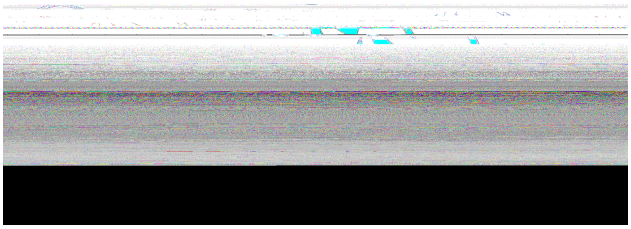
Press Release



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Warming slows down oceanic carbon dioxide uptake
Marine scientists discover new positive climate feedback

January 7, 2015 / Southampton / Kiel. **The ocean absorbs a large fraction of the carbon dioxide emitted to the atmosphere. A new study published recently in the international journal Proceedings of the National Academy of Sciences shows that higher water temperatures reduce the efficiency of transport of carbon from the surface to the deep ocean, due to a previously unknown process. For this study, scientists from the British National Oceanography Centre, Southampton and the German GEOMAR Helmholtz Centre for Ocean Research Kiel analysed oceanic particulate organic carbon export data from several key regions in the Atlantic.**

Without our oceans the carbon dioxide content of the atmosphere would be considerably higher. A fraction of this major greenhouse gas is being absorbed by the oceans and transferred to the deep sea where it is stored for 100s to 1000s of years. The new study led by British researchers shows the efficiency of the carbon transfer process may be reduced due to increasing water temperatures. As a result, global warming would ultimately strengthen itself due to a positive feedback.

A key factor in the carbon dioxide balance between ocean and atmosphere is the transport of organic particles to the deep sea. This so-called biological carbon pump is driven by CO_2 uptake by small organisms (phytoplankton) in the upper ocean. Phytoplankton die and sink to the deep sea, where they are remineralized. In their study, scientists have investigated the dependence of this remineralization process on water temperature. "We have found that with increasing temperature the remineralization process is faster," Prof. Dr. Eric Achterberg from GEOMAR Helmholtz Centre for Ocean Research Kiel, one of the co-authors of the study explains. "As a result, the penetration depth of the organic material and thus the transfer of carbon to the deep ocean is reduced, which ultimately reduces the CO_2 uptake by the ocean," Achterberg continues. The results are in contrast to previous studies which had shown a more efficient particle flux in warmer water of the tropical oceans.

For their investigations scientists used data from different regions of the North Atlantic. In four key regions sediment traps were positioned at specific depths in the ocean to collect sinking organic material. From the amount and composition of the collected material, they determined the particle flux, remineralization depth and the relationships to water temperatures.

"This is a relatively small, but unique record. By selecting stations in subpolar and subtropical areas we were able to establish robust results about the relationship between fluxes of organic material and water temperature", Achterberg explains. "Of course we need more data from other areas of the world's ocean. However, we believe that our results are robust. "The temperature dependence that was established by this study is definitely not a good sign, said the scientist. If in future less CO_2

Scientific paper:
Marsay, C.M., R.J. Sanders, S.A. Henson, K. Pabortsava, E.P. Achterberg, and R.S. Lampitt, 2015: Attenuation of sinking particulate organic carbon flux through the mesopelagic ocean