

Raising awareness of the rapidity of past sea level changes and helping policymakers plan for the future

Research at the National Oceanography Centre, Southampton has discovered new evidence about changes in the sea level on Earth over the past half million years. The findings are the first accurate estimates of how quickly the sea level rose in the past and could do so again in future. This has helped planners carrying out risk assessments to come up with a realistic upper limit to such an increase.

People living along the coast around the world are at risk from serious flooding as sea levels rise with climate change, as is critical infrastructure. Implications for world trade and security/defence are anticipated as well. In the UK, around £150 billion of coastal properties would be at risk from future flooding, and about half of this concerns London alone. It is essential to understand and make an accurate estimate of these risks to inform coastal defence planning and support engineers in their work to protect the coastline.

Since the mid-1990s, research at the University of Southampton, led by Eelco Rohling, Professor of Ocean and Climate Change, has developed a new method of reconstructing past changes in sea level by measuring oxygen isotope ratios in microfossils from cores retrieved from the Red Sea sea-floor. By determining how fast sea-level changed during warmer periods between ice ages, a better understanding was formed of the potential for sea-level rise in the future, which helped planners in determining a realistic 'worst case' scenario.

Professor Rohling led the development of a £3.3m consortium project on sea level research, which includes an active partnership with policymakers and representatives from industry. Professor Rohling received a Royal Society Wolfson Research Merit Award for this work in 2010.

The research involved analysing microfossils and developing an hydraulic control models for the Strait of Bab-el-Mandab, which links the Red Sea to the open ocean. Researchers have thus measured sea-level changes going back 520,000 years, to an accuracy of six metres compared with previous ranges of 15 metres. Findings for the last interglacial, the last period when sea level rose above the present (about 125,000 years ago), suggested rates of increase of 1.6 \pm 1 metres per century. It was also estimated that sea level around three million years ago, when the atmosphere had modern levels of CO₂, stood 25 \pm 5 metres above the present level.

Results of the University of Southampton's research have been employed by the UK's Environment Agency and the UK Climate Impact Programme. They have also been included in assessments by the relevant authorities in The Netherlands, Sweden, and the United States. The release of these research findings in 2008 attracted widespread international media coverage across more than 400 outlets, with strong follow-up in interviews about the specific results as well as the underlying work, and how it may contribute to future planning.