Soil Carbon

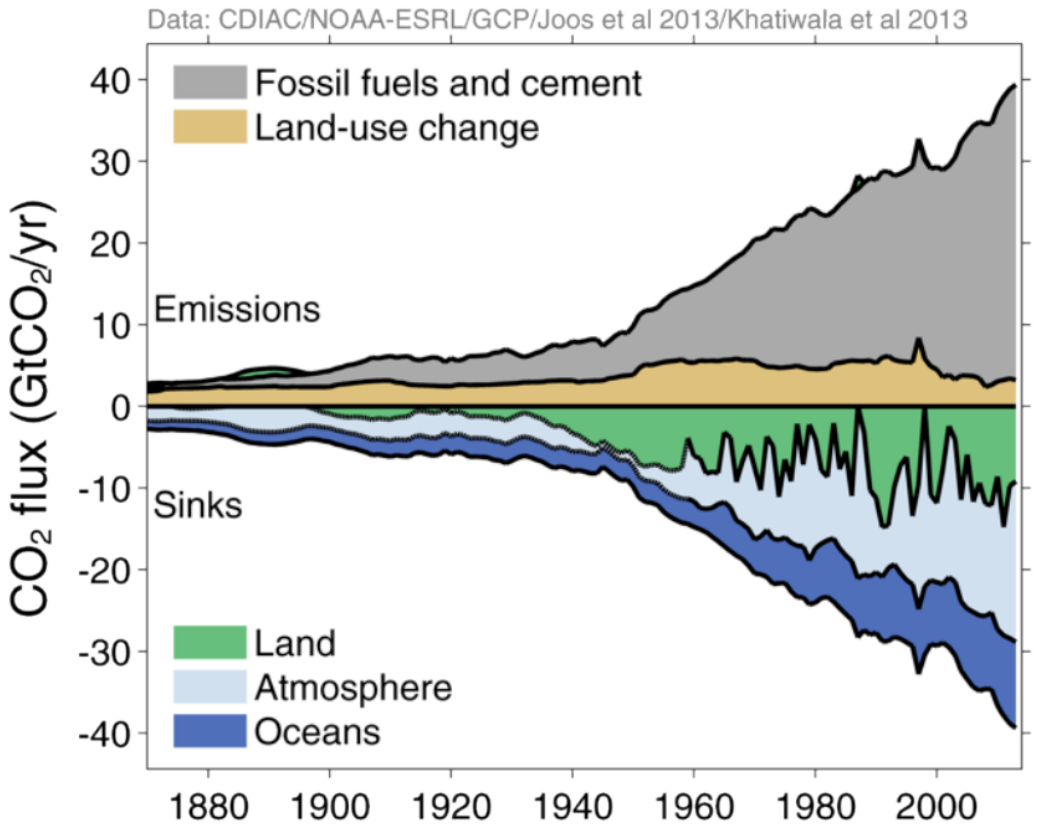
For food security and climate change mitigation

Sydney Institute of Agriculture

THE UNIVERSITY OF SYDNEY

Global Carbon Stocks & Fluxes

Fluxes



8.9 Gt C

Terrestrial Stocks

Vegetation: **550±100 Gt C**

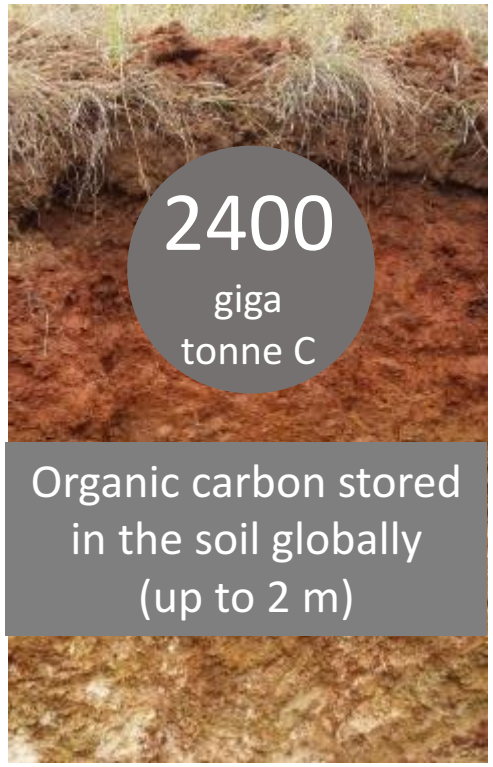
Soils: **2400 ± 500 Gt C**

PARIS2015
UN CLIMATE CHANGE CONFERENCE
COP21·CMP11

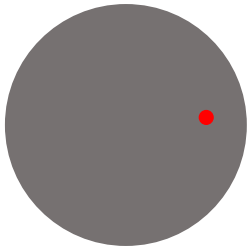
4 PER 1000
SOILS FOR FOOD SECURITY AND CLIMATE

8.9 giga tonne C

Annual Global CO_2 emissions from fossil fuels



Organic carbon stored in the soil globally (up to 2 m)

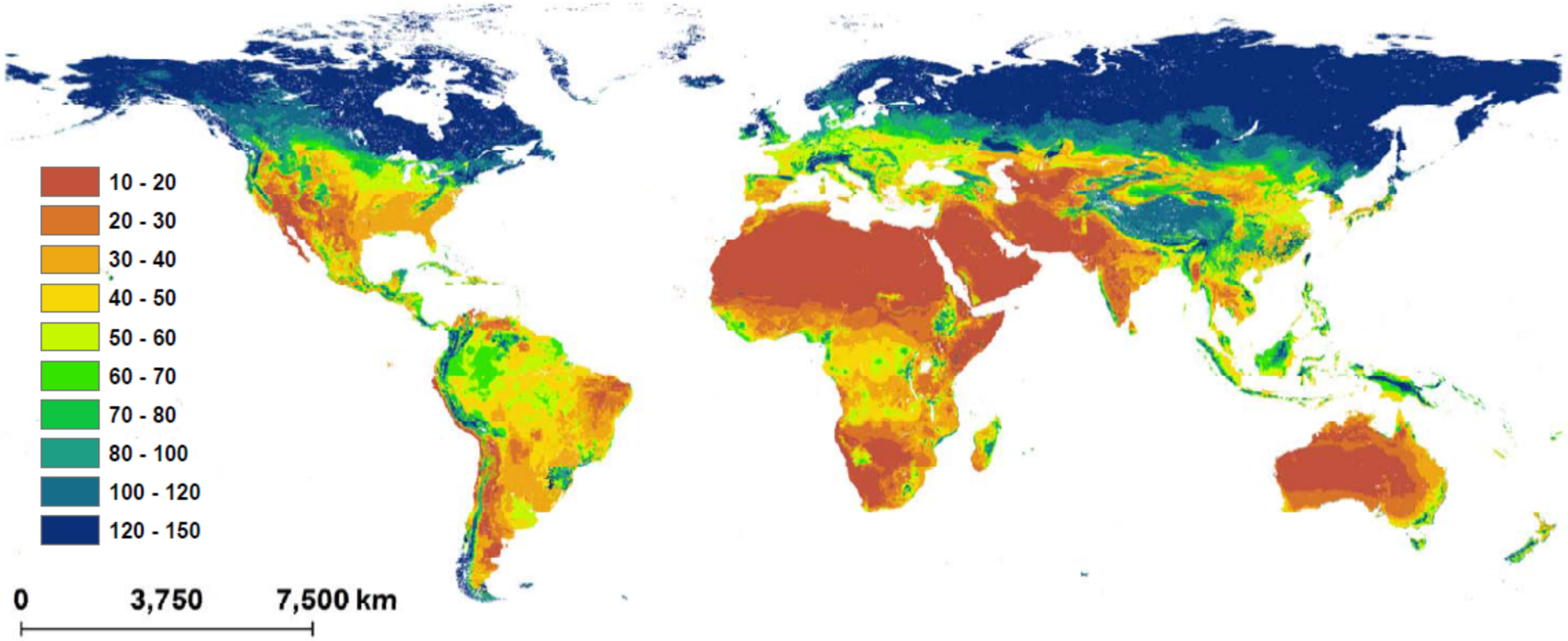


$8.9 / 2400 = 4‰$

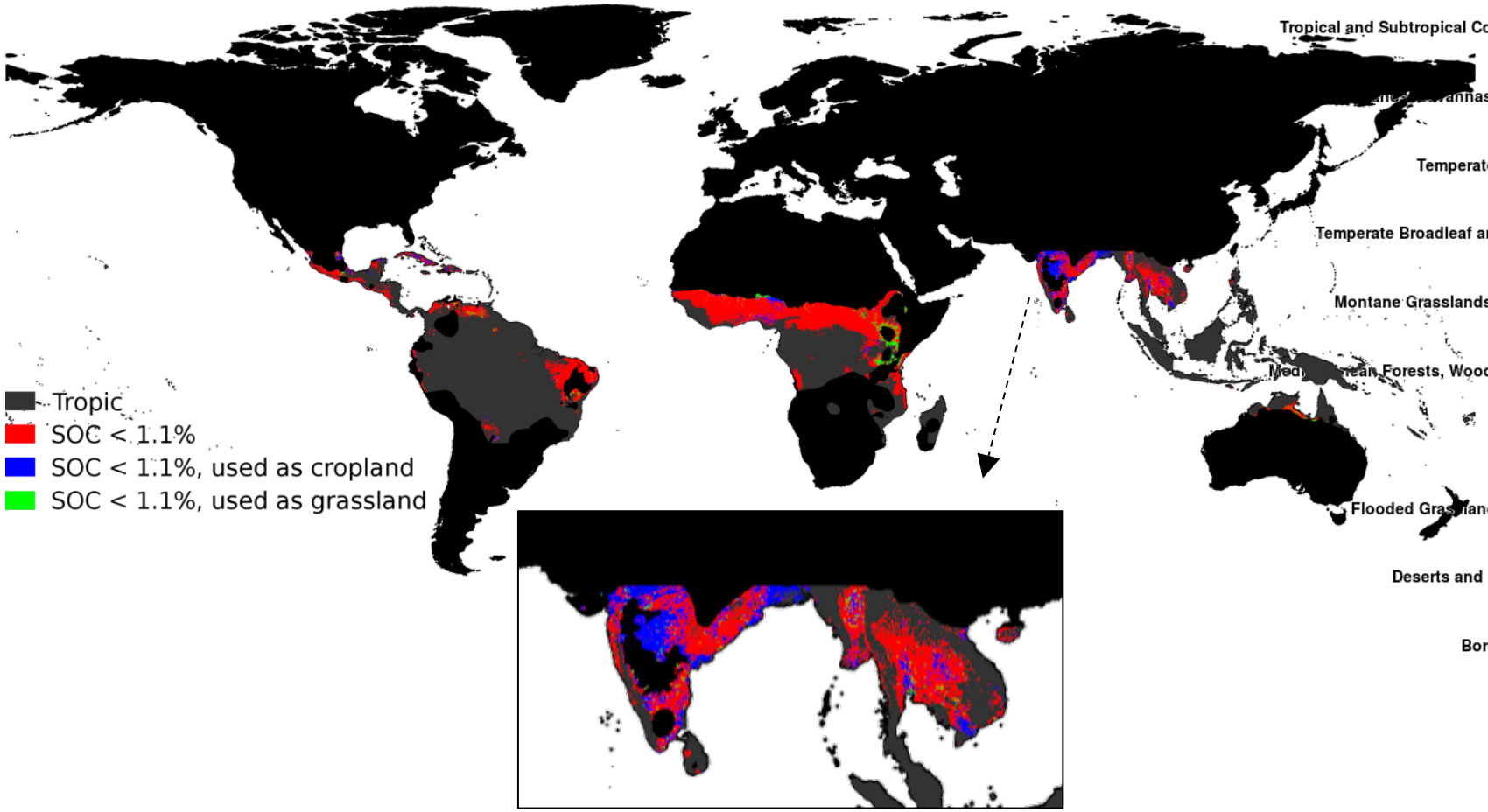
Amount of C stock increase needed to offset CO_2 emission

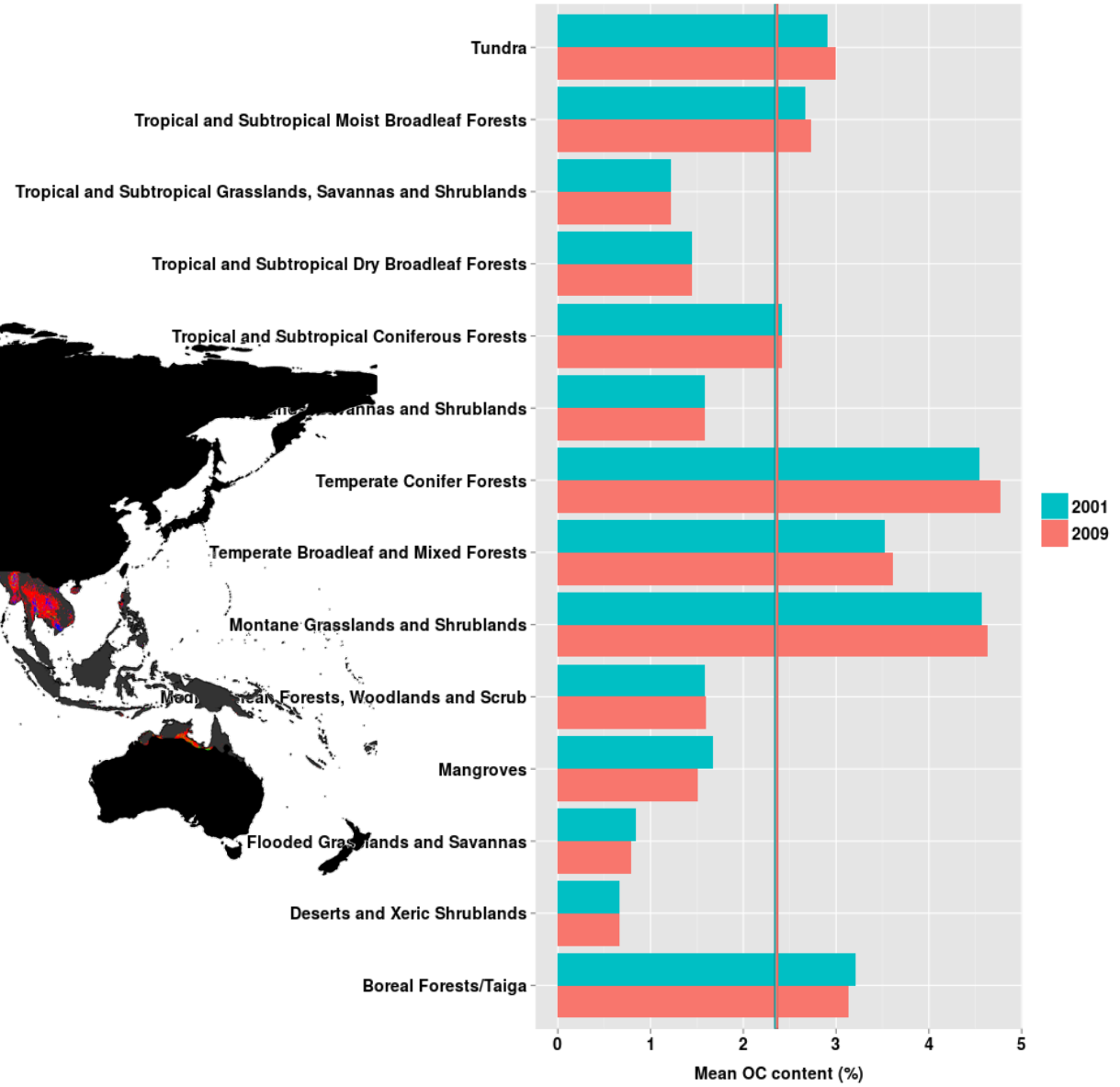
Adapted from Ademe, 2015

Global soil OC stock (0-30cm, t C ha^{-1})

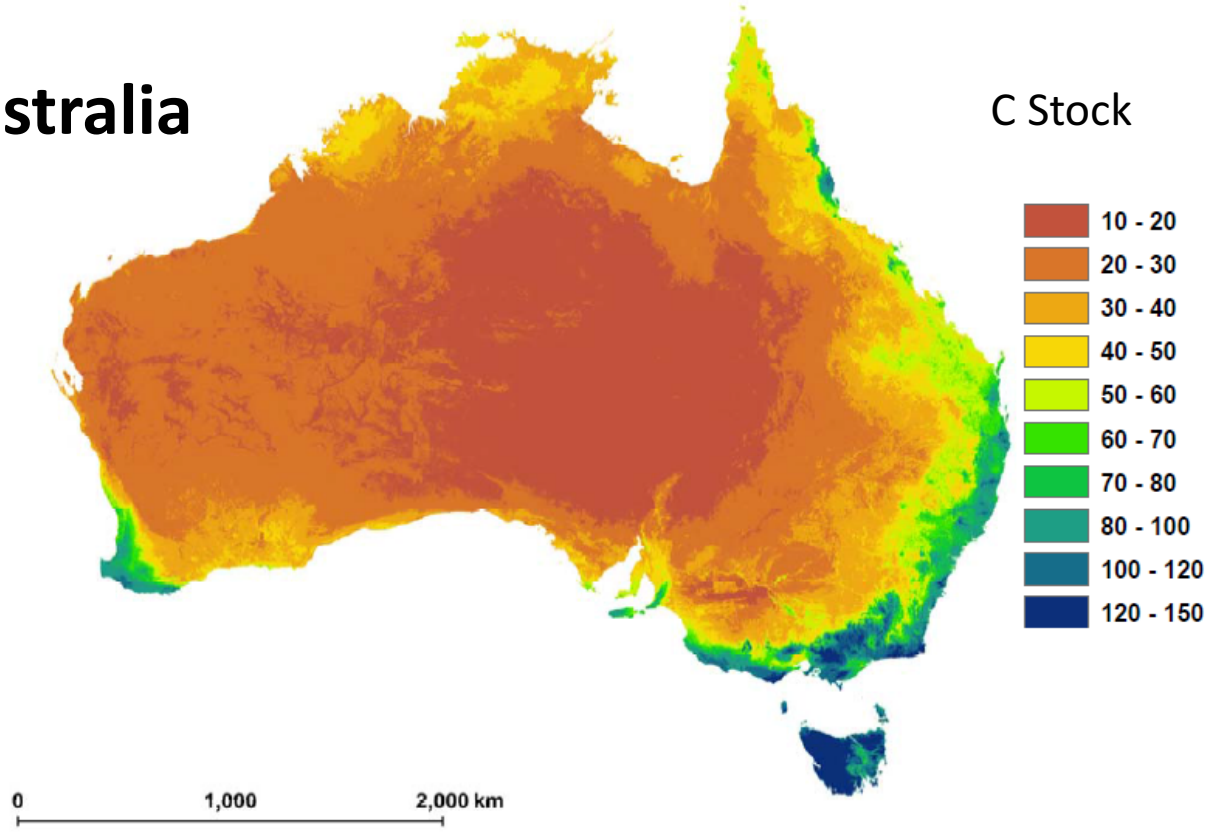


Areas in the tropics below critical level



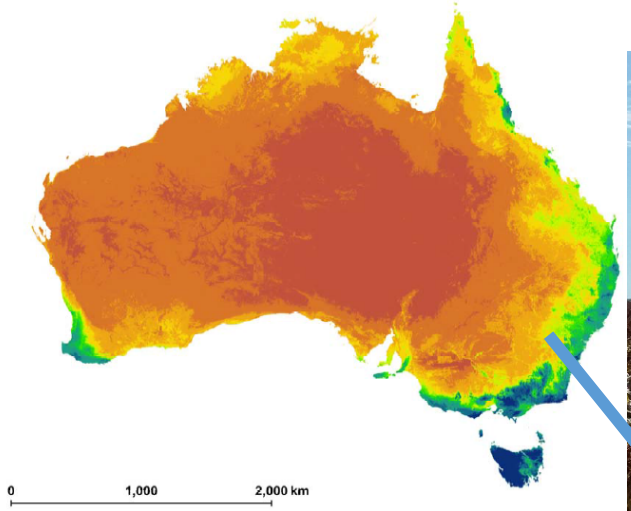


Australia



Potentials and challenges

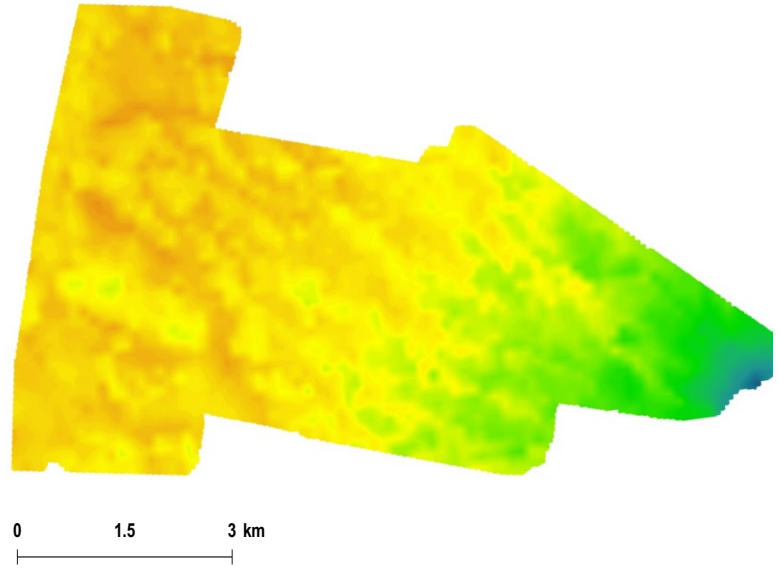
Country/ Region	Total Soil organic C stock 0-30 cm (Gt)	Agricultural Area (Mha)	Soil C stock in Agricultural land (Gt)	Potentials	Challenges
Australia	25	455	12.76	Large agricultural land area, optimization of crop rotations, and retention of crop residues, improved grassland management.	Lack of water, zero or minimum tillage has been implemented almost 80% in the grain cropping areas.



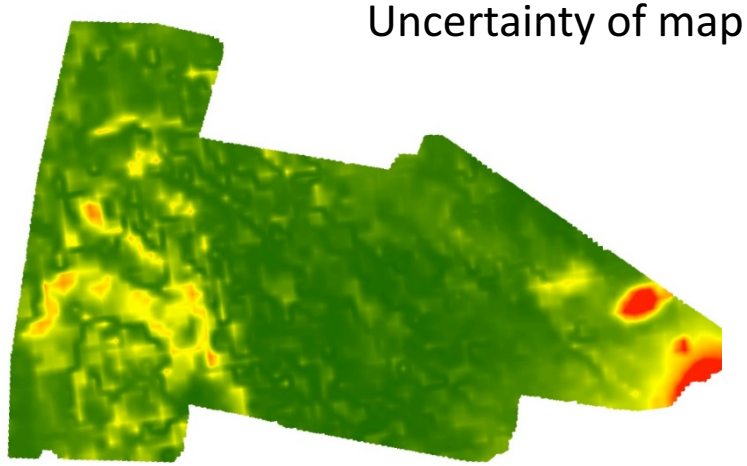
University of Sydney
Nowley experimental station

Auditing Soil Carbon

Topsoil C prediction

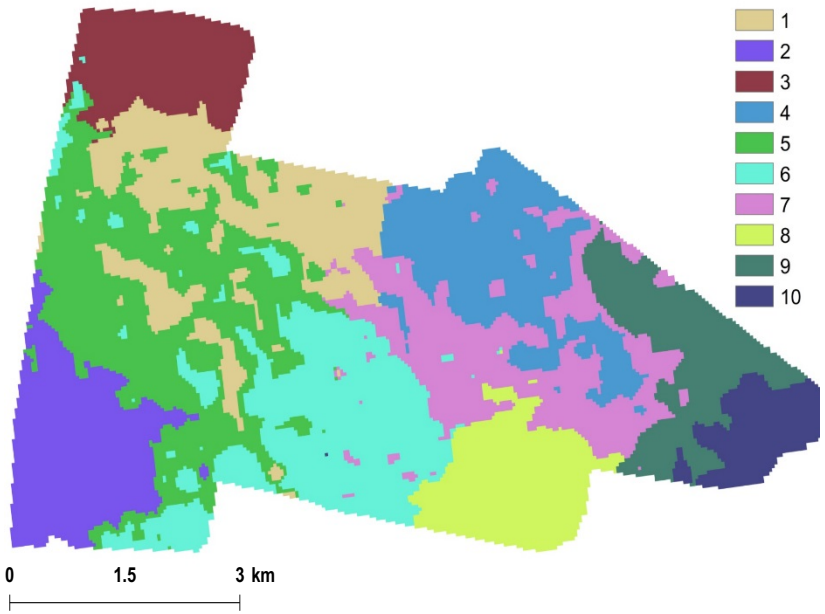


Uncertainty of map



Auditing Soil Carbon

Sampling design



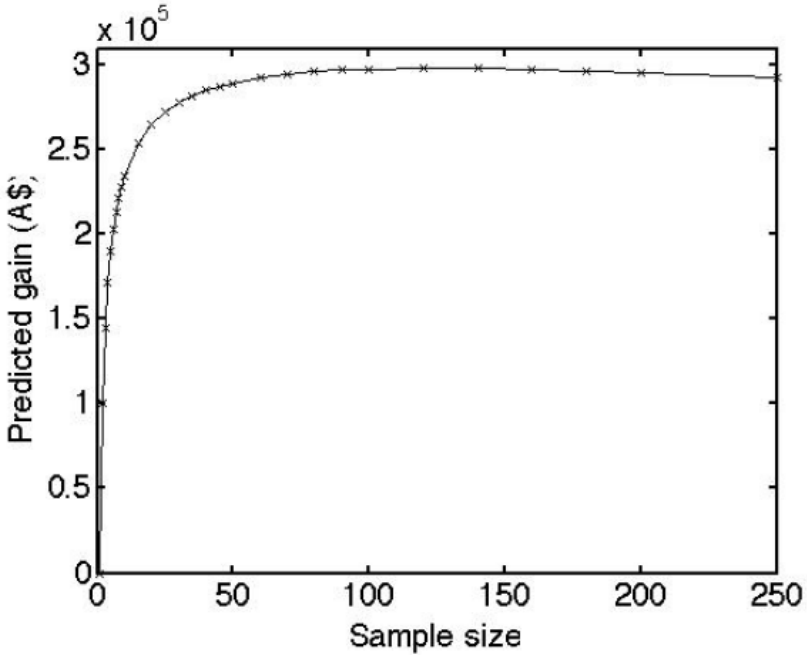
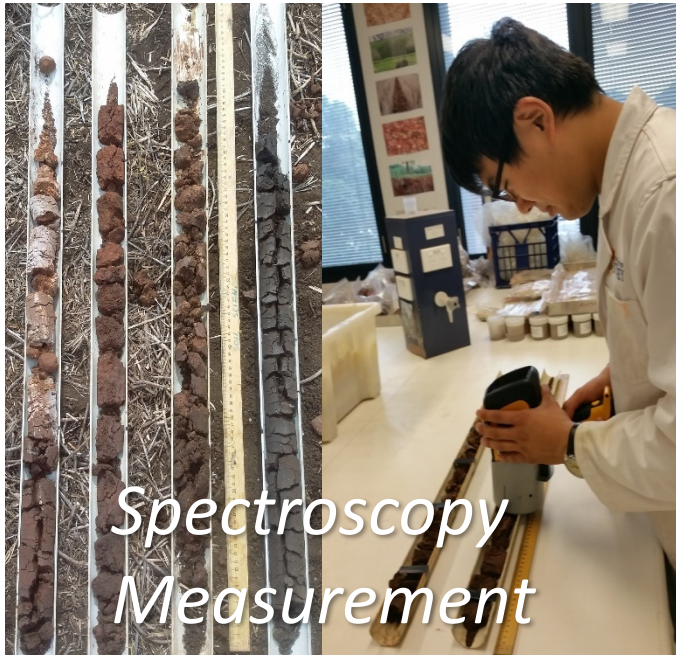
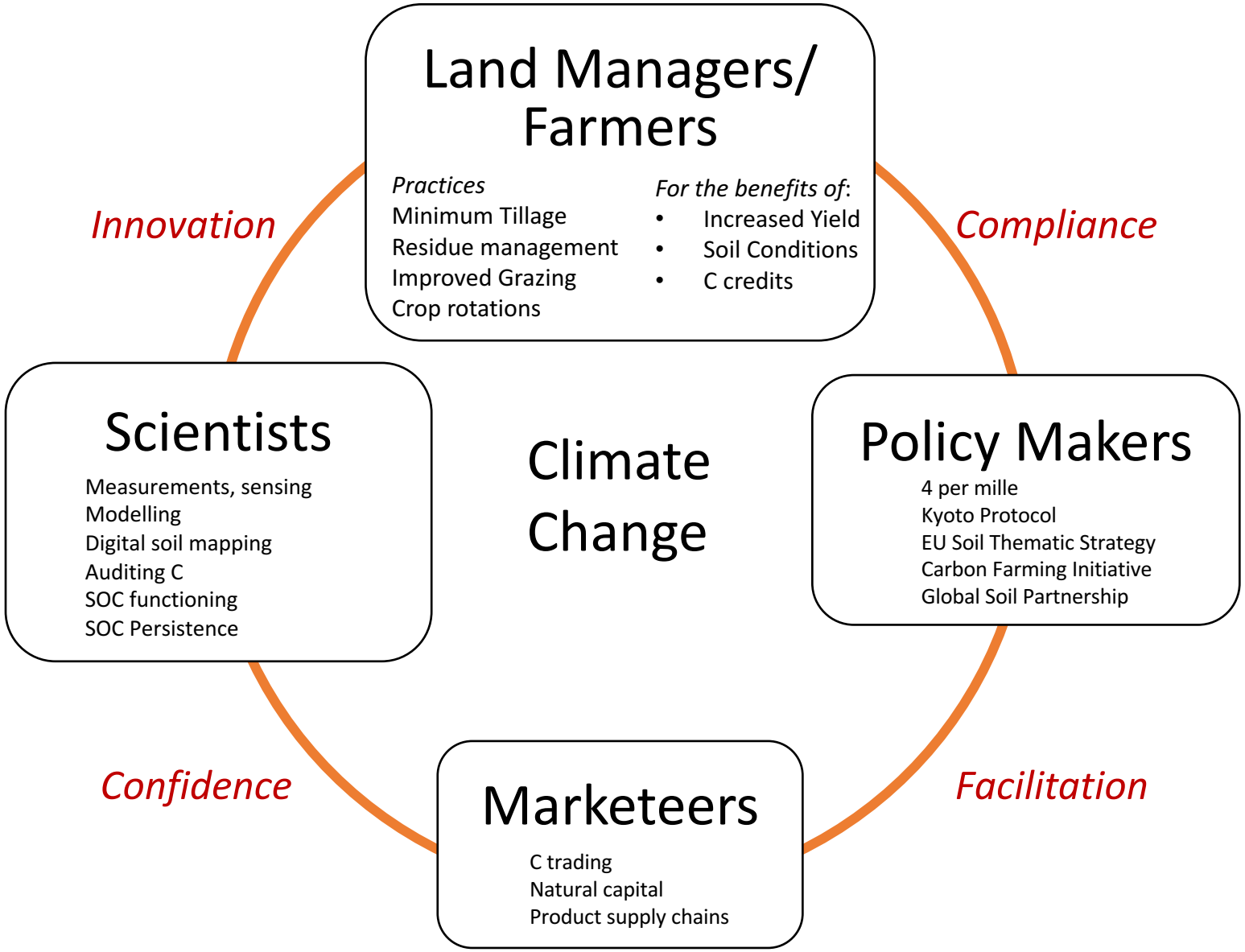


Table 2: Statistics of C sample data from Nowley farm, based on the *Ospats* stratification with 10 strata and 5 samples per stratum

Strat.	Relative size	Mean	St. error estimated	St. error predicted	Optimal sample size
1	7.52	11.56	0.83	3.34	11
2	9.01	11.27	1.27	3.08	12
3	12.48	11.70	1.16	2.64	15
4	16.10	13.37	1.44	2.55	18
5	7.63	10.98	1.25	2.99	10
6	15.98	17.06	2.13	2.75	20
7	12.16	14.35	2.01	2.68	15
8	7.89	16.72	1.24	2.93	10
9	7.46	28.12	4.00	2.85	10
10	3.75	25.19	2.54	3.34	6
Farm	100.00	14.82	0.62	0.90	127

Mean C stock =
14.82 ± 0.62 Mg C ha^{-1}




Land Managers/ Farmers
Practices
Minimum Tillage
Residue management
Improved Grazing
Crop rotations
For the benefits of:
• Increased Yield
• Soil Conditions
• C credits
Compliance
Policy Makers
4 per mille
Kyoto Protocol
EU Soil Thematic Strategy
Carbon Farming Initiative
Global Soil Partnership
Facilitation
Marketeers
C trading
Natural capital
Product supply chains
Confidence
Scientists
Measurements, sensing
Modelling
Digital soil mapping
Auditing C
SOC functioning
SOC Persistence
Innovation
Climate Change

Soil Carbon

- Food Security, Climate change mitigation, Improving soil structure