Impact of sea-level rise on atmospheric CO2 concentrations

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(PhysOrg.com) -- The rise in sea level since the last ice age has prevented us from feeling the full impact of man-made global warming. The sea level rise has resulted in more harmful greenhouse gases being absorbed by the seas. So argue Bangor University scientists in the latest issue of *Geophysical Research Letters* (23/12/08), an influential US scientific journal publishing scientific advances that are likely to have immediate influence on the research of other investigators.

Over the last 22,000 years, since the last ice age, global sea level has risen by 130 m. Research by Bangor scientists Tom Rippeth and James Scourse have calculated the impact of this sea-level rise on the ability of the ocean to absorb the greenhouse gas CO2 from the atmosphere.

Currently only about half of man made CO2 emissions stay in the atmosphere. The remaining 50% are absorbed by the oceans and land-based systems such as forests. The shallow continental shelf seas, such as the North Sea, are thought to play a particularly important role in absorbing CO2 from the atmosphere

Understanding the processes controlling the absorption of CO2 on land and sea is crucial to understanding and predicting future climate change. Looking at past climates helps us understand more about how our climate works.

Dr Tom Rippeth, Senior Lecturer at Bangor University's School of Ocean Sciences says:

"We are currently getting a 50% 'discount' on the climatic impact of our fossil fuel emissions. Unfortunately, we have no guarantee that the 50% discount will continue, and if it disappears we will feel the full climatic brunt of our unrelenting emission of carbon dioxide from burning fossil fuels."

The growth of plankton in the ocean acts as an important mechanism to absorb CO2 from the atmosphere.

Professor James Scourse, Royal Society Senior Research Fellow at the School continues: "We have been looking at how the strength of this CO2 sink has increased since the last age (22,000 years ago), as sea level has risen by about 130 m. During this time the continental shelf seas have grown by 400% - flooding an area of land equivalent to twice the area of the USA.

By combining reconstructions of past landscapes with numerical models, confirmed using fossils collected from the sea bed, we have simulated the size of this CO2 sink over the past 22,000 years. In doing so we have shown that sea-level rise has resulted in a significant increase in the ocean uptake of CO2 from the atmosphere. Our results are consistent with the timing of changes in atmospheric CO2 concentration measured in Antarctic ice cores,"

However, this impact is dwarfed when compared to the impact which man has had over the past 100 years by burning fossil fuels.

The results, however, show that without the rise in sea level, and consequent flooding of the shelf seas, the amount of CO2 in the atmosphere would be rising at an even faster rate due to man's activities than it currently is.

In effect, past sea-level rise has helped put a brake on the impact of

anthropogenic CO2 emissions on the atmosphere.

Provided by Bangor University

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