

**NAME**

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TITLE OF PRESENTATION

The role of the ocean carbon cycle in climate change

ABSTRACT OF PRESENTATION

The ocean carbon cycle plays a twofold role in the context of climate change: 1. Through carbon dioxide gas exchange with the atmosphere and carbon cycle climate feedbacks, the ocean regulates the carbon dioxide concentration in the atmosphere and hence has a strong influence on the heat budget of the Earth. 2. The paleo-climatic marine sediment core record is largely based on biogenic matter fluxes from the surface ocean to the sea floor which are part of the marine carbon cycle. The ocean is important for the global carbon cycling primarily due to three factors: 1. The ocean is a huge carbon reservoir with a relative short turnover time. 2. Carbon dioxide in sea water is effectively dissociated inorganically into other substances. 3. Marine plankton is keeping the surface ocean carbon dioxide concentration at a lower level than a lifeless ocean would provide. For natural carbon dioxide variations, such as during the glacial-interglacial cycles, the biological carbon cycling presumably played a key role as shown by sediment core data. For the uptake of human produced carbon dioxide, the inorganic uptake by the ocean (dissolution, dissociation, transport, and mixing) plays the most prominent role. Ocean acidification, changes in ocean circulation, and other factors can, however, also lead to a modification of organic carbon cycling. On intermediate to long time scales, the ocean provides the most important sink for anthropogenic carbon dioxide. The marine uptake kinetics for carbon dioxide work on a longer time scale than current and projected emissions by humans occur. Therefore, saving fossil fuel emissions is of key importance for enabling efficient carbon dioxide buffering by the oceans.

BIOGRAPHICAL NOTE

Christoph Heinze was educated originally as a physical oceanographer who switched to biogeochemical ocean modelling for his PhD studies. He is currently professor in chemical oceanography at the Geophysical Institute of the University of Bergen and leads the research group on biogeochemical cycles at the Bjerknes Centre for Climate Research, a national centre of excellence in scientific research. His work focuses on simulations of the ocean carbon cycle and other elemental cycles using predictive global biogeochemical ocean models and Earth system models. He coordinates the European FP7 large-scale integrated project CARBOCHANGE, and has coordinated the FP6 Integrated Project CARBOOCEAN, both dedicated to the oceanic uptake of carbon dioxide from the atmosphere and involving a large number of scientists from Europe, Africa, and North America. Christoph Heinze was member of the lead author team for the 4th IPCC Assessment Report (physical science basis) and currently is review editor for the respective 5th IPCC Assessment Report. Next to present and future ocean studies, he also has an interest in studies of past climates, where he tries to combine ocean models with sediment core data from the real world in order to explain glacial-interglacial changes in the carbon cycle. Currently, he is member of the scientific steering committee of the IGBP core project SOLAS.