

European Project on ocean acidification and its consequences for ecosystems welcomed

The National Oceanography Centre, Southampton has welcomed the launch this month of a Europe-wide initiative that will investigate increases in acidity in the world's oceans, caused by carbon dioxide emissions.

Emissions of carbon dioxide (CO₂) by human activity has a well known impact on the Earth's climate. Its other, much less well known, impact is "ocean acidification", with uncertain consequences on marine organisms and ecosystem.

The European Project on Ocean Acidification (EPOCA) is launched on 10 June 2008. Its goal is to document ocean acidification, investigate its impact on biological processes, predict its consequences in the next 100 years, and advise policy-makers on potential thresholds or tipping points that should not be exceeded.

Dr Toby Tyrrell of the National Oceanography Centre, Southampton, welcomed the launch of EPOCA. He said:

"EPOCA is a Europe-wide programme of research into ocean acidification that we are delighted to be a part of. The wide scope of the required research is beyond the capacity of any one institute to investigate. At the National Oceanography Centre we will focus on taking measurements at sea to study the impact of natural variations in pH on biology. Some of these will be taken on board a ferry between Portsmouth and Bilbao, courtesy of P&O Ferries.

"We will also study the function of the calcium carbonate shells of coccolithophores (a type of phytoplankton), which might become harder to make as a result of acidification, and the genes and proteins involved in their production."

The National Oceanography Centre's owning parties - the Natural Environment Research Council and the University of Southampton - are both partners in the EPOCA consortium.

The World's oceans cover over 70% of the planet's surface, contribute half of its primary production and contain an enormous diversity of life. Thus it is not surprising that they provide invaluable resources to human society. They also play a vital role in the Earth's life support system through regulating climate and global biogeochemical cycles through their capacity to absorb atmospheric carbon dioxide (CO₂).

The oceans currently absorb half of the CO₂ produced by burning fossil fuel. Put simply, climate change would be far worse if it was not for the oceans. However, there is a cost to the oceans. When carbon dioxide dissolves in seawater it forms carbonic acid. As more CO₂ is taken up by the oceans surface, the pH (a measure of acidity, the lower the pH the greater the acidity) decreases moving towards a less alkaline and therefore more acidic state. This is called "ocean acidification" and is happening at a rate that has not been experienced for at least 400,000 years and probably for the last 20 million years.

The overall goal of the European Project on Ocean Acidification (EPOCA) is to fill the

numerous gaps in our understanding of the effects and implications of ocean acidification.

- EPOCA aims to document the changes in ocean chemistry and biogeography across space and time. Paleo-reconstruction methods will be used on several archives, including foraminifera and deep-sea corals, to determine past variability in ocean chemistry and to tie these to present-day chemical and biological observations.
- EPOCA will determine the sensitivity of marine organisms, communities and ecosystems to ocean acidification. Molecular to biochemical, physiological and ecological approaches will be combined with laboratory and field-based perturbation experiments to quantify biological responses to ocean acidification, assess the potential for adaptation, and determine the consequences for biogeochemical cycling. Laboratory experiments will focus on key organisms selected on the basis of their ecological, biogeochemical or socio-economic importance. Field studies will be carried out in systems deemed most sensitive to ocean acidification.
- Results on the chemical, biological and biogeochemical impacts of ocean acidification will be integrated in biogeochemical, sediment and coupled ocean-climate models to better understand and predict the responses of the Earth system to ocean acidification. Special attention will be paid to the potential feedbacks of the physiological changes in the carbon, nitrogen, sulfur and iron cycles.
- EPOCA will assess uncertainties, risks and thresholds (“tipping points”) related to ocean acidification at scales ranging from sub-cellular, to ecosystem and from local to global. It will also assess pathways of CO₂ emissions required to avoid these thresholds and describe the state change and the subsequent risk to the marine environment and Earth system should these emissions be exceeded.

Led by the Centre National de la Recherche Scientifique (CNRS), the EU Framework 7 Collaborative Project EPOCA is run by a consortium of 27 partners across 9 countries involving many of the leading oceanographic institutions across Europe and more than 100 permanent scientists. The budget of this 4 year project is 16.5 M€ with a contribution from the European Commission of 6.5 M€.

For more information visit: HYPERLINK "http://epoca-project.eu" <http://epoca-project.eu> .

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