

Clue: A major city



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Sea absorbing less CO2, scientists discover

David Adam, environment correspondent
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Scientists have issued a new warning about [climate change](#) after discovering a sudden and dramatic collapse in the amount of [carbon emissions](#) absorbed by the Sea of Japan.

The shift has alarmed experts, who blame global warming.

The world's oceans soak up about 11bn tonnes of human carbon dioxide pollution each year, about a quarter of all produced, and even a slight weakening of this natural process would leave significantly more CO2 in the atmosphere. That would require countries to adopt much stricter emissions targets to prevent dangerous rises in temperature.

Kitack Lee, an associate professor at Pohang University of Science and Technology, who led the research, says the discovery is the "very first observation that directly relates ocean CO2 uptake change to ocean warming".

He says the warmer conditions disrupt a process known as "ventilation" - the way seawater flows and mixes and drags absorbed CO2 from surface waters to the depths. He warns that the effect is probably not confined to the Sea of Japan. It could also affect CO2 uptake in the Atlantic and Southern oceans.

"Our result in the East Sea unequivocally demonstrated that oceanic uptake of CO2 has been directly affected by warming-induced weakening of vertical ventilation," he says. Korea argues that the Sea of Japan should be renamed the East Sea, because it says the former is a legacy of Japan's military expansion in the region.

Lee adds: "In other words, the increase in atmospheric temperature due to global warming can profoundly influence the ocean ventilation, thereby decreasing the uptake rate of CO2."

Working with Pavel Tishchenko of the Russian Pacific Oceanological Institute in Vladivostok, Lee and his colleague Geun-Ha Park used a cruise on the Professor Gagarinskiy, a Russian research vessel, last May to take seawater samples from 24 sites across the Sea of Japan.

They compared the dissolved CO2 in the seawater with similar samples collected in 1992 and 1999. The results showed the amount of CO2 absorbed during 1999 to 2007 was half the level recorded from 1992 to 1999.

Crucially, the study revealed that ocean mixing, a process required to deposit carbon in deep [water](#), where it is more likely to stay, appears to have significantly weakened.

Announcing their results in the journal *Geophysical Research Letters*, the scientists say: "The striking feature is that nearly all anthropogenic CO2 taken up in the recent period was confined to waters less than 300 metres in depth. The rapid and substantial reduction ... is surprising and is attributed to considerable weakening of overturning

circulation."

Corinne Le Quéré, an expert in ocean carbon storage at the University of East Anglia, said: "We don't think the ocean is just going to completely stop taking our carbon dioxide emissions, but if the effect weakens then it has real consequences for the atmosphere."

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