Mapping soil carbon sequestration across Argentina and Mexico using Roth C

Veronica Reynoso [1], Franco Daniel Frolla [2], Sol Ortiz [1], Marcos Esteban Angelini [3], Areli Cerón [1], Marcelo Javier Beltrán [3], Verónica Bunge [1], Guillermo Ezequiel Peralta [4], Luciano Elias Di Paolo [4], Darío Martín Rodríguez [3], Guillermo Andrés Schulz [3], Juan Velázquez [1], Carla Pascale Medina [4], Mario Guevara [5]

[1] Secretaría de Agricultura y Desarrollo Rural, México
[2] Instituto Nacional de Tecnología Agropecuaria - Bordenave, Argentina
[3] Instituto Nacional de Tecnología Agropecuaria - Soil Institute, Argentina
[4] Global Soil Partnership Secretariat - FAO, Rome
[5] Centro de Geociencias, Universidad Nacional Autónoma de México

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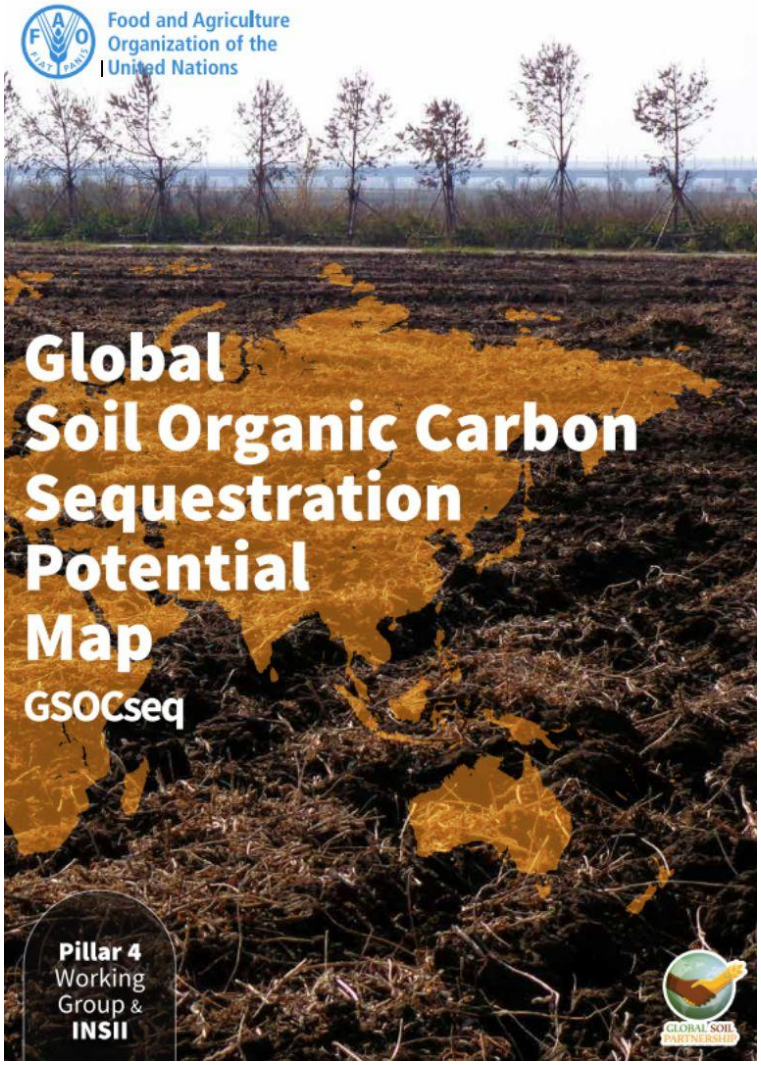
Webinar
Pedometrics
WGs Digital Soil Mapping - Global Soil Map

Technical Manual Global Soil Organic Carbon Sequestration Potential Map GSOCseq

Food and Agriculture Organization of the United Nations, Rome, 2020

25/11/2020



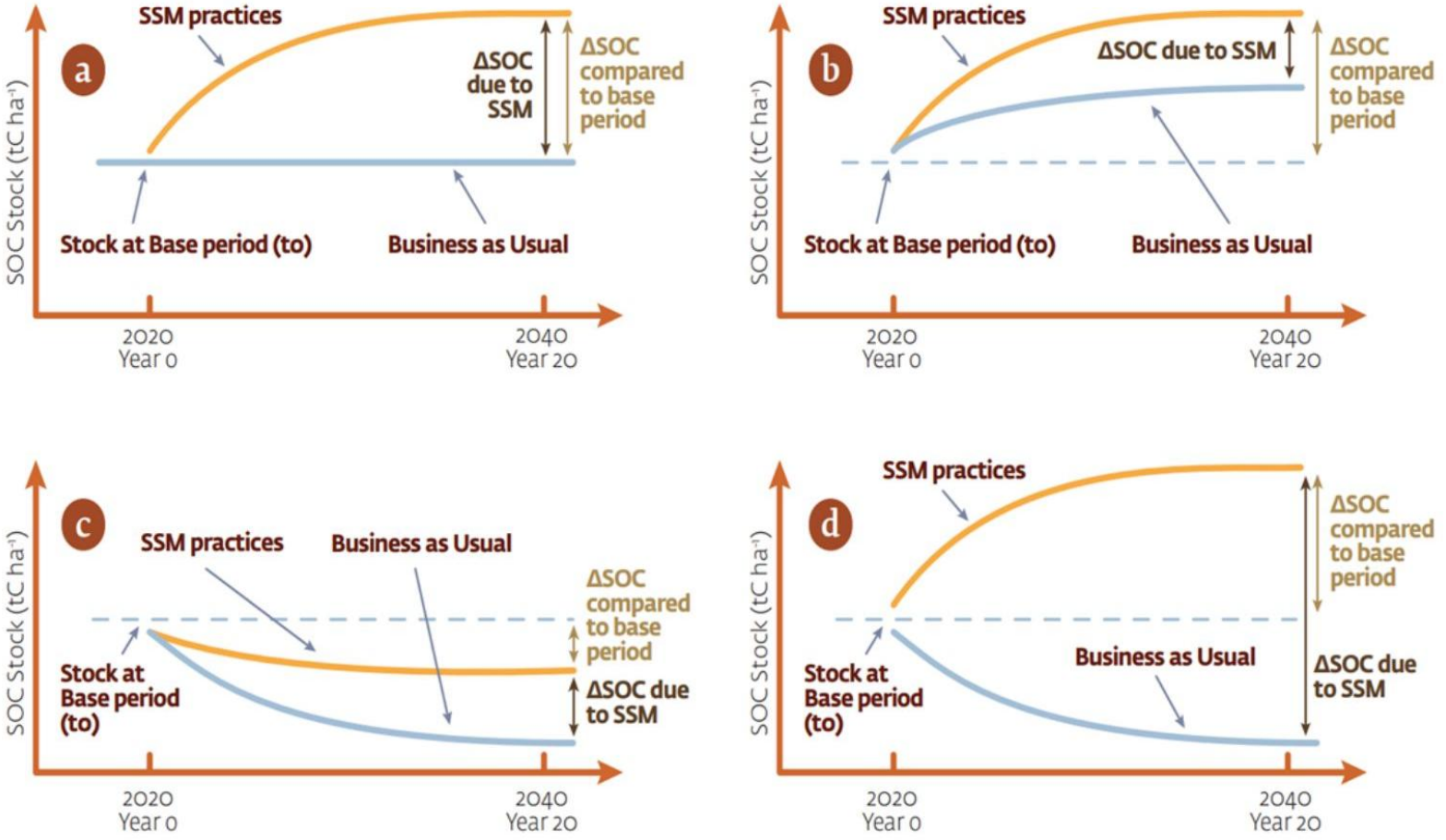
List of contributors

Authors

Guillermo Peralta (GSP Secretariat)
Luciano Di Paolo (GSP Secretariat)
Christian Omuto (GSP Secretariat)
Kostiantyn Viatkin (GSP Secretariat)
Isabel Luotto (GSP Secretariat)
Yusuf Yigini (GSP Secretariat)

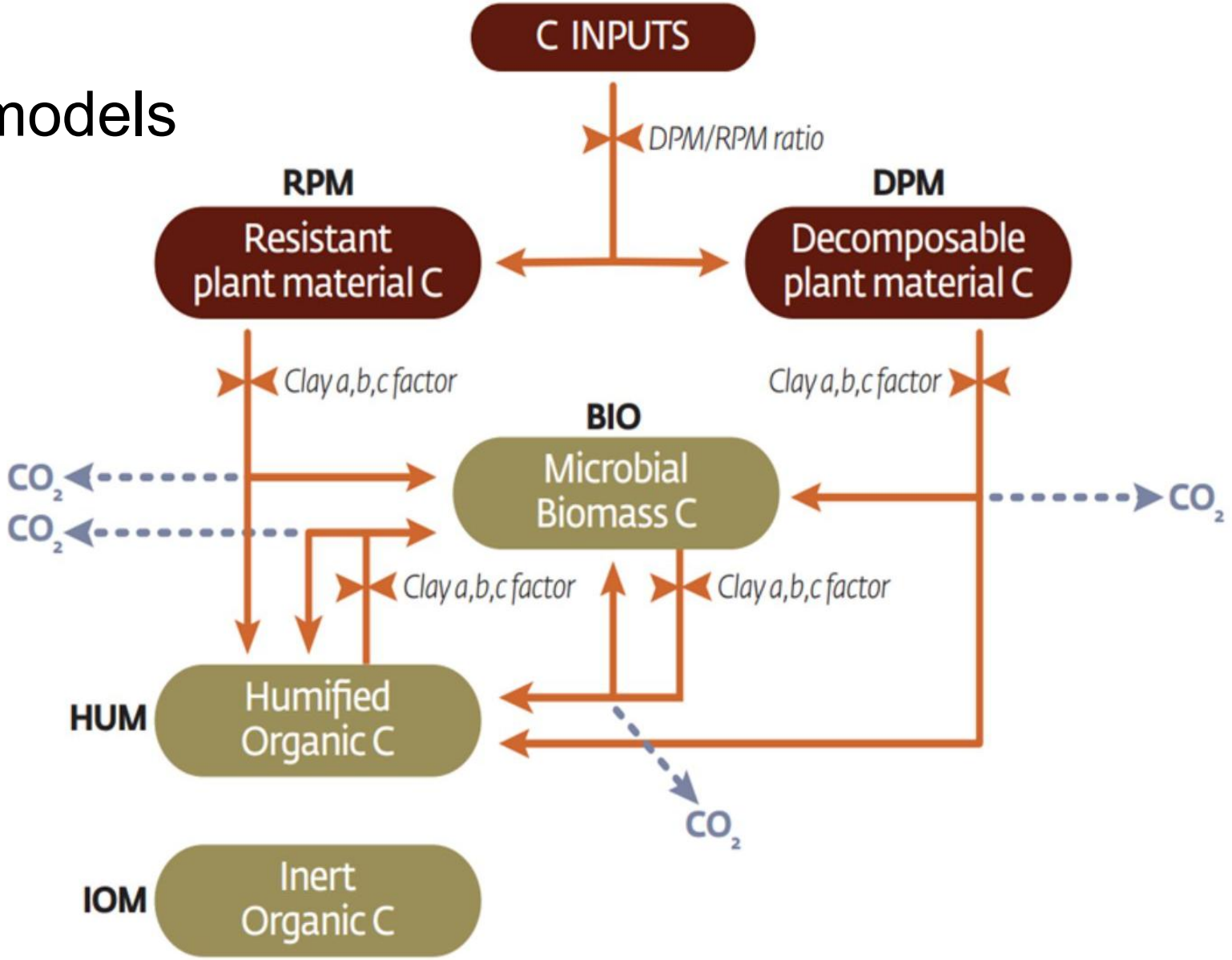
FAO. 2020. GSOCseq Global Soil Organic Carbon Sequestration Potential Map Technical Manual. G. Peralta,L. Di Paolo, C. Omuto, K. Viatkin, I. Luotto, Y. Yigini, 1st Edition, Rome. https://github.com/FAO-GSP

Hypothetical SOC change in response to Sustainable Soil Management



FAO. 2020

Process based models (e.g., Roth C)



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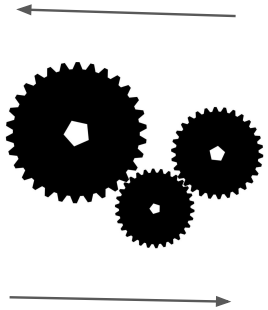
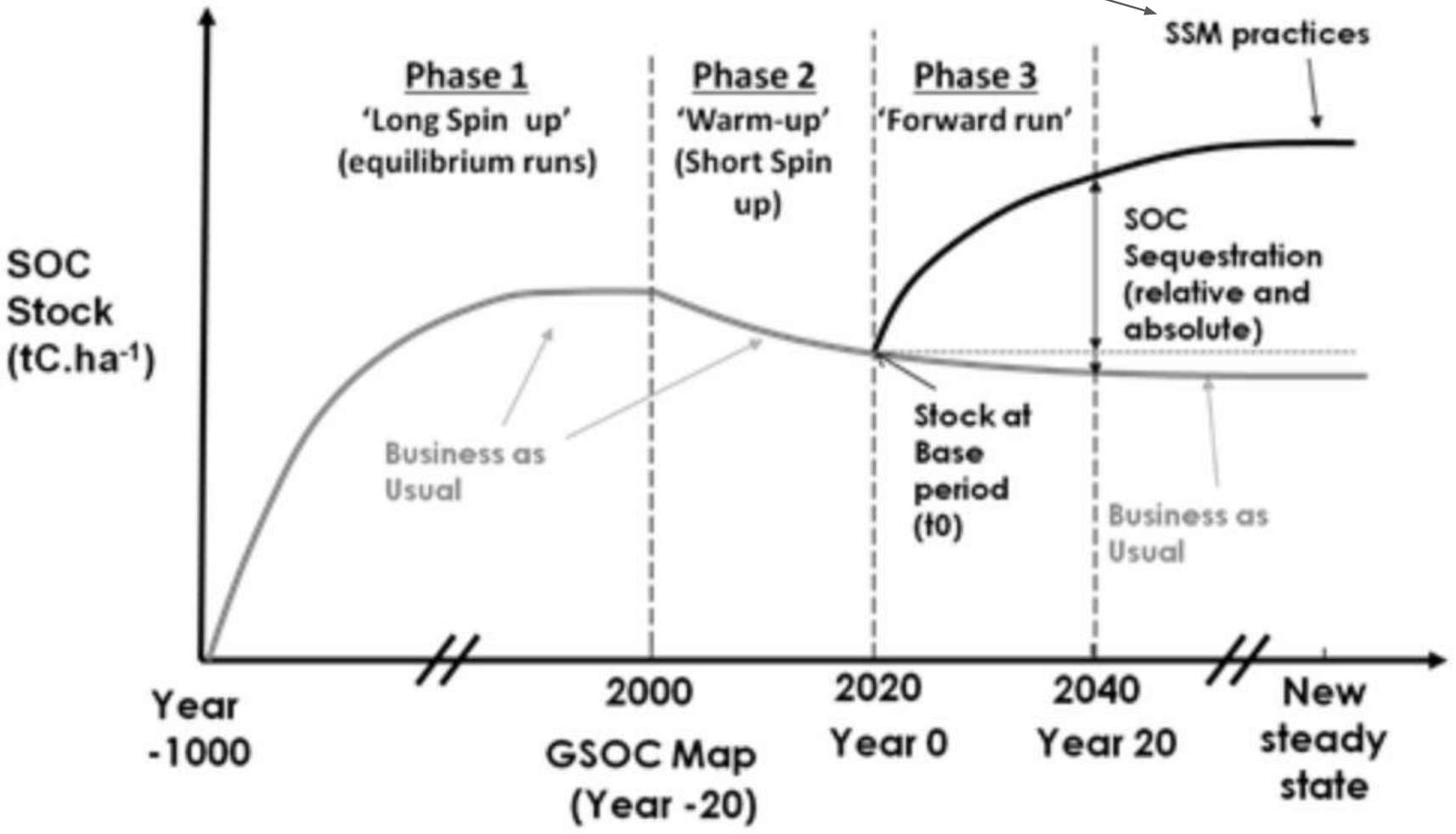
Main inputs

Climate Data	Soil Data	Land Use Management Data
1. Monthly rainfall(mm)	1. Total initial 0-30cm SOC stocks (t C ha-1)	1. Monthly Soil cover (binary: bare vs. vegetated)
2. Average monthly mean air temperature (ºC)	2. Initial C stocks of the different pools (t C ha-1): DPM, RPM, BIO, HUM, IOM	2. Irrigation (to be added to rainfall amounts)
3. Monthly open pan evaporation (mm)/evapotranspiration (mm)	3. Clay content (%) at simulation depth.	3. Monthly Carbon inputs from plant residue (aboveground + roots + rhizodeposition), (t C ha-1)
		4. Monthly Carbon inputs from organic fertilizers and grazing animals' excretion (t C ha-1)
		5. DPM/RPM ratio, an estimate of the decomposability of the incoming plant material

FAO. 2020

Modeling phases





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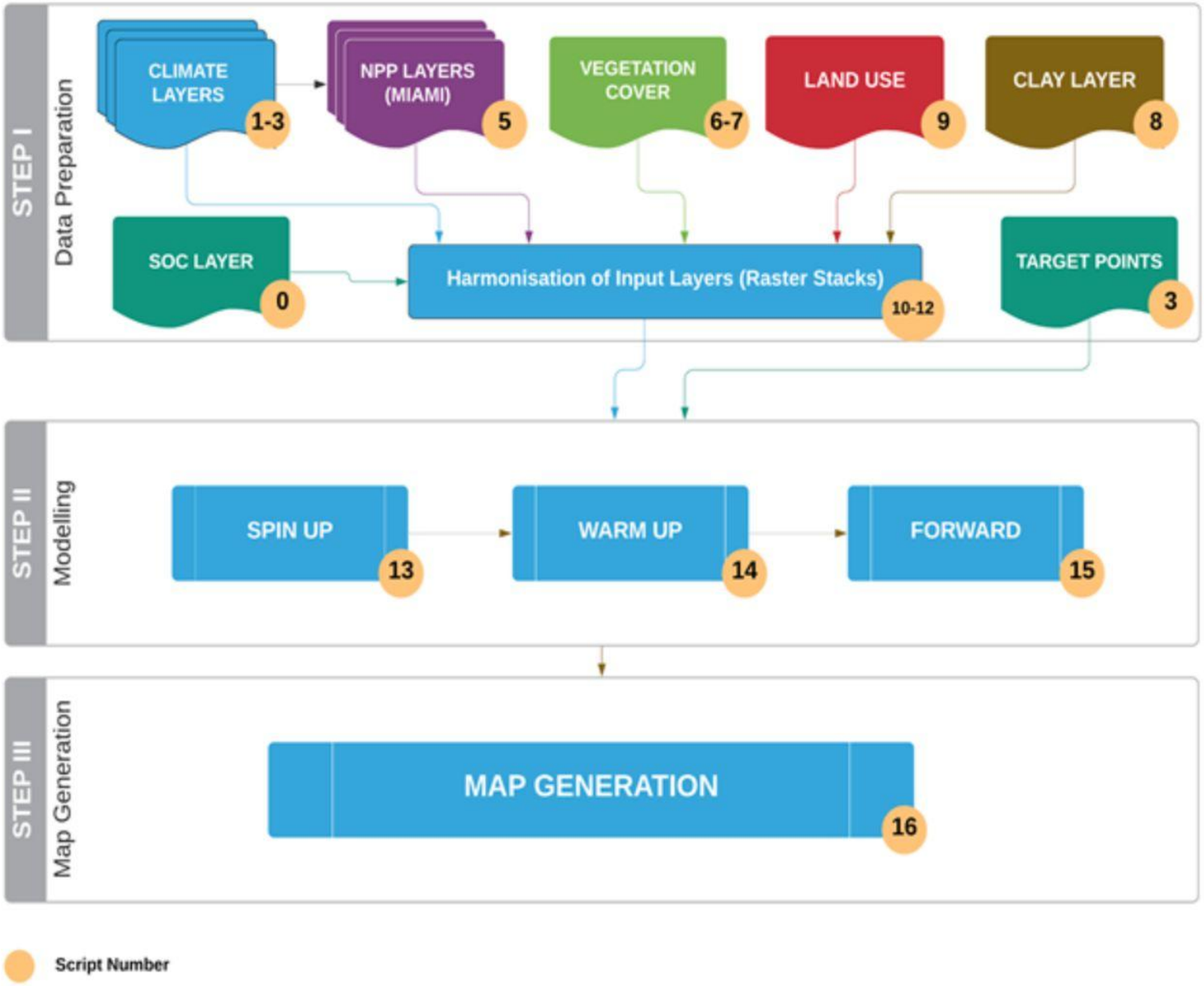
Workflow



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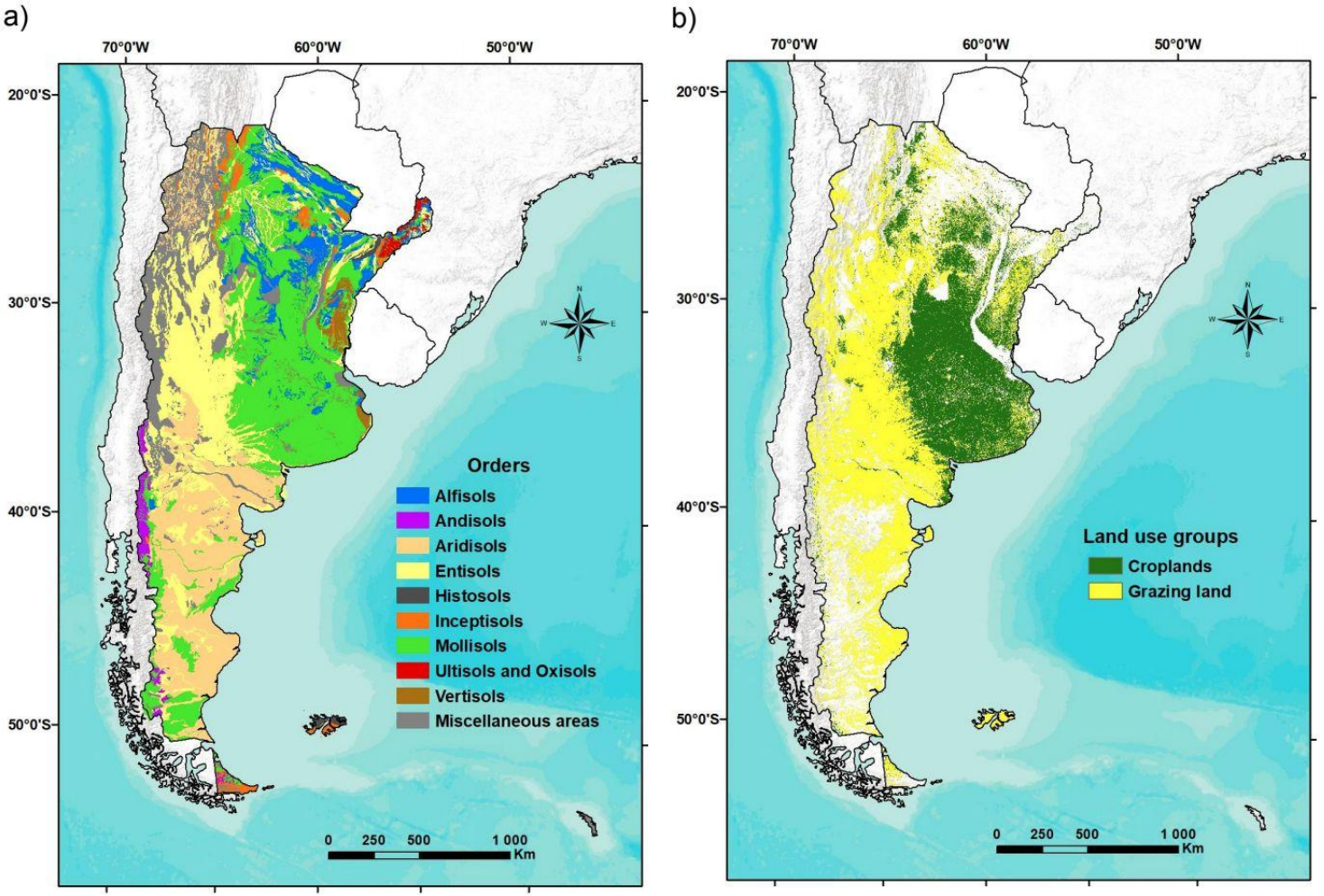
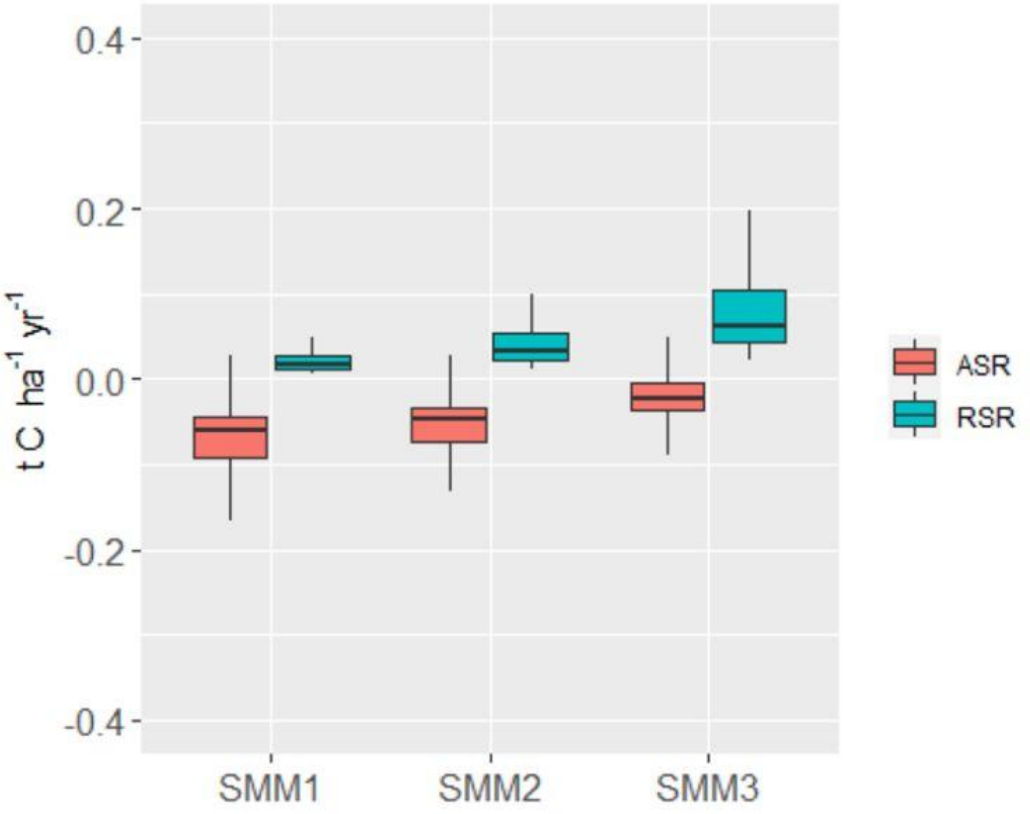
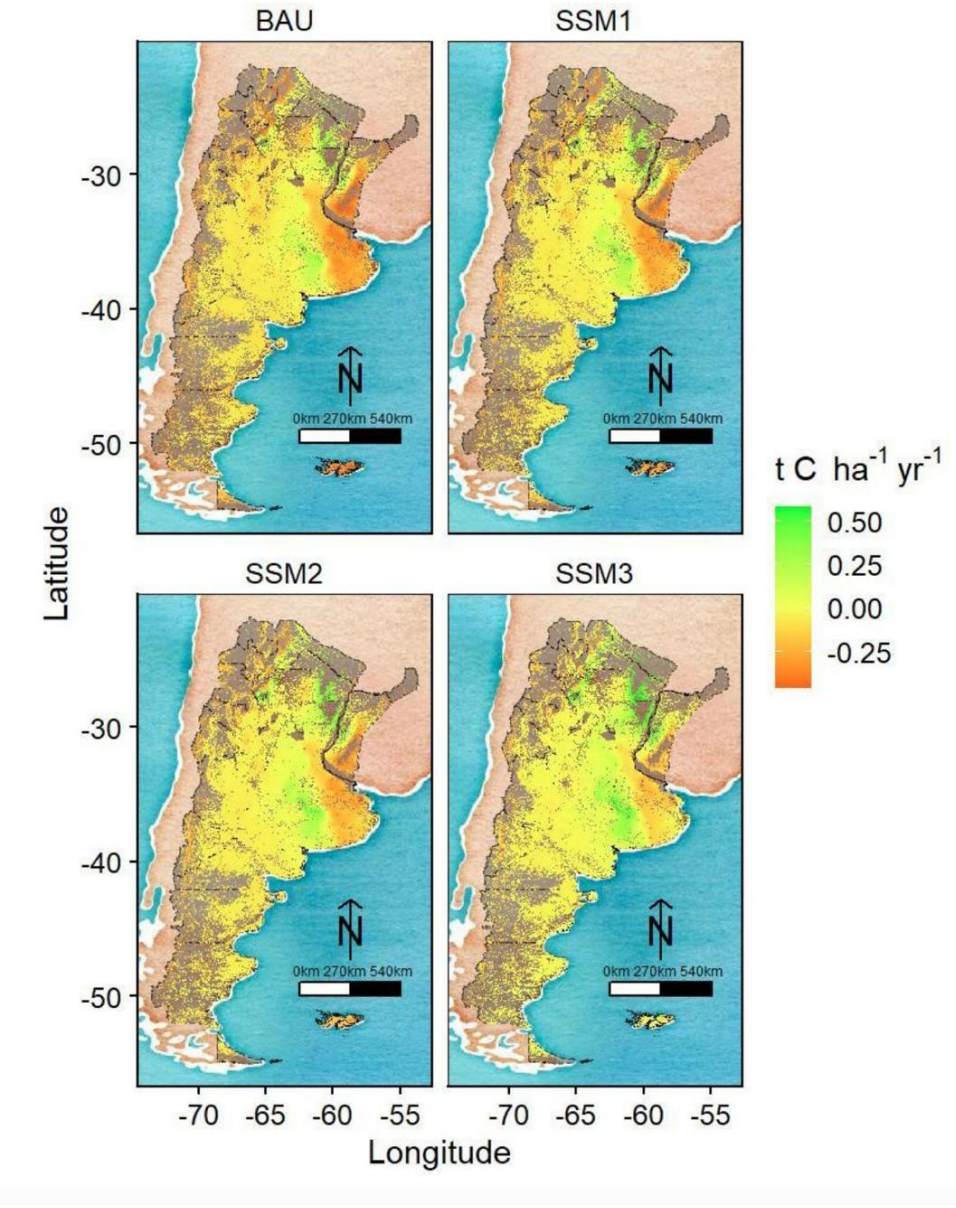
Soils orders of Argentina and land use



Frolla et al., 2021

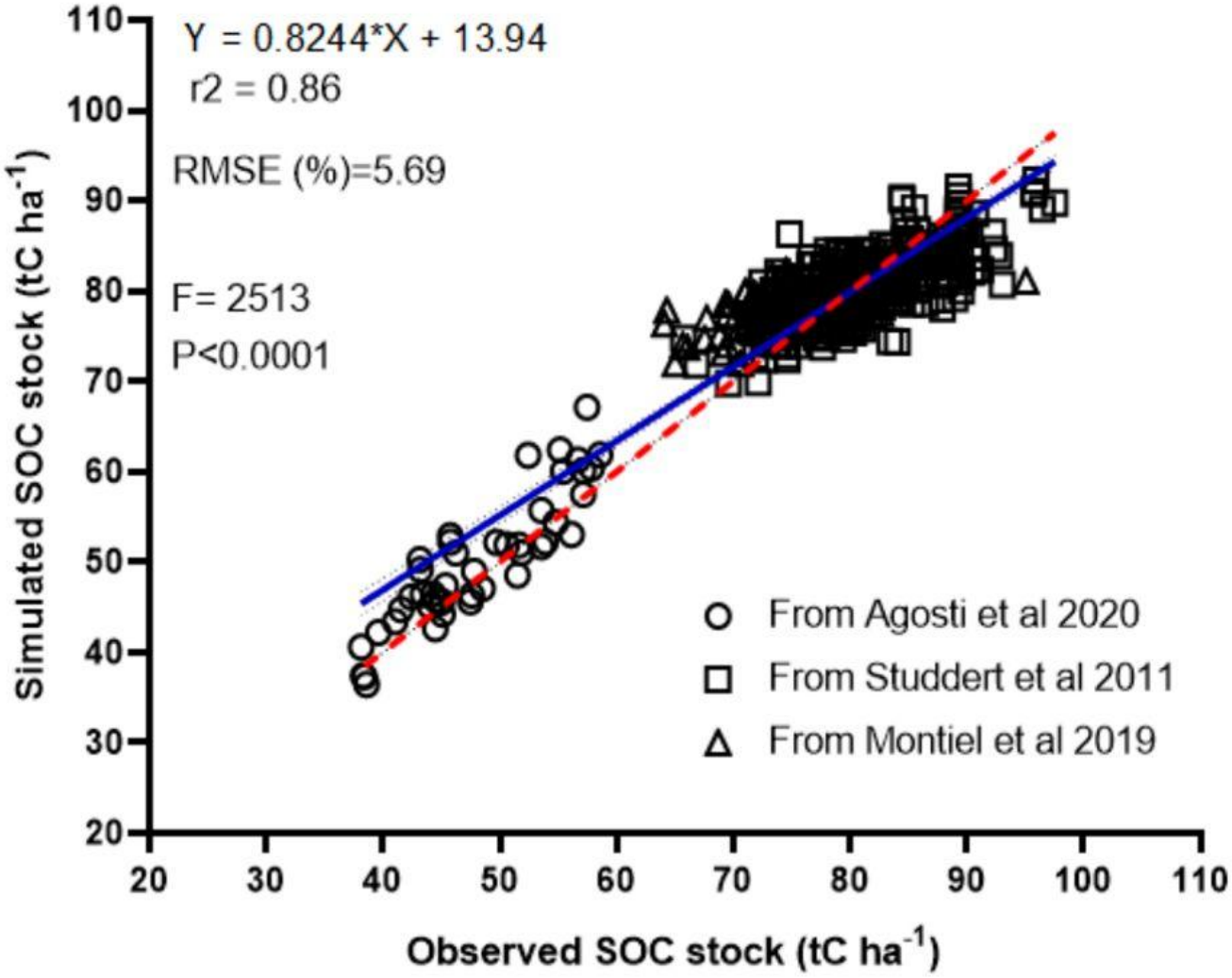
SOC prediction





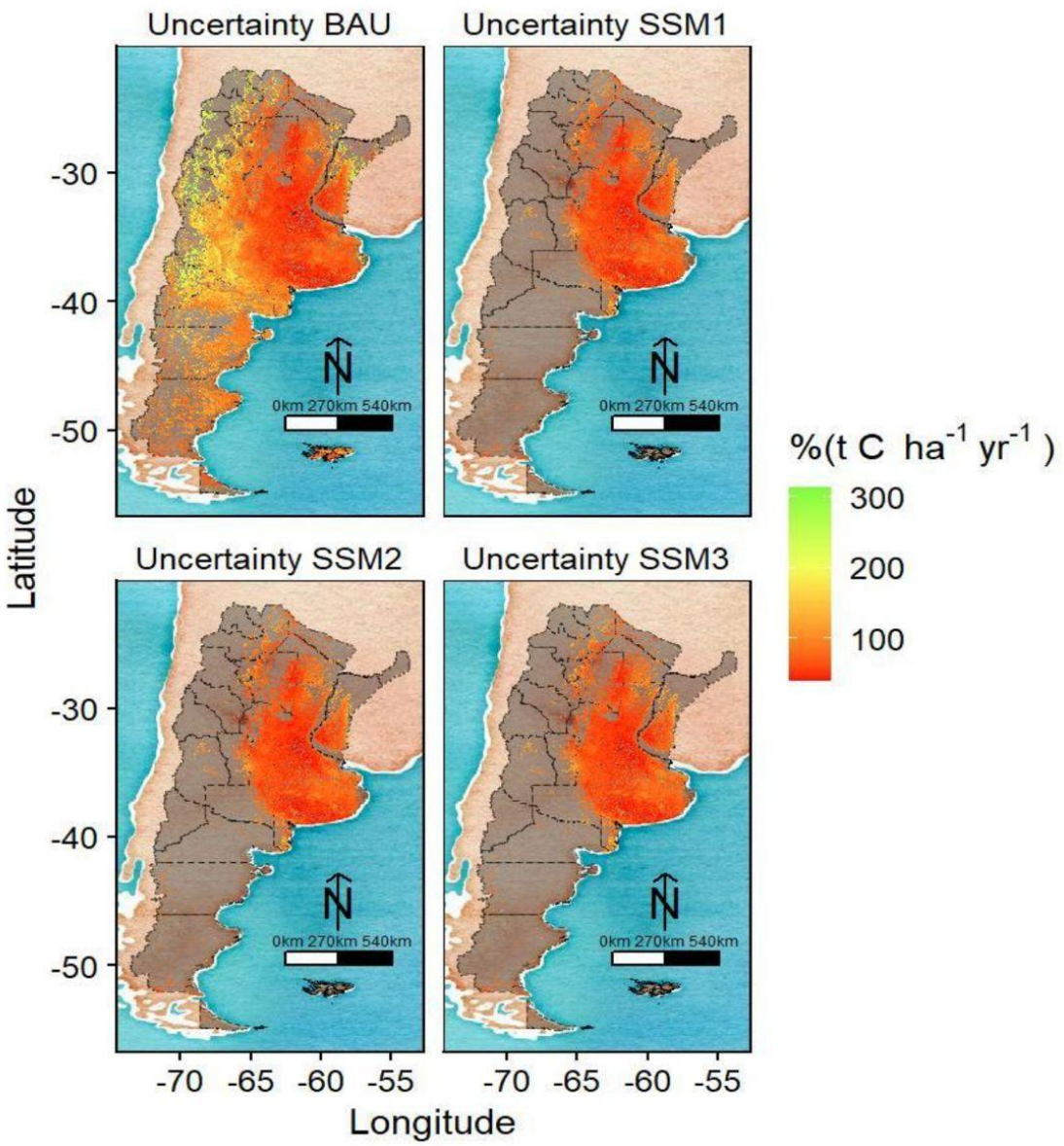
Frolla et al., 2021

Accuracy



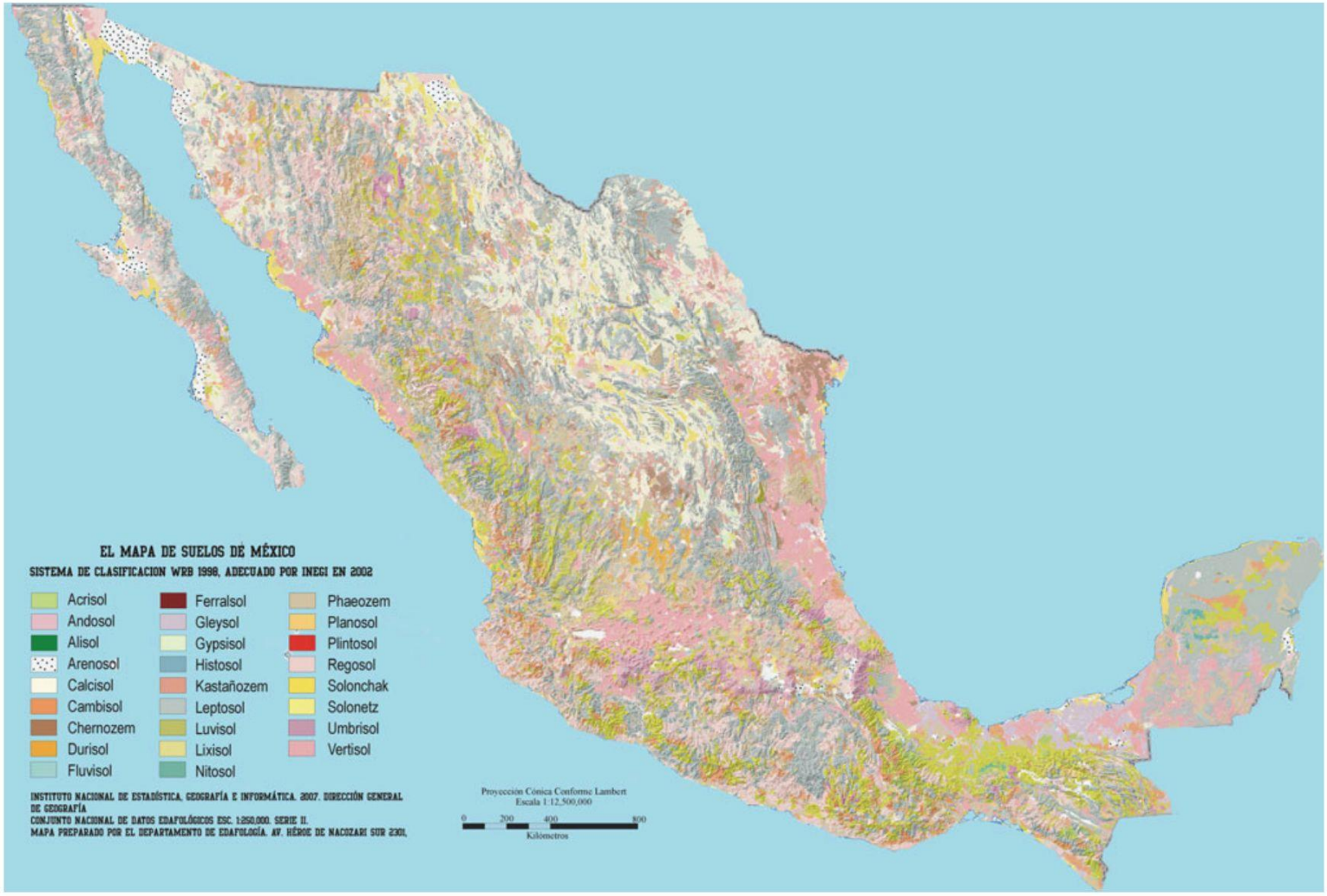
Frolla et al., 2021

Uncertainty



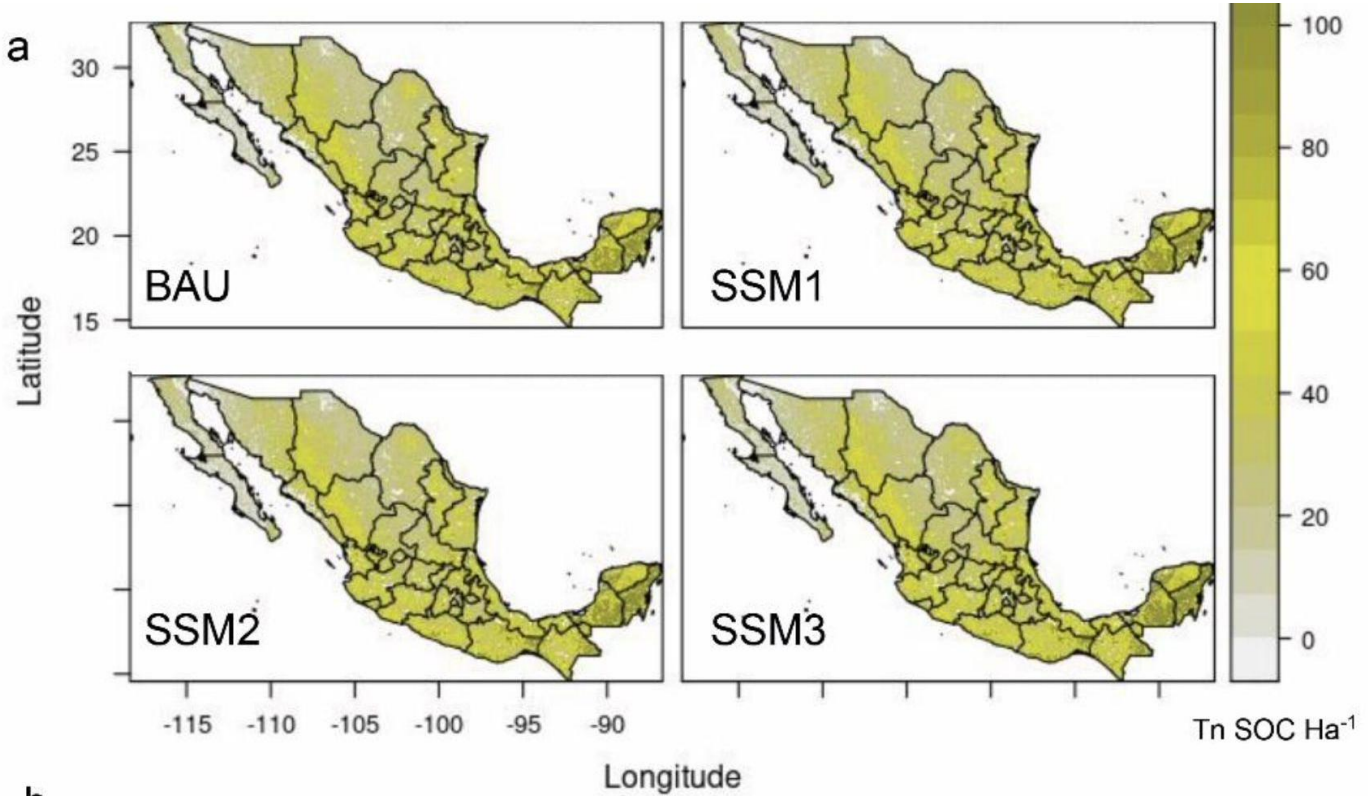
Frolla et al., 2021

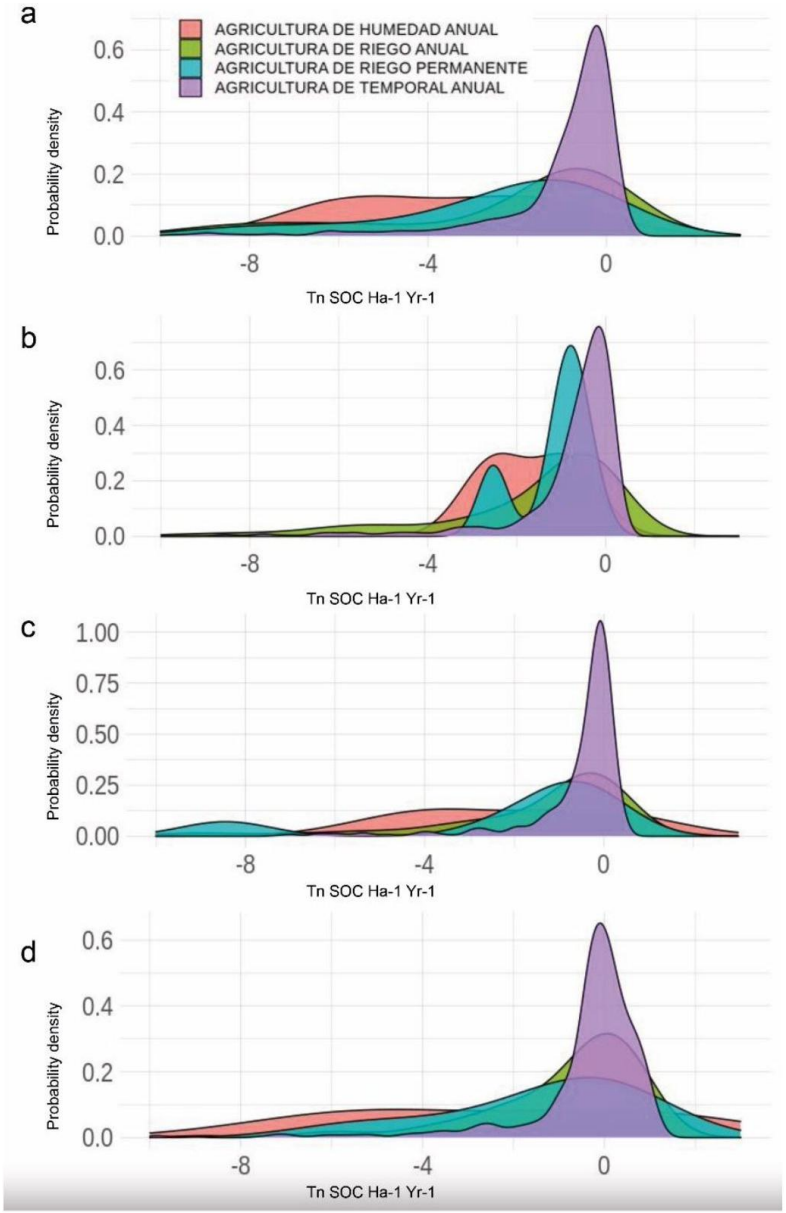
Soils in Mexico



INEGI, 2006

SOC prediction



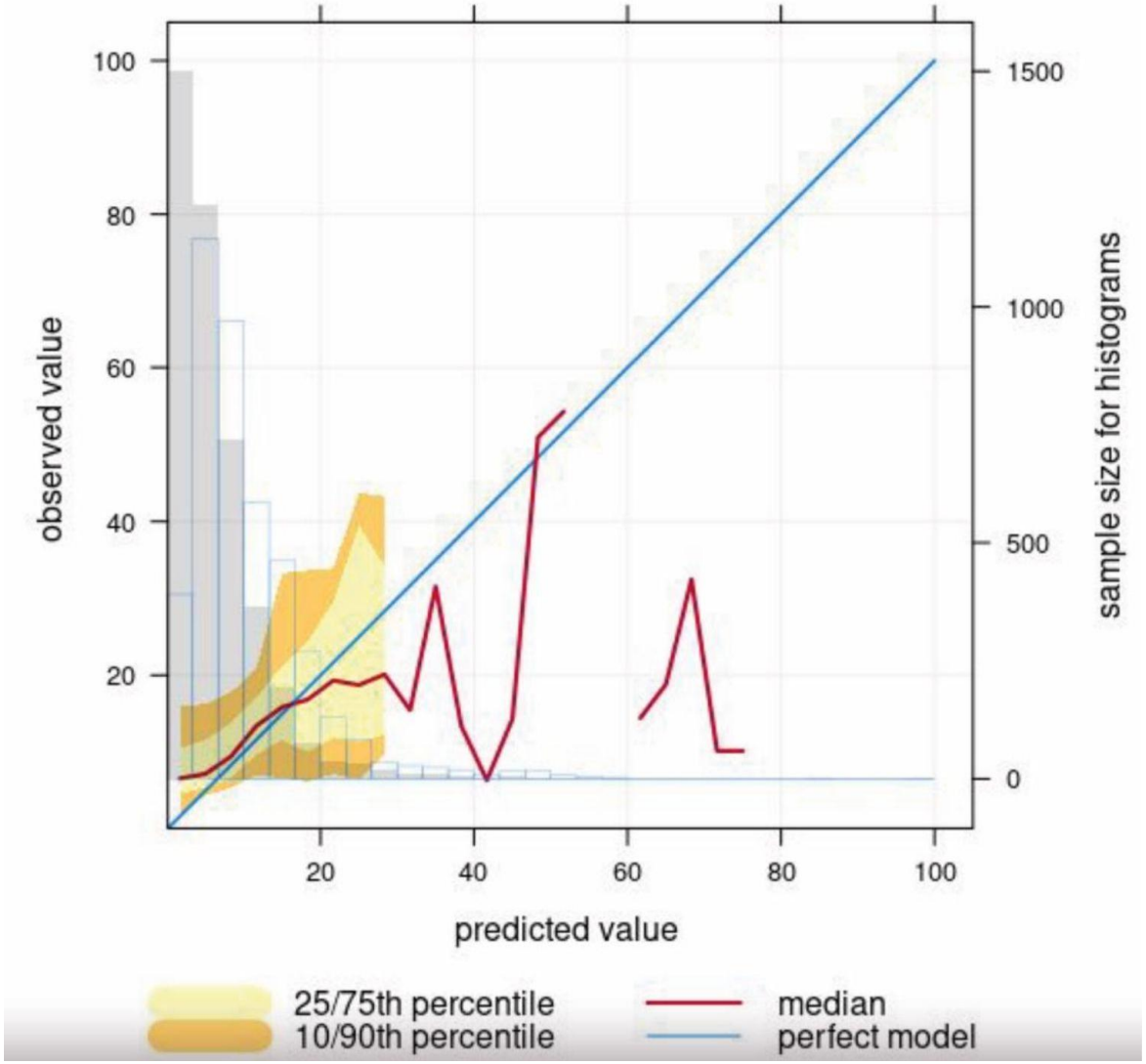


Reynoso et al., 2021

Accuracy

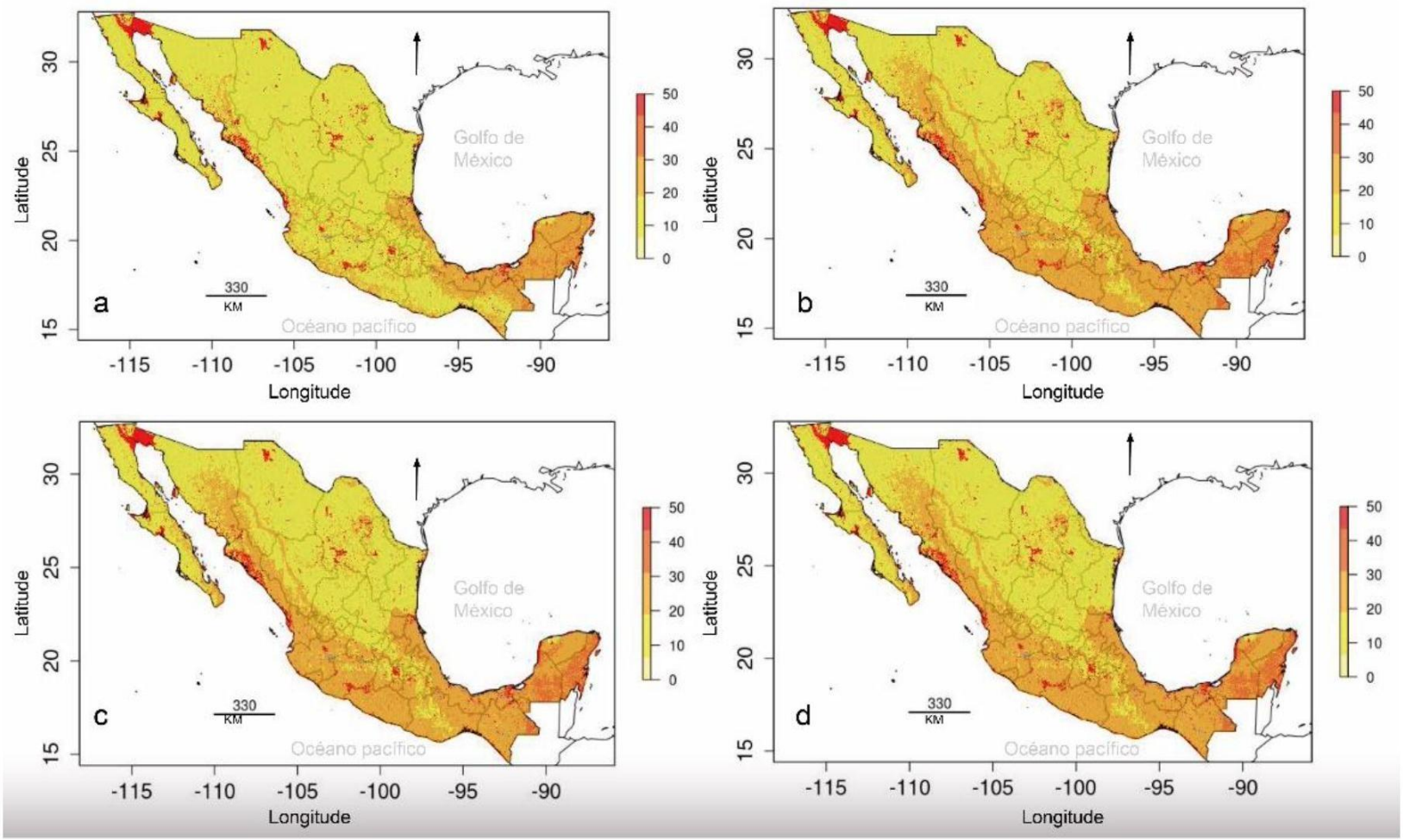
r=0.36

RMSE 10%



Reynoso et al., 2021

Uncertainty



Reynoso et al., 2021

Summary

- Collective learning between Mexico and Argentina to support GSOCseq following GSP specifications

- Roth C suggest that both countries are SOC sources and that they will continue to be a source of SOC in the next 20 years

- Comparing and testing other models and approaches for predicting and forecasting SOC change allow to confirm or reject the opinion of Roth C

Perspective

- Mexico and Argentina increase interoperability towards better SOC estimates to enable SOC monitoring and forecasting with a national perspective

- Countries share experiences on sustainable soil management to support national guidelines for policy relevant research around the carbon cycle