

# THE INTERNATIONAL OCEAN CARBON COORDINATION PROJECT (IOCCP)

*A joint project of SCOR and IOC and an affiliate program of the Global Carbon Project.*

Project Coordinator: Maria Hood, Intergovernmental Oceanographic Commission -  
UNESCO

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## **Guide to Best Practices for Ocean CO<sub>2</sub> Measurements Published**

PICES, IOC and SCOR are pleased to announce the publication of the Guide to Best Practices for Ocean CO<sub>2</sub> Measurements, by Andrew Dickson, Chris Sabine, and Jim Christian. The guide is an update of the 1994 DOE "Handbook of methods for the analysis of the various parameters of the carbon dioxide system in sea water". The guide is available on-line from the CDIAC Ocean CO<sub>2</sub> Program web-site in individual chapters or as a whole electronic document, and hardcopies are also available upon request from CDIAC. Chapters and operating procedures include:

Chapter 1: Introduction to the Guide

Chapter 2: Solution chemistry of carbon dioxide in sea water

Chapter 3: Quality assurance

Chapter 4: Recommended standard operating procedures (SOPs)

Water sampling for the parameters of the oceanic carbon dioxide system

Determination of total dissolved inorganic carbon in sea water

Determination of total alkalinity in sea water using a closed-cell titration

Determination of total alkalinity in sea water using an open-cell titration

Determination of p(CO<sub>2</sub>) in air that is in equilibrium with a discrete sample of sea water

Determination of p(CO<sub>2</sub>) in air that is in equilibrium with a continuous stream of sea water

Determination of the pH of sea water using a glass/reference electrode cell

Determination of the pH of sea water using the indicator dye *m*-cresol purple

Determination of dissolved organic carbon and total dissolved nitrogen in sea water

Gravimetric calibration of the volume of a gas loop using water

Gravimetric calibration of volume delivered using water

Gravimetric calibration of volume contained using water

Procedure for preparing sodium carbonate solutions for the calibration of coulometric C<sub>T</sub> measurements

Applying air buoyancy corrections

Preparation of control charts

Statistical techniques used in quality assessment

Calculation of the fugacity of carbon dioxide in the pure gas or in air  
Chapter 5: Physical and thermodynamic data

**For more information:** Download the Guide from the CDIAC site ([http://cdiac.esd.ornl.gov/oceans/Handbook\\_2007.html](http://cdiac.esd.ornl.gov/oceans/Handbook_2007.html)) or contact Alex Kozyr at CDIAC for a hardcopy of the Guide ([kozyra@ornl.gov](mailto:kozyra@ornl.gov)).

## WOCE Hydrography Manual to be Updated

Earlier this year, the IOCCP, CLIVAR, and the joint SOLAS-IMBER Carbon Coordination Group formed the Global Ocean Ship-based Repeat Hydrographic Investigations Panel (GO\_SHIP) to develop a strategy for a sustained program of interdisciplinary repeat hydrography, post-CLIVAR. One of the Terms of Reference of the Panel is to review and provide guidance on the need to update the WOCE hydrographic manual (1994), including a review and update of data quality control issues.

The Panel is in the process of contacting authors and reviewers for the following chapters:

- Standards and laboratory calibrations
- CFCs, <sup>3</sup>He-tritium and small volume radiocarbon
- CFC data processing quality control steps (including SF<sub>6</sub>)
- Salinity measurements
- Helium isotopes and tritium
- Protocol for continuous flow automated analysis of seawater nutrients
- Dissolved oxygen (also determination of DO by Winkler titration)
- <sup>14</sup>C; Sigma CO<sub>2</sub> by accelerator mass spec.
- <sup>13</sup>C
- Underway measurements / Overview
- ADCP measurements and navigation
- Near-surface temperature, salinity, and bathymetry measurements
- Meteorological measurements from research ships
- Underway pCO<sub>2</sub>
- Introduction to CTD methods
- CTD oxygen calibration procedures
- Calculation of physical properties of seawater
- Optimal operation of Seabird system
- LADCP (new)

The Panel will work with reviewers to update the chapters as necessary and to have drafts available on-line by June 2008 for a 3 month open community review period. Chapters will be published electronically as they are finalized, with a final full document scheduled for publication during the first half of 2009. Several of the chapters will draw from other recent publications (such as the carbon handbook) or from on-going methods development activities being carried out by other groups.

**For more information:** The WOCE hydrographic manual chapters are available on-line at CCHDO (<http://whpo.ucsd.edu/manuals.htm>). Information about GO\_SHIP is available on the IOCCP site ([www.ioccp.org](http://www.ioccp.org) >hydrography >International Advisory Group). Any questions or comments about this activity should be sent to Maria Hood at [m.hood@unesco.org](mailto:m.hood@unesco.org).

## **The Ocean in a High CO<sub>2</sub> World –II: Registration opens 29 February**

The Scientific Committee on Oceanic Research (SCOR), Intergovernmental Oceanographic Commission (IOC), International Atomic Energy Agency's Marine Environmental Laboratory (IAEA-MEL), and the International Geosphere-Biosphere Programme (IGBP) are convening the second symposium on *The Ocean in a High-CO<sub>2</sub> World* on **6-9 October 2008** in Monaco. The purpose of the meeting is to provide an interdisciplinary forum to assess what is known about ocean acidification and priorities for future research. The 4<sup>th</sup> day (October 9) will be a half-day session for the meeting summary and press conference.

The registration period for the second symposium will begin on **29 February 2008**. The meeting space in the Oceanography Museum in Monaco is limited, so it is very important that individuals interested in participating in the symposium register as early as possible. If the number of registrants is greater than the space available, a selection process will be used, with some preference given to applicants who submit an abstract relevant to the meeting topics:

- Scenarios of ocean acidification
- Effects of changes in seawater chemistry on nutrient and metal speciation
- Ocean carbon system from deep-time to the present to the distant future
- Paleo-chemistry
- Mechanisms of calcification
- Impacts on benthic and pelagic calcifiers
- Physiological effects: From microbes to fish
- Adaptation and (micro)evolution
- Fisheries, food webs, and ecosystem impacts
- Biogeochemical consequences and feedbacks to the Earth system
- Economic consequences
- CO<sub>2</sub> disposal

***For more information:*** Visit the symposium pages at [www.ocean-acidification.net](http://www.ocean-acidification.net). Registration information will be available on 29 February from the Conference Management site (<http://www.confmanager.com/main.cfm?cid=975>)

## **OceanSensors 08 / Early Registration Ends 15 February**

Registration is open for the OceanSensors08 workshop for marine scientists and sensor developers with an interest in shaping the future of ocean sensing. The workshop will be held from 31 March to 4 April in Warnemunde, Germany, and is co-sponsored by the US National Science Foundation, the UK National Environment Research Council, the Deutsche Forschungsgemeinschaft, and the Leibniz Institute for Baltic Sea Research. The program is divided into 4 main topics: Climate, Ecosystems, Hazards, and Cross-cutting and Emerging Technologies.

***For more information:*** Visit the OceanSensor08 home page for registration, program announcement, participants and local information ([www.oceansensors08.org](http://www.oceansensors08.org))

## **OceanObs 09 - Ocean Information for Society: Sustaining the Benefits, Realizing the Potential**

Confirmed Date and Venue: 21-25 September 2009, Venice, Italy.

Almost a decade has passed since the OceanObs'99 symposium played a major role in consolidating the plans for a comprehensive ocean observing system able to deliver systematic global information about the physical environment of the oceans. Now, for the first time in history, the world's oceans are being observed routinely and systematically by means of satellite and *in situ* techniques. The availability of these observations has led to rapid progress in ocean analysis and forecasting as well as new scientific understanding of oceanic variability and the role of the oceans in weather and climate. This information and knowledge supports a wide range of societal and business benefits.

It is now critically important to ensure sustainability and further development of the present system and to realize the full extent of the benefits across all stakeholders and for all participating nations. It is equally important to define a clear plan for extending the present system to include comprehensive observation, analysis and forecasting of the biogeochemical state of the ocean and the status of marine ecosystems.

The OceanObs'09 symposium will celebrate a decade of progress and make a major contribution to chart the way forward for the coming decade.

### Meeting Goals

- Document the importance and benefits of the existing ocean observing system.
- Demonstrate its scientific, societal and economic impacts.
- Revisit the current status, and update plans for the physical and carbon ocean observing systems.
- Advance capabilities for marine biogeochemistry and ecosystems.

This event will be an important one for the ocean carbon community, and the IOCCP will make it a priority for 2009. As soon as information becomes available about sessions and participation, we will keep you informed and provide coordination support for technical background documents and session development.

***For more information:*** Visit the conference web-site ([www.oceanobs09.net](http://www.oceanobs09.net)). A first announcement will be on-line shortly.