

Warmer oceans release CO₂ faster than thought

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As the world's oceans warm, their massive stores of dissolved carbon dioxide may be quick to bubble back out into the atmosphere and amplify the greenhouse effect, according to a new study.

The oceans capture around 30 per cent of human carbon dioxide emissions and hide it in their depths. This slows the march of global warming somewhat. But [climate records from the end of the last ice age show](#) that as temperatures climb, the trend reverses and the oceans emit CO₂, which exacerbates warming.

Previous studies have suggested that it takes between 400 and 1300 years for this to happen. But now the most precise analysis to date has whittled that figure down.

Quick response

"We now think the delay is more like 200 years, possibly even less," says Tas van Ommen from the Australian Antarctic Division, in Hobart, who led the study.

The new results come from Siple and Byrd ice cores in western Antarctica. Van Ommen and colleagues dated CO₂ bubbles trapped in the ice, and then compared their measurements with records of atmospheric temperatures from the same time period.

As expected, when temperature increased, carbon dioxide followed, but at both Siple and Byrd the time lag was around 200 years – much shorter than previous studies found.

[Rising temperatures](#) make carbon dioxide leak from the oceans for two main reasons. First, melting sea ice increases the rate that the ocean mixes, which dredges up CO₂-rich deep ocean waters. Second, "when you warm the ocean up, just like warming up a Coke bottle, it drives the gas out," says van Ommen.

Previous estimates used cores from regions with low snowfall, van Ommen says, leading to a very gradual trapping of the carbon dioxide in the ice. This increased uncertainty in timing. Also, many previous studies used only one ice core site.

Worse warming?

And while more precise than the others, the team's study also comes with significant uncertainty: plus or minus 200 years, meaning there could actually be no lag time between rising temperatures and gases being released from the atmosphere.

"They've nailed it," says Paul Fraser, a greenhouse gas researcher at Australia's Commonwealth Scientific and Industrial Research Organisation (CSIRO). He adds that despite the uncertainty, "this is a really good data set that they've got."

Van Ommen says climate modelling will be needed before we can speculate how the results relate to current warming.

The work was presented at the Greenhouse 2011 conference in Cairns earlier this month.