



National Oceanography  
Centre, Southampton

UNIVERSITY OF SOUTHAMPTON AND  
NATURAL ENVIRONMENT RESEARCH COUNCIL

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## Welcome to the National Oceanography Centre, Southampton

The centre is the country's focus for oceanography and represents an unparalleled investment in marine and earth sciences and technology in the UK. The centre opened in 1995 in a purpose-built, £50 million waterfront campus on the city's Empress Dock. A collaboration between the Natural Environment Research Council and the University of Southampton, the centre houses around 500 staff and 750 undergraduate and postgraduate students.

### News

#### Close relationship between past warming and sea-level rise

In a paper in *Nature Geoscience*, a team from the National Oceanography Centre, Southampton (NOCS), along with colleagues from Tübingen (Germany) and Bristol presents a novel continuous reconstruction of sea level fluctuations over the last 520 thousand years. Comparison of this record with data on global climate and carbon dioxide (CO<sub>2</sub>) levels from Antarctic ice cores suggests that even stabilisation at today's CO<sub>2</sub> levels may commit us to sea-level rise over the next couple of millennia, to a level much higher than long-term projections from the Fourth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC).

Little is known about the total amount of possible sea-level rise in equilibrium with a given amount of global warming. This is because the melting of ice sheets is slow, even when temperature rises rapidly. As a consequence, current predictions of sea-level rise for the next century consider only the amount of ice sheet melt that will occur until that time. The total amount of ice sheet melting that will occur over millennia, given the current climate trends, remains poorly understood.

The new record reveals a systematic equilibrium relationship between global temperature and CO<sub>2</sub> concentrations and sea-level changes over the last five glacial cycles. Projection of this relationship to today's CO<sub>2</sub> concentrations results in a sea-level at 25 (±5) metres above the present. This is in close agreement with independent sea-level data from the Middle Pliocene epoch, 3-3.5 million years ago, when atmospheric CO<sub>2</sub> concentrations were similar to the present-day value. This suggests that the identified relationship accurately records the fundamental long-term equilibrium behaviour of the climate system over the last 3.5 Million years.

Lead author Professor Eelco Rohling of the University of Southampton's School of Ocean and Earth Science based at NOCS, said: "Let's assume that our observed natural relationship between CO<sub>2</sub> and temperature, and sea level, offers a reasonable 'model' for a future with sustained global warming. Then our result gives a statistically sound expectation of a potential total long-term sea-level rise. Even if we would curb all CO<sub>2</sub> emissions today, and stabilise at the modern level (387 parts per million by volume), then our natural relationship suggests that sea level would continue to rise to about 25 m above the present. That is, it would rise to a level similar to that measured for the Middle Pliocene."

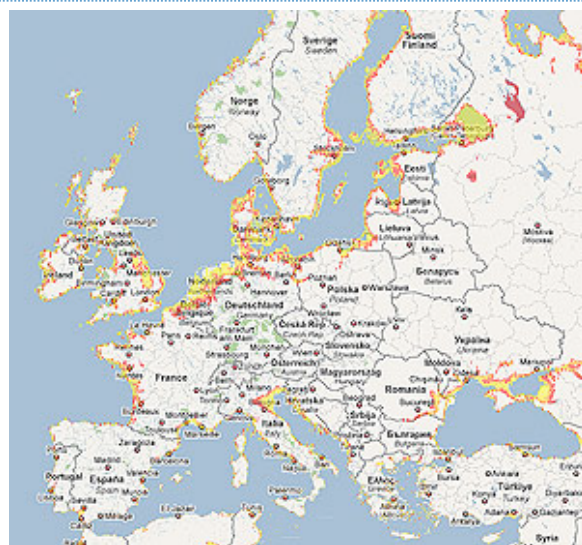
Project partners Professor Michal Kucera (University of Tübingen) and Dr Mark Siddall (University of Bristol), add: "We emphasise that such equilibration of sea level would take several thousands of years. But one still has to worry about the large difference between the inferred high equilibrium sea level and the level where sea level actually stands today. Recent geological history shows that times with similarly strong disequilibria commonly saw pulses of very rapid sea-level adjustment, at rates of 1-2 metres per century or higher."

The new study's projection of long-term sea-level change, based on the natural relationship of the last 0.5 to 3.5 million years, differs considerably from the IPCC's model-based long-term projection of +7 m. The discrepancy cannot be easily explained, and new work is needed to ensure that the 'gap is closed'. The observed relationships from the recent geological past can form a test-bed or reality-check for models, to help them achieve improved future projections.

The project was funded by the Natural Environment Research Council (UK) and the Deutsche Forschungs-Gemeinschaft (Germany). The paper 'Antarctic temperature and global sea level closely coupled over the past five glacial cycles' is published by *Nature Geoscience*, on 21 June 2009. The authors are Eelco Rohling (NOCS), Katharine Grant (NOCS), Mike Bolshaw (NOCS), Andrew Roberts (NOCS), Mark Siddall (University of Bristol), Christoph Hemleben (University of Tübingen) and Michal Kucera (University of Tübingen).

[link to paper](#)

*Image:* Example projections of 0-7 m (yellow), 7-15 m (orange), 15-25 m (red) flooding, based on <http://freegeographytools.com/2007/sea-level-rise-google-mapplet>



### Oceanographers launch Alboran Sea Research and Outreach Initiative

Ocean scientists from the National Oceanography Centre, Southampton and the Environmental Ocean Team are in Italy to present an initiative that combines research and outreach in the Mediterranean this autumn.

This [\[More\]](#)



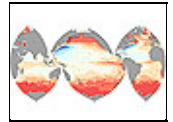
### Understanding gas exchange at the air-sea interface and its impact on climate

Scientists from the National Oceanography Centre, Southampton are making a significant contribution to an ambitious international programme (SOLAS; the Surface Ocean-Lower Atmosphere Study) aimed at understanding the physical, chemical and [\[More\]](#)



### New global air-sea interaction dataset

A new global air-sea interaction dataset important for understanding past, present and future climate has been developed at the National Oceanography Centre, Southampton (NOCS), and is described in a paper [\[More\]](#)



### The 6th Annual Marine Biological Association Postgraduate Conference 22-25 June 2009

We are pleased to announce that the MBA Postgraduate Conference is being held at NOCS this year.

This annual scientific meeting is designed to provide a friendly, semi-formal forum for postgraduate [\[More\]](#)



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