

Published: 30 July 2012

1000-km-wide ocean funnels carry carbon to depths

A team of British and Australian scientists has discovered how carbon is drawn down from the surface of the Southern Ocean to the deep waters beneath.



Credit: CSIRO

The Southern Ocean is an important carbon sink in the world – around 40 per cent of the annual global CO₂ emissions absorbed by the world's oceans enters through this region.

Reporting in the journal *Nature Geoscience*, scientists from British Antarctic Survey (BAS), CSIRO and the Antarctic Climate & Ecosystem Cooperative Research Centre (ACE CRC) reveal that rather than carbon being absorbed into the deep ocean in vast uniform areas, it is drawn down and locked away from the atmosphere by intense, plunging currents up to a thousand kilometres wide. Winds, currents and massive whirlpools that carry warm and cold water around the ocean – known as eddies – create these regional pathways or funnels, through which carbon to be stored.

'The Southern Ocean is a large window by which the atmosphere connects to the interior of the ocean below,' says the paper's lead author, Dr Jean-Baptiste Sallée from BAS.

'Until now we didn't know exactly how carbon ends up being stored deep in the ocean. It's the combination of winds, currents and eddies that create these vast carbon-capturing pathways drawing waters down into the deep ocean from the ocean surface.'

'If climate change alters these pathways, it will be harder for carbon to penetrate deep down into the ocean, causing an additional warming effect. Now that we have a better understanding of the mechanisms for carbon draw-down we are better placed to understand the effects of changing climate and future carbon absorption by the ocean.'

CSIRO co-author, Dr Richard Matear, says the rate-limiting step in the anthropogenic carbon uptake by the ocean is the physical transport from the surface into the ocean interior. 'Our study identifies these pathways and this matches well with observationally derived estimates of carbon storage in the ocean interior.'

Due to the size and remoteness of the Southern Ocean, scientists have only recently been able to explore its depths with the help of small robotic probes known as Argo floats. In 2002, 80 floats were deployed to collect information on the temperature and salinity. This unique set of observations spanning over 10 years has enabled scientists to discover how carbon is taken to the depths.

The team also analysed temperature, salinity and pressure data collected from ship-based observations since the 1990s.

Source: CSIRO & BAS

From **ECOS** online <http://www.ecosmagazine.com/?paper=EC12371>