

European Project on Ocean Acidification



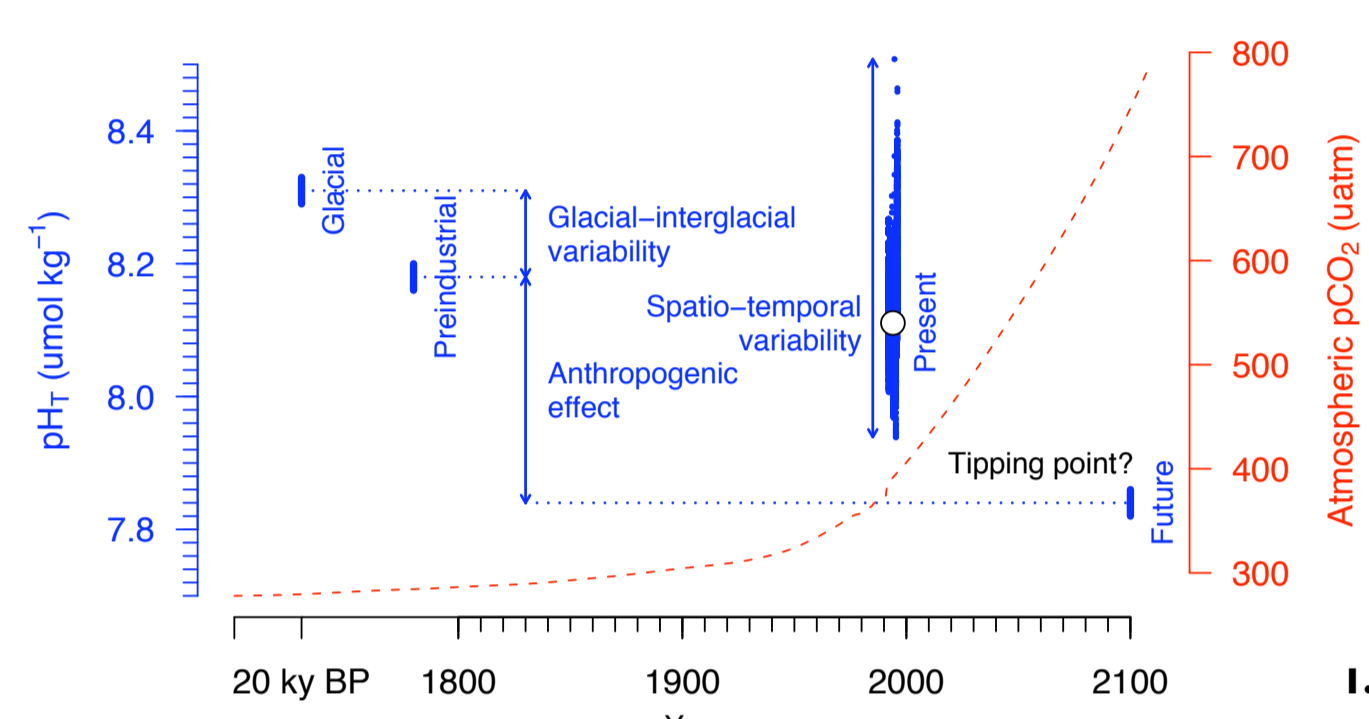
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What is EPOCA?

The EU FP7 Integrating Project EPOCA (European Project on Ocean Acidification) was launched in May 2008 with the overall goal to advance our understanding of the biological, ecological, biogeochemical, and societal implications of **ocean acidification**. The EPOCA consortium brings together more than 100 researchers from 27 institutes and 9 European countries.

EPOCA research

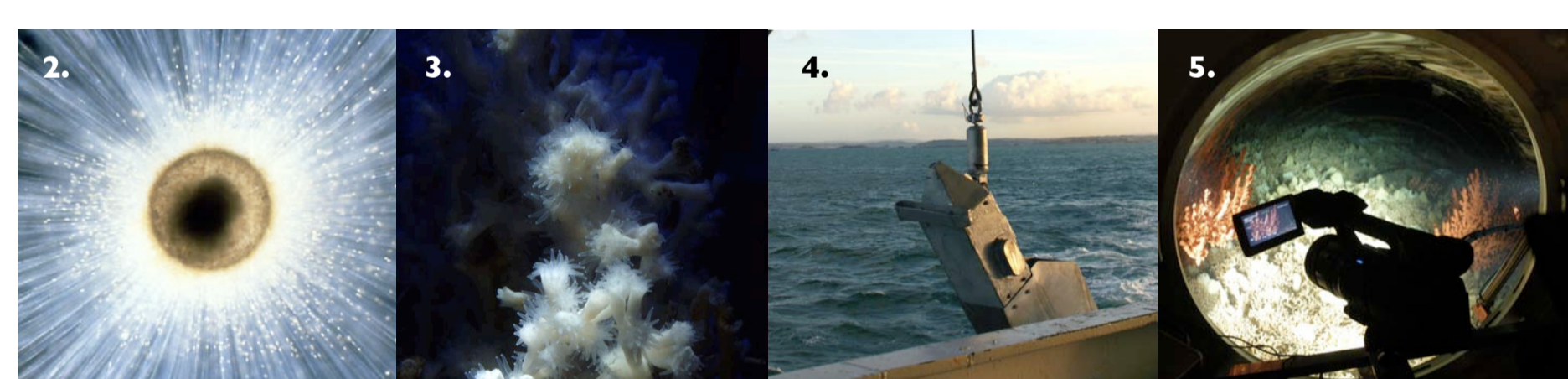
Besides global warming, another consequence of man's use of fossil fuels is receiving increased attention from the marine scientific community. **Ocean acidification** has been referred to as "the other CO₂ problem", a much less known but potentially as dramatic result of the approximately 79 million tons of carbon dioxide (CO₂) released into the atmosphere every day, not only as a result of fossil fuel burning but also from deforestation and production of cement. Over the past 250 years, the world's oceans have absorbed about one third of the CO₂ released due to anthropogenic activities.



Whereas the chemical consequences of this CO₂ uptake are well understood (decrease in pH and shifts in seawater carbonate chemistry) the biological impacts of ocean acidification are poorly known. One of the most likely consequences is the slower growth of organisms forming calcareous skeletons or shells, such as corals and mollusks.

EPOCA's research activities are organised into four overall themes:

Theme 1 – What are the past and present fluctuations in carbonate chemistry and biogeography of marine key species?



An important part of EPOCA focuses on such variations across space and time. Past variability in ocean chemistry is studied via paleo-reconstruction methods using archives such as cold-water corals and foraminifera. Continuous sampling and measurements in time-series stations and along crossings constitute the observational component of EPOCA.

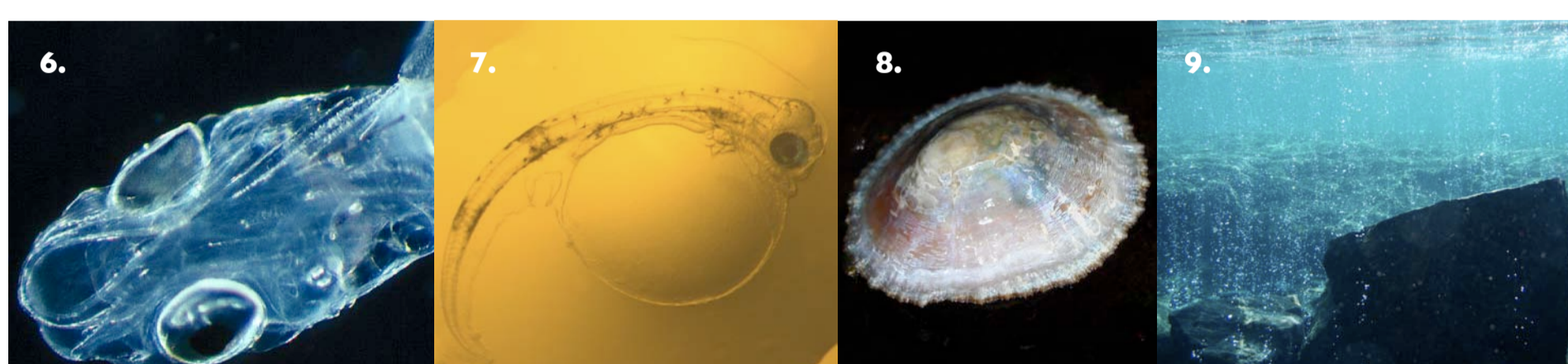
Data Management

The EPOCA Data Management team collects, quality controls and archives data in order to facilitate a consistent information exchange. Two major types of data are handled: (1) direct measurements from Themes 1 and 2 (e.g., proxy data, water column data, mesocosms and laboratory experiments) and (2) model outputs from Themes 2 and 3 (e.g., 4-D velocity and tracer fields, material fluxes).

Dissemination and Outreach

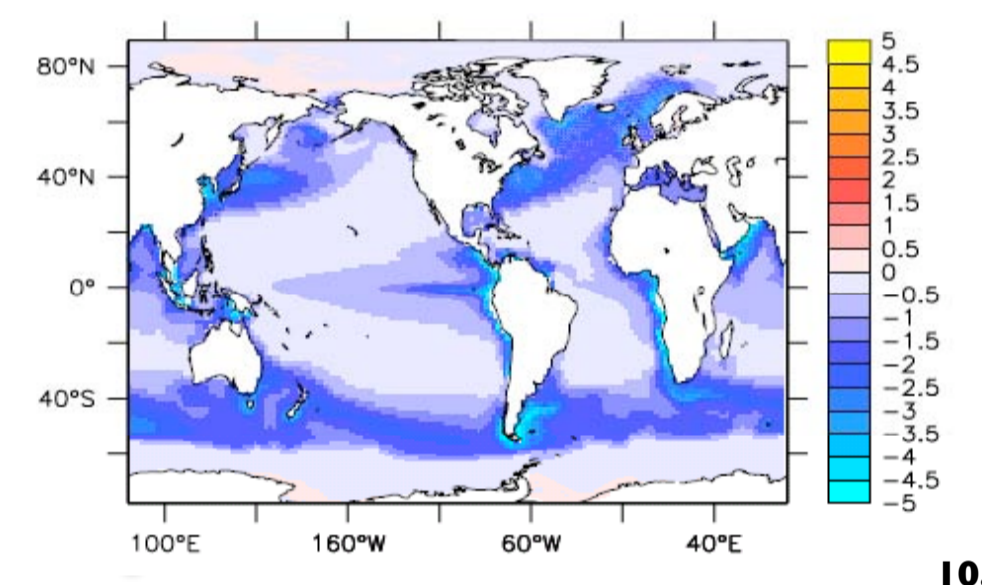
The EPOCA consortium combines expertise in various fields of marine research. The results of this multi-disciplinary collaboration will be presented to the non-scientific community (policy-makers, business leaders and the general public). The EPOCA Reference User Group (RUG) of targeted stakeholders works with the consortium to optimize the dissemination procedures and to make sure that the project results are communicated in an efficient way.

Theme 2 – How will marine organisms and ecosystems react in response to ocean acidification?



EPOCA's largest research theme is devoted to the impacts of ocean acidification on marine organisms, from planktonic species to higher trophic levels. Laboratory and mesocosm CO₂ enrichment experiments combined with experimental approaches ranging from molecular to ecosystem scale are used to study key organisms and physiological processes in an attempt to quantify the biological response and assess acclimation and adaptation possibilities.

Theme 3 – To what extent will ocean acidification alter ocean carbonate chemistry, biogeochemistry, and marine ecosystems over the next 200 years, and how will these changes feed back on climate change?



Results from themes 1 and 2 will be incorporated into biogeochemical, sediment, and coupled ocean-climate models to project future variability in carbonate chemistry, responses to ocean acidification from the Earth system and feedbacks.

Theme 4 – What conclusions can be drawn when combining the results from themes 1, 2 and 3?

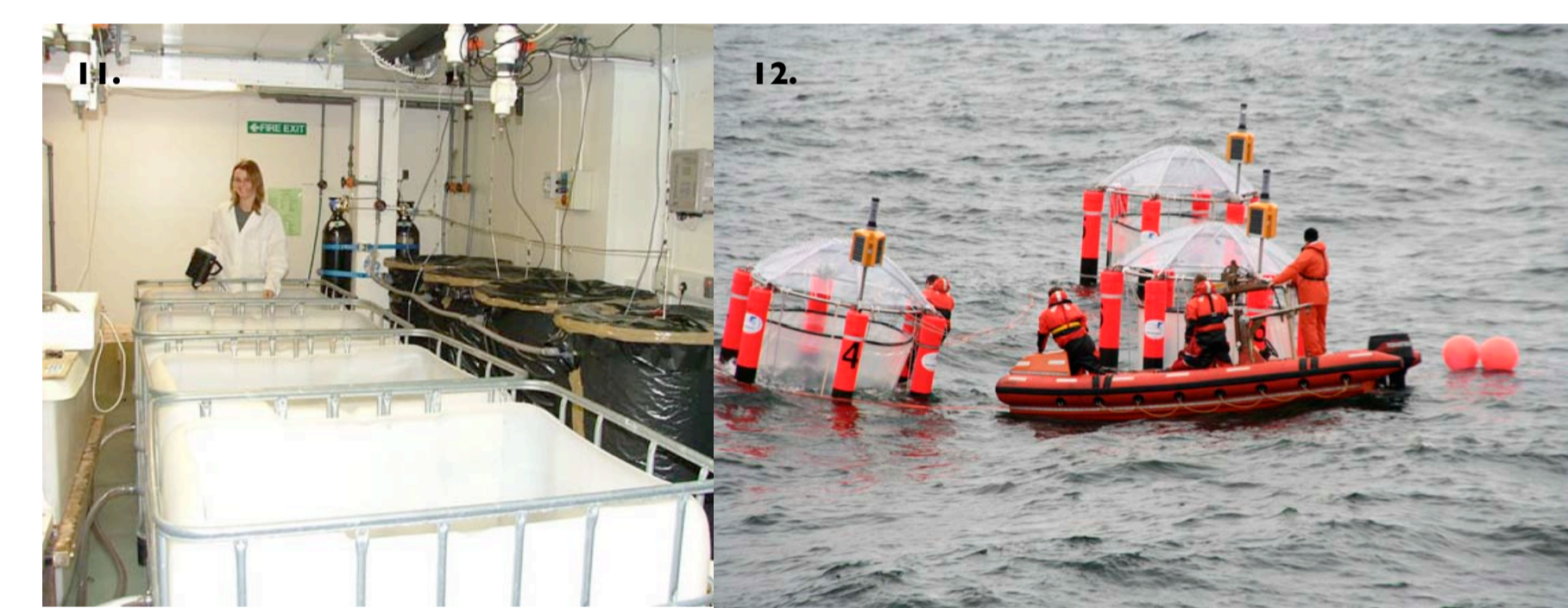
Uncertainties, risks and potential critical thresholds or "tipping points" associated with ocean acidification will be communicated to policy-makers and the general public in a comprehensive format and language.

Theme 4 will also assess the decrease in CO₂ emissions required to avoid the thresholds and describe the change to the marine environment and the Earth system, should these emissions be exceeded.

Cross-cutting research activities

EPOCA Svalbard campaigns 2009 and 2010

EPOCA focuses on areas where ocean acidification is thought to strike first, such as the Arctic Ocean and the North Atlantic, where water temperatures are low and the CO₂ dissolves more easily. The two largest EPOCA campaigns will be carried out in the Arctic, in May 2009 and 2010. During the 2009 experiment, around 15 EPOCA scientists will investigate the impact of ocean acidification on Arctic benthic organisms such as echinoderms, mollusks, crustaceans and calcareous algae, using indoor mesocosms. In 2010, appr. 40 scientists will study pelagic organisms (phyto- and zooplankton) using off shore mesocosm facilities.



Guide to Best Practices for Ocean Acidification Research and Data Reporting

EPOCA organised, together with IOC-UNESCO, SCOR, OCB and the Kiel Excellence Cluster, an international workshop on Best Practices for Ocean Acidification Research in Kiel, Germany, 19-21 November 2008. The meeting brought together around 40 experts within different areas of ocean acidification research and covered seawater carbonate chemistry, experimental design of perturbation experiments, measurements of CO₂-sensitive processes and data reporting and usage.

The participants are in the process of producing a "Guide to Best Practices for Ocean Acidification Research and Data reporting" to ensure proper collaboration and comparisons of results within the ocean acidification research community. The guide will be subject to a 2-months open community discussion prior to publication, which is expected for the end of June 2009.

Overarching activities

International collaboration

EPOCA strives for an active international cooperation on ocean acidification. In particular, its International Scientific Advisory Panel, with members from the US and Korea, and one of the EPOCA partners (the intergovernmental organisation IOC-UNESCO) ensure that research being carried out through EPOCA is coordinated with the research activities of non-EU scientists.

Training and Education

EPOCA will organise several training workshops for Ph.D students and early career scientists in order to provide young researchers with approaches, theories and methods related to ocean acidification research.

Topics such as carbon biogeochemistry, paleo-reconstruction methods and perturbation experiments will be covered.

Ph.Ds and Post Docs are also invited to get involved in EPOCA school projects to raise their skill to communicate with non-scientific audiences. EPOCA has joined the Carboschools initiative; educational projects with a strong scientist – teacher – pupil interaction, to share the knowledge on ocean acidification with young people.

For more information, see www.carboschools.org.

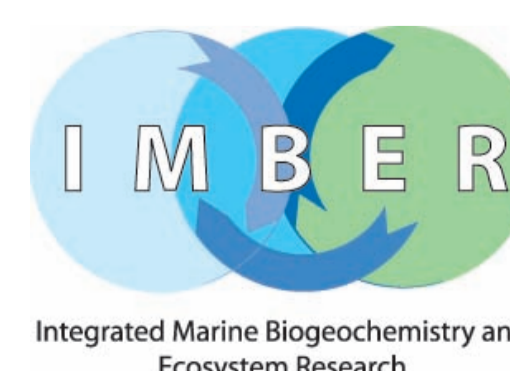


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<http://epoca-project.eu>