



Food and Agriculture
Organization of the
United Nations

GSOCseq

Global Soil Organic Carbon Sequestration Potential Map

8 - 10
September
2021

VIRTUAL
MEETING

GSOCseq - GSP Secretariat

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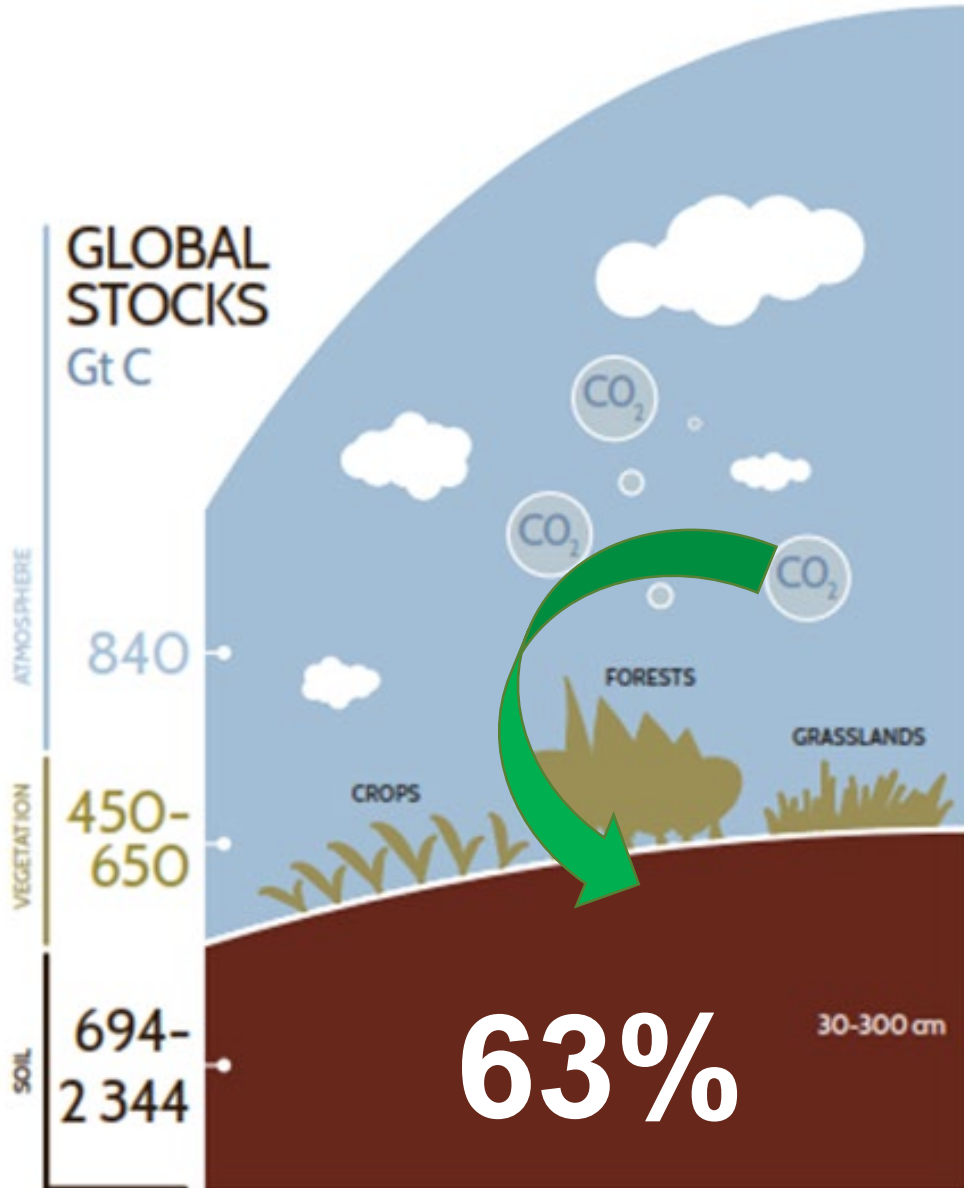
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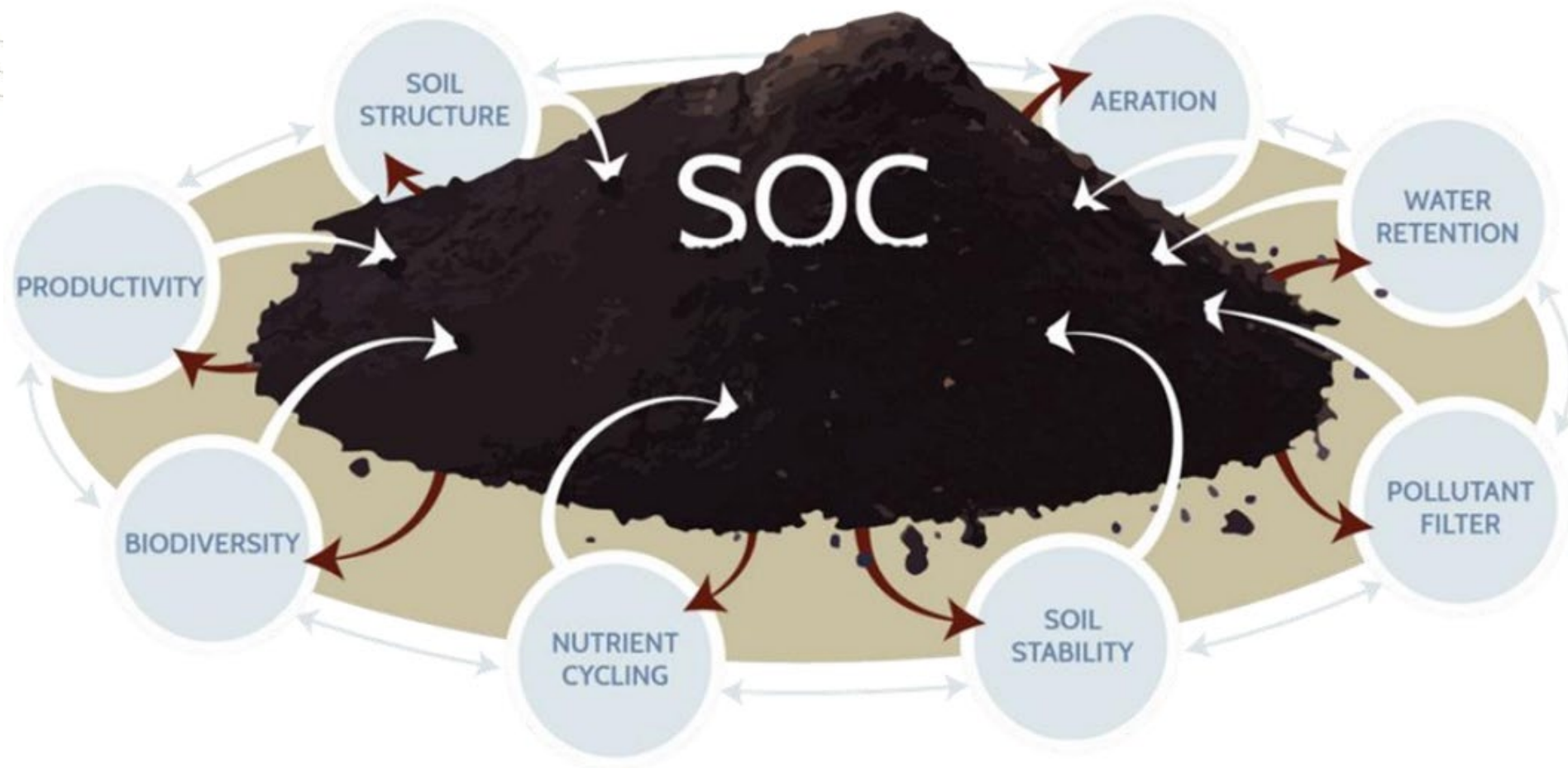
Why is Soil Organic Carbon (SOC) important?



- **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) **Source** to potential **carbon Sinks** (Paustian et al., 2016)
- **CO₂ 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).



Why is SOC important?



Following FAO members request, Global Soil Partnership (GSP) has started the GSOCseq initiative to:



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

Enhance National capacities on sustainable soil management, soil data management, digital soil mapping and modelling; as inputs for NDCs and reporting



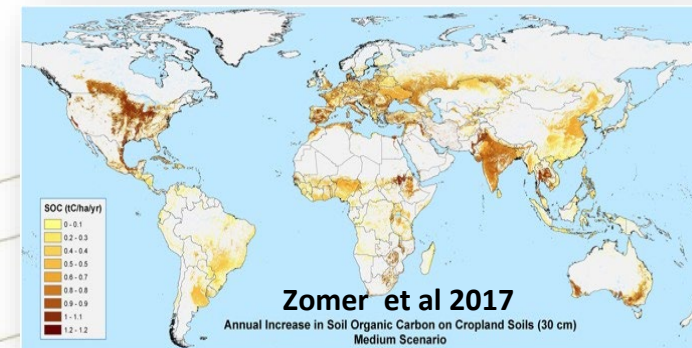
SOC dynamicsLand use, soil type , climate , vegetation cover , topography , management practices

Why GSOCseq?

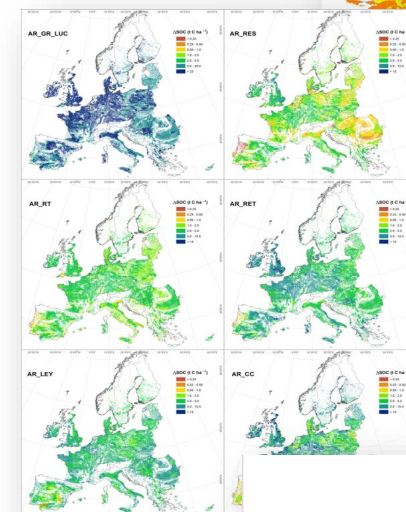
GSOCseq Global Map based on Country -Driven (“bottom-up”) approach

GSOCseq Strengths:

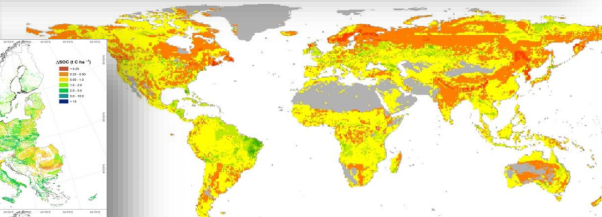
- **Local expertise** , best available local data and local knowledge
- **Interaction** from experts from different fields and institutions
- Allows to be continuously updated and improved (“living product ”)
- **Tool** to encourage SSM practices



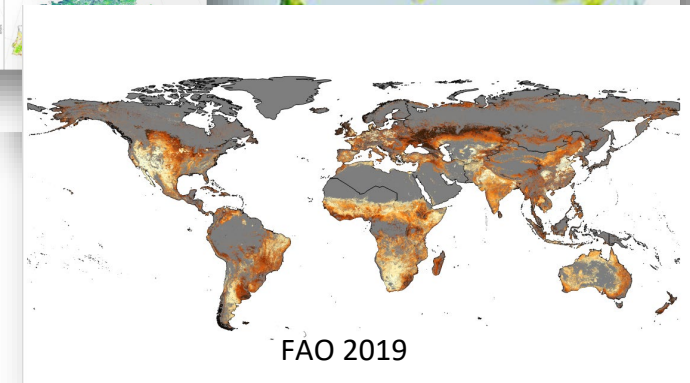
Lugato al 2014



Gottschalk et al 2012

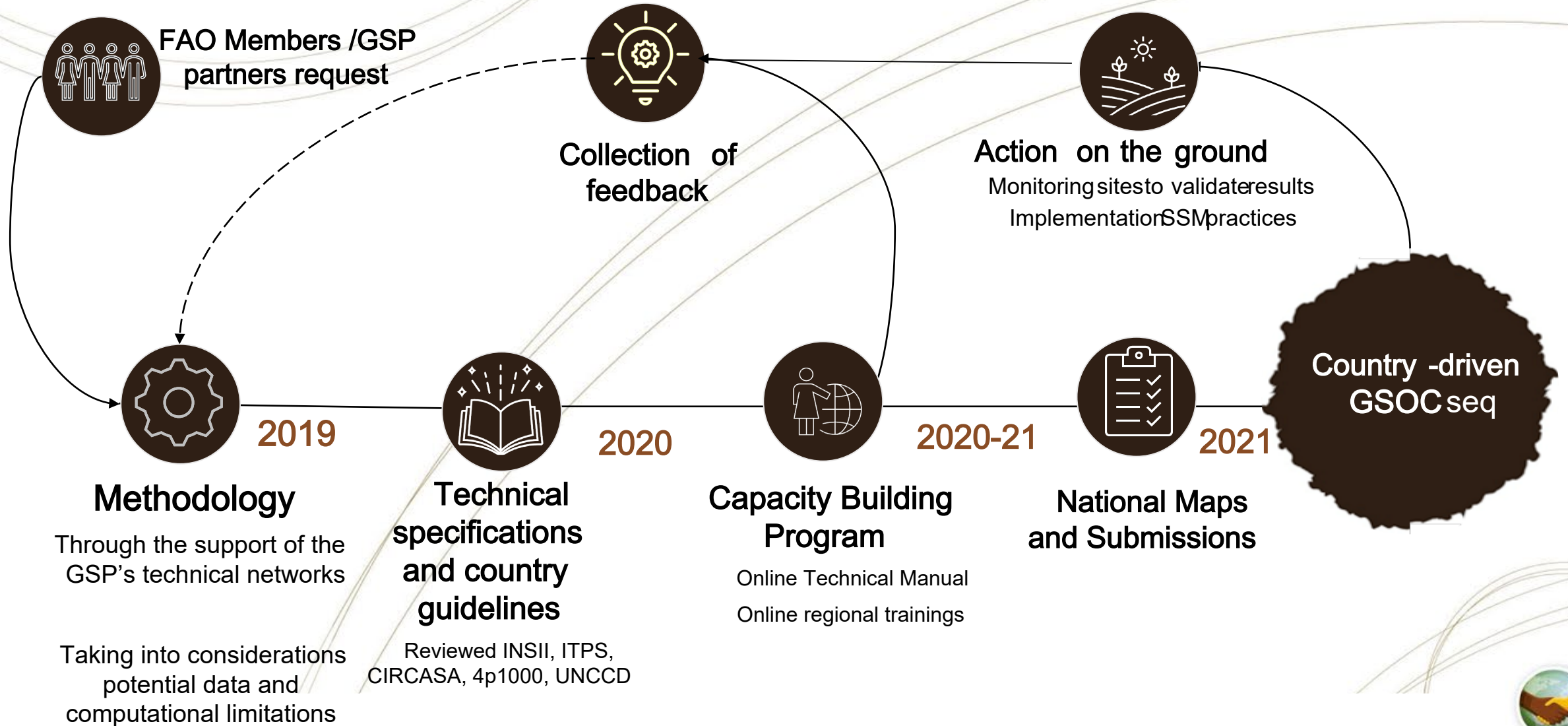


Morais et al 2019

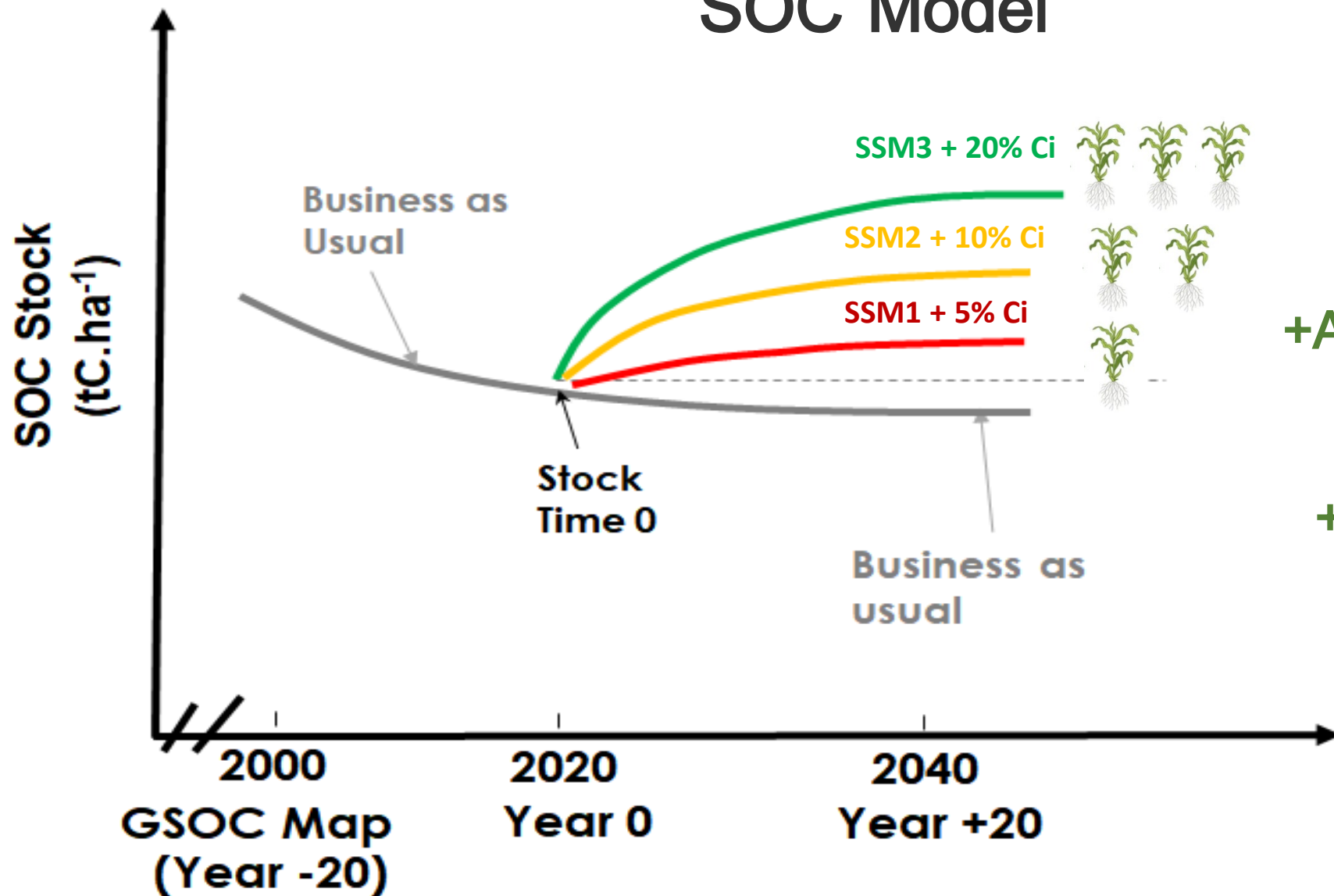




How is the GSOCseq Country -driven process?



Spatial Data + Process oriented SOC Model



+ Carbon inputs (Ci)?

+Above and belowground
 plant residues
 + Manure
 + organic amendments
 Other sources

by SSM practices

SSM practices

“ Technical manual of recommended management practices for SOC maintenance and Sequestration ”



Crop rotation, intercropping cover crops
Perennials in rotation



Water conservation practices



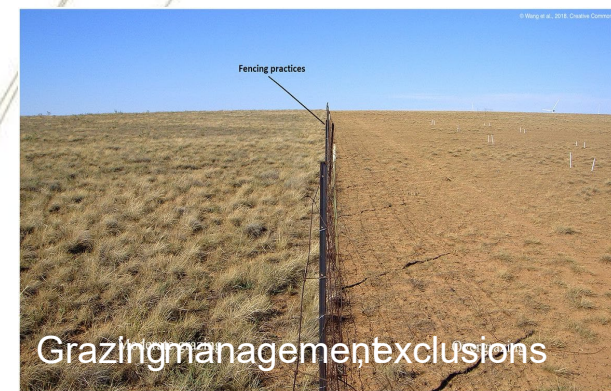
Nutrient Management
Organic amendments



Manure addition



Rotational grazing/pasture management



Grazing management, exclusions

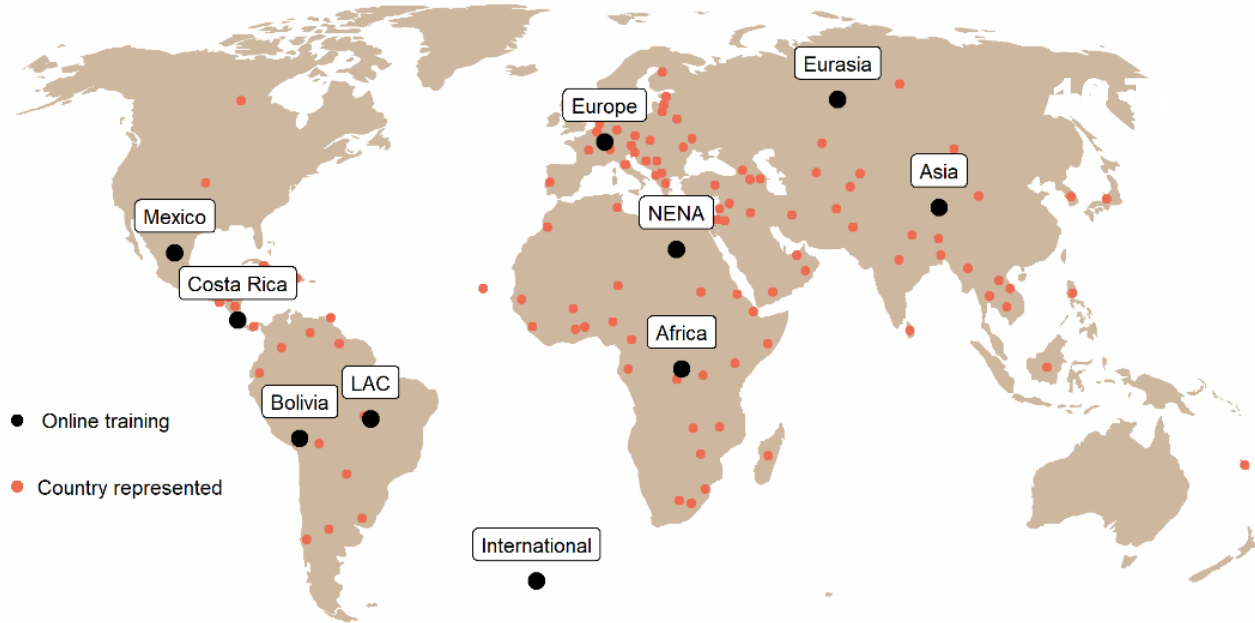


IS BEING
LAUNCHED
TODAY

..and many other practices around the world...

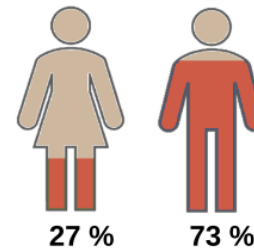
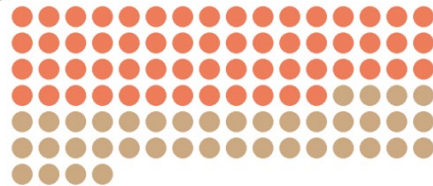
Capacity development

10 Online Trainings

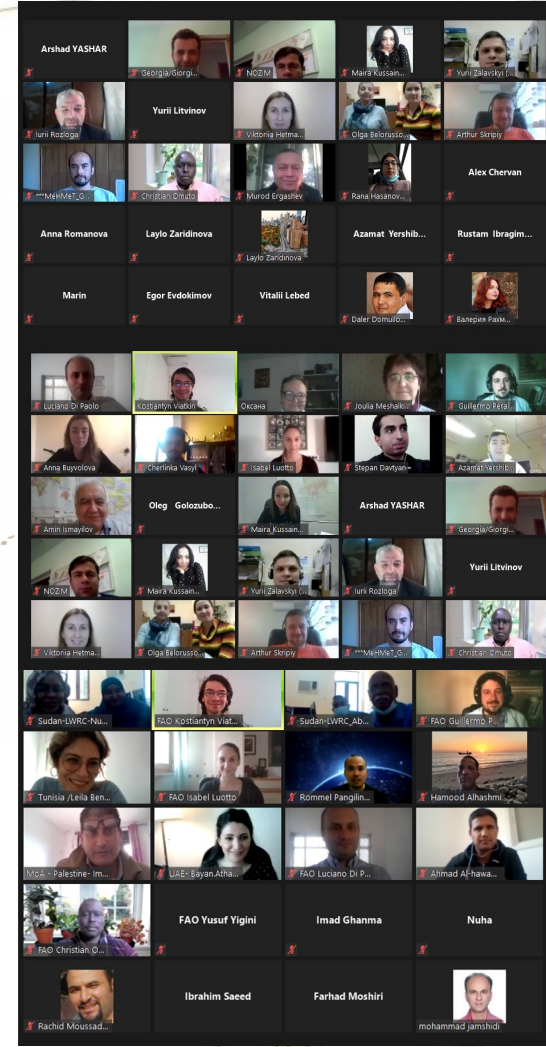
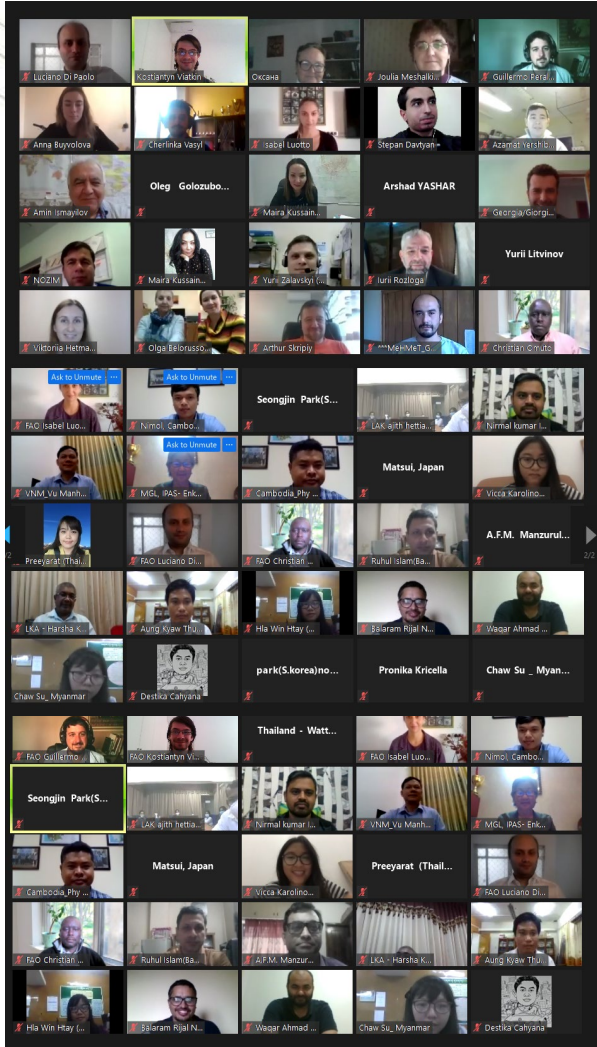


119 Countries

433 participants



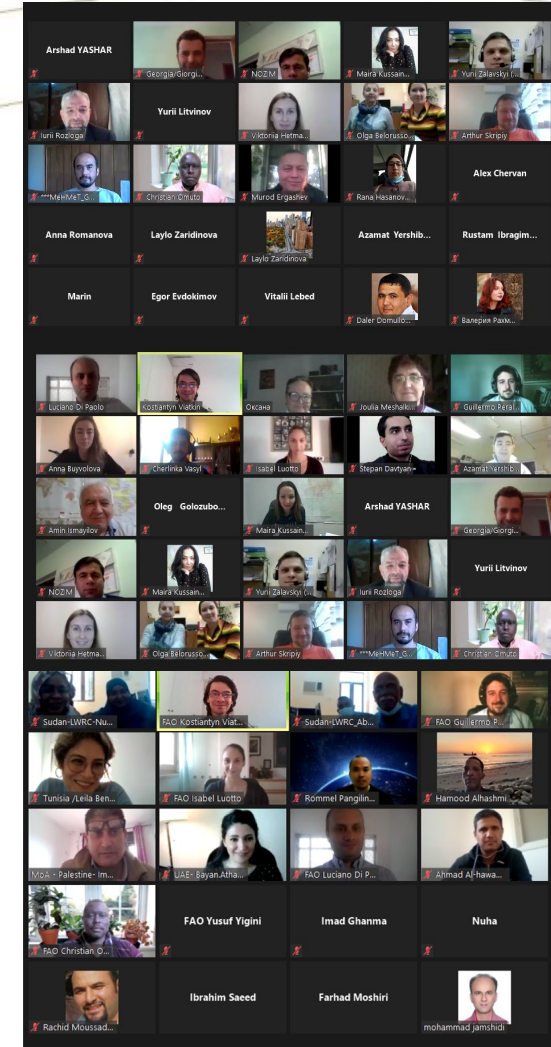
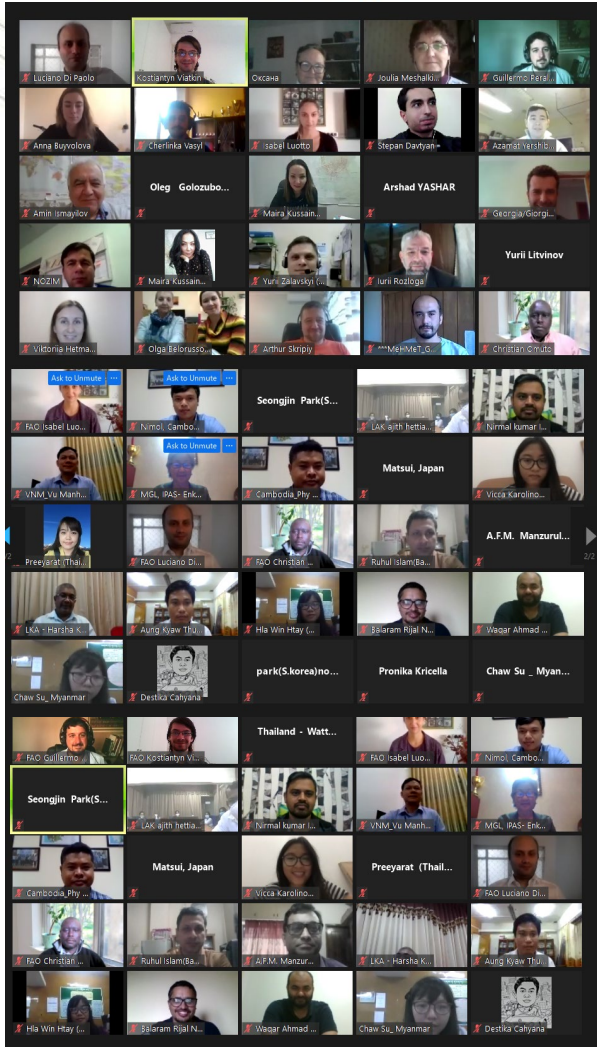
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Contributions to date...

- 46 National Submissions
- 73 countries , map in progress
(temporary maps using global layers)
- 9 countries blank
- 69 Not Response; No formal request to be blank; Gap filled

Current version : 90% of Global Agricultural Area , being periodically updated

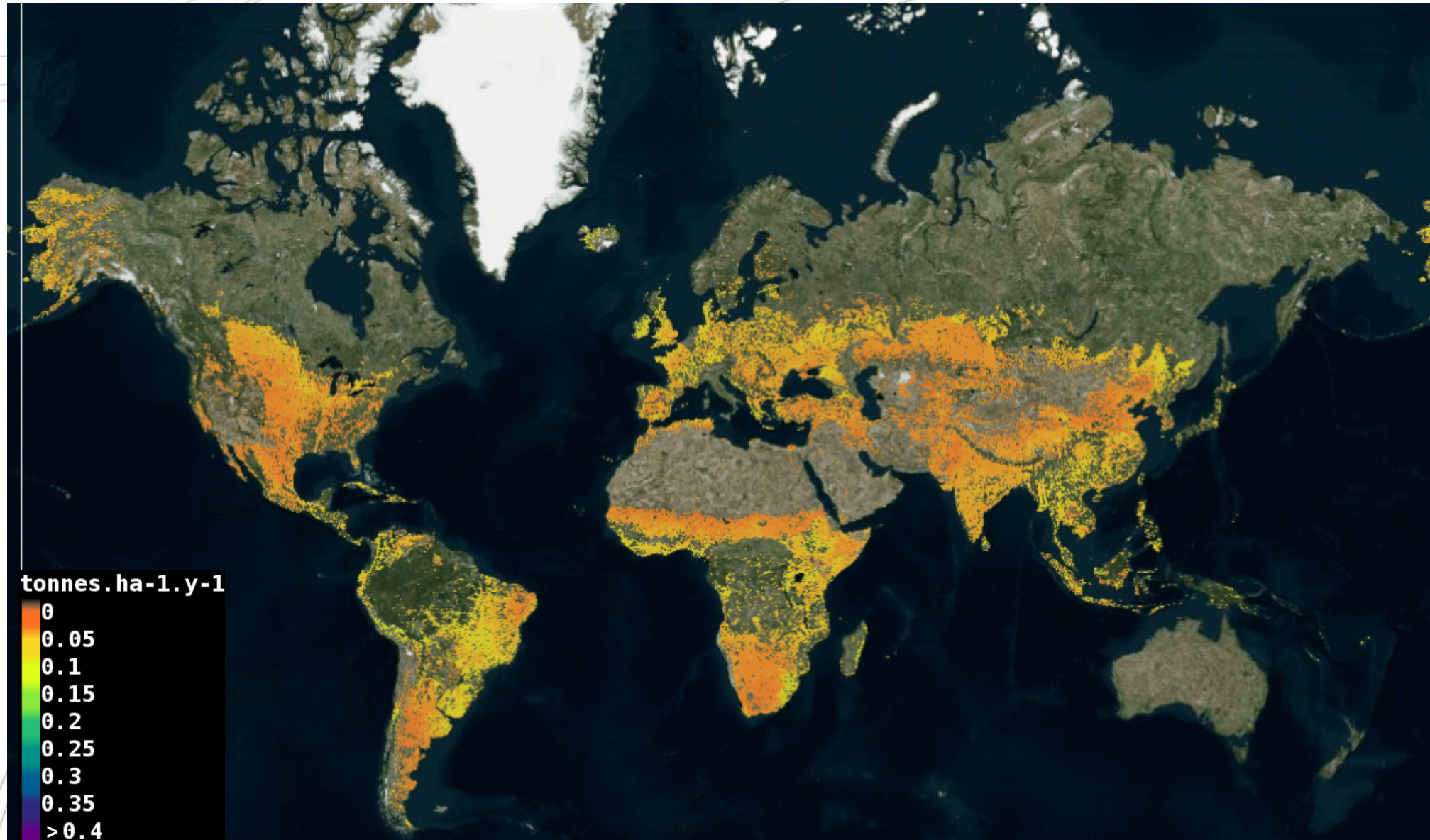


GSOCseq Data Platform -

GSOCseq V1.0.0

- SOC Sequestration Potential (tC/ha/yr) SSM 1-3 (vs BAU)
- 20-year period (2020-2040)
- Depth: 0-30 cm
- 1 x 1 km resolution

- Current Agricultural Lands (Croplands + grazing lands) under management



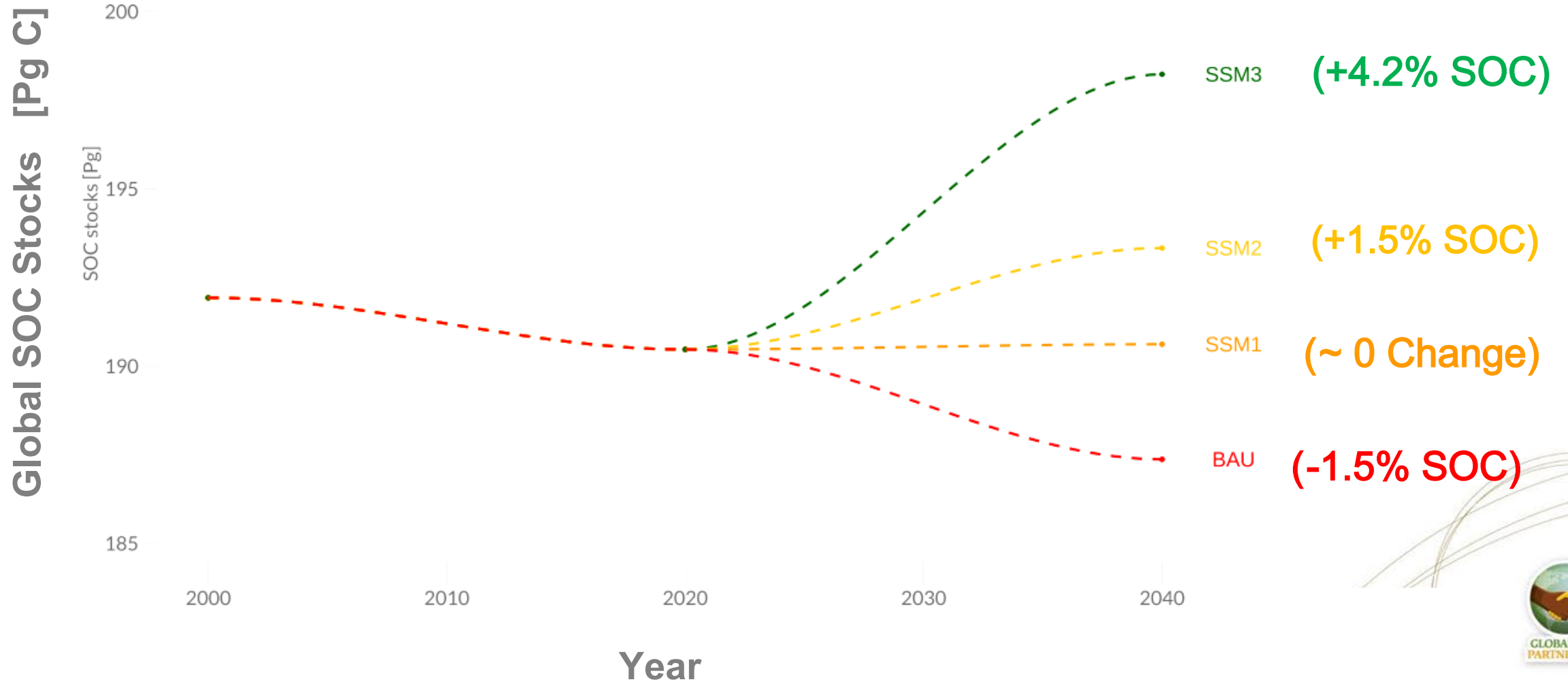
GSOCseq V1.0.0

Uncertainties (%)



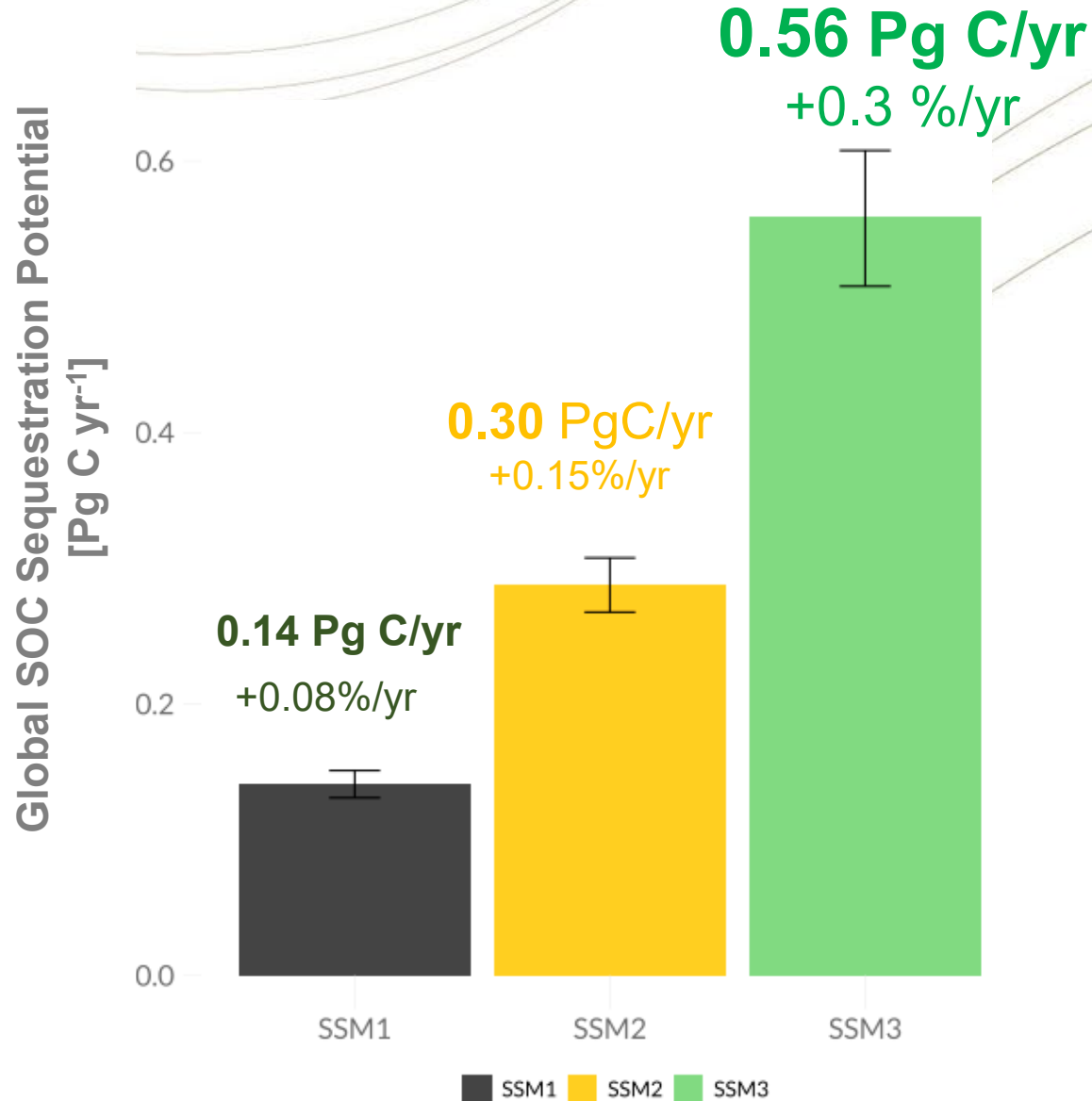
First results - Global SOC stocks Agricultural lands*

*Excluding blank countries



First results - Annual SOC Sequestration*

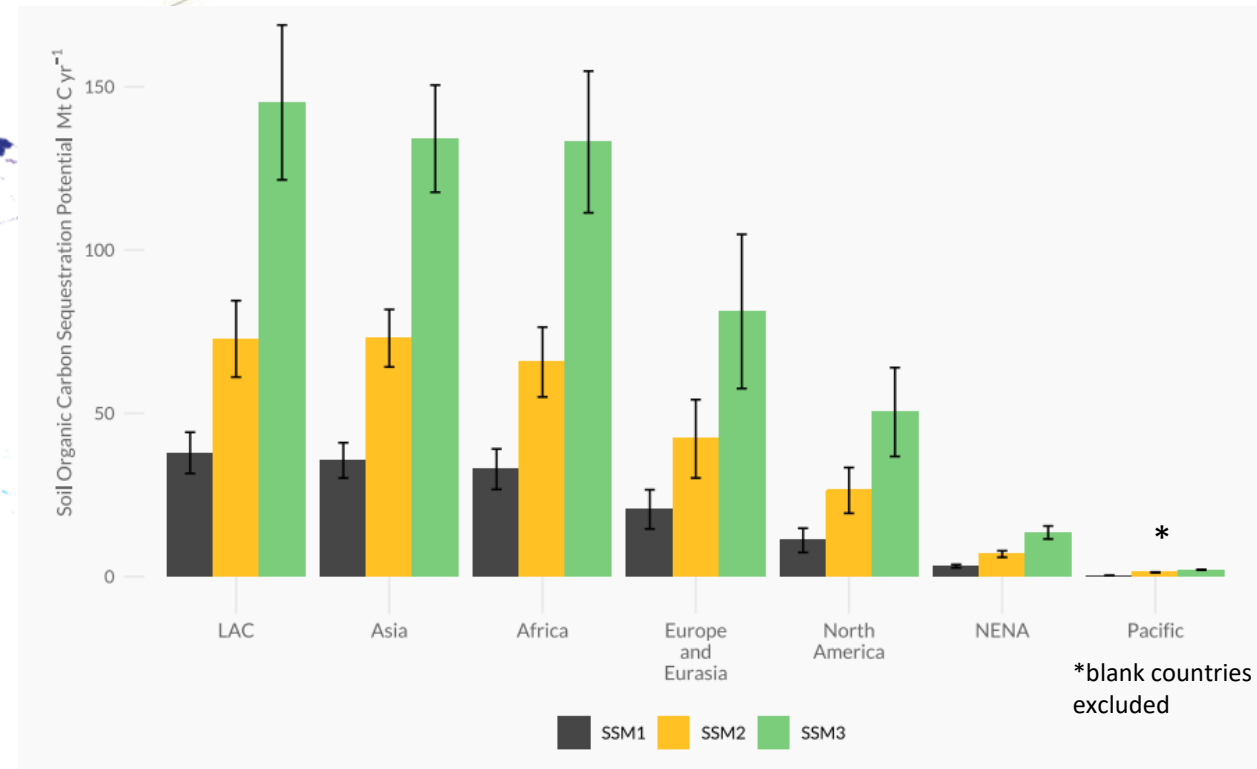
*Excluding blank countries



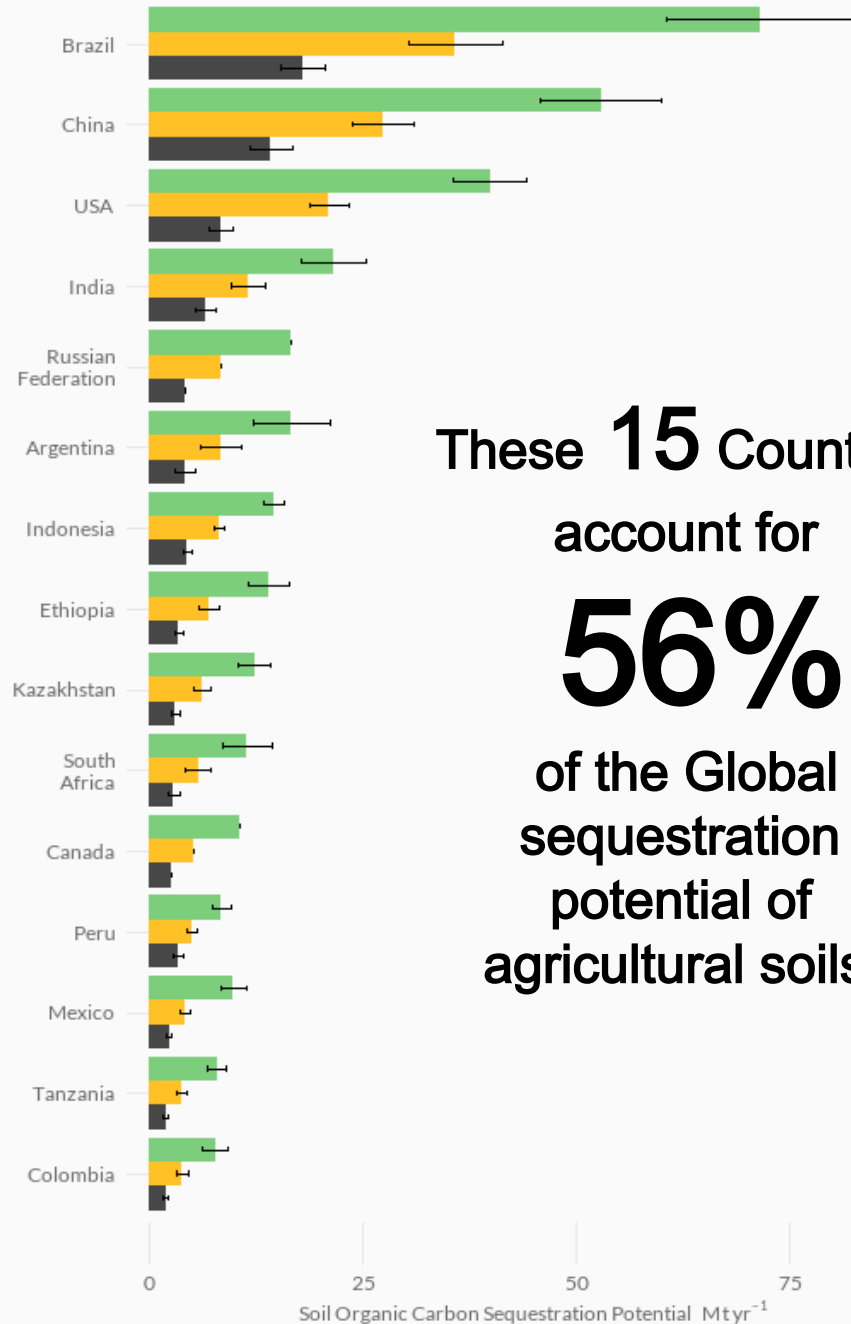
Previous Estimates

Source	Seq.rate Pg C.year ⁻¹
Paustian et al (2004)	0.44 - 0.88
Smith et al (2008)	0.44 - 1.15
Sommer and Bossio (2014) (Croplands+grasslands)	0.37 - 0.74
Batjes et al (2019)	0.32 - 1.01
Lal et al (2018) (Croplands+grasslands/shrubland)	0.48 - 1.93
Fuss et al (2018)	0.54 - 1.36

Which Climate types, Land Uses, Regions, Countries have greater SOC Sequestration Potential?



Countries with Higher SOC sequestration potential



These **15** Countries
account for
56%
of the Global
sequestration
potential of
agricultural soils

See Technical Report for details

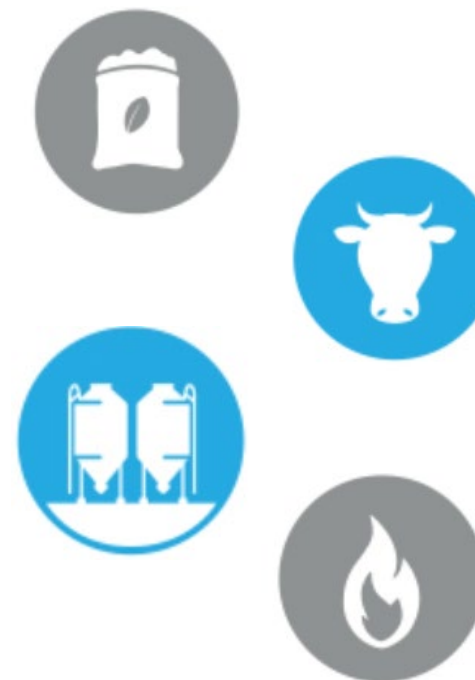
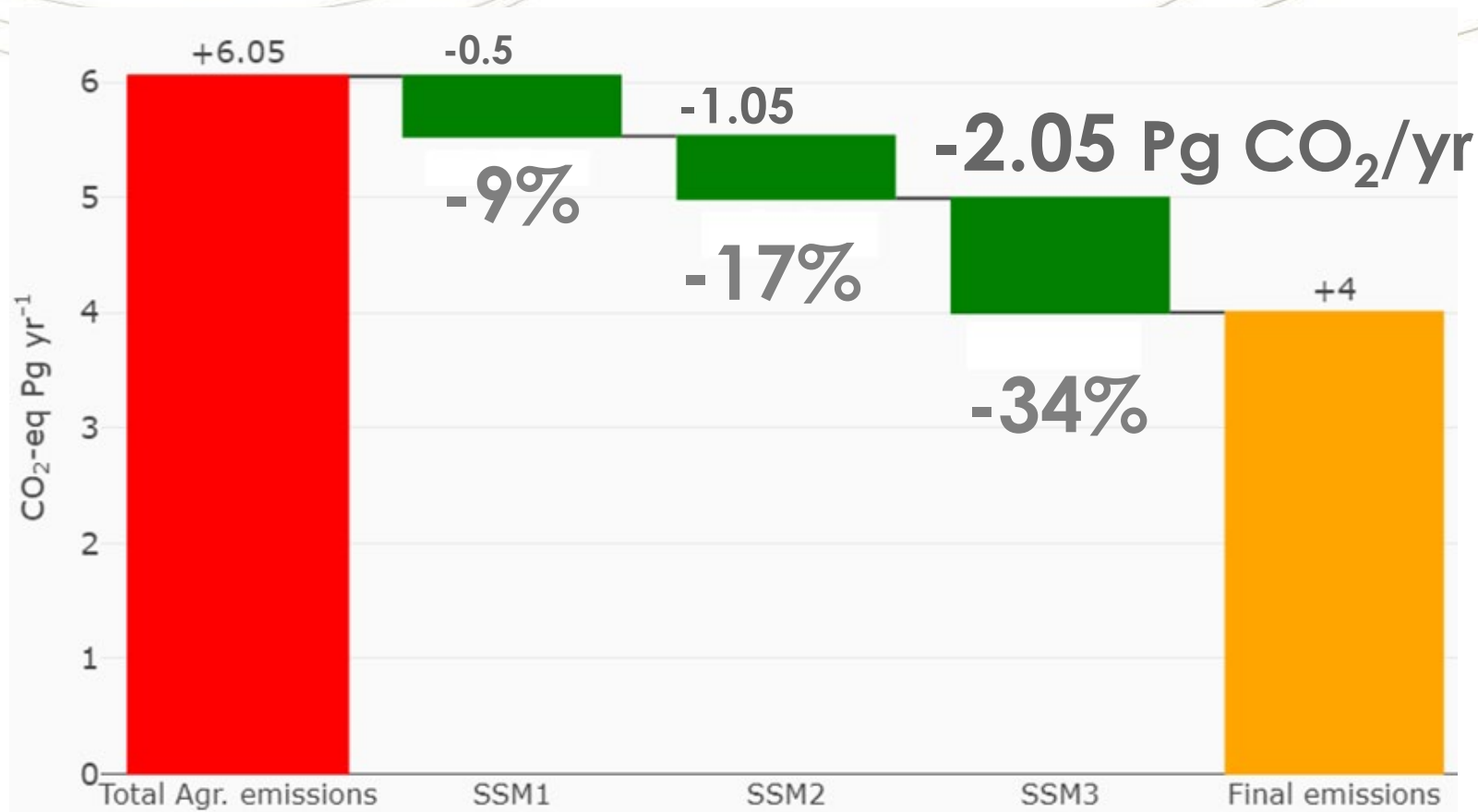
Mitigation Potential*

*Excluding blank countries

Agricultural soils play an important role in mitigating GHG emissions:
emissions could be cut by 34 %

yearly agricultural global

Also work on other
Mitigation strategies :



*Total Agricultural Emissions from FAOSTAT (2019)

Way Forward

- Upload Technical **Report** GSO Cseq v.1.0.0 (review by all experts and contributors)
- Preparation scientific article
- Periodically **Update** GSO Cseq , with more available local data – Local country specific scenarios
- Strengthen **Expert Network and Capacity Development**
- Strengthen **communication** to involve more countries
- Provide technical support for applicability of GSO Cseq in defining NDCs, reporting, recarbonization projects
- Encourage **on the ground actions** on SOC sequestration

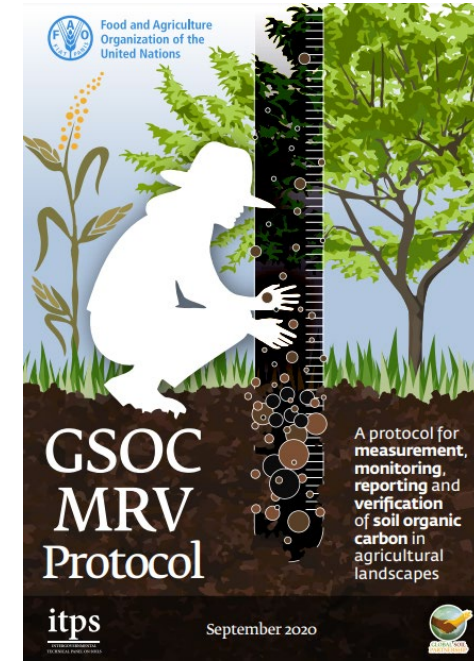
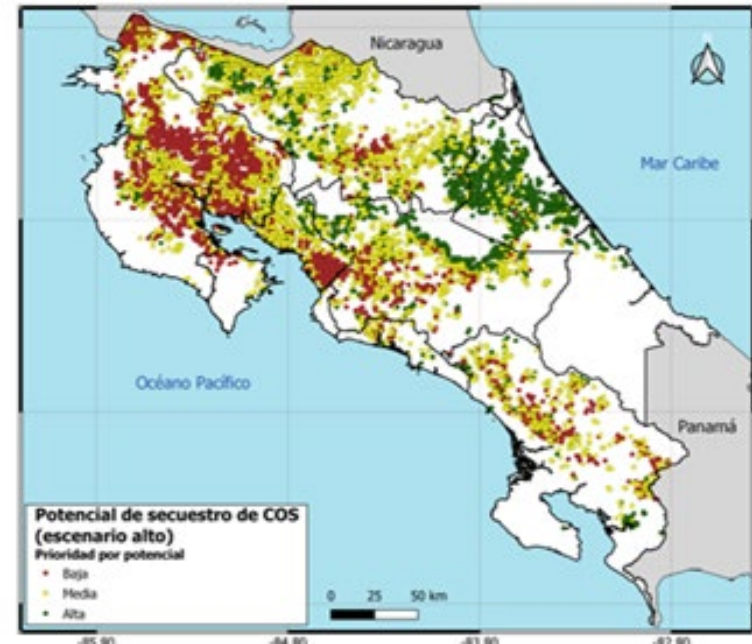
GSOCCseq into action...

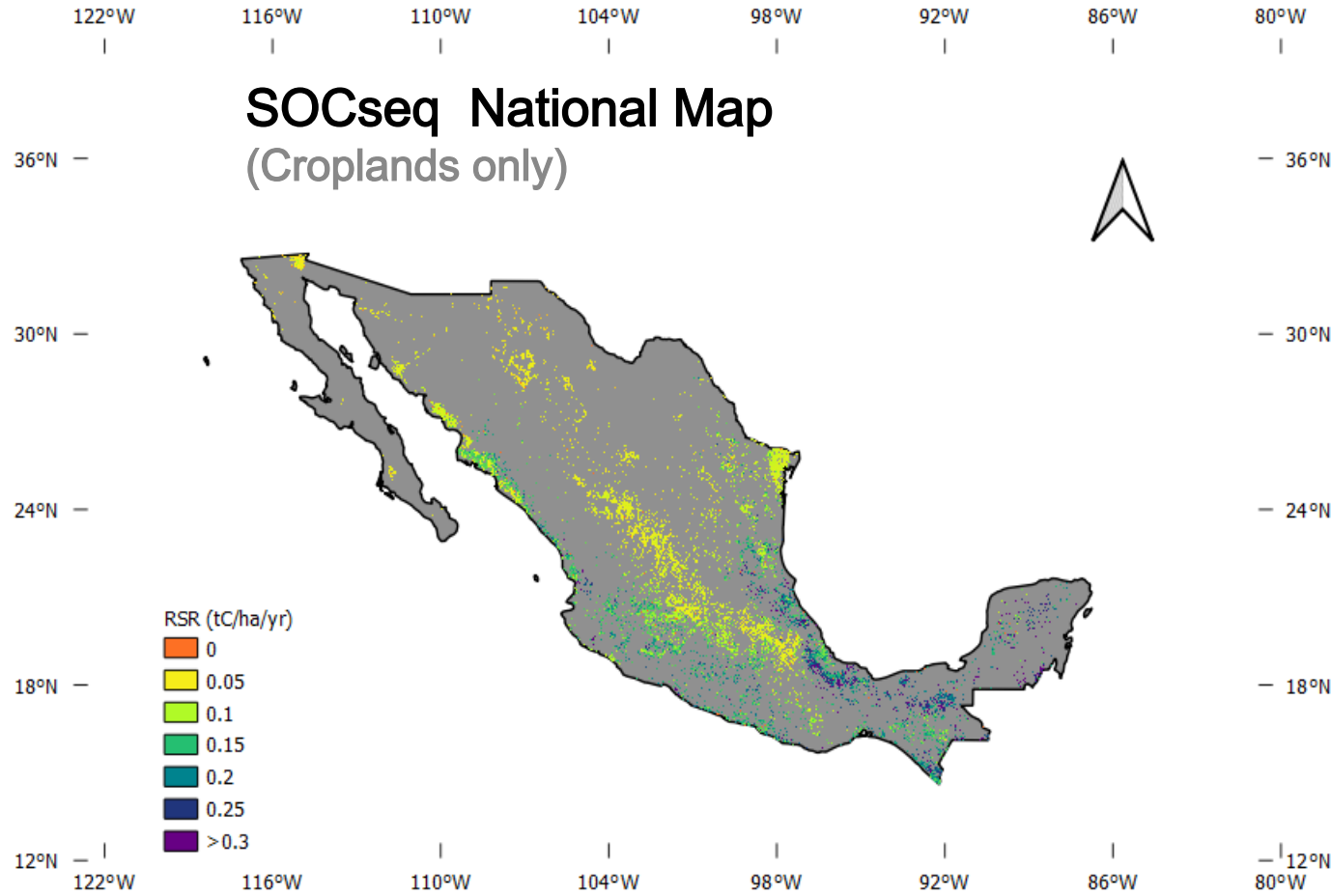
RECSO IL Costa Rica
 RECSO IL Mexico...
 RECSO IL Colombia

Modelo de implementación RECSOIL-Costa Rica

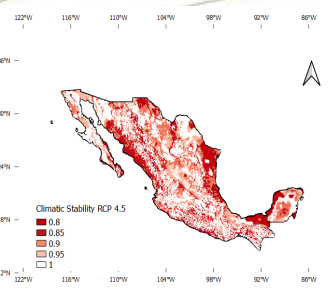


Mapa GSOCCseq en Pastos CR

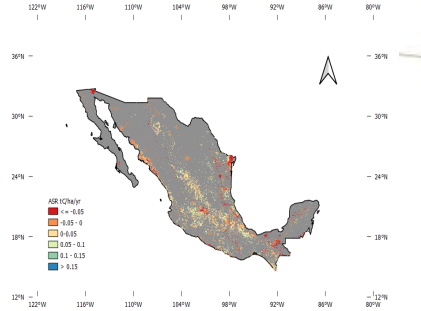




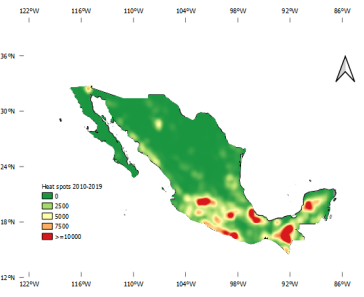
Climatic Variability



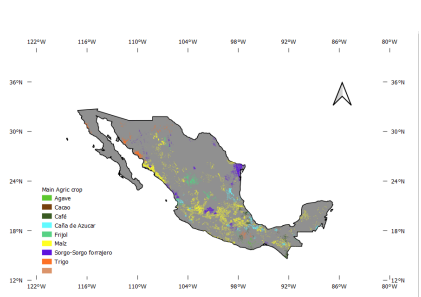
SOC Projected Losses



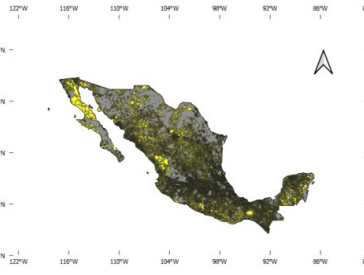
Fires/Heat spots



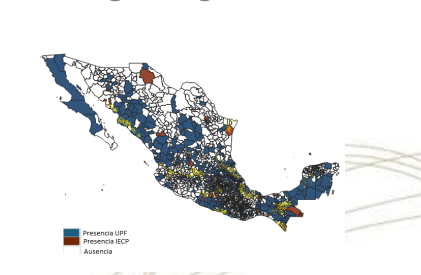
Main agricultural crop



Land tenure

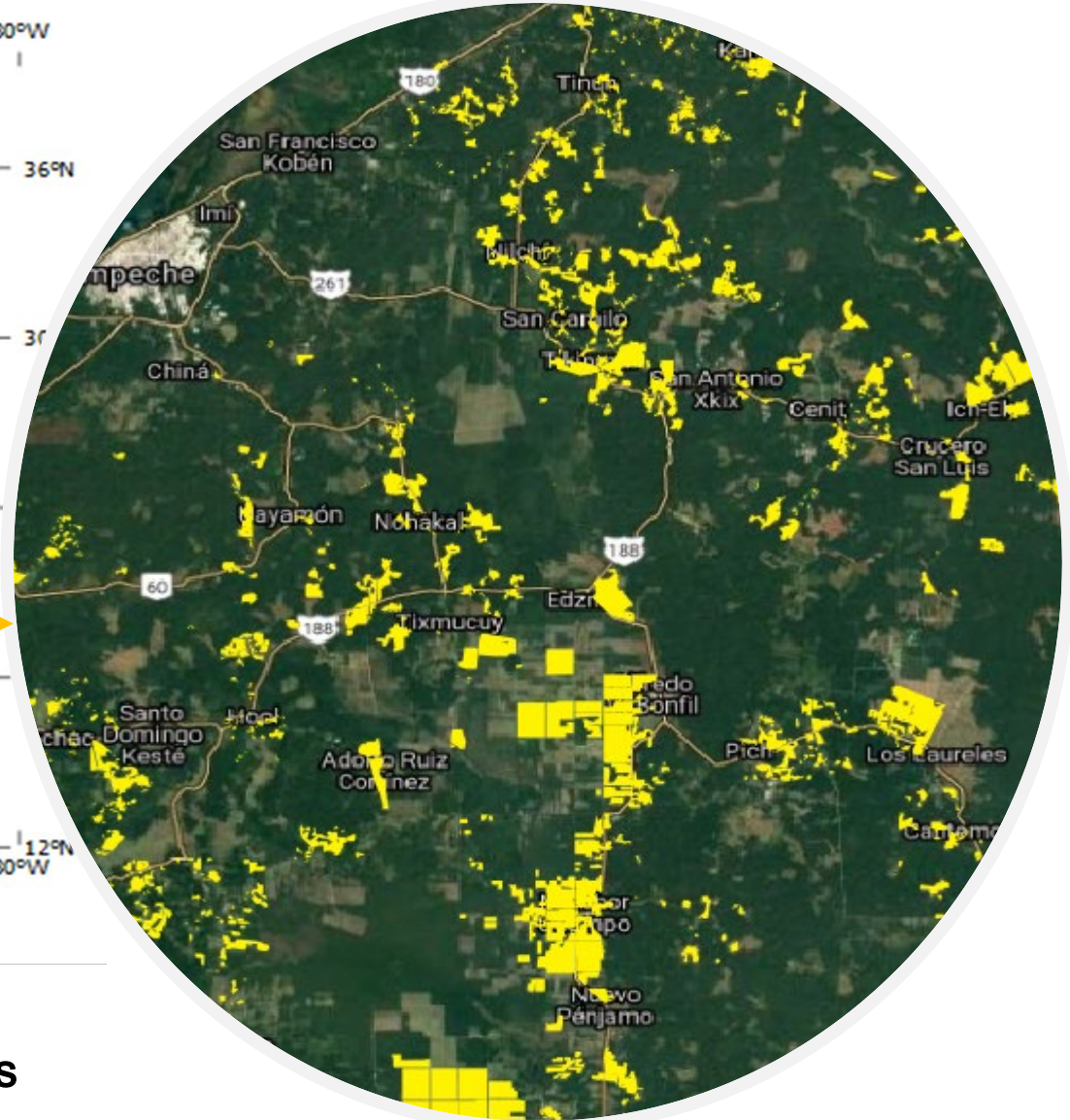
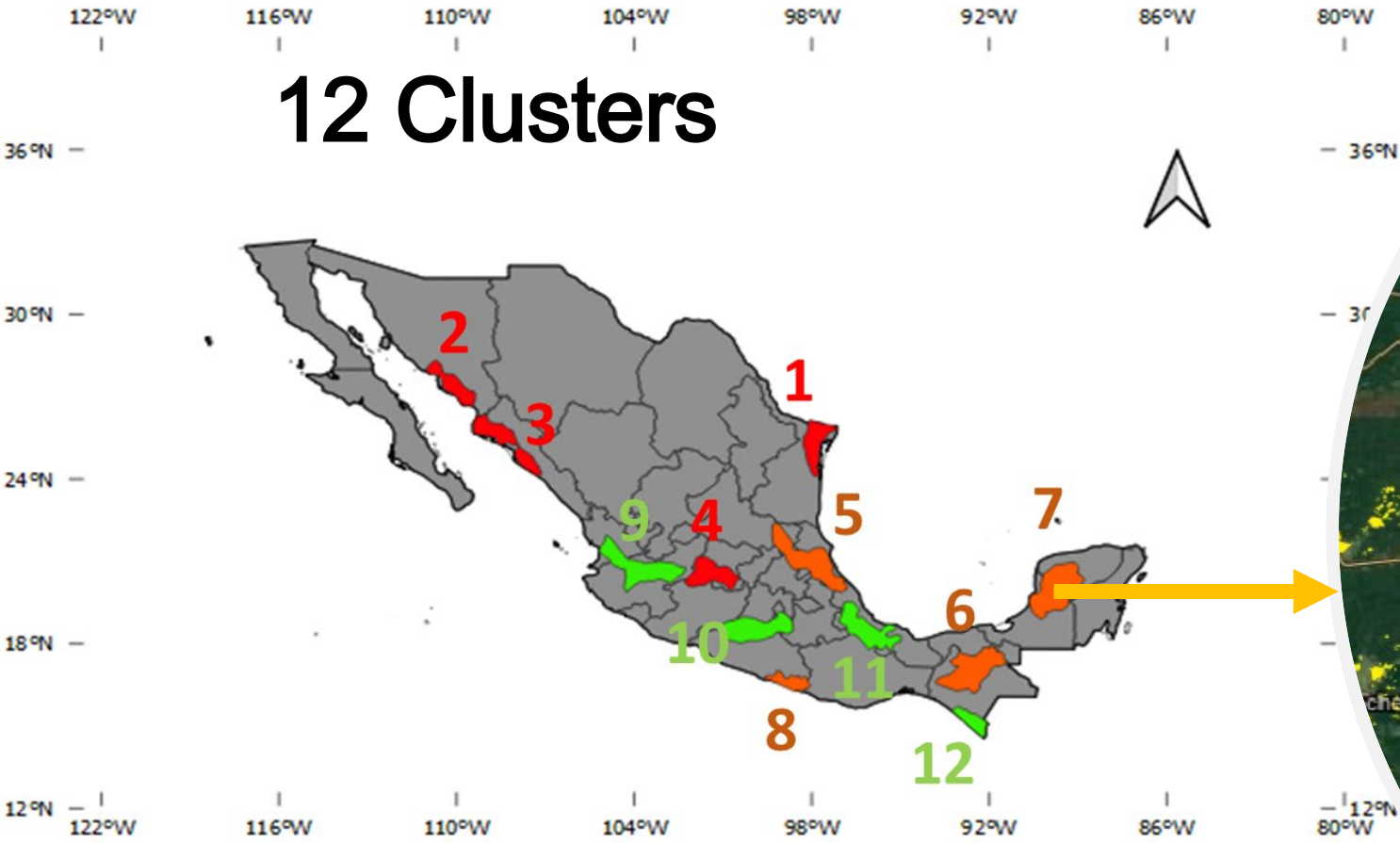


Existing Programmes



RECSOILMexico

12 Clusters



- High Risk – Low Seq Potential ➡ CC Adaptation strategies
- High Risk – High Seq Potential ➡ CC Adaptation + Mitigation
- Low Risk – High Seq Potential ➡ CC Mitigation

Identification of ~64,000 potential beneficiaries (smallholders) applying for international funds for recarbonization, mitigation and adaptation projects





From C Source to C Sink



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Thank you for your attention



Special Thanks

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

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