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Dissemination Level		
PU	Public	x
PP	Restricted to other programme participants (including the Commission Services)	
RE	Restricted to a group specified by the consortium (including the Commission Services)	
CO	Confidential only for members of the consortium (including the Commission Services)	

Towards a common framework for ocean acidification research

Training Workshop on the Fundamentals of Carbon Biogeochemistry; Bergen, Norway, 24-26 February 2009.

Research into ocean acidification is burgeoning due to the growing realisation that many organisms and ecosystems often exhibit large physiological to biogeochemical responses when perturbed under seawater carbon dioxide concentrations relevant to future atmospheric CO₂ scenarios. These ecological responses will have a crucial role in determining the ecological consequences and climate feedback potential of ocean acidification. An essential component of the effort to understand ocean acidification, the associated ecological effects and climate feedbacks, is a solid understanding of the functioning of the marine carbon cycle. It is also imperative to develop a common methodological approach and rigorous (meta)data reporting skills that will enable the direct and consistent comparison of experimental results.

To this end, a training workshop was held by the Bjerknes Centre for Climate Research, University of Bergen, Norway on the 24th to 26th February 2009, co-sponsored by the EU projects EPOCA and CARBOOCEAN and the IOC. The course was open to all students and researchers involved in ocean acidification research. Priority was given to PhD and early stage postdoctoral researchers. The course participants numbered 56.

The workshop introduced the IOC-sponsored “*Guide of Best Practices for Oceanic CO₂ Measurement and Data Reporting*” (2007) and provided a comprehensive insight into the marine carbon cycle. Presentations were given on the geological record of atmospheric and ocean carbon dioxide concentrations and extended through to scenarios of future ocean acidification. Processes modulating the ocean carbon cycle, encompassing ecosystem carbon biogeochemistry, were introduced including physiological processes of autotrophic carbon assimilation, biogenic calcification and the CaCO₃ cycle, and mediation of the carbon cycle through microbial processes. The often confusing world of pH scales and dissociation constants was unravelled and increasing array of instrumentation for the determination of carbon dioxide system variable determination was presented.

A special section on Education and outreach was a major focus of the workshop and included a presentation on scientific writing.

Finally, practical exercises were undertaken on calculating the carbonic acid system (using several software versions freely available on the net) to highlight the sensitivity of dissociation constant choice and pH scale consistency.

The agenda for the workshop is shown in Appendix A. Lectures given at the workshop can be downloaded from <http://www.epoca-project.eu/index.php/What-do-we-do/Training/Workshops/Bergen-workshop-02-2009.html>.

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Appendix A. Agenda for the workshop

24th February 2009

08:30	Registration and coffee
CARBOOCEAN Session 1 The marine carbon cycle past, present and future	
09:00	Welcome and Introduction (Richard Bellerby)
09:15	CO ₂ variability over paleo timescales (Toby Tyrrell)
10:30	Coffee
11:00	Future atmospheric CO ₂ and acidification scenarios (Jim Orr)
12.15	Lunch
EPOCA Session I Ecosystem carbon biogeochemistry – sensitivity and feedbacks to OA	
13:15	Physiological processes of autotrophic carbon assimilation (Björn Rost)
14:30	Biogenic calcification (Fred Gazeau)
15:45	Coffee
16:15	Microbial mediation of the carbon cycle (Markus Weinbauer)
17:45	Poster Session I
19:00	End

25th February 2009

CARBOOCEAN Session II The marine carbon dioxide system	
09:00	Writing readable scientific papers (Jim Orr)
09:45	The marine inorganic carbon dioxide system (Toby Tyrrell)
11:00	Coffee
11:30	Measurement of the marine inorganic CO ₂ system (Mike DeGrandpre).
12:45	Lunch
Joint EPOCA-CARBOOCEAN Session: CO₂ calculations	
13:45	pH scales and carbonic acid dissociation constants (Richard Bellerby)
15:00	Practical exercises on programs for the determination of the CO ₂ system (All)
15:30	Coffee
16:00	Practical exercises on programs for the determination of the CO ₂ system (All)
17:30	Poster Session II
19:00	End

26th February 2009

EPOCA Session II Data transfer and communication of results	
09:00	Data reporting and archiving (Anne-Marin Nisumaa)
10:15	Coffee
10:45	Education and outreach (Ingunn Skjelvan).

12:00	Closing Discussion
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13:00	Lunch
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