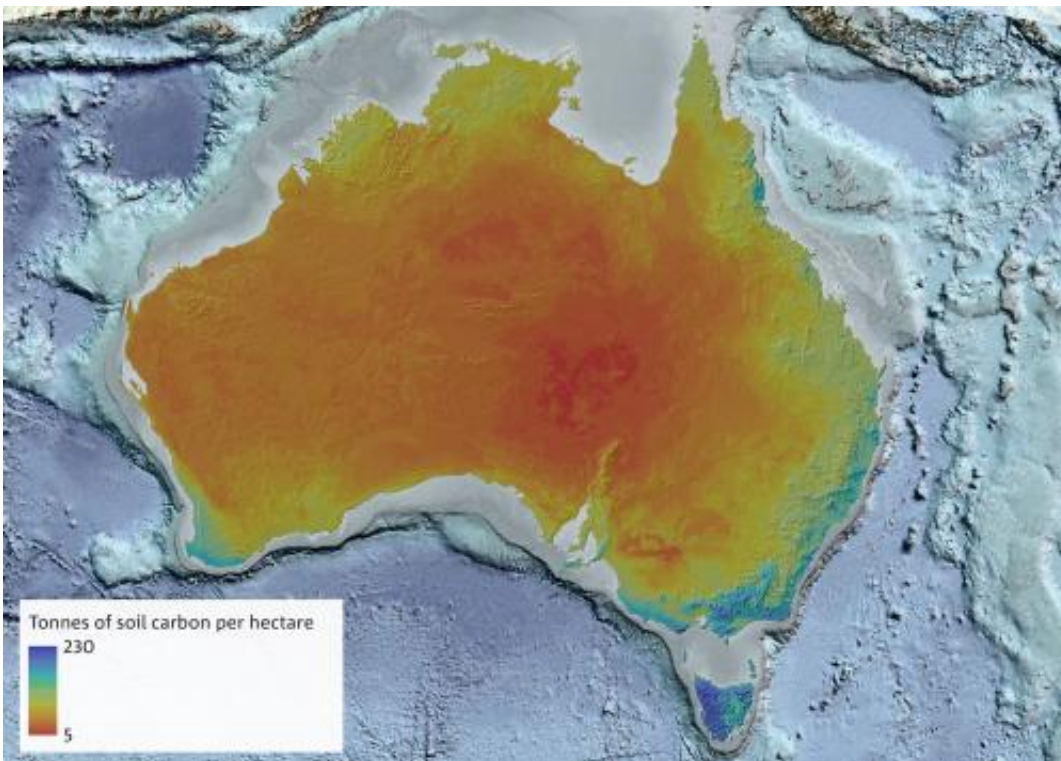


Australian soil carbon map sets a baseline for future gains

March 18 2014, by Roger Nicoll



The 2010 baseline map of organic carbon in Australian soil will help Australia track changes in soil carbon stocks and assist with strategies to reduce greenhouse gas emissions through soils.

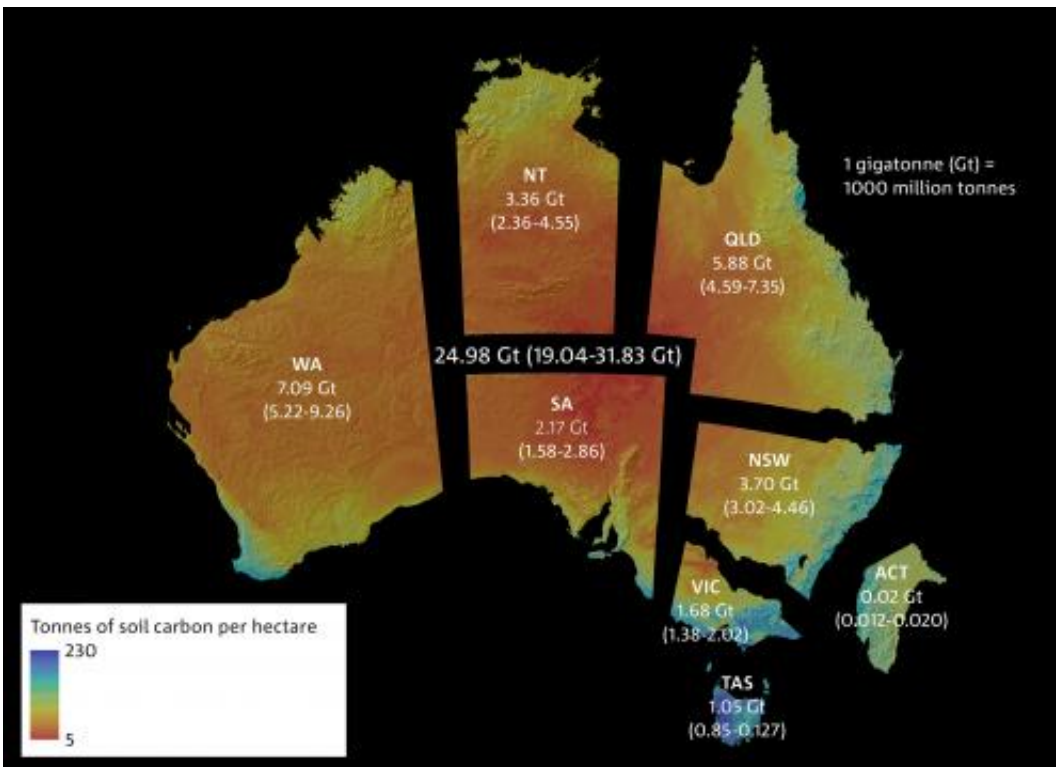
(Phys.org) —A new CSIRO-developed map of Australia's stored soil carbon provides an important benchmark against which Australia can track future changes in soil carbon storage or carbon sequestration.

Providing the most detailed and accurate representation of soil organic [carbon stocks](#), to a depth of 30 cm, at a national scale, the 2010 soil organic carbon map for Australia, draws on soil sampling data and innovative prediction methods. The map includes an estimate of [soil carbon](#) stock and an estimate of the uncertainty for approximately two billion football-field-sized blocks (90m by 90m) across Australia.

"This map is the first effective nationwide baseline of organic carbon levels in the top 30 cm of soil, which comes with estimates of uncertainty," according to lead researcher, Dr Raphael Viscarra Rossel.

Until now, estimates of soil organic carbon across the breadth of Australia have not been available or were largely uncertain because of large gaps in data and the limits of past measurement and spatial modelling.

"The map provides a reliable benchmark for Australia to monitor the influence that changes in land cover, climate, land management and greenhouse gas offset activities have on soil carbon stocks and associated carbon dioxide removal from the atmosphere," Dr Viscarra Rossel said.



The 2010 baseline map of Australia's soil organic carbon stocks showing the national and state and territory estimates and their uncertainty range.

In assembling the new map, CSIRO drew on three major datasets, including CSIRO's National Soil and Spectral databases and the national Soil Carbon Research Program - a nationally coordinated research program led by CSIRO, universities and state government agencies and funded by the Australian Government and the Grains Research and Development Corporation.

The map and its prediction methods provide new insight into the environmental drivers that determine the distribution of soil carbon across the nation, its diverse bioregions and its states and territories.

"Australia's largest soil organic carbon stores per hectare occur in the cool, temperate zones, which have higher-than-average rainfall and

extensive rainforests and eucalyptus forests," Dr Viscarra Rossel said.

"These larger stocks of organic soil carbon tend to coincide with southern states and regions fringing the coastlines, where wetter and cooler conditions produce more vegetation growth with slower decomposition and loss of carbon dioxide. South Australia, due to its large amount of desert, is an exception; its soils contain the least amount of organic carbon per hectare, followed by northern and western jurisdictions and regions exposed to Mediterranean, subtropical and tropical climates."

The average amount of [organic carbon](#) in the top 30 cm of Australian soil was estimated to be 29.7 tonnes per hectare and the total stock for the continent at 25.0 gigatonnes (Gt= 1000 million tonnes) with a 95 per cent confidence of being within the range of 19.0 to 31.8 Gt. The total stock in agricultural regions of Australia is 12.7 Gt with 95 per cent confidence of being within the range of 9.9 to 15.9 Gt.

The new map and associated estimates and uncertainties have important applications, according to Dr Viscarra Rossel.

The maps of the estimates and their uncertainty are for 2010 and could be used to:

- set a baseline from which Australia's national soil carbon stocks could be monitored
- guide the design of national soil monitoring networks
- help guide future soil sampling designed to improve estimates of Australia's soil carbon stocks
- help to assess the potential of Australian soil to sequester carbon
- improve Australia's terrestrial carbon budgeting
- assist with strategies to mitigate and adapt to the effects of a changing climate.

More information: Viscarra Rossel RA, Webster R, Bui EN, Baldock JA. 2014. "Baseline map of organic carbon in Australian soil." *Global Change Biology* [external link]. [DOI: 10.1111/gcb.12569](https://doi.org/10.1111/gcb.12569).

Provided by CSIRO

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