Evento Regional: Conmemoración del Día Mundial del Suelo

GLOBAL SOIL PARTNERSHIP

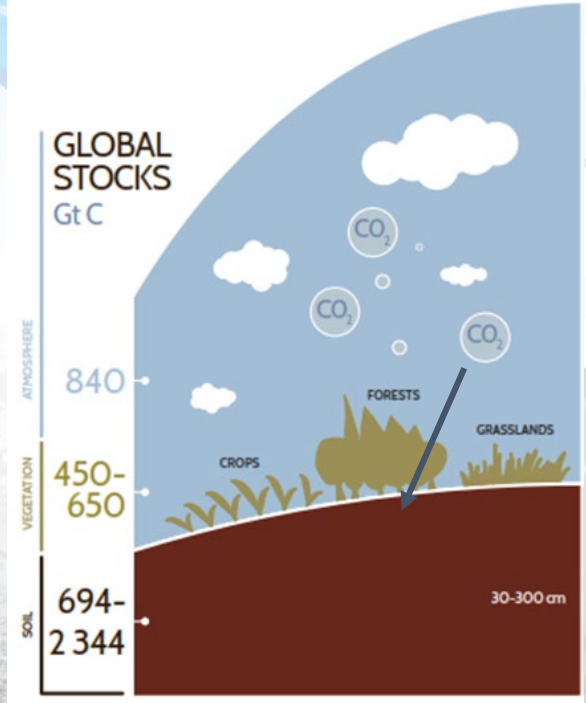
fao.org

# Global Soil Organic Carbon Sequestration Potential Map GSOCseq v1.1

Guille Peralta
Luciano Di Paolo
Yusuf Yigini
Isabel Luotto

#DíaMundialDeLosSuelos

# Soil organic carbon (SOC): Climate change




- SOC represents the largest C pool in terrestrial ecosystems
- Due to the magnitude, a small increase in SOC stocks can transform soils from greenhouse gas (GHG) sources to potential sinks (Paustian et al., 2016)
- $CO_2$ sequestration as SOC through sustainable soil management (SSM) practices has been outlined as one of the most cost-effective practices to mitigate GHG emissions (Smith et al, 2008; Lal et al., 2018; IPCC, 2019; Smith et al., 2020).

Evento Regional:
Conmemoración del Día Mundial del Suelo

GLOBAL SOIL PARTNERSHIP

fao.org

# Soil organic carbon (SOC): Food security


#DíaMundialDeLosSuelos

Evento Regional:
Conmemoración del Día Mundial del Suelo

GLOBAL SOIL PARTNERSHIP

fao.org

Why GSOCseq?

1. **Set** attainable and evidence based **national targets for carbon sequestration**

2. **Identify areas** that have high SOC sequestration **for SSM projects**

3. **Improve technical capacities** on sustainable soil management, soil data management, digital soil mapping and modelling

#DíaMundialDeLosSuelos



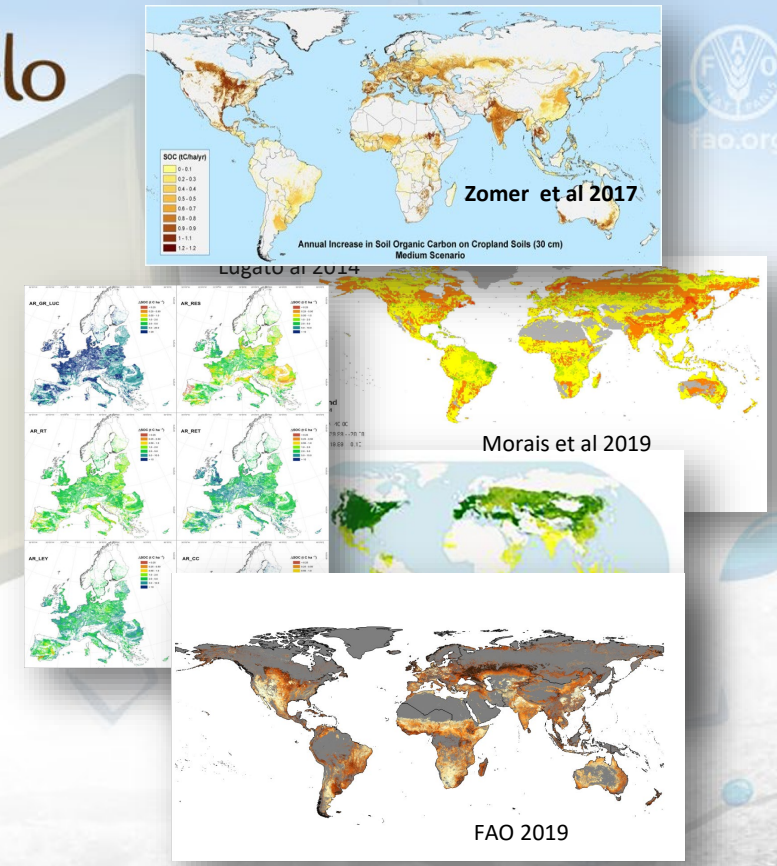



#DíaMundialDeLosSuelos

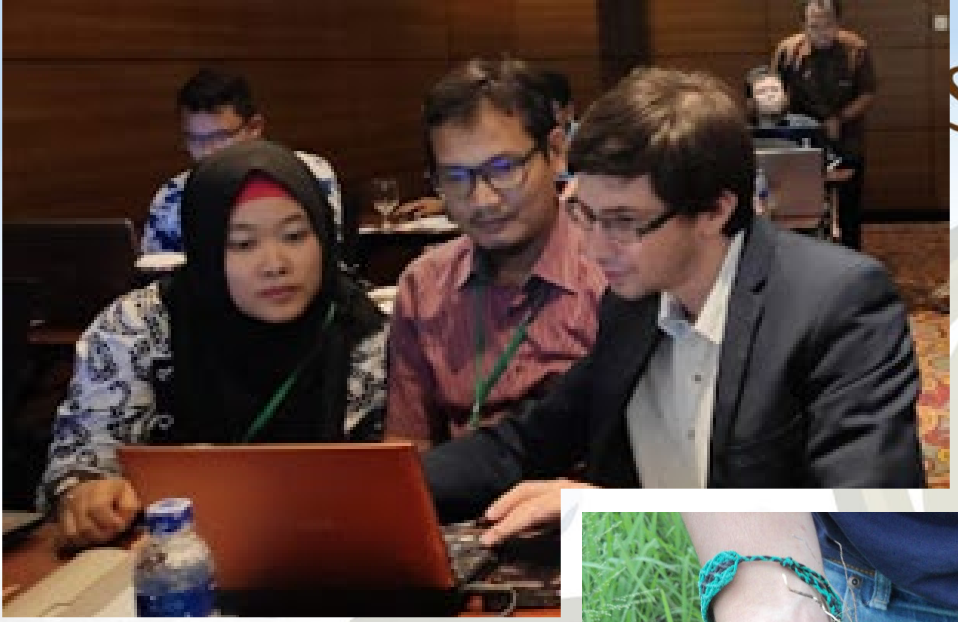
Evento Regional:
Conmemoración del Día Mundial del Suelo

# GSOCseq a Global Map based on country -driven ("bottom -up" ) approach

- **Local expertise** , best available local data and local knowledge
- **Interaction** from experts from different fields and institutions
- Constitutes a **"living product"** being continuously updated and **improved**
- **Tool** to encourage SSM practices




#DíaMundialDeLosSuelos



Evento Regional:
Conmemoración del Día Mundial del Suelo

GLOBAL SOIL PARTNERSHIP

fao.org

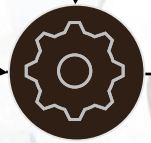
FAO Members /GSP partners request

Collection of feedback

Action on the ground

Observatories to validate results

Implementation SSM practices



2019

2020

2020-21

2021


## Methodology

Through the support of the GSP's technical networks

Taking into considerations potential data and computational limitations

## Technical specifications and country guidelines

Reviewed INSII, ITPS, CIRCASA, 4p1000, UNCCD

## Capacity Building Program

Online Technical Manual

Online regional trainings

https://fao-gsp.github.io/GSOCseq/

## National Maps and Submissions

#DíaMundialDeLosSuelos

# The GSOCseq process?

# How?
# Framework -Summary

- 20-year projections (SOC stocks for the year 2040)
- After the adoption of SSM that increase C inputs
- 0-30 cm Depth
- In current agricultural lands (Each country can model preferred land uses, restoration, etc.)

# Why RothC as standard model?

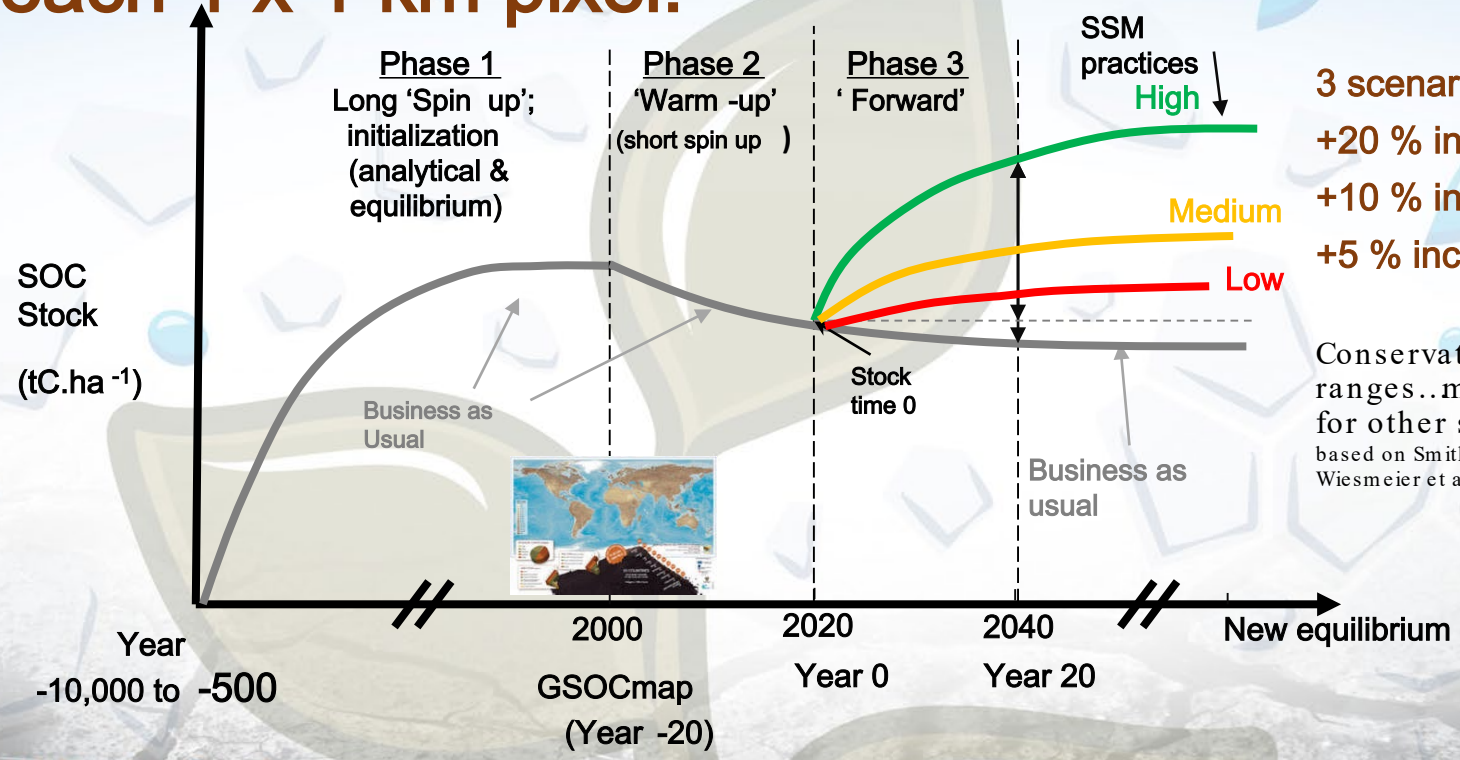
- Standard method among countries (DayCent, Century, ICBM, YASSO,DAISY,AMG, CLM5, etc.)
- Fewer data requirements; data relatively simple to obtain;
- It has been applied across several ecosystems, climate conditions, soils and land use classes;
- Successfully applied at national, regional and global scales; e.g. Smith et al., (2005), Smith et al., (2007), Gottschalk et al., (2012), Wiesmeier et al., (2014), Farina et al., (2017), Mondini et al., (2018), Morais et al., (2019)
- It (or its modified/derived version) has been used to estimate carbon dioxide emissions and removals in different national GHG inventories as a Tier 3 approach; Smith et al., (2020): Australia (as part of the FullCam model, Japan (modified RothC), Switzerland, and UK (CARBINE, RothC).

Evento Regional: Conmemoración del Día Mundial del Suelo

GLOBAL SOIL PARTNERSHIP

fao.org

# For each 1 x 1 km pixel:




3 scenarios:

+20 % increase Ci

+10 % increase Ci

+5 % increase Ci

Conservative ranges..may be high for other systems

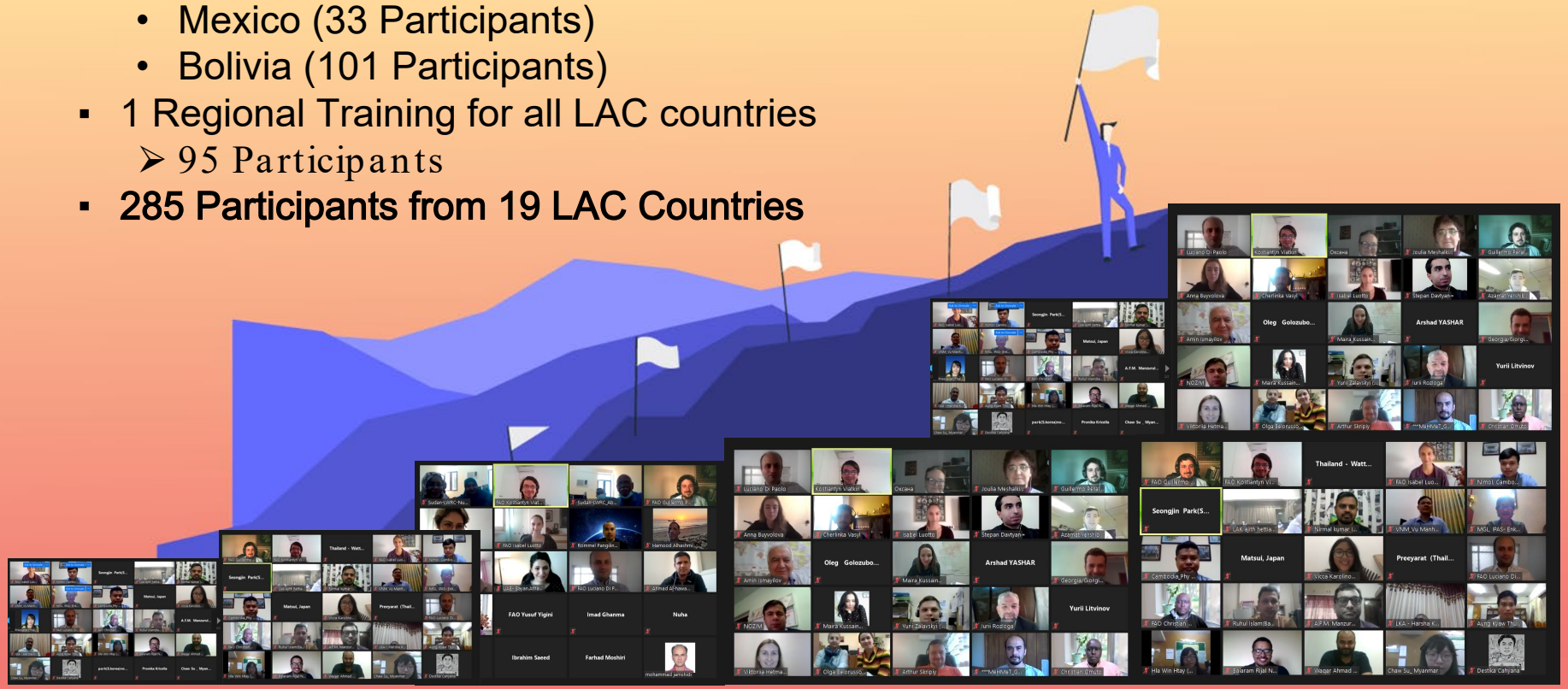
based on Smith, 2004; Wiesmeier et al., 2016

#DíaMundialDeLosSuelos

Approach based on Smith et al. (2006; 2008); Gottschalk et al. (2012)

# Capacity Development LAC Region:

- 3 National Online Training Sessions:
  - Costa Rica (56 Participants)
  - Mexico (33 Participants)
  - Bolivia (101 Participants)
- 1 Regional Training for all LAC countries
  - ➢ 95 Participants
- **285 Participants from 19 LAC Countries**



Evento Regional:
Conmemoración del Día Mundial del Suelo

GLOBAL SOIL PARTNERSHIP

fao.org

- 12 National Submissions to date for the LAC region


#DíaMundialDeLosSuelos

# GSOCseq data platform

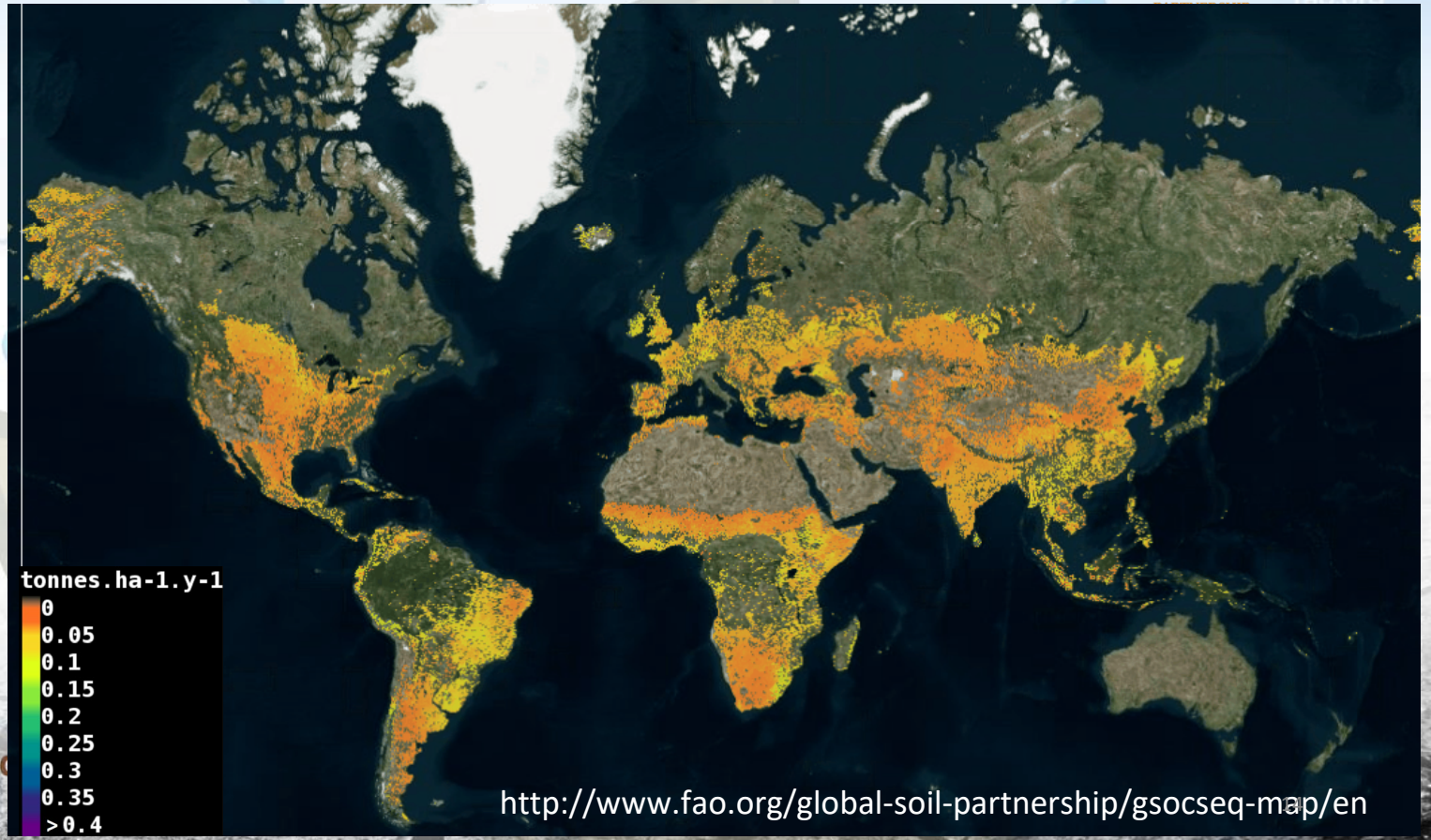
Relative sequestration rates tonnes.ha-1.y-1

SSM1 >> SSM3

## GSOCseq v1.0.0

- SOC sequestration ( tC/ha/yr) SSM 1-3
- Agricultural lands (croplands + grazing lands)
- 20-year period
- Depth: 0 -30 cm
- 1 x 1 km

http://54.229.242.119/GloSIS/



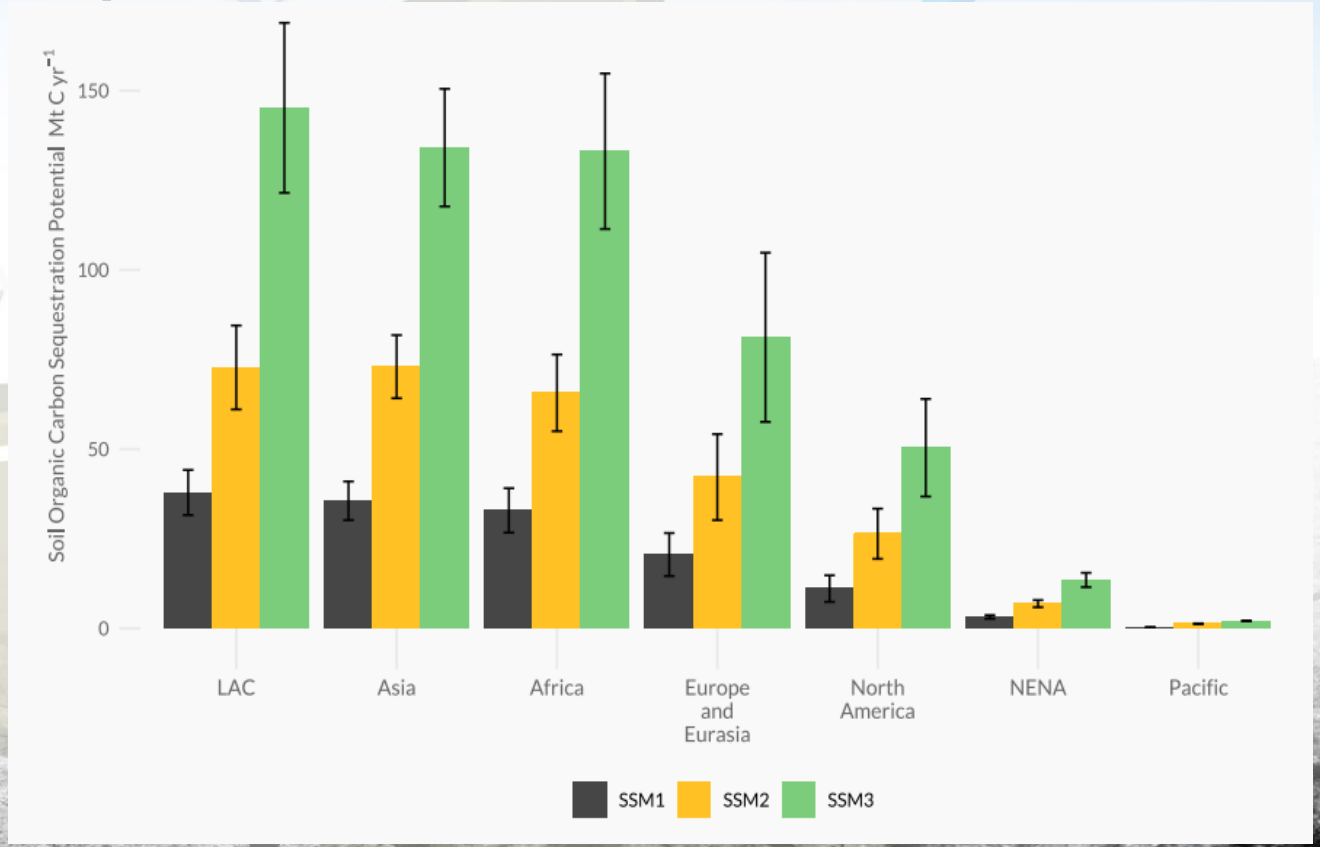
# GSOCseq v1.0.0 Uncertainties (%)

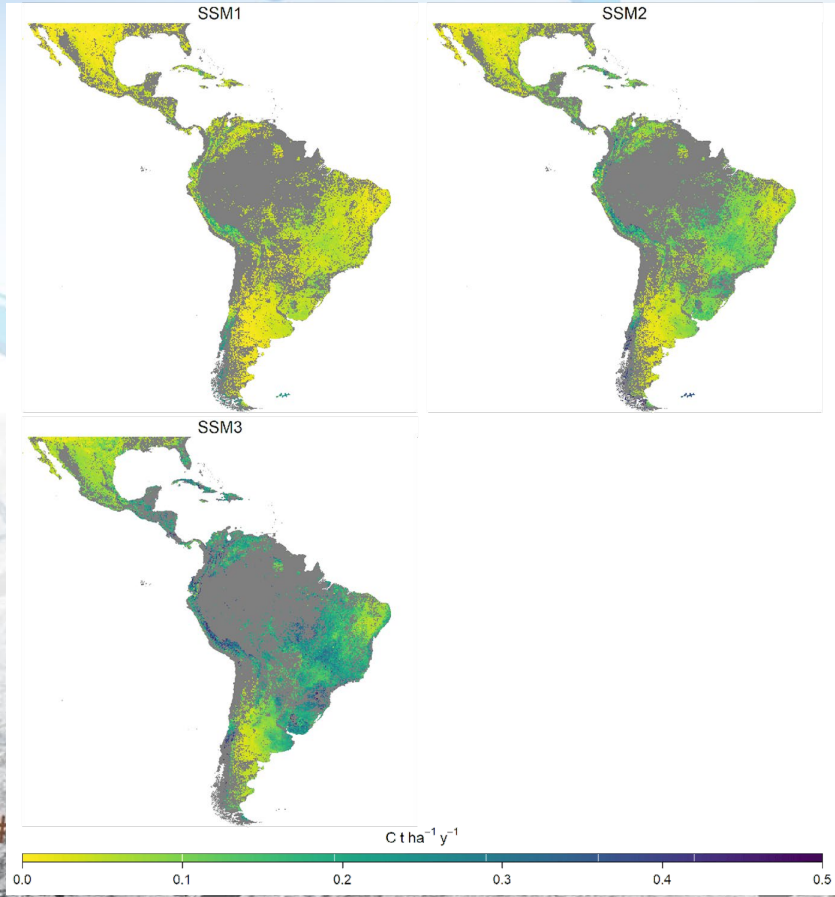




# SOC sequestration potential GSP Regions

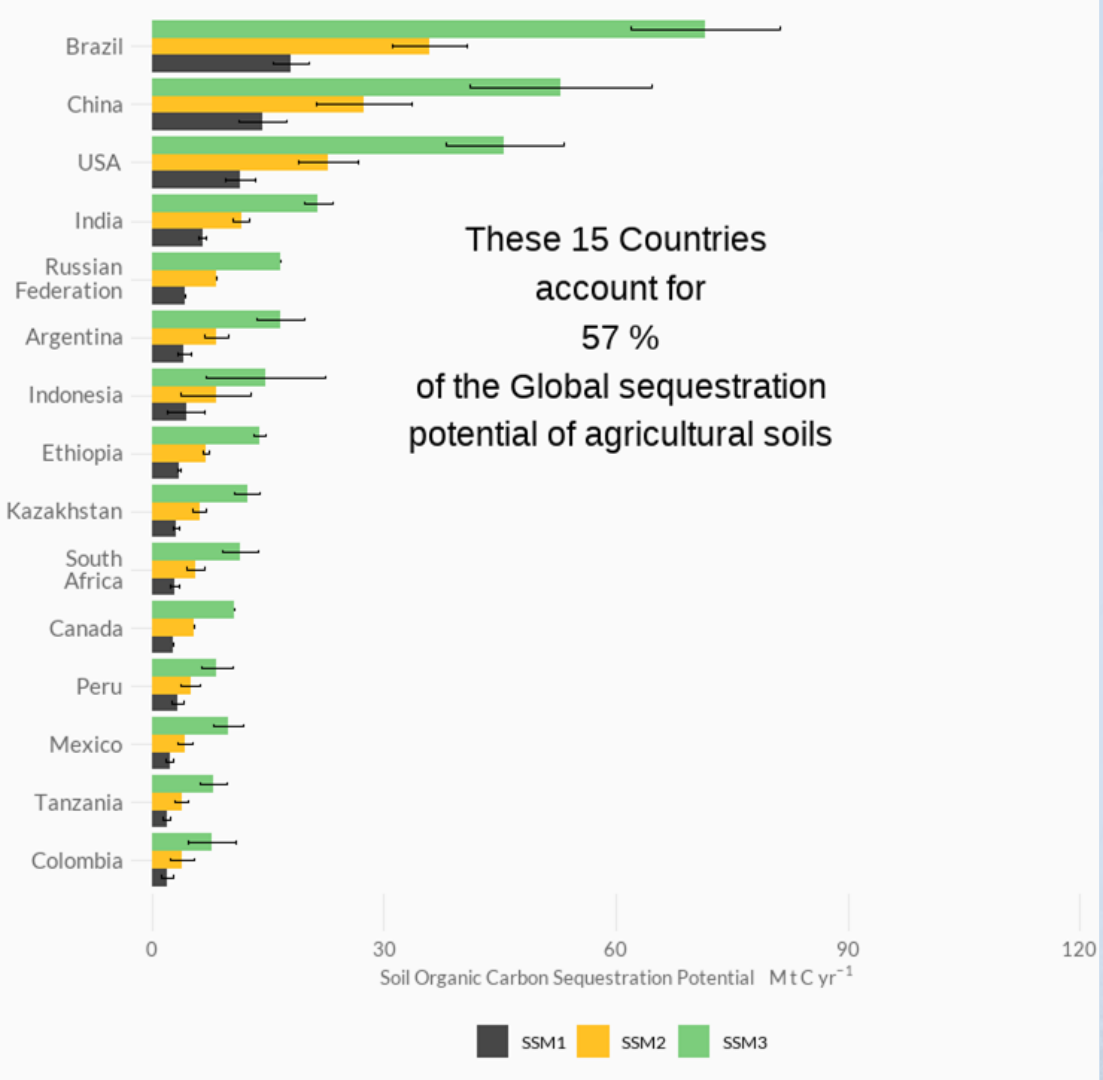
Considering all agricultural lands in the different GSP regions, the Latin America-Caribbean (LAC) Region shows the greatest sequestration potential under the adoption of Sustainable Soil Management (SSM) practices, being able to sequester over 130 Mt C/yr.






# Distribution of SOC sequestration potential –LAC

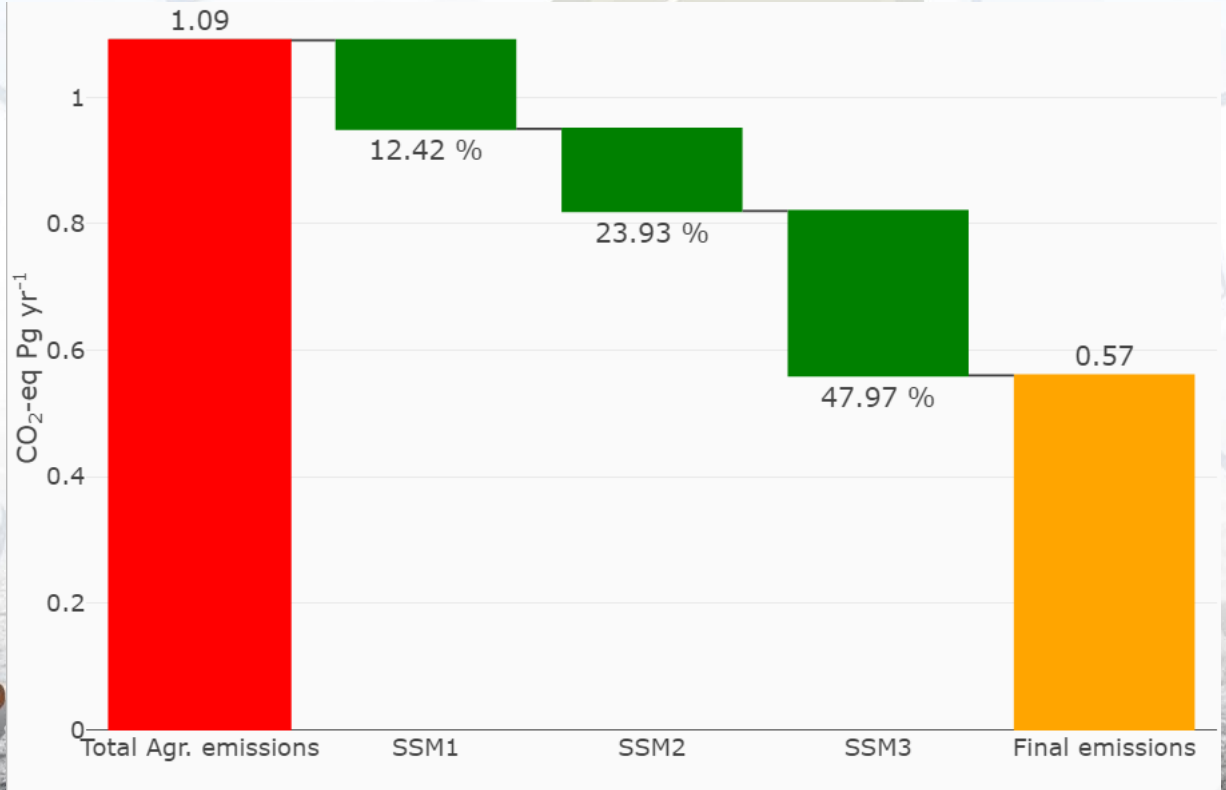
The GSOCseq v1.1.0 highlights how much and where additional C (t/ha/yr) could be sequestered yearly in agricultural soils by adopting SSM practices compared to the Business as Usual (BAU) scenario.


Brazil
China
USA
India
Russian Federation
Argentina
Indonesia
Ethiopia
Kazakhstan
South Africa
Canada
Peru
Mexico
Tanzania
Colombia
These 15 Countries
account for
57 %
of the Global sequestration
potential of agricultural soils
0
30
60
90
120
Soil Organic Carbon Sequestration Potential M t C yr$^{-1}$
SSM1
SSM2
SSM3

# Mitigation Potential – LAC



**Agricultural soils play an important role in mitigating GHG emissions:** yearly agricultural global emissions could be cut by 48 % in the LAC region.



# Thank you for your attention

## Special thanks to

- University of Aberdeen; Thünen -Institut
- 4p1000 SC, CIRCASA, UNCCD
- National SOCseq teams and all experts contributing to the process