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GSP – GSOCMap Soil Organic Carbon Mapping

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GLOBAL SOIL PARTNERSHIP

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GSP?

The **G**lobal **S**oil **P**artnership was established in December 2012 as a mechanism to develop a strong interactive partnership and enhanced collaboration and synergy of efforts between all stakeholders. From land users through to policy makers, one of the key objectives of the GSP is to improve the governance and promote sustainable management of soils.

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Background - GSP

The Global Soil Partnership (GSP) cooperates very closely with various global mechanisms which address soil issues and which require improved information collection and sharing about the status of soils.

This cooperation is important because FAO member countries are involved in various global activities through monitoring and reporting on natural resources, including soils. FAO is working to align these activities to **improve knowledge** and **information exchange** about soils.

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Background - GSP

Since its creation, the GSP has become an important partnership where global soil issues are discussed and addressed by multiple stakeholders. Key outputs demonstrate that the partnership was needed to fill an existing gap in the promotion of sustainable soil management.

Among those outputs are the:

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what have been done?

- ✓ Establishment of the Intergovernmental Technical Panel on Soils
- ✓ Submission of the proposal for the International Year of Soils 2015
- ✓ Production of the **Status of the World's Soil Resources** report
- ✓ Establishment of Regional Soil Partnerships
- Development of capacities in developing countries on digital soil mapping
- Establishment of national soil information systems

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itps
INTERGOVERNMENTAL TECHNICAL PANEL ON SOILS

Intergovernmental Technical Panel on Soils

The Intergovernmental Technical Panel on Soils (ITPS) was established at the first Plenary Assembly of the Global Soil Partnership held at FAO Headquarters on 11 and 12 of June, **2013**.

The ITPS is composed of 27 soil experts representing all the regions of the world. The main function of the ITPS is to provide **scientific** and **technical** advice and guidance on global soil issues to the Global Soil Partnership

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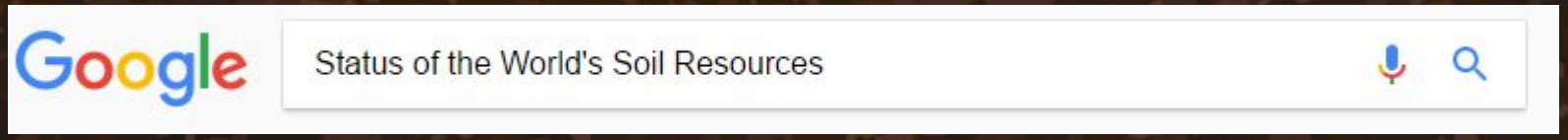
Status of the World's Soil Resources report

The SWSR is a reference document on the status of global soil resources that provides regional assessments of soils. The information is based on peer-reviewed scientific literature, complemented with expert knowledge and project outputs.



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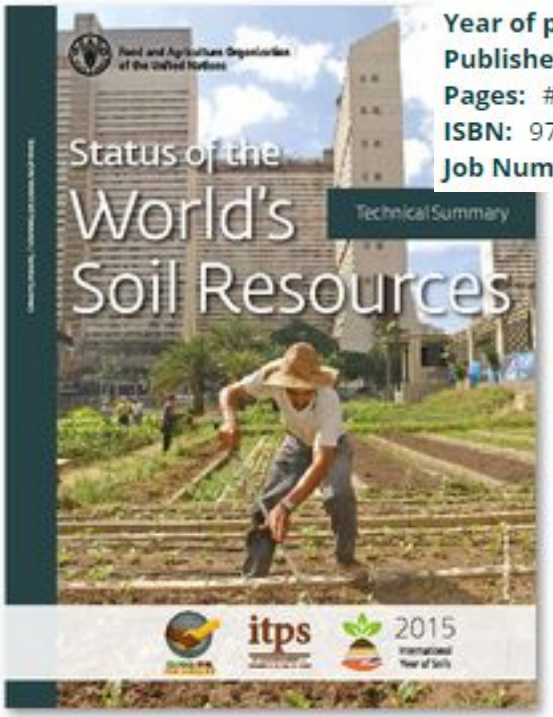
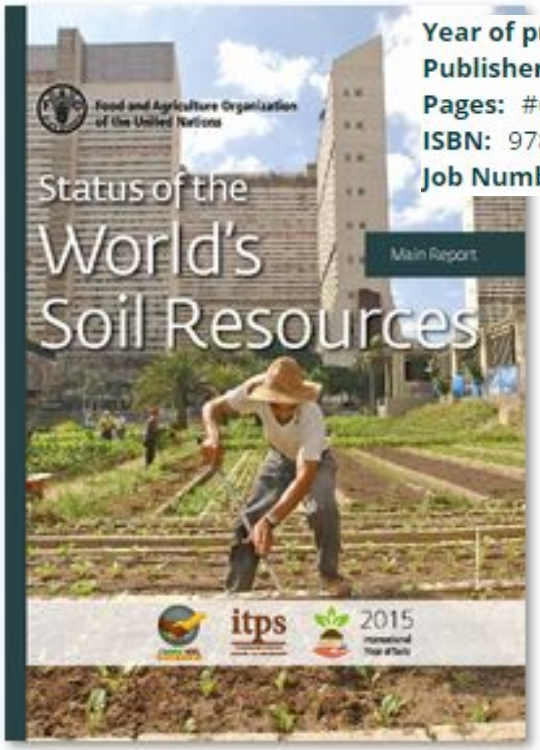
Status of the World's Soil Resources report



Year of publication: 2015
Publisher: FAO
Pages: #94 p.
ISBN: 978-92-5-108960-6
Job Number: I5126;



Year of publication: 2015
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Pages: #650 p.
ISBN: 978-92-5-109004-6
Job Number: I5199;

Google Status of the World's Soil Resources

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GSP – Regional Partnerships

Regional Soil Partnerships were established in order to facilitate regional actions and to ensure that the partnership process becomes ***country driven***.

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GSP – Regional Partnerships

Regional Soil Partnerships build on existing regional networks or collaborative processes and provide guidance on regional goals, their required implementation mechanisms and should regularly review progress in reaching **common objectives and targets.**

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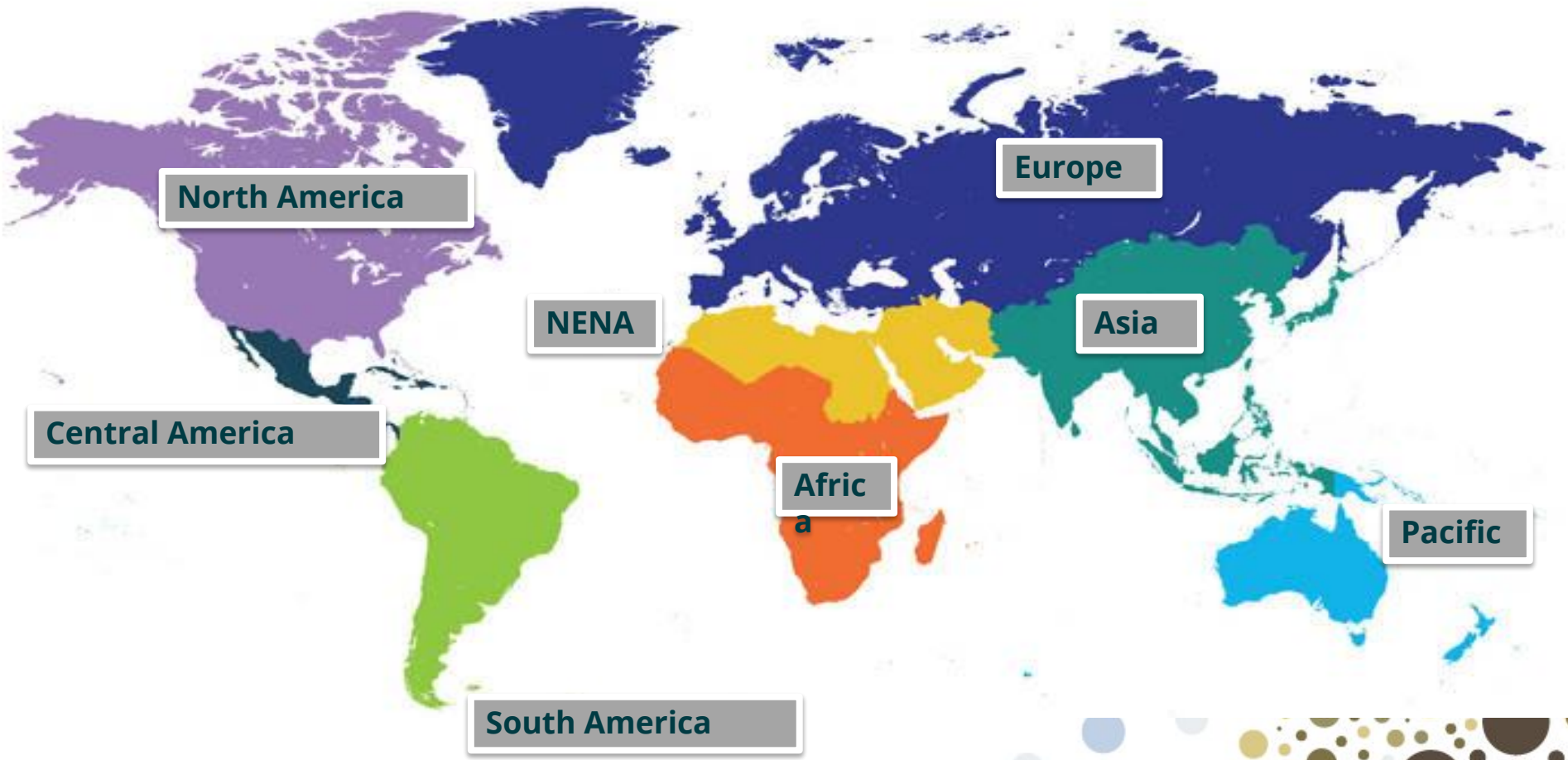
GSP – Regional Partnerships



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International Year of Soils 2015

Submission of the proposal for the International Year of Soils 2015

The Food and Agriculture Organization of the United Nations has been nominated to implement the IYS 2015, within the framework of the Global Soil Partnership and in collaboration with Governments and the secretariat of the United Nations Convention to Combat Desertification.

http://www.fao.org/global-soil-partnership/wsd2016/background/en/

2015 International Year of Soils

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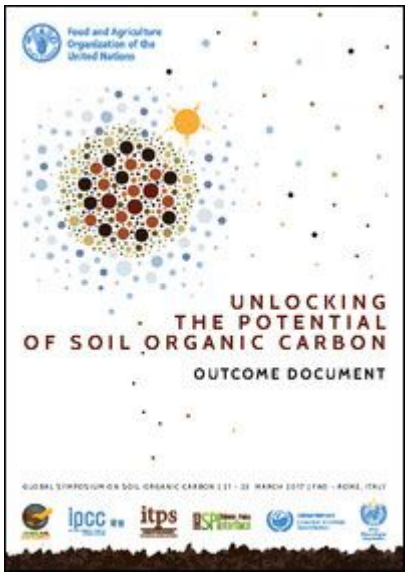
✓ GSOC'17



Global Symposium on Soil Organic Carbon

Over 450 participants among which scientists and practitioners working in related fields, from 111 countries and all geographical regions gathered together for the Global Symposium on Soil Organic Carbon, held from 21 to 23 March 2017 at FAO HQ, Rome.

http://www.fao.org/about/meetings/soil-organic-carbon-symposium/en/

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what have been done?

- Establishment of the Intergovernmental Technical Panel on Soils
- Submission of the proposal for a UN World Soil Day (5 December) and the International Year of Soils 2015
- Production of the Status of the World's Soil Resources report
- Establishment of Regional Soil Partnerships
- **Development of capacities in developing countries on digital soil mapping**
- **Establishment of national soil information systems**

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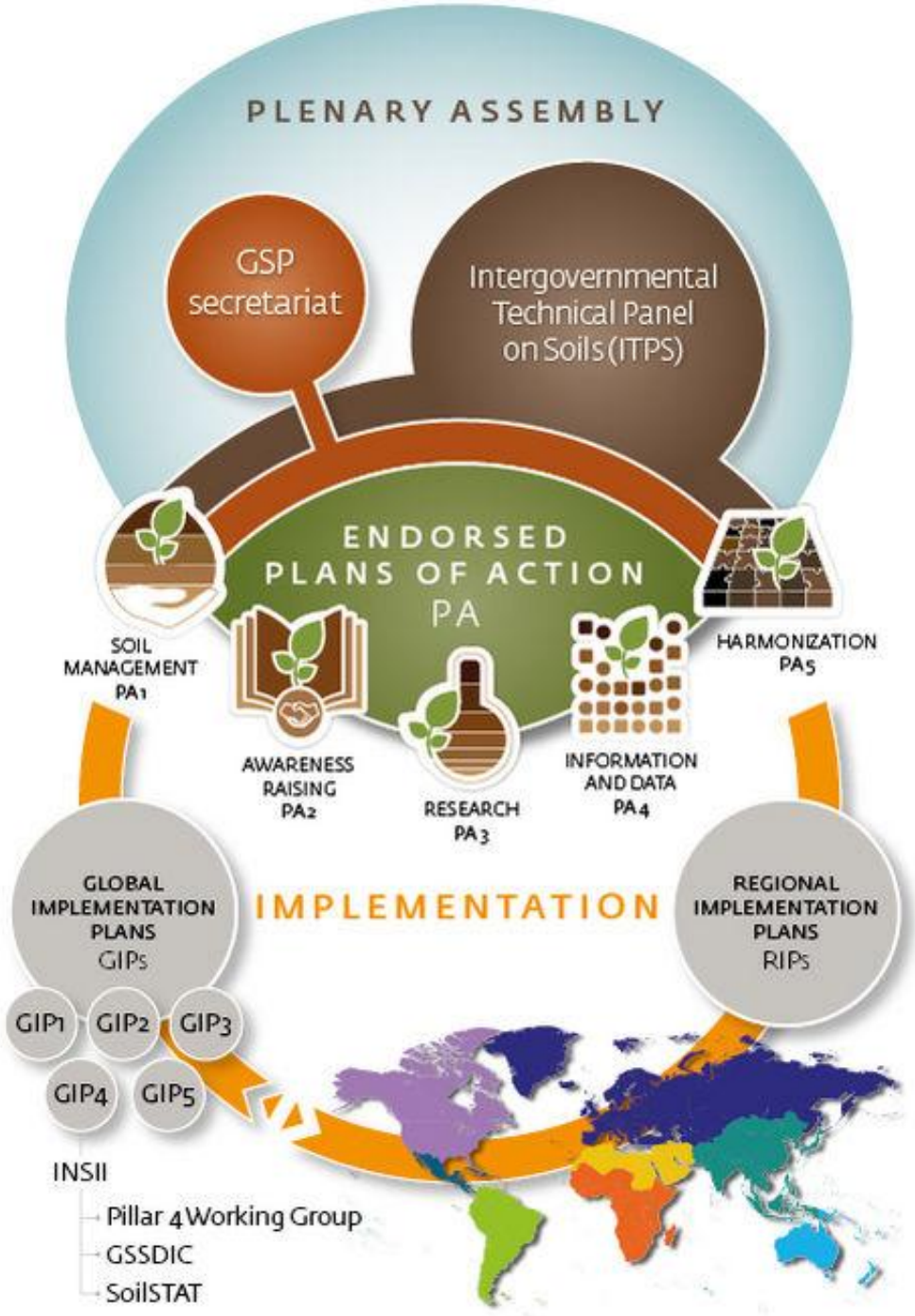
Pillar 4

Capacity development programme on soil information is one of the main activities of **PILLAR 4**.



GSP Pillars

The mandate of the GSP is to improve governance of the limited soil resources of the planet in order to guarantee **agriculturally** productive soils for a food secure world,

In order to achieve its mandate, the GSP addresses five pillars of action to be

1- Soil management
2- Awareness raising
3- Research
4- Information and data
5- Harmonisation

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Pillar 4

Aims to enhance the quantity and quality of soil data and information: data collection (generation), analysis, validation, reporting, monitoring and integration with other disciplines

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GSP - Capacity Development

The aim of this capacity development programme is to introduce **recent concepts and techniques of DSM** to soil scientists/staff who work at national soil science institutes in soil mapping related activities. This should reflect on **developing and updating national and regional soil information.**

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Background - GSOCMap

The GSP is currently tasked to provide support on soil carbon issues. FAO and the GSP Secretariat were approached by the United Nations Convention to Combat Desertification (**UNCCD**) Secretariat to share information about the GSP and the possible pathways to contribute to improving **soil carbon** information and data.

Background - GSOCMap

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GLOBAL SOIL

itps
INTERGOVERNMENTAL TECHNICAL PANEL ON SOILS

UNCCD

IPCC
INTERGOVERNMENTAL PANEL ON climate change

ipbes
Science and Policy for People and Nature

During the 5th Session of the GSP's Intergovernmental Technical Panel on Soils (**ITPS**) held in March 2016, **collaboration** between **ITPS,** the Science Policy Interface (SPI) of the **UNCCD**, the Intergovernmental Platform on Biodiversity and Ecosystem Services (**IPBES**), and the Intergovernmental Panel on Climate Change (**IPCC**) was discussed.

GSP/ITPS were requested to conduct a global SOC assessment based on country-level spatial soil data sets, combined to a new global SOC map (GSOCMap).

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Background - GSOCMap

- Request from the UNCCD to ITPS to prepare a **Global Soil Organic Carbon** map as a contribution to the SDG process (indicator 15.3.1).
- Part of the ongoing activities to establish the **Global Soil Information System** under the Pillar 4.
- Need to empower member countries to develop their own national soil information using state of the art techniques/methods.
- Crucial need to make **SOC baseline** available considering the dynamic nature of soils.

Dear Focal points, Dear INSII members, **February,, 2017**

With the hope that you have had a good start of the year, we would like to inform you about the following.

The recent FAO's Committee on Agriculture (http://www.fao.org/3/a-mr949e.pdf) supported the establishment of the Global Soil Information System and the preparation of the Global Soil Organic Carbon map by December 2017. This was then confirmed by the 155th session of the FAO Council in December 2016 (http://www.fao.org/3/a-ms339e.pdf).

The preparation of the Global Soil Organic
the Intergovernmental Technical Panel on S
Interface of the UNCCD to support them in t

The GSOCMap will be prepared following a
will produce their own national Soil Organic
specifications (this was developed with men
of Soil Information Institutions under
partnership/resources/highlights/detail/en/c/
prepared during the INSII workshops and v
the 5th GSP Plenary Assembly in June 2017

This bottom-up approach will allow many co
methods and tools for deriving soil informati
job training activities are planned by the Sec

The challenging goal is to deliver this pr
December 2017.

We would be grateful to obtain your feedback on the following issues:

- Your country could produce the map without any support from the Secretariat;
- Your country requires support in terms of training/capacity development on new methods/tools;
- Your country will require further assistance for preparing this map;
- Your country will not be able/willing to respond to this request.

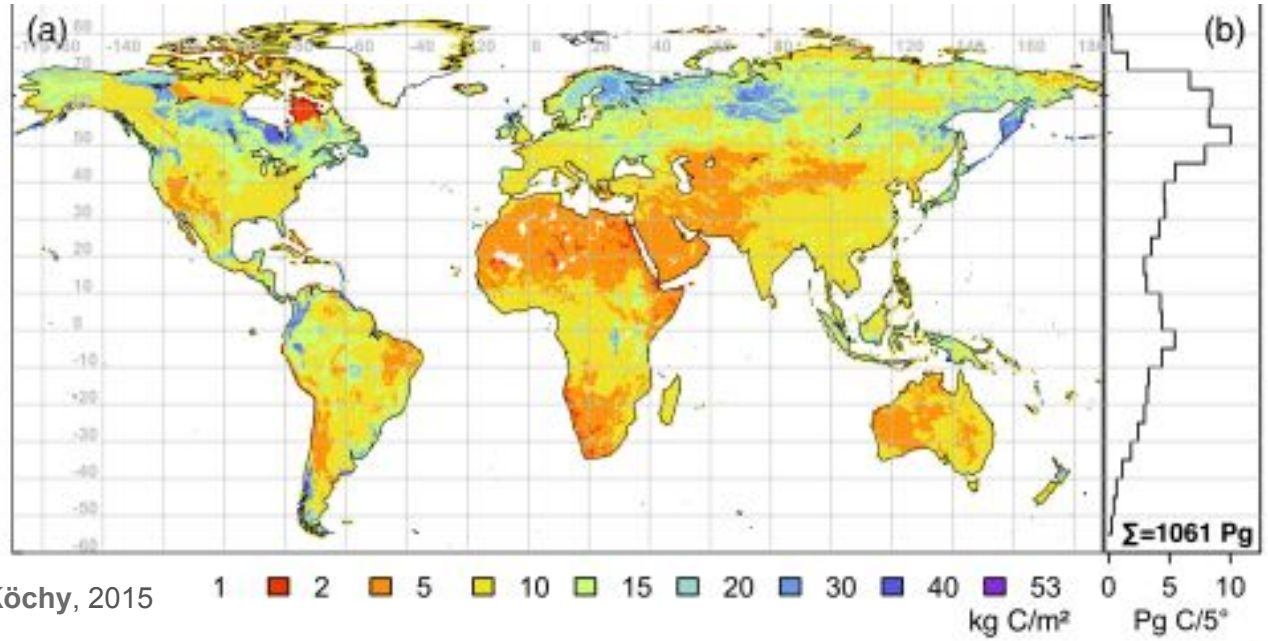
We really hope we could count with your great support and participation in this very important task.

This activity is very much linked to the upcoming Global Symposium on Soil Organic Carbon (http://www.fao.org/about/meetings/soil-organic-carbon-symposium/en/).

.. training/capacity development

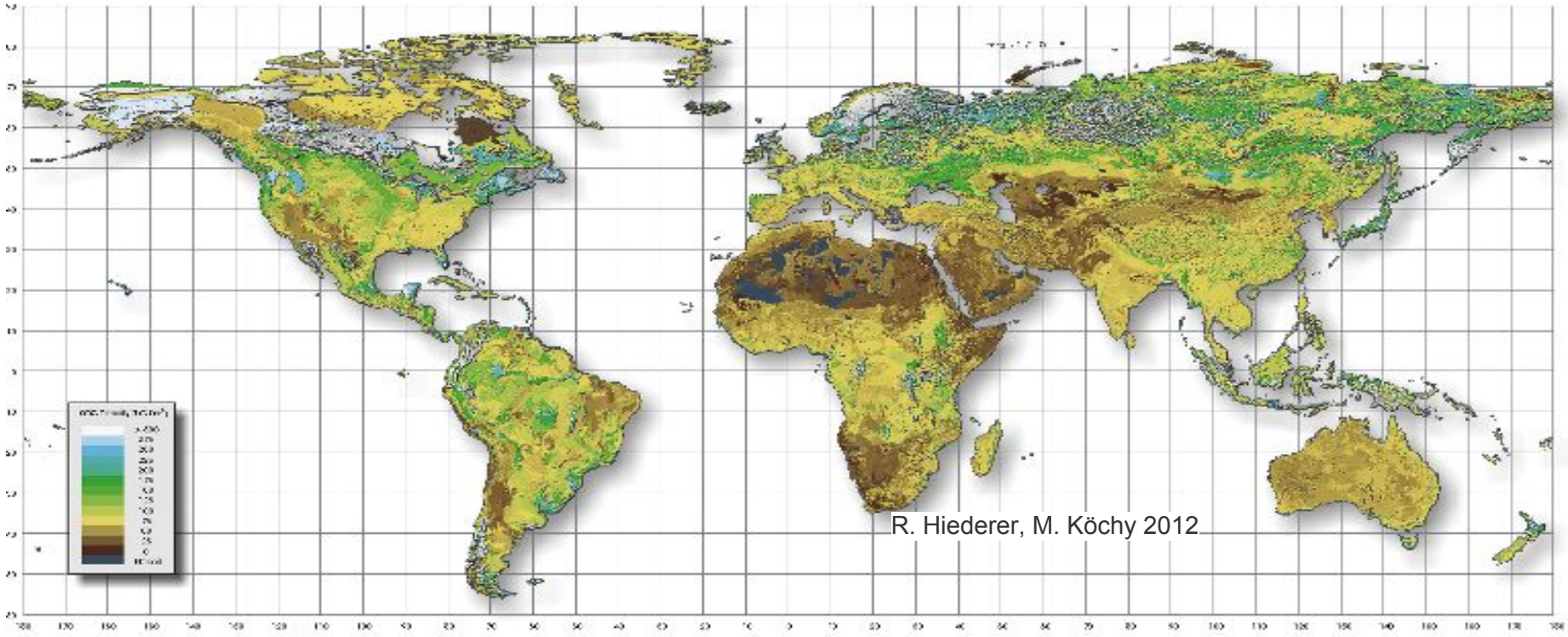
- Your country could produce the map without any support from the Secretariat;
- Your country requires support in terms of training/capacity development on new methods/tools;
- Your country will require further assistance for preparing this map;
- Your country will not be able/willing to respond to this request.

What is the current status of spatial information about SOC



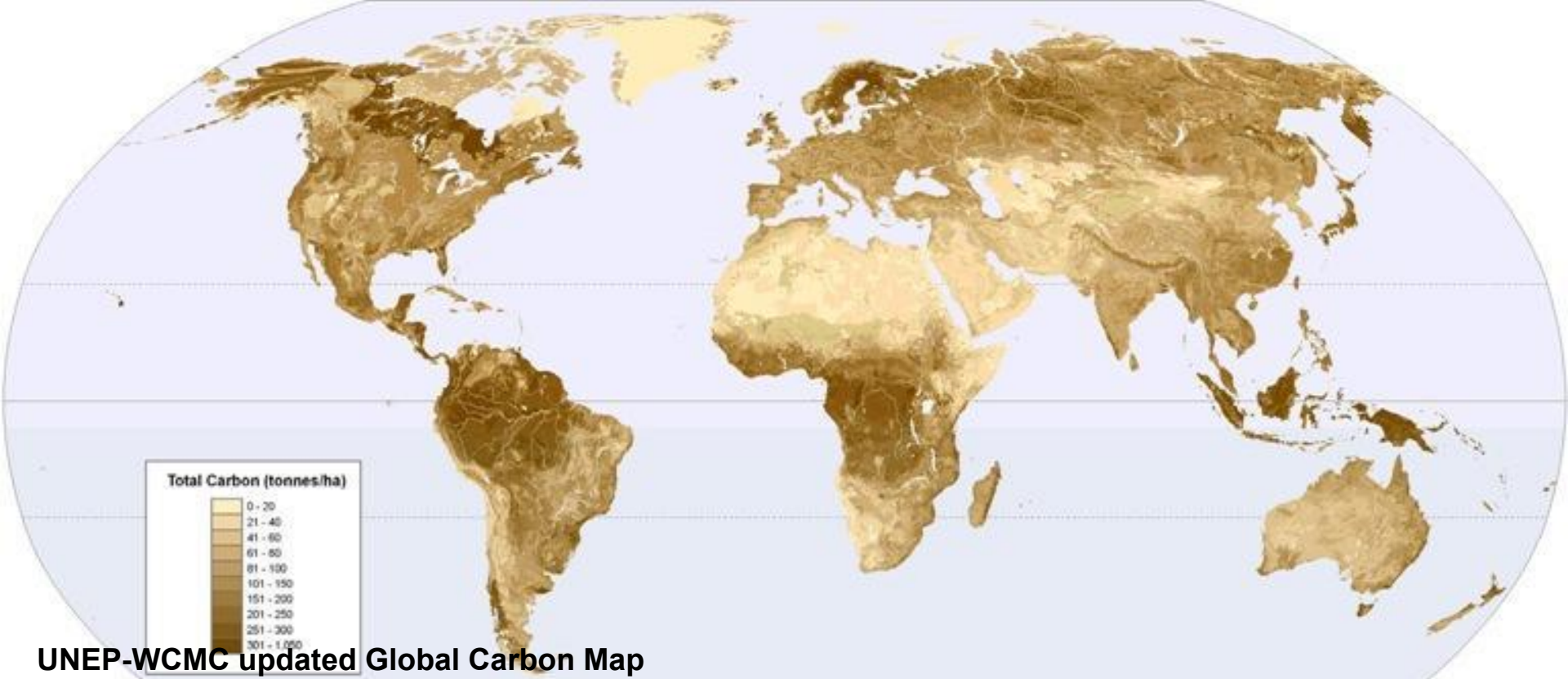
Köchy, 2015

Figure 1. Global stock **(a)** and mass **(b**, per 5° latitude) of organic carbon in the top 1 m of the terrestrial soil calculated from HWSD v.1.1-adjusted.



Estimates of Global Soil Organic Carbon Density from amended Harmonized World Soil Database (*t C ha^{-1}*)

According to the data recorded in the **HWSD** the total SOC stock were computed separately for the topsoil layer (0 - 30cm) and the subsoil layers (30 - 100cm). Where the soil depth was less than 100cm stocks were computed to that depth. The SOC stocks thus computed for the two layers were then combined to provide an estimate of SOC stock in t ha-1 to a nominal depth of 1m

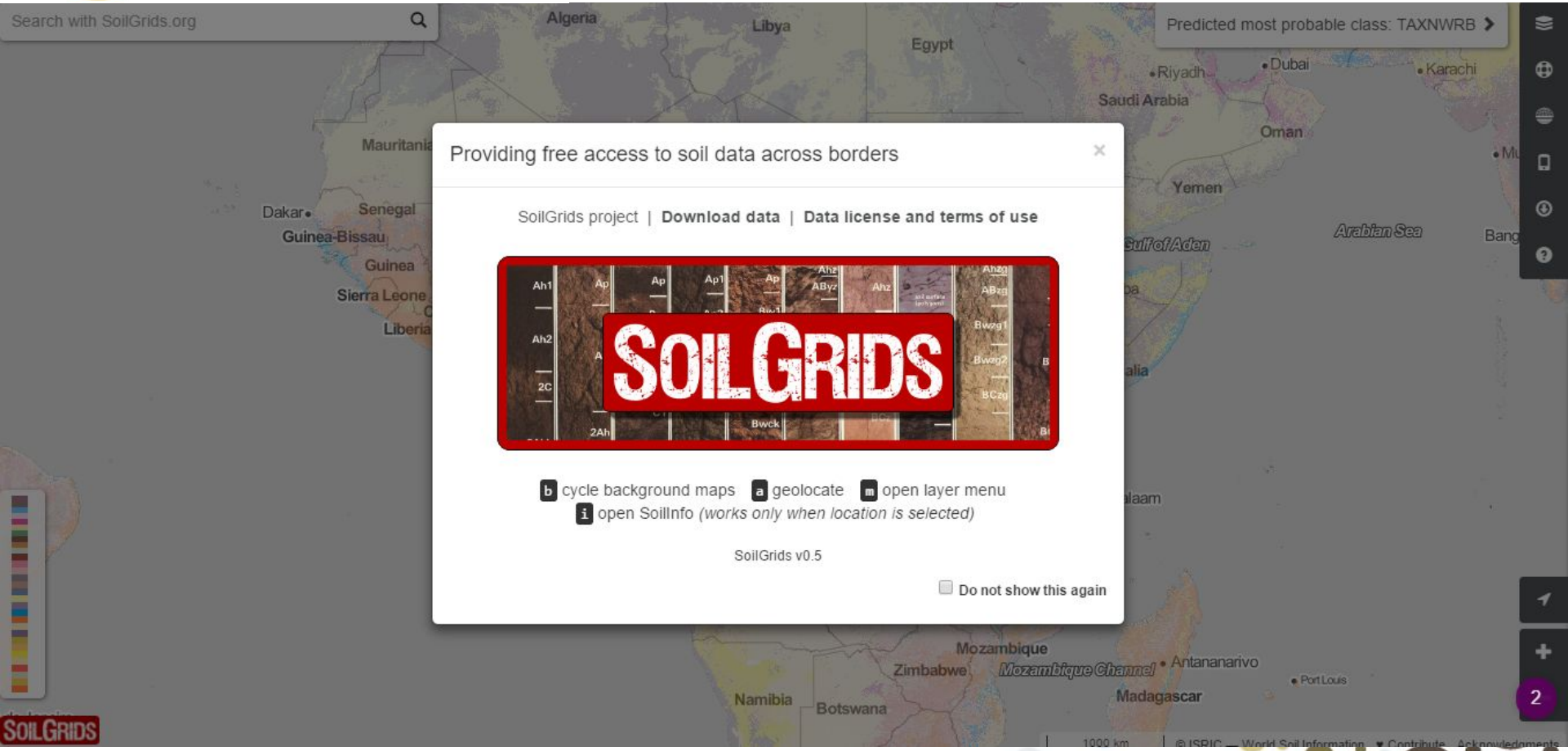


UNEP-WCMC updated Global Carbon Map

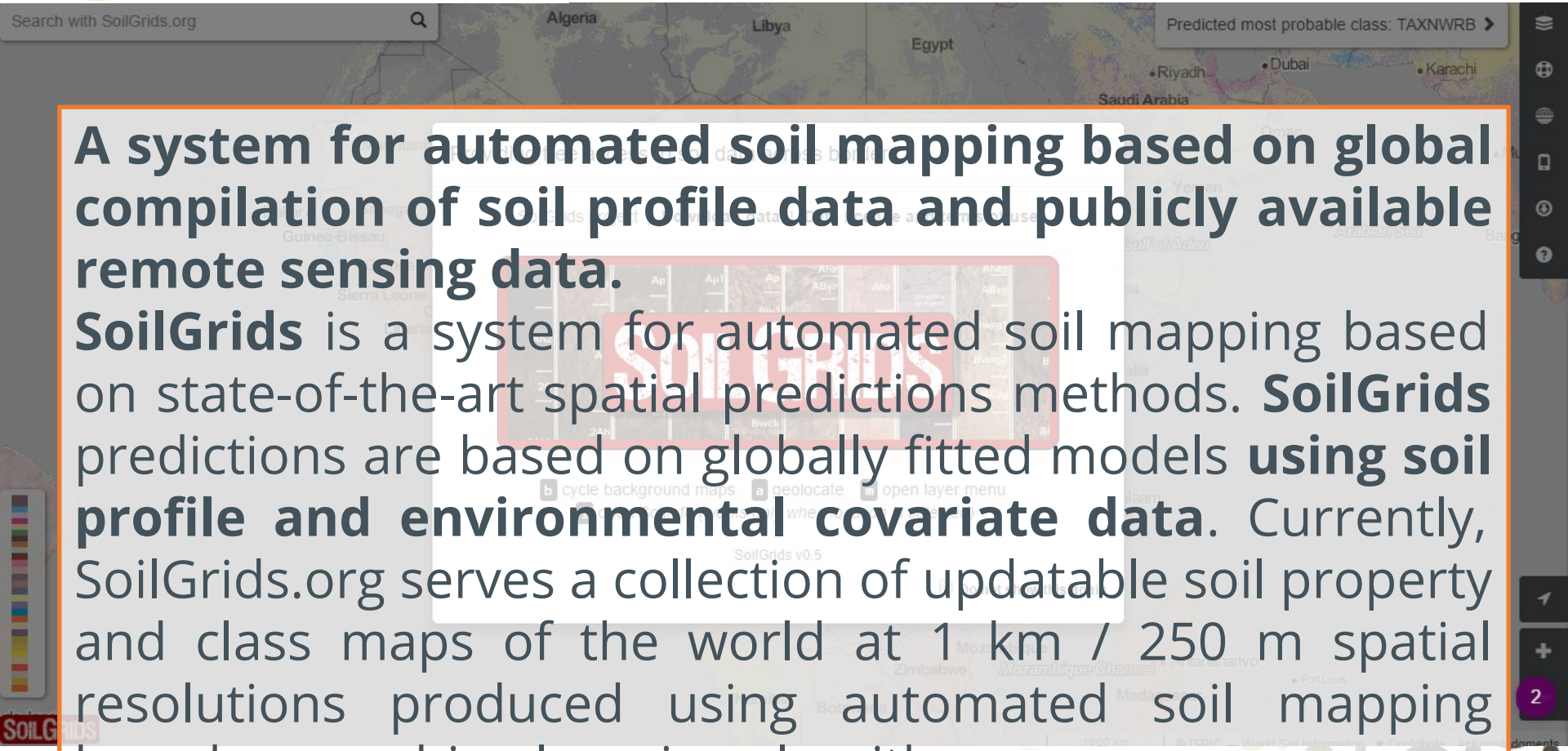
The updated global carbon map improves upon the rather coarse data on soil carbon (IGBP-DIS 2000) that were used in UNEP's Carbon and biodiversity: a demonstration atlas (Kapos et al. 2008). A global map of estimated soil carbon stocks to 1m depth was generated **based on the soil organic carbon and bulk density values included in the HWSD** (FAO/IIASA/ISRIC/ISS-CAS/JRC 2009). The data in the HWSD were adjusted and missing data filled in where possible. It therefore provides a better tool for visualising the distribution of carbon stocks, which are dominated by soil stocks in some parts of the world such as boreal peatlands and tropical swamps.

Scharlemann, J.P.W., R. Hiederer, V. Kapos and C. Ravilious (2011) UN Environment World Conservation Monitoring Centre Updated Global Carbon Map.

ISRIC
World Soil Information

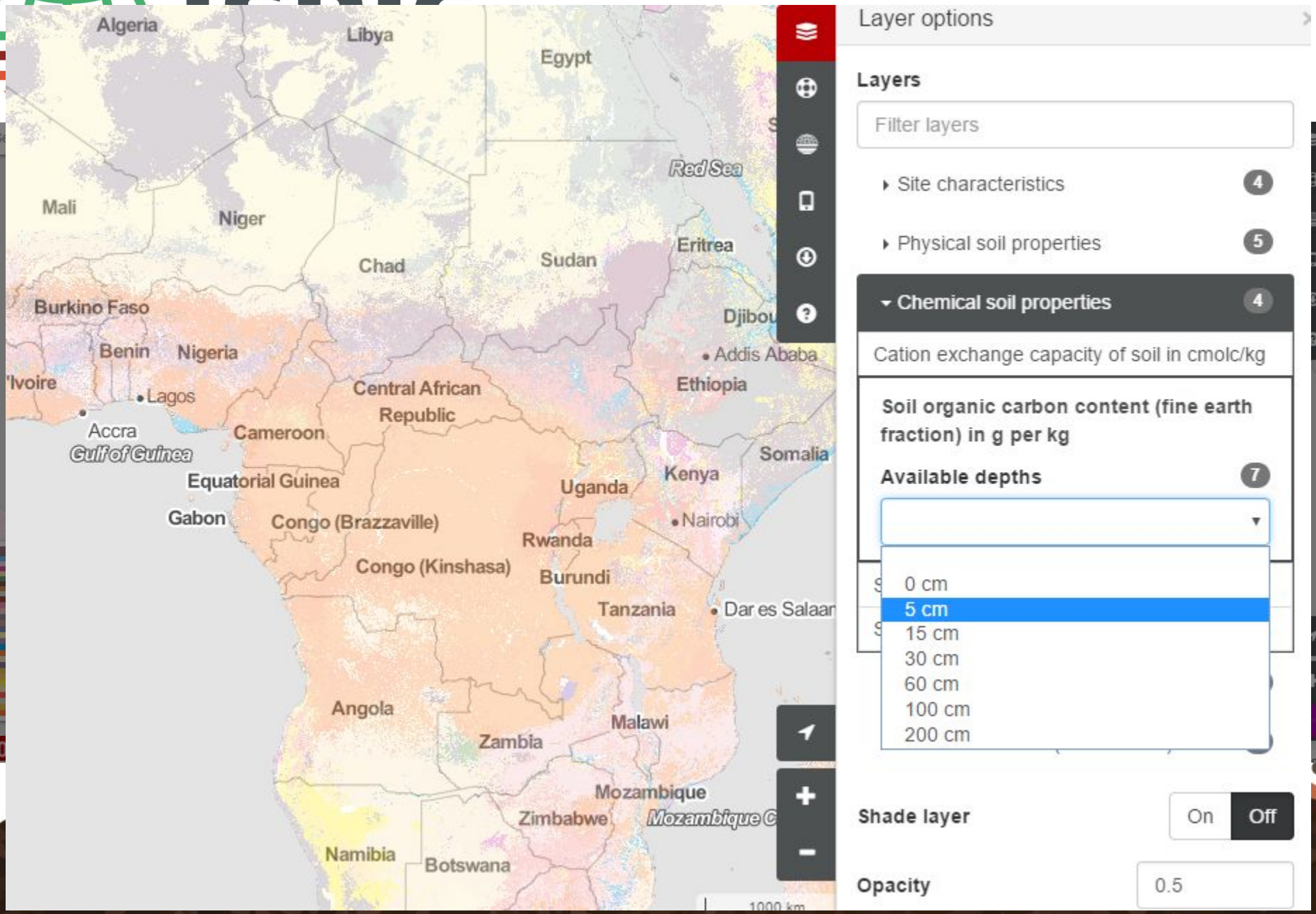


ISRIC
World Soil Information



A system for automated soil mapping based on global compilation of soil profile data and publicly available remote sensing data.

SoilGrids is a system for automated soil mapping based on state-of-the-art spatial predictions methods. **SoilGrids** predictions are based on globally fitted models **using soil profile and environmental covariate data**. Currently, SoilGrids.org serves a collection of updatable soil property and class maps of the world at 1 km / 250 m spatial resolutions produced using automated soil mapping based on machine learning algorithms.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Ethiopia
Lagos
Central African Republic
Accra
Cameroon
Gulf of Guinea
Somalia
Kenya
Equatorial Guinea
Uganda
Gabon
Congo (Brazzaville)
Nairobi
Rwanda
Congo (Kinshasa)
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Layer options
Layers
Filter layers
Site characteristics 4
Physical soil properties 5
Chemical soil properties 4
Cation exchange capacity of soil in cmolc/kg
Soil organic carbon content (fine earth fraction) in g per kg
Available depths 7
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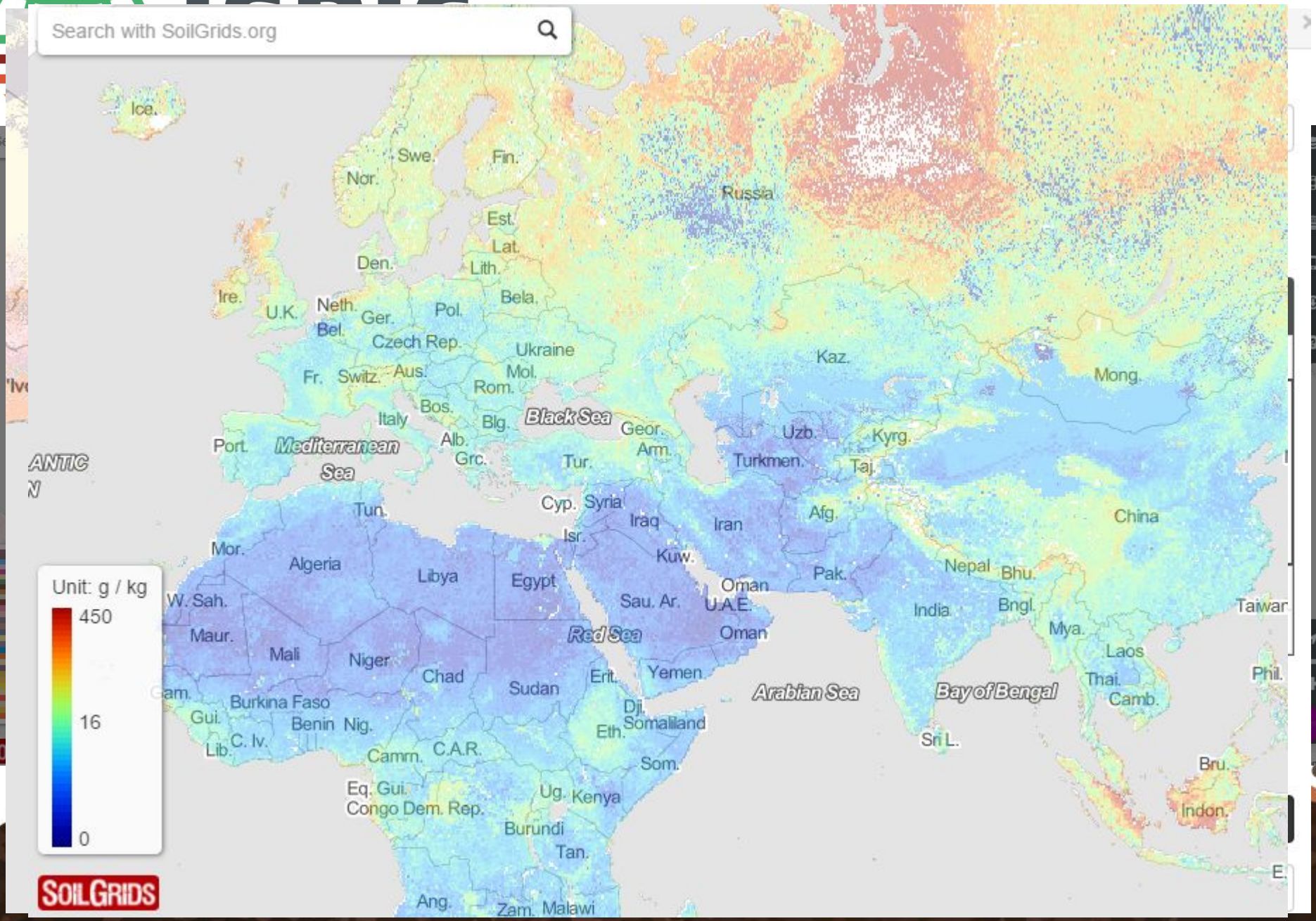
15 cm
30 cm
60 cm
100 cm
200 cm
Shade layer
On
Off
Opacity
0.5


Search with SoilGrids.org
Unit: g / kg
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SoilGrids
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Taiwan
Maur.
Red Sea
Oman
Mya.
Mali
Niger
Laos
Chad
Sudan
Erit.
Yemen
Thai.
Phil.
Arabian Sea
Bay of Bengal
Burkina Faso
Dji.
Camb.
Gui.
Benin
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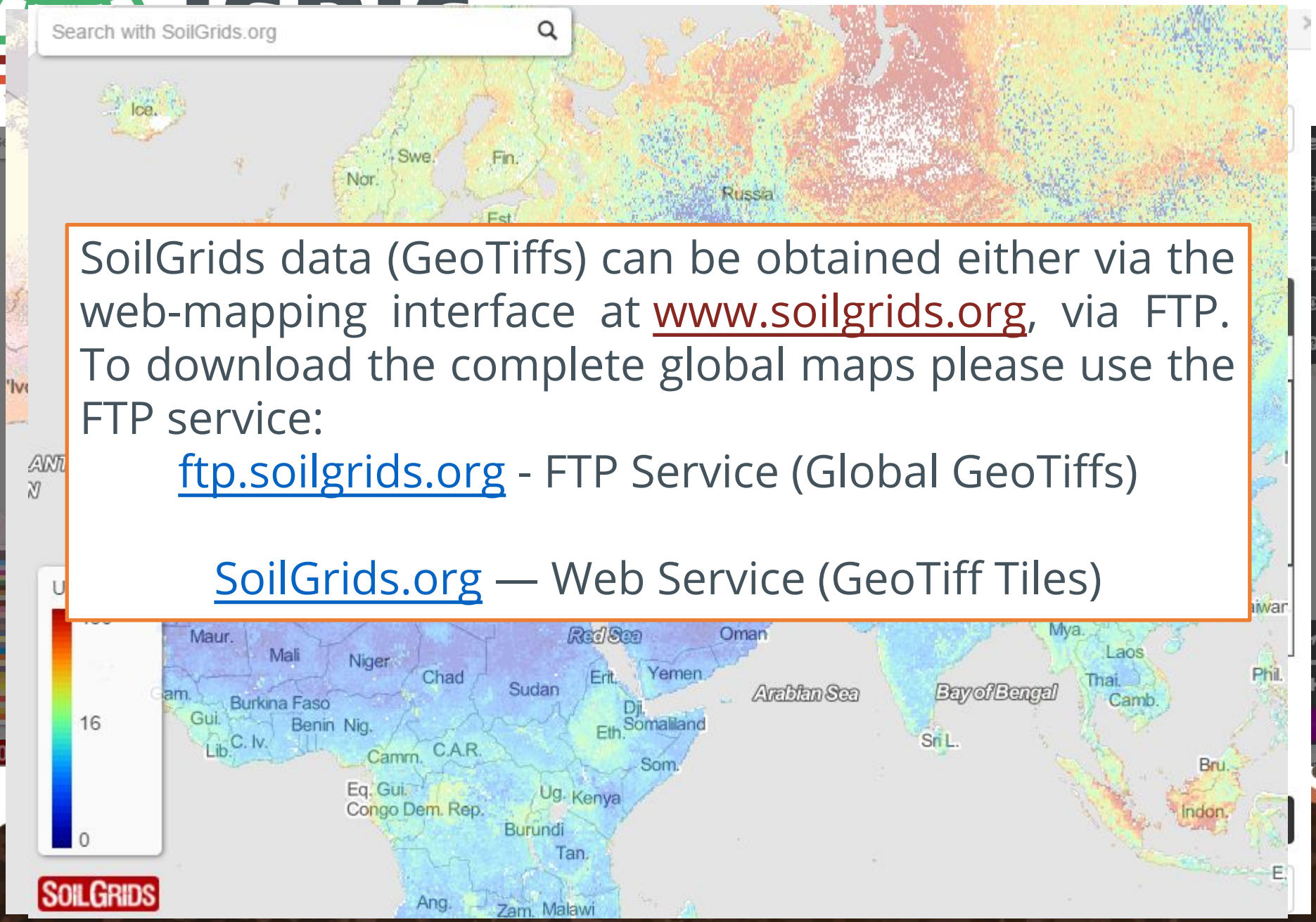

SoilGrids data (GeoTiffs) can be obtained either via the web-mapping interface at www.soilgrids.org, via FTP. To download the complete global maps please use the FTP service:

ftp.soilgrids.org - FTP Service (Global GeoTiffs)

SoilGrids.org — Web Service (GeoTiff Tiles)

Global SOC Stocks

SOC stock values [Pg]	Depth [cm]						
	0-30	30-100	0-100	0-200	0-300	>100	Accuracy
Batjes (1996)			1462-1548	2376-2456			WISE (4353 soil profiles) + DSMW
Global Soil Data Task Group (2000)			1550				
Jobbagy and Jackson (2000)			1502	1993	2344		2721 soil profiles grouped by biome
Henry et al. (2009)			1598	2521			DSMW
Henry et al. (2009)			1850				HWSD
Hiederer et al. (2011)			1455				HWSD v1.1
Schlesinger (1997, 2013)			1500	2500			
Scharlemann et al. (2014)			1461				Review of publications 1951 and 2011
Shangguan et al. (2014)			1455	230 cm: 1923			DSMW
Koechy et al (2015) – HWSD			1062				adjusted BD for organic soils
Koechy et al. (2015) final			1325			3000	

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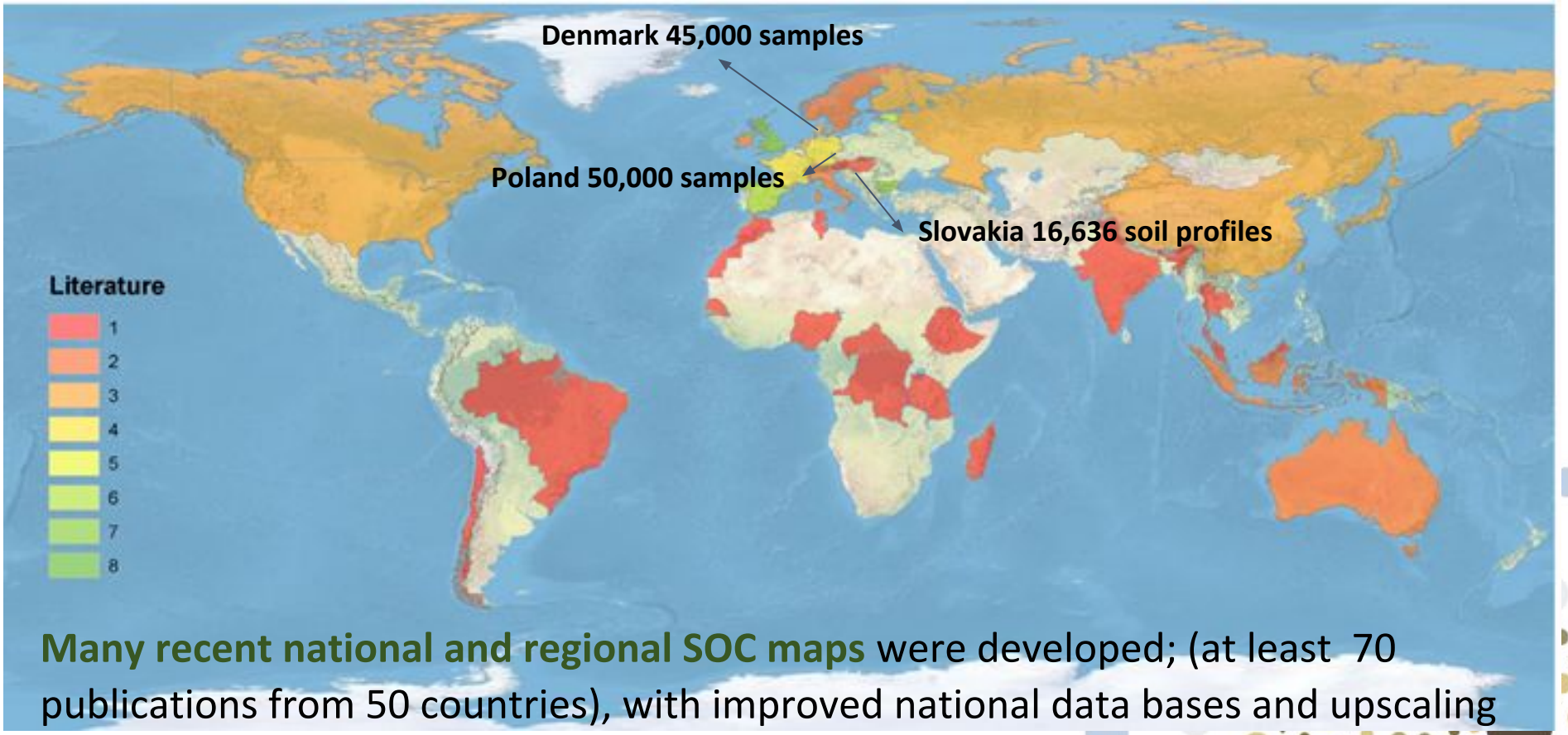
NATIONAL EFFORTS



Many recent national and regional SOC maps were developed; (at least 70 publications from 50 countries), with improved national data bases and upscaling models

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Develop a **global SOC map** by 5th Dec 2017

- Precise and reliable global view on soil organic carbon (SOC) is needed under different UN conventions and related processes
- Soil carbon is **key indicator** related to water and nutrient dynamics of soils, its decomposer activity, and the physical soil structure/stability.
- A combination of reliable national SOC estimates around the globe can provide a **new baseline** on the currently existing SOC density.

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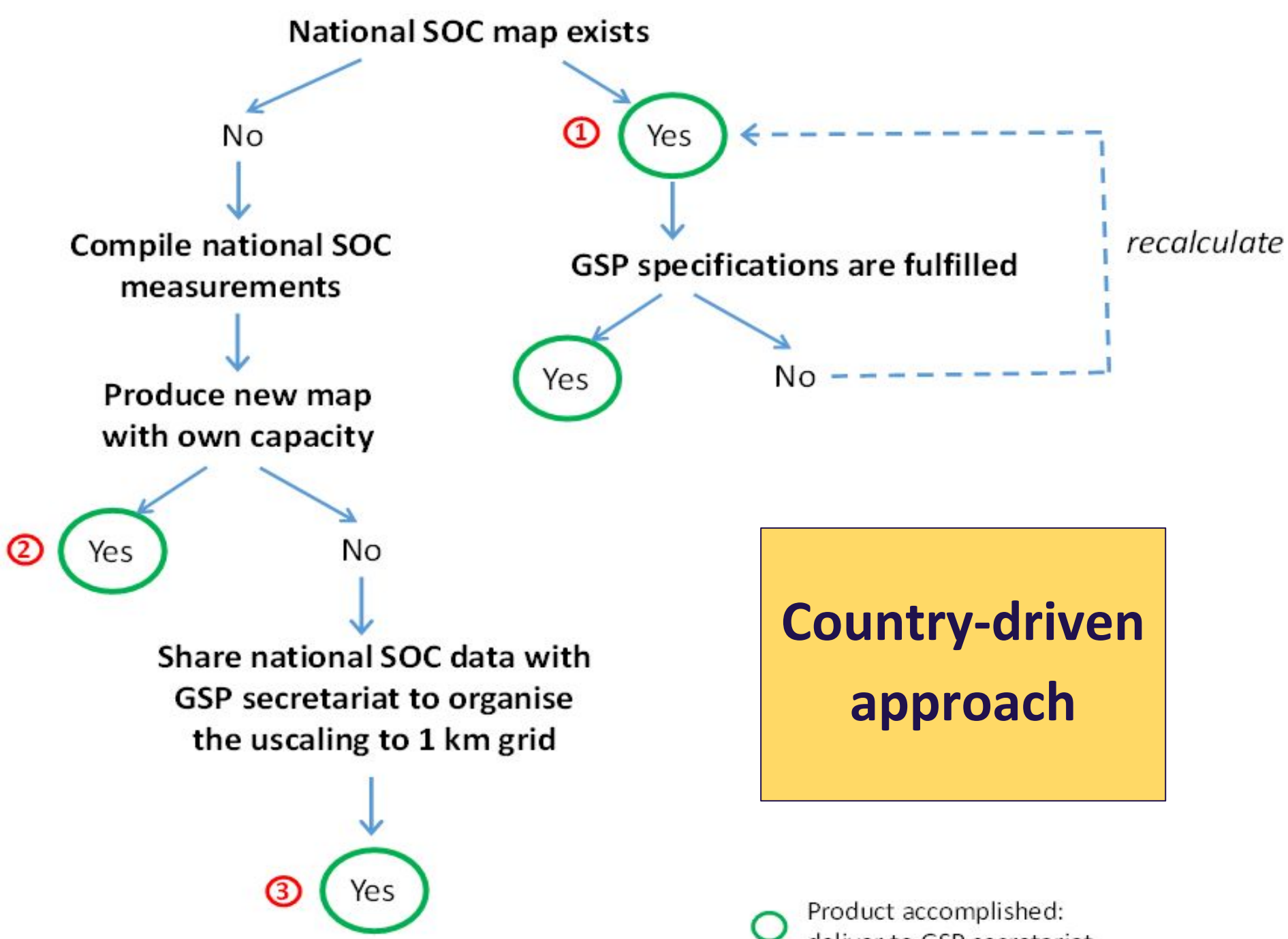
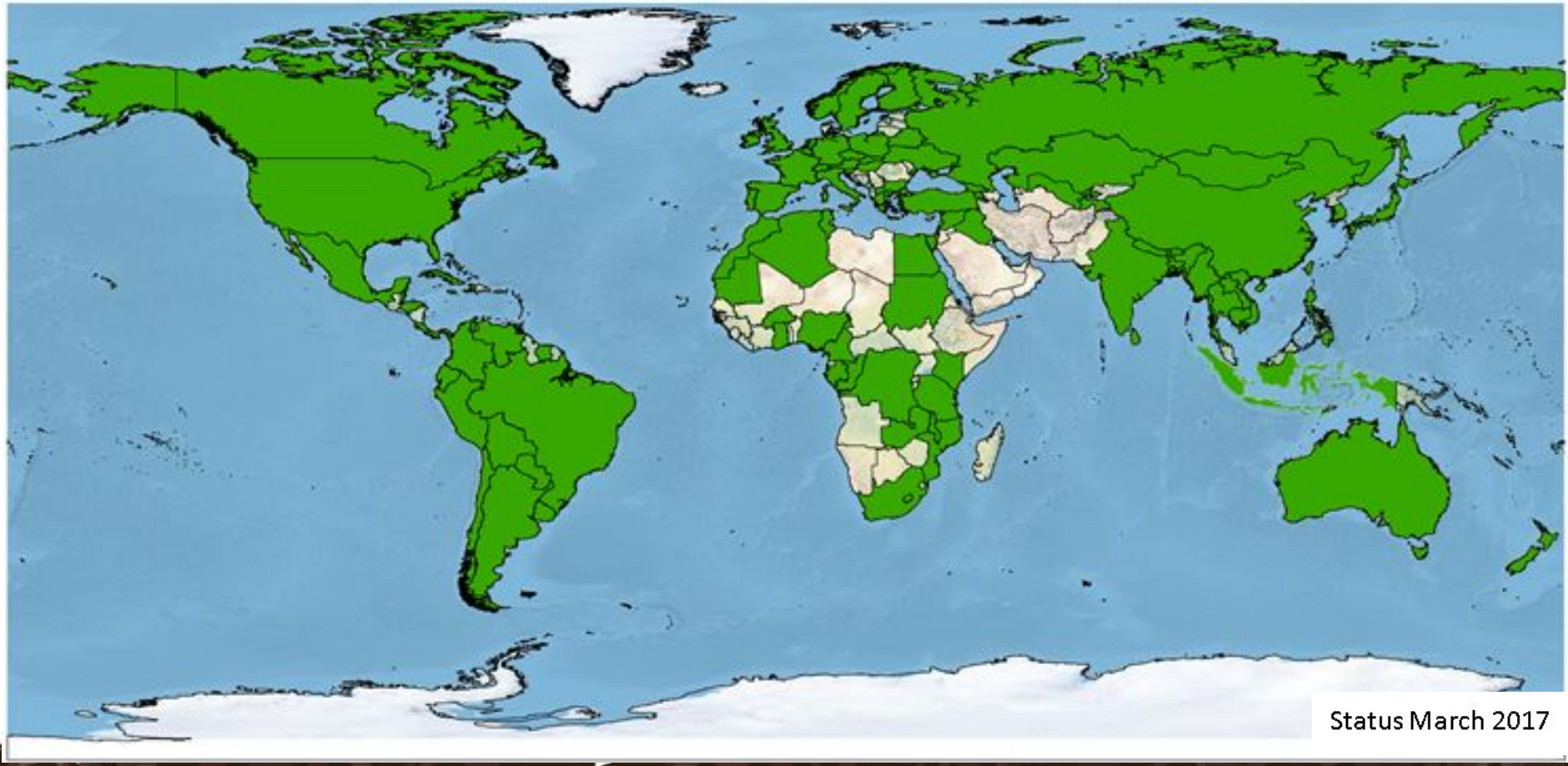
Develop a **global SOC map** by 5th Dec 2017

- **Country-driven approach**
- **Generate SOC soil grids** : use existing soil profile data and soil (polygon) maps, combined with digital soil mapping
- Build on UNFCCC/IPCC GHG definitions and reporting methods (see GSP-Guideline, 0-30 cm; (if possible subdivide depth classes; GlobalSoilMap.NET Specs: 0-5 cm, 5-15 cm, 15-30 cm, 30-60 cm, 60-100 cm and 100-200 cm)
- Build on **existing national capacities** and extend these
- **Develop first indicator for the Global Soil Information System (GSIS) - GSP demonstration project**


National SOC map exists
No
Compile national SOC measurements
Produce new map with own capacity
② Yes
No
Share national SOC data with GSP secretariat to organise the uscaling to 1 km grid
③ Yes
① Yes
GSP specifications are fulfilled
Yes
No
recalculate
Country-driven approach
Product accomplished: deliver to GSP secretariat

GSOC Map: National contact points and INSII



INSII: **International** Network of Soil Information

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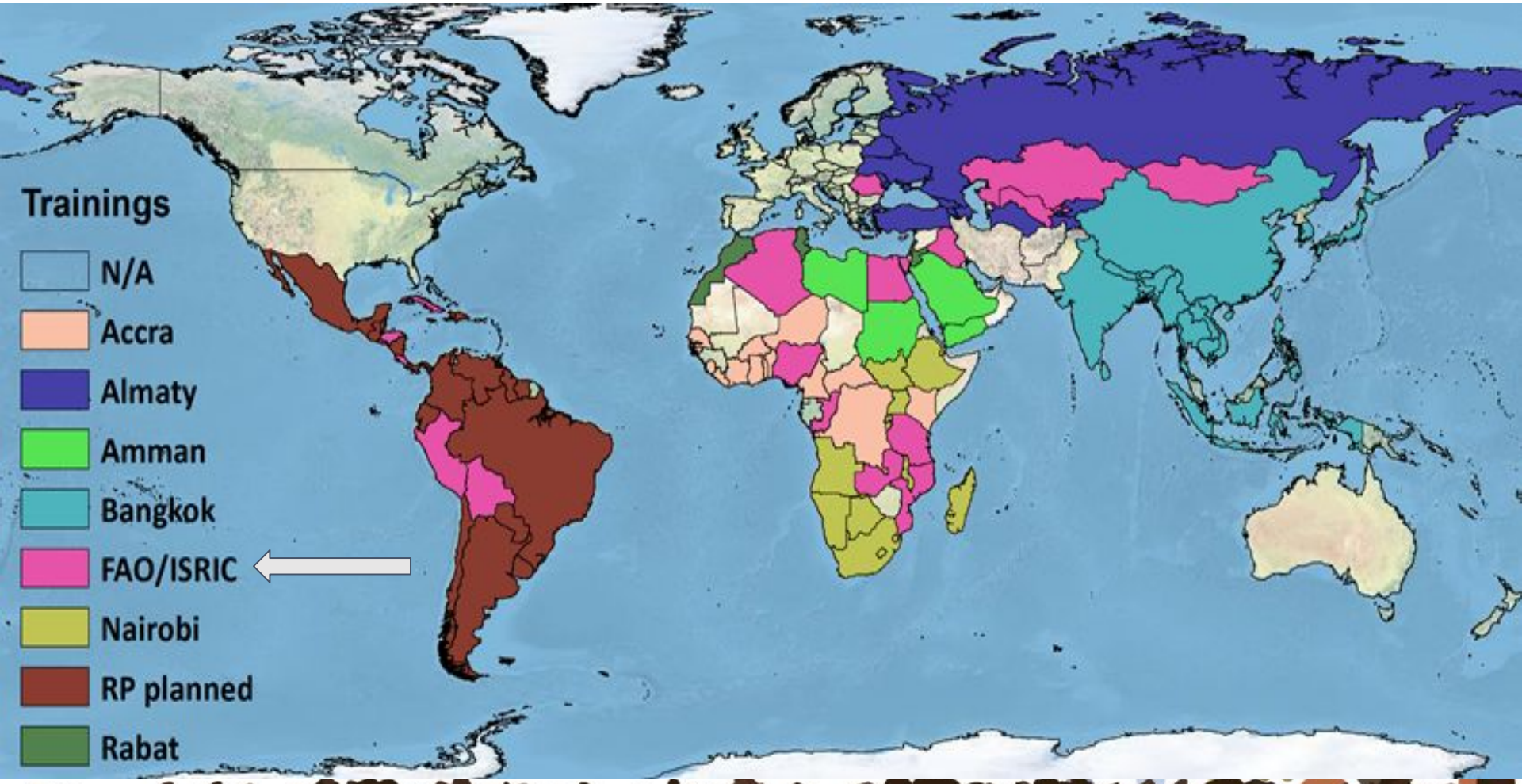
GSOC Map: Capacity development



BANGKOK 24-29 APRIL 2017

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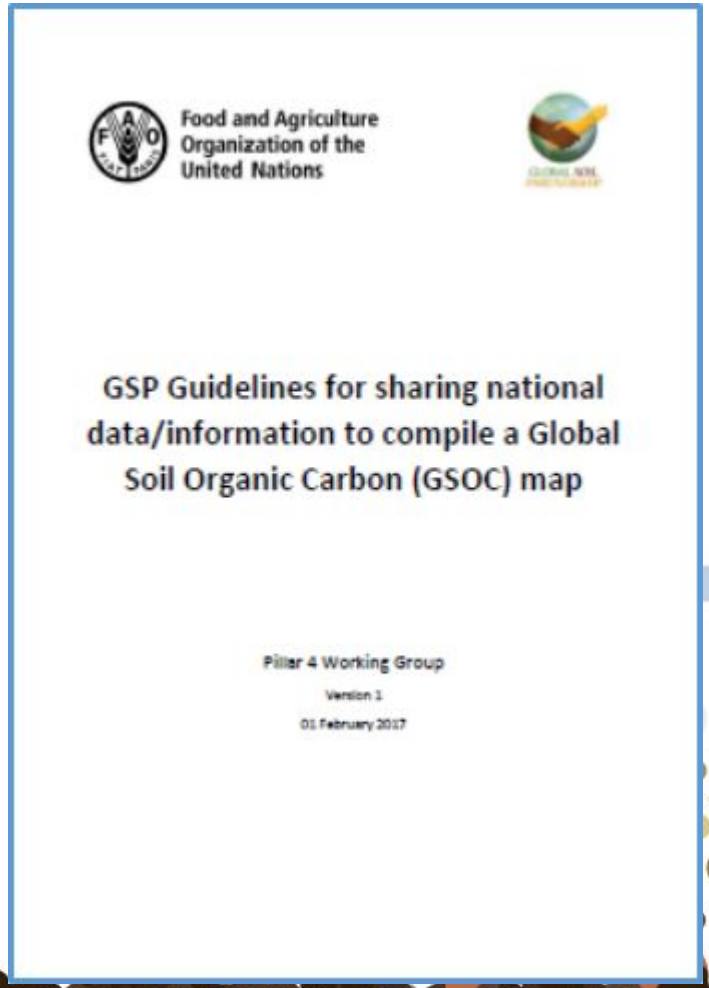
GSOCMap Specifications

- **Guideline:** detailed specifications
- 1 km grid (global raster)
- **0-30 cm**, forest floor and peat <100
- Metadata (input data, upscaling)
- **Spatial mapping:** conventional upscaling and DSM
- **Uncertainties (quantitative, qualitative)**
- **Cookbook:** detailed methods and working steps, especially data preparation and DSM



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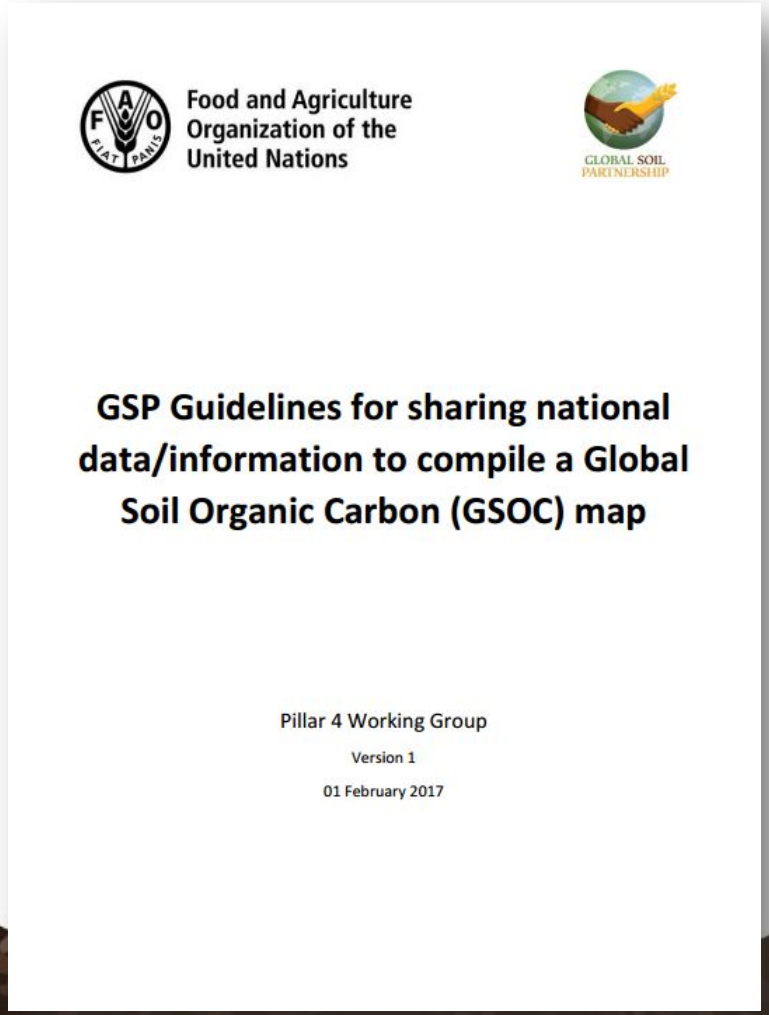
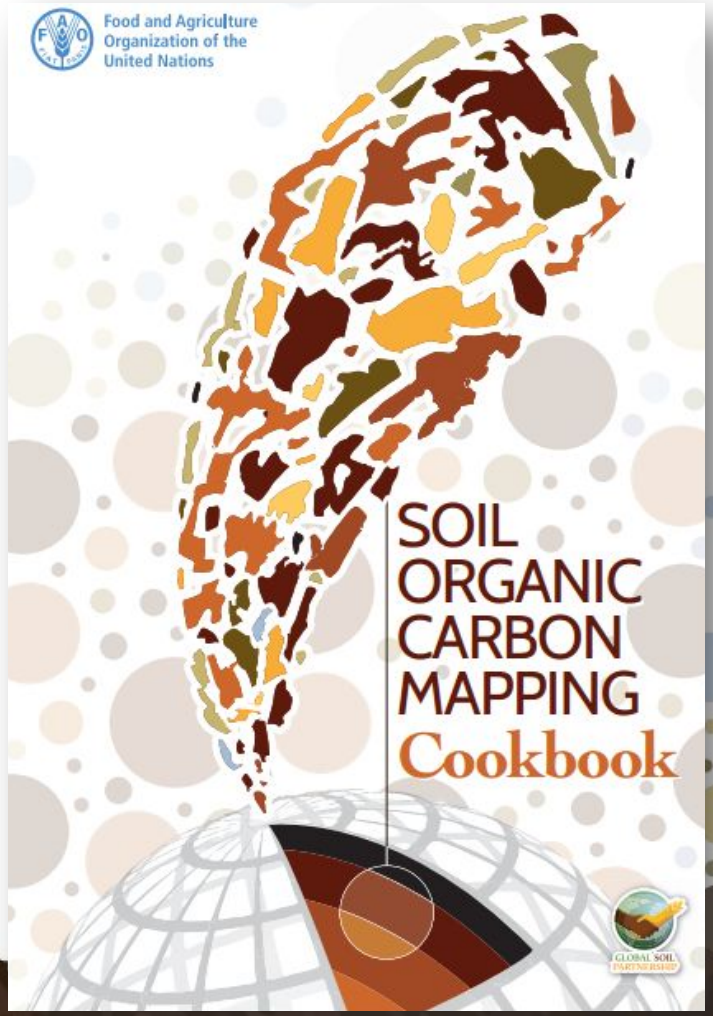
Two Key Documents





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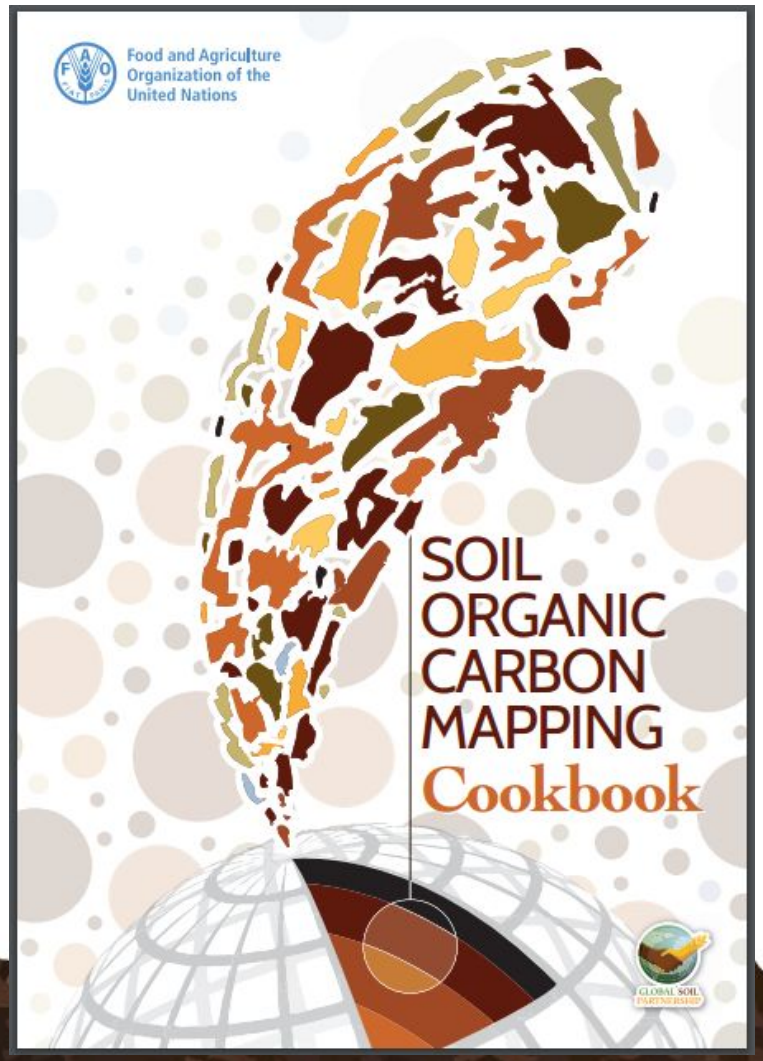
SOC Mapping Cookbook



The cookbook provides generic methodologies and the technical steps to produce a SOC map. This includes step-by-step guidance for developing 1 km grids for SOC stocks, as well as for the preparation of local soil data, the compilation and pre-processing of ancillary spatial data sets, upscaling methodologies, and uncertainty assessments.

Guidance is mainly specific to soil carbon data, but also contains many generic sections on soil grid development due to its relevance for other soil properties.

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SOC Mapping Cookbook

The main focus of the cookbook is on the upscaling of SOC stocks in the GSOCMap and as such it supplements the “GSP Guidelines for sharing national data/information to compile a Global Soil Organic Carbon (GSOC) map”. It provides technical guidelines to prepare and evaluate spatial soil data sets to:

- Determine SOC stocks from local samples to a target depth of 30 cm;
- Prepare spatial covariates for upscaling; and
- Select and apply the best suitable upscaling methodology.

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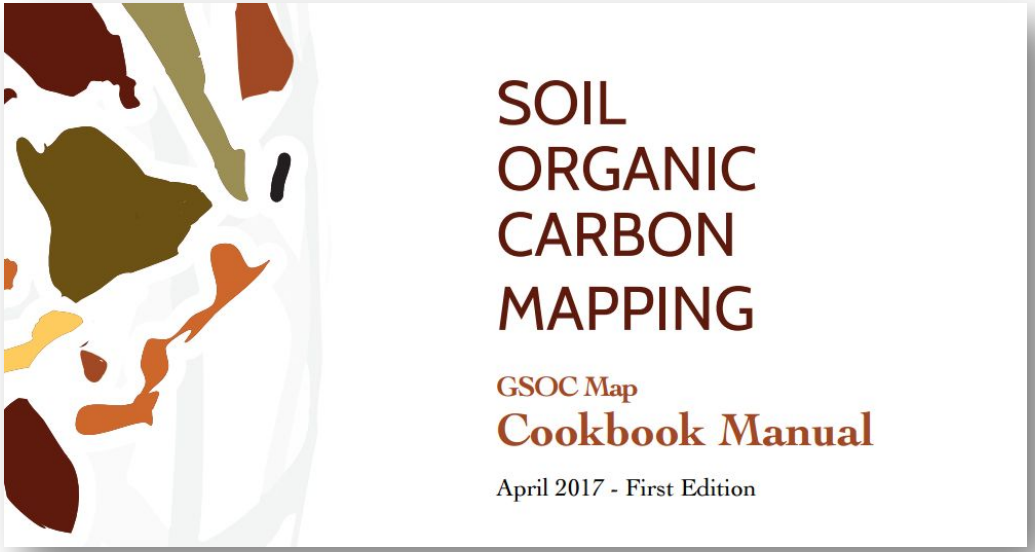

Download

http://www.fao.org/3/a-bs901e.pdf or

https://goo.gl/hu3zWt

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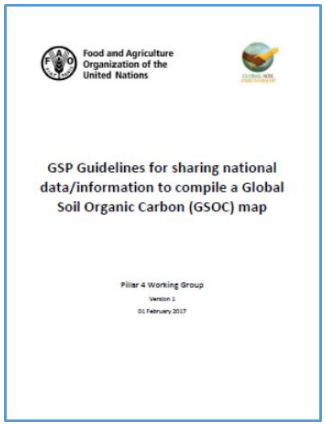
Specifications

http://www.fao.org/3/a-bp164e.pdf



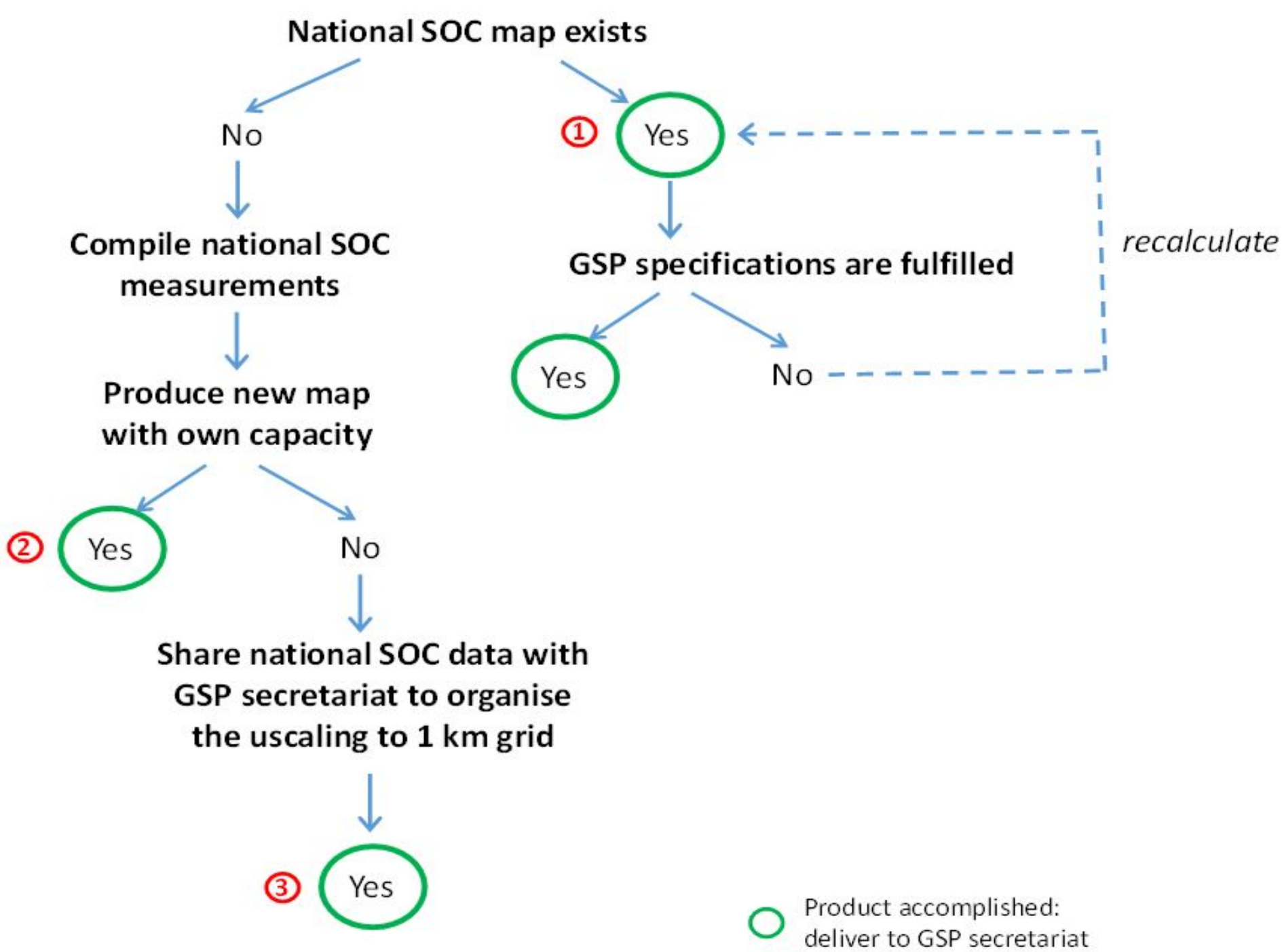
Overview GSOC map specifications

A global layer of harmonized national soil carbon stock maps will be developed.

1. SOC stock maps

Spatial resolution	Depth	Unit	Temporal dimension
1 km	**0-30 cm (all soils)** Optional extensions: - 30-100 cm (peat) - Litter (forest)	Soil carbon [tons/hectare]	Nationally defined
Local soil data (point sources)	– Collection of sampling points (soil profiles or auger) – SOC stock calculations based on soil carbon (measured), bulk density and stones (both estimated or measured) – re-calculation or addition of horizons/layers to 30 cm depth		
IPCC land use categories*)	Mandatory: cropland, grassland and forests (IPCC (2006) recommends to include both managed and unmanaged areas) Optional: managed and unmanaged wetlands (e.g. natural open bogs) Excluded: settlement, wetlands (open waters), and other lands (e.g. bare rock and vegetation-free desert)		
Upscaling	1) Conventional GIS upscaling 2) Digital soil mapping (DSM) DSM is consistent with Pillar 4 coarse resolution soil grids (recommended)		
Uncertainties	a) Qualitative assessment (in the case of 1) b) Quantitative, e.g. standard deviation (in the case of 2)		

*) Definitions see IPCC (2006), Volume 4, Chapter 3.2


National SOC map exists
No
Compile national SOC measurements
Produce new map with own capacity
Yes
No
Share national SOC data with GSP secretariat to organise the uscaling to 1 km grid
Yes
Yes
GSP specifications are fulfilled
Yes
No
recalculate
Product accomplished: deliver to GSP secretariat

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1. Compile existing national SOC maps

Should countries already have national SOC maps which meet the specifications of this project, these may be shared for this global SOC mapping project. If a national SOC map exists, and if not all requirements are met, adjustments of the existing SOC map may be implemented if this is possible (e.g. recalculation according to target depth). Any other relevant national information about SOC-related evaluations, calculations and reports (e.g. SOC in UNFCCC reporting), shall be shared with the GSP secretariat as meta information. This includes methodological information (e.g. distribution of soil profiles; upscaling method) in order to allow an uncertainty assessment.

In countries where national SOC maps are not available or existing SOC maps do not meet the specifications, refer to approach 2:

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2. Countries may develop new or updated SOC maps

Countries which do not yet have a national SOC map, may develop such a map based on the specifications recommended here (see also Annex 2, Cookbook for SOC mapping, to be supplemented later). As mentioned under Ch. 6 (Benefits), and similar to approach 1, this would enable countries to derive national IPCC default values for SOC (i.e. typical SOC values for soil types, soil-climate-land cover types, or other stratification). Where needed, FAO, with the help of its national and regional offices, will attempt to bilaterally support such national activities.

If the in-country development of a SOC map is not possible (perhaps due to insufficient capacity), refer to approach 3:

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3. Countries are encouraged to share original national SOC measurements (point-locations: soil profiles or auger sampling) with the GSP secretariat

Typically, the measurement of SOC requires the sampling of soils in the field at a certain location ("point data" compared to map data, presented in the form of polygon maps or grids). In order to allow for a national SOC map, such point data require upscaling. Where no national capacity exists to conduct such an upscaling exercise, the original SOC measurements may be shared with the GSP secretariat which would then execute the upscaling in close cooperation with the national GSP-focal points and/or institutional data providers. Countries may decide whether shared soil profile data may enter the GSP Pillar 4 Tier 1 and/or Tier 2 soil profile databases or not.

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! If there are countries with a complete **lack of SOC measurements**, a sampling campaign may be conducted in representative soil types under typical land use. Due to the limited time available to produce the global SOC map, however, this cannot be done in a sufficiently representative manner.

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Data sources for SOC mapping

Data sources to produce SOC maps can be any relevant measurements on soil samples, i.e. data from soil augers or soil profiles. In most cases, these data are derived from previous field campaigns (legacy data: see also 3.3.5). Meta data about the available data sources include the following:

Specification 1: Share auxiliary information about the national data sources, e.g. type of sampling (soil profile or auger), density of sampling points in the country, sampling design (distribution and sampling depth/s), time of sampling (year), selection criteria (if subset of soil profiles is selected from a larger national database).

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Analytical methods to determine SOM and SOC

- Total soil carbon from dry combustion with higher temperatures (elementary analysis)
- Total soil organic matter (SOM) (dry combustion by Loss on Ignition)
- SOC from wet oxidation

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Specification 2: In order to estimate the quality of the global SOC map, as much metadata as possible are needed, for example about the SOC analysis method/s (for large data sets, most likely, different variants of soil analysis may apply)

- Examples: type of analysis (a, b, c or other); type of apparatus; temperatures used; in case of wet oxidation: method and variations*); sample treatment (storage conditions: frozen, air-dried, stored in a moist, cool storage, and storage length), sample preparation: grinding or cutting (and thresholds for particle sizes)
- For calcareous soils: report whether and how inorganic carbon was analysed.

*) heating temperature and length of heating, titration agent and amount, sample weight, CO_2 determination (titrimetric (less accurate), photometric)

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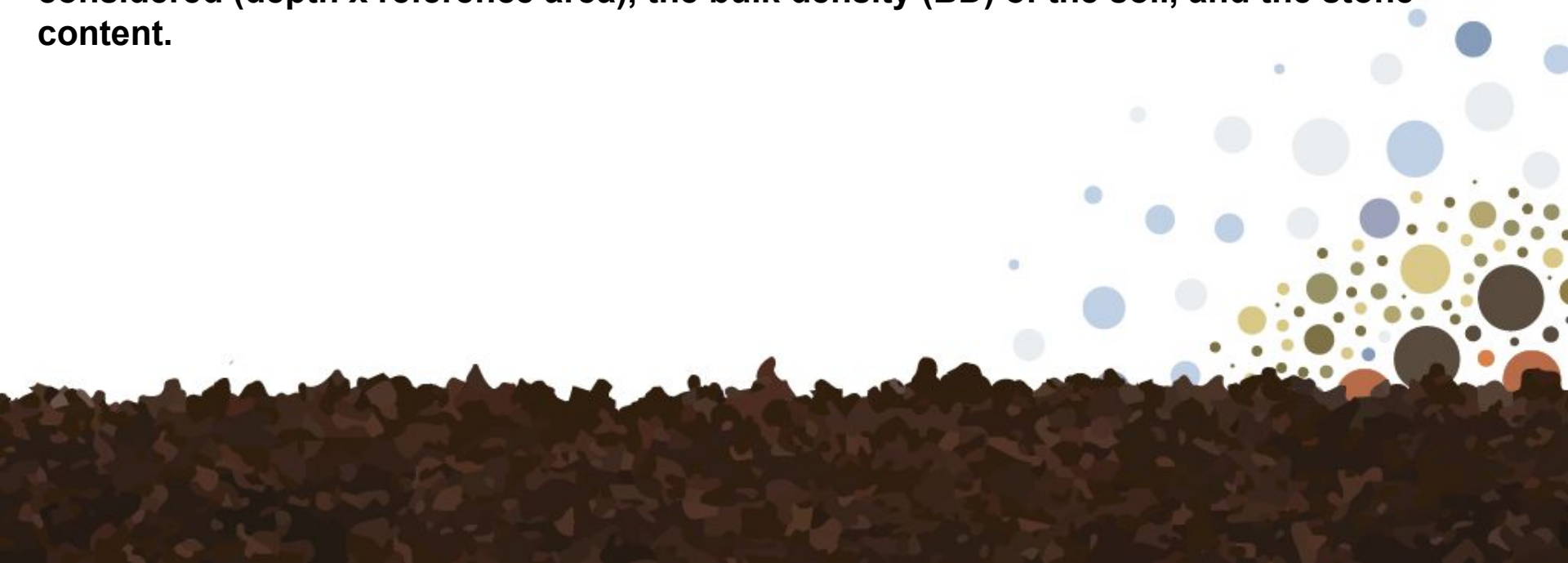
Calculation of SOC stocks for sampling locations and target soil depth

The amount of fine earth is one of the basic parameters to estimate SOC stocks in the mineral soil as well as in peat layers. This amount depends on the volume of soil considered (depth x reference area), the bulk density (BD) of the soil, and the stone content.



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BD Estimation

The following approaches may be used to derive bulk density:

a) BD could be measured after sampling (report if stones were present in top soil samples, and thus in the sampling cylinders, and whether these were considered or not)

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BD Estimation

b) Calculated using appropriate pedo-transfer functions (provide reference to specify which function or estimation method was used)

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BD Estimation

c) Use of default values from literature (provide citation, level of disaggregation)

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Stoniness

Approaches to derive the stone content include:
a) Direct measurement from soil samples (weight of stones in a sample of known volume; if used, provide method and thresholds for material sizes)

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Stoniness

Approaches to derive the stone content include:

b) Estimated during field work (if the stone content has been estimated using %-classes, it would be important to share the class codes)

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Stoniness

c) Cited values from literature (e.g. typical values per soil type and depth (provide sources)

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Target Depth

The target depth is 30 cm. It represents the topsoil most susceptible to management effects.

If data are available for soil horizons, or according to country-specific depth classes, additional calculations have to be made to refer values to a soil block of 0-30 cm

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STOCK Calculations

Formula to determine the SOC stock:

The following formulas are used to determine the SOC stock in different soils:

a) Mineral soils

$$SOC = d * BD * (C_{tot} - C_{min}) * CF_{st})$$

where:

SOC = soil organic carbon [kg/m^2]

C_{tot} and C_{min} = total and mineral (or inorganic) carbon [g g^{-1}], to be considered for calcareous soils, and if dry combustion is used with typically high temperatures (otherwise: C_{tot} equals C_{min})

d = depth of horizon/depth class [m]

BD = bulk density [kg/m^3]

CF_{st}= correction factor for stoniness and gravel content (1-(%gravel + %stones)/100)

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Stock Calculations

b) Organic layers (forest floor):

$SOC_{forest\ floor} = weightOR * (C_{tot} - C_{min})$

where:

$SOC_{forest\ floor}$ = soil organic carbon in the forest floor [kg/m^2]

weightOR = dry weight of the forest floor material sampled [kg/m^2]

C_{tot} and C_{min} = total and mineral (or inorganic) carbon [$g\ g^{-1}$], to be considered for calcareous soils, and if dry combustion is used with typically high temperatures (otherwise: C_{tot} equals C_{min})

Values for a) and b) need to be multiplied by 10 In order to receive [tons/hectare].

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Specification 3: Share metadata about SOC stocks calculation in terms of:

a) Describe how SOC stocks for the target depth 0-30 cm have been calculated; in case there are deviations from this specification, explain.
b) Quantify the amount of carbon stored in litter (organic layer of forest floors)
c) If data allow, stratify the national soil data bases according to organic (peat) and inorganic soils, and estimate the SOC stock for peat soils to 1 m depth
d) Bulk density: measured and/or estimated, provide method description.
e) Coarse fragments: measured and/or estimated, provide method description.

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Spatial dimension: upscaling approaches

a) Basic methodologies There are many possible upscaling procedures. All procedures will be accepted for the global SOC map as long as the depth dimension (0-30 cm) and the minimum spatial dimension (grid/raster 1 km) is fulfilled. However, the preferred upscaling method is digital soil mapping (DSM). In contrast to conventional upscaling, DSM allows the quantification of uncertainties. In addition, DSM-based SOC maps would conform to Pillar 4 specifications for soil grids (thus also GSM specifications).

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Upscaling Methods

The following table provides an overview of common upscaling methods:

Conventional upscaling[20]	Class-matching	Derive average SOC stocks per hectare per "class": soil type for which a national map exists, or combination with other spatial covariates, e.g. land use category, climate type, biome, etc. This approach is used in the absence of spatial coordinates of the source data.
	Geomatching	Point locations with spatial referencing are overlaid with GIS layers of important covariates. Upscaling is based on averaged SOC values per mapping unit.
Digital soil mapping[21] (all methods require geomatching)	Data mining	Multiple regression, classification tree, artificial neural network
	Geostatistics	Regression kriging, kriging with external drift
	Knowledge-based systems	Fuzzy inference system, decision tree, Bayesian belief networks

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For this SOC mapping project, GSP Secretariat will collect requests for training, organize collective workshops and facilitate partnering between experienced and inexperienced institutions.

Specification 4: Share details about the upscaling approach

1. Upscaling method (description, citation)
2. Input data/covariates, grid, soil maps, etc.

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Space-Time

Temporal dimension: use of existing legacy data, baselines, and future updating

The long-term objective of the Global Soil Partnership is to enable global soil monitoring, and ultimately to update the SWRS report. This objective is fully in line with the needs to update sink/source assessments under UNFCCC/IPCC and the monitoring of SDG indicators (which also includes SOC). Therefore, in the design of this new initiative for SOC mapping, the temporal dimension needs to be considered. The UNFCCC has established 1990 as the reference year/baseline.

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Specification 5: In order to consider the temporal dimension of the SOC map, it is important to share the sampling date as metadata. If the national data situation allows, pre-1990 or post-1990 sub data sets might be defined. However, it will be an important asset of this SOC map to demonstrate the density of existing soil carbon data sets. The more data points are used, the better the reliability and accuracy of the global product. Subsequent steps to improve the temporal dimension, will be considered at a later stage.

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Documentation

The source data used and the methodologies for SOC mapping should be well-documented. A template for documentation will be developed and provided separately through the GSP Portal. Specifications 1 to 5 above serve as orientation for the metadata documentation.

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Data security

A GSP-Data Policy (Intellectual Property Rights) is currently being prepared by the Pillar 4 Working Group to ensure that the GSP data sharing principles – as mentioned in the Pillar 4 Plan of Action and Implementation plan – are fully respected. All national data will remain under the ownership of the data providers and shared data will only be used for the global SOC map.

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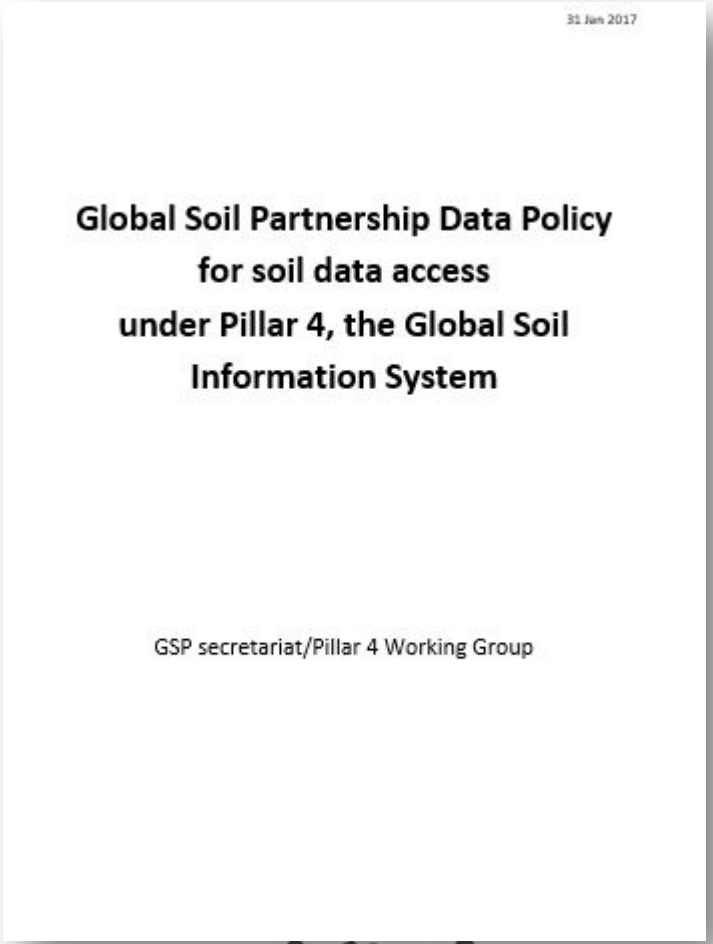
Data security


31 Jan 2017

Global Soil Partnership Data Policy
for soil data access
under Pillar 4, the Global Soil Information System

GSP secretariat/Pillar 4 Working Group

An agreed IP Policy was jointly prepared during the INSII workshops and will be submitted for final consideration at the 5th GSP Plenary Assembly in June 2017.

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Data Sharing Policy

- Data shared by countries will be collected by the GSP Secretariat.
- The GSP data policy will ensure that the national data policies are fully respected.
- Data can be shared using common GIS formats and metadata should be compiled in an excel file (template has been provided through the cookbook).

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Roadmap

Process coordination: GSP Secretariat, supported by voluntary members of ITPS and P4WG prepare guideline for SOC mapping	July 2016
Develop GSP Data policy	July 2016 – June 2017
Contact GSP national focal points, GSP partners (especially FAO Member countries) inviting them to develop/share their national SOC maps	August-September 2016
INSII meeting with GSOC workshop	November 2016
IPCC/GSP-ITPS conference to scientifically discuss SOC mapping based on interim results	March 2017
Global SOC mapping: preparation of national maps, SOC stock evaluations/ modelling, metadata and data sharing	Dec 2016 - Aug 2017
Modification/adjustment of national SOC maps where necessary	Sept – Nov 2017
Documentation of methods/publication/data release	World Soil Day (5 December) 2017

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GSOCMap is not just a map!

It supports the **development and empowerment of national capacities** to build their National Soil Information Systems.

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