 280 raster layers in total). Predictions were based on ca. 150,000 soil profiles used for training and a stack of 158 remote sensing-based soil covariates (primarily derived from MODIS land products, SRTM DEM derivatives, climatic images and global landform and lithology maps) which were used to fit an ensemble of machine learning methods



# ISRIC Spatial data infrastructure



Software client (Desktop GIS, Web mapping, Mobile Apps)



# GeoNetwork – <http://data.isric.org>

The screenshot shows a search results page for the ISRIC Soil Metadata Catalogue. The left sidebar contains filters for Type of Resources (Dataset), Topics (Environment, Geoscientific information), Keywords (Calcium, Carbon, Cation Exchange Capacity, Environment, Geoscientific information), Contact for the Resource (ISRIC - World Soil..., Kenya Agricultural Research...), Provided By (My GeoNetwork catalogue), Years (2006, 2007, 2014, 2015, 2016), Formats (SOTER, SOTWIS), Representation Types (Vector), Update Frequencies (As needed, Not planned), and Status (Reviewed). The main area displays five dataset cards:

- SOTER-based soil parameter estimates (SOTWIS) for Central Africa**: This harmonized set of soil parameter estimates for Central Africa, comprising Burundi, the Democratic Republic of the Congo and Rwanda, was derived from the Soil and Terrain Database for Central Africa (SOTERCAF ver. 1.0) and the ISRIC-WISE soil profile database, using standardized taxonomy-based pedotransfer (taxotransfer) procedures. The land surface of Central Africa has been characterized using 397 unique SOTER units corresponding with 623 soil components. The major soils have been Niels H. Batjes
- SOTER-based soil parameter estimates (SOTWIS) for Tunisia**: This dataset describes a harmonized set of soil property estimates for Tunisia. It has been derived from the 1:1 million scale Soil and Terrain Database for the country (SOTER, TN, ver. 1.0) and the ISRIC-WISE soil profile database, using standardized taxonomy-based pedotransfer (taxotransfer) procedures. The land surface of Tunisia, covering Niels H. Batjes
- SOTER-based soil parameter estimates (SOTWIS) for Kenya**: This harmonized data set has been derived from the Soil and Terrain Database for Kenya (KENSOTER), at scale 1:1M, compiled by the Kenya Soil Survey. The land surface of the Republic of Kenya - excluding lakes and towns - has been characterized using 397 unique SOTER units corresponding with 623 soil components. The major soils have been Niels H. Batjes
- Africa Soil Profiles Database, version 1.1**: The Africa Soil Profiles Database, Version 1.1, is compiled by ISRIC - World Soil Information (World Data Center for Soils) as a project activity for the Globally Integrated- Africa Soil Information Service (AISIS) project ([www.africasoils.net/data/legacyprofile](http://www.africasoils.net/data/legacyprofile)). It replaces version 1.0. The Africa Soil Profiles Database is a LEENAARS, J.G.B. (Johan)
- SOTER-based soil parameter estimates (SOTWIS) for Central and Eastern Europe**: This harmonized set of soil parameter estimates for Central and Eastern Europe has been derived from a revised version of the 1:25M Soil and Terrain (SOTER) Database for Central and Eastern Europe (SOEUR ver. 1.1) and the ISRIC-WISE soil profile database. The land surface of Central and Eastern Europe has been characterized using 4022 unique SOTER units.

On the right side of the main area, there is a map of Southern Africa with several rectangular overlays, each containing a small map of a specific region. A legend below the map indicates the meaning of the colors and patterns used in the overlays.



# GeoNetwork – <http://data.isric.org>

85.214.241.121:8090/geonetwork/srv/eng/catalog.search#/metadata/dcc5e339-149d-49b4-8163-16a710446dd5

ISRIC Soil Metadata Catalogue Search Map Sign in English

Back to search < Previous Next >

Soil and Terrain Database (SOTER) for Senegal and the Gambia

The Soil and Terrain database for Senegal and The Gambia primary data (version 1.0), at scale 1:1 million (SOTER\_Senegal\_Gambia), was compiled of enhanced soil information within the framework of the FAO's program Land Degradation Assessment in Drylands (LADA). Primary soil and terrain data for Senegal were obtained through the Institut National de Pédologie Dakar; the digital soil map from the Centre de Suivi Ecologique. Adjustments made in the SOTER units were based on the SRTM-DEM derived data interpretations.

SOTER forms a part of the ongoing activities of ISRIC, FAO and UNEP to update the world's baseline information on natural resources. The project involved collaboration with national soil institutes from the countries in the region as well as individual experts.

Completed

Download and links

Soil and Terrain Database (SOTER) for Senegal and the Gambia [Download](#)

This dataset is published in the view service (WMS) available at <http://85.214.241.121:8080/geoserver/soter/wms?> with layer name soter\_sngm\_map\_unit. [Add to map](#)

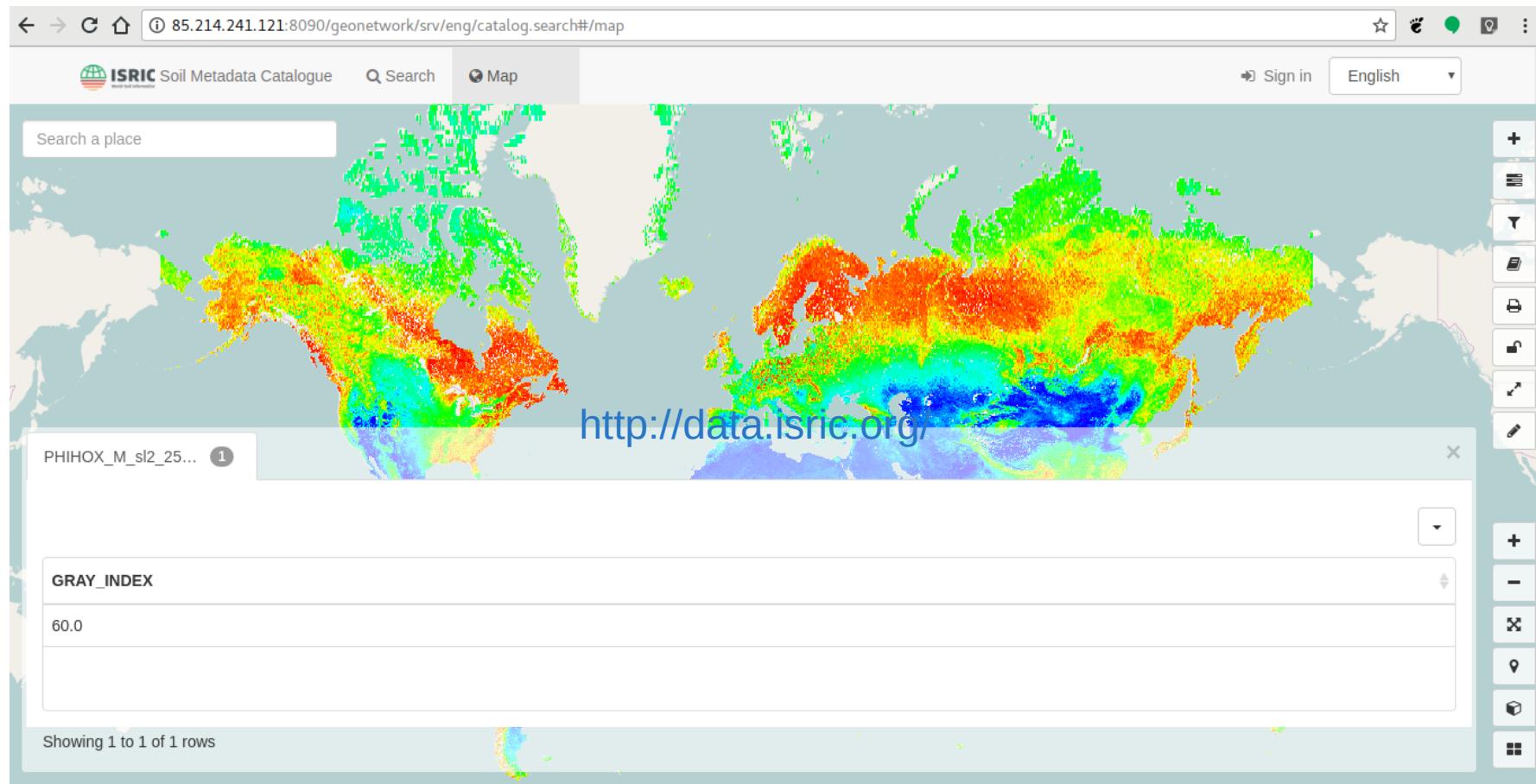
Overview [large\\_thumbnail](#)

Spatial extent

Dakar Senegal Gambia, The Guinea-Bissau

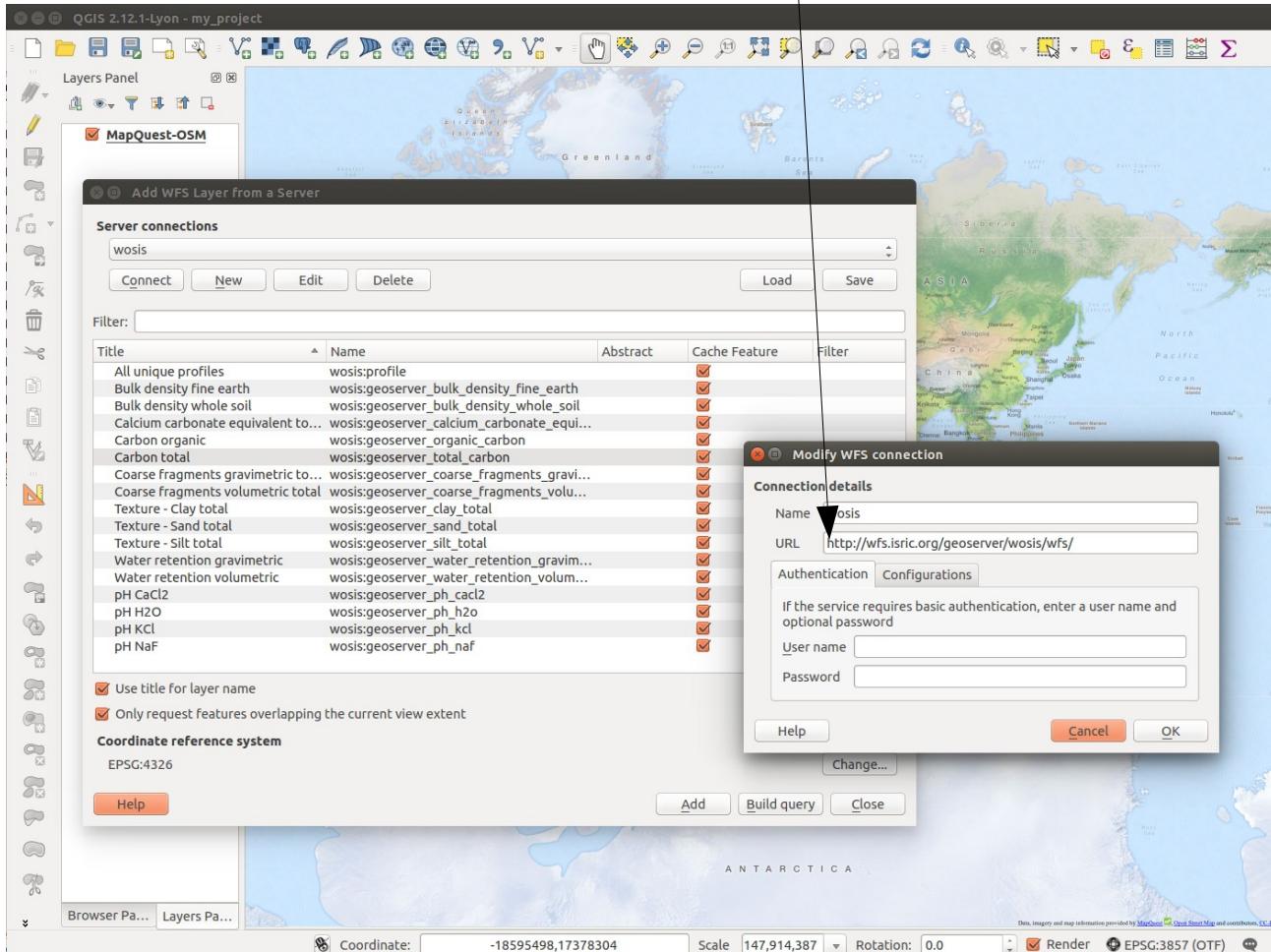


# GeoNetwork – <http://data.isric.org>





# WoSIS [http://data.isric.org/geoserver/wosis\\_latest/wfs](http://data.isric.org/geoserver/wosis_latest/wfs)



- One central place for data gathering by GIS applications
- Free to use and download
- Start your research immediately with standardized and validated soil data
- More info <http://isric.org/explore/wosis>



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World Soil Information



# Obrigado



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