

THE INTERNATIONAL OCEAN CARBON COORDINATION PROJECT (IOCCP)

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

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Introducing the IOCCP Scientific Steering Group for 2008-2010

The IOCCP was launched as a standing project of IOC and SCOR in 2005 with requirements to develop a rotation scheme for the members of the scientific steering group following the first 3-year term. The Scientific Steering Group is composed of a Chair and 8 members selected for expertise in specific areas of IOCCP activities and ability to provide a global perspective on ocean carbon research and observation activities and plans. For the 2008-2010 term, Chris Sabine (NOAA/PMEL, USA) has agreed to continue as Chair of the SSG, and he is joined by returning members Masao Fukasawa (JAMSTEC, Japan) and Dorothee Bakker (UEA, UK). New members of the SSG for this term include Toste Tanhua (IfM-Geomar, Germany), Alex Kozyr (CDIAC, USA), Ute Schuster (UEA, UK), Melchor Gonzalez (U. Las Palmas de Gran Canaria, Spain), Pedro Monteiro (CSIR, South Africa), and Yukihiko Nojiri (NIES, Japan). The co-chairs of the SOLAS-IMBER joint carbon coordination group, Arne Kortzinger (IfM-Geomar, Germany) and Truls Johannessen (Uni. Bergen, Norway), also serve as ex-officio members of the IOCCP SSG. The IOCCP and its sponsors would like to thank the outgoing members for their participation and leadership during these critical first 3 years of the project's development: Bronte Tilbrook (CSIRO, Australia), Cindy Lee (SUNY-Stonybrook, USA), Helmuth Thomas (Dalhousie, Canada), Cyril Moulin (CNRS, France), and Nick Bates (BBSR, Bermuda).

For more information: See the IOCCP SSG member biographical sketches at: www.ioccp.org > Contacts.

The LDEO Takahashi data base published at CDIAC

The LDEO (Takahashi) data base (Version 1.0) is now available for general public use through CDIAC web page:

http://cdiac.ornl.gov/oceans/LDEO_Underway_Database/LDEO_home.html

More than 3 million measurements of surface water partial pressure of CO₂ obtained over the global oceans during 1968 - 2006 are listed in the Lamont-Doherty Earth Observatory (LDEO)

database, which includes open ocean and coastal water measurements. The data assembled include only those measured by equilibrator-CO₂ analyzer systems and have been quality-controlled based on the stability of the system performance, the reliability of calibrations for CO₂ analysis, and the internal consistency of data. To allow re-examination of the data in the future, a number of measured parameters relevant to pCO₂ measurements are listed. The overall uncertainty for the pCO₂ values listed is estimated to be $\pm 2.5 \mu\text{atm}$ on the average. The data presented in this database include the analysis of partial pressure of CO₂ (pCO₂), sea surface temperature (SST), sea surface salinity (SSS), pressure of the equilibration, and barometric pressure in the outside air from the ship's observation system. The global pCO₂ data set is available free of charge as a numeric data package (NDP-088: http://cdiac.ornl.gov/oceans/ndp_088/ndp088.html) from the Carbon Dioxide Information Analysis Center (CDIAC). The database is available as simple ASCII data and metadata files, as an ODV collection, and via two search engines: WAVES and LAS.

For more information: Visit the CDIAC web-site at:
http://cdiac.ornl.gov/oceans/LDEO_Underway_Database/LDEO_home.html

CDIAC Launches a Coastal Carbon Data and Information Web-site

IOCCP is pleased to announce that Alex Kozyr at CDIAC has launched a new data and information web-site for coastal carbon data, including data from VOS, moorings, and hydrography (bottle measurements from coastal cruises). The site address is: http://cdiac.ornl.gov/oceans/Coastal/Coastal_data.html. At present, there are only three regions to choose from: North American East Coast, North American West Coast, and European Coast. Scientists with data in these three regions are requested to check the information provided and to provide corrections, data links and updates as necessary. Data and information from other regions is being sought to develop a truly global database. This is a tool that has been requested repeatedly over the years by many research and observation programs, and we hope you will participate in making this a comprehensive site. Alex is also requesting information on past, ongoing, and future projects as well.

For more information: Please contact Alex at kozyra@ornl.gov or visit the site at: http://cdiac.ornl.gov/oceans/Coastal/Coastal_data.html

Report from OceanSensors08 and Launch of the Ocean Carbon Sensor Directory

The OceanSensors08 workshop was held at the Leibniz Institute for Baltic Sea Research, IOW, in Warnemünde, Germany, from 31 March to 4 April 2008 (<http://www.oceansensors08.org/>). The workshop was attended by marine scientists, sensor developers and technologists with an interest in determining and shaping the future of ocean sensing. Sensor developments in four areas were covered: (i) Climate - observation techniques and instruments for air/sea fluxes, carbon measurements, (ii) Ecosystems - observation techniques and instruments for ocean-omics, nutrient environment, ecosystem status, ground-truthing of space-based observations; (iii) Hazards - observation techniques and instruments for geohazards, hydrometeorological hazards, pollution hazards and extreme events; and (iv) Cross-cutting issues and emerging technologies.

In special sessions, draft white papers were discussed, including for sensors for fluxes through the sea surface (headed by Arne Körtzinger, IFM-GEOMAR, Germany), and sensors and instruments for oceanic carbon measurements (headed by Ute Schuster, UEA, UK). Manuscripts

are now being prepared for submission to a special issue in the journal of Ocean Science, <http://www.ocean-science.net/index.html>.

In addition to the manuscript for oceanic carbon measurements, an internet-based directory of sensors and instruments has been developed by the IOCCP. The first version site can be viewed at: www.ioccp.org >Sensors. The development of this directory stimulated great interest by the workshop participants, as it provides an overview of available technologies of interest to scientist aiming to start oceanic carbon measurements and to developers aiming to improve on technologies utilized. The issue of Technology Readiness Levels (TRLs, see e.g. http://en.wikipedia.org/wiki/Technology_Readiness_Level), was also discussed. TRLs have been adapted for marine research, where the aim is to provide documentation (publications, cruise reports, laboratory reports, project reports, etc.) that describes the level of development for each sensor / instrument. The IOCCP will continue to develop this directory and actively seeks input and suggestions from the ocean carbon community.

For more information: Visit the IOCCP ocean carbon sensor directory at www.ioccp.org >Sensors.

The IOC Establishes an Ad Hoc Consultative Group on Ocean Fertilization

Despite the numerous international and intergovernmental reviews on ocean fertilization that object to its use as a means of sequestering carbon without a more complete understanding of the environmental impacts, pressure from commercial groups has re-opened this issue with the International Maritime Organization's Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter (referred to as the "London Convention"). In 2007, London Convention developed a Statement of Concern about ocean iron fertilization, urging Contracting Parties to take into account environmental concerns when considering experimental or large-scale ocean iron fertilization to sequester CO₂. The Scientific and Legal groups of the Convention are now reviewing scientific and regulatory aspects of large-scale ocean fertilization experiments designed for carbon mitigation purposes in order to provide guidance to governments about whether this practice should be permitted and under what conditions. The IOC was requested to provide input to the London Convention Scientific Group meeting on this subject, to be held in Guayaquil, Ecuador from 19-23 May. An ad hoc Consultative Group of Experts was established to respond to specific scientific and technical questions of the London Convention Scientific Group, and consists of Ken Caldeira (Chair), Carnegie Institute of Washington, Stanford, USA; Philip Boyd, National Institute of Water and Atmospheric Research, New Zealand; Ulf Reibesell, Leibniz Institute of Marine Sciences, Germany; Christopher Sabine, National Oceanic and Atmospheric Administration, USA; and Andrew Watson, University of East Anglia, UK. Ken Caldeira will attend the London Convention meeting in Guayaquil to provide direct input to the discussions of the Scientific Group.

For more information: Read the statement of the IOC Ad Hoc Consultative Group on Ocean Fertilization at: http://iodeweb3.vliz.be/oanet/OAdocs/IOC_LCSGStatement.pdf . Statements from the London Convention and other groups can be found at: www.ocean-acidification.net > Resource Library Fact Sheets and General Information.

The UK Carbon-Ops Program

Earlier this year, the UK Carbon-Ops Program was launched. The following report was provided by Nick Hardman-Mountford (PML) and Gwen Moncoiffe (BODC).

What is CARBON-OPS? - The CARBON-OPS project is a UK-funded initiative (2007-2009) which aims to demonstrate a 'supply chain' for automated measurement of the partial pressure of CO₂ (pCO₂) in the surface of the ocean, through data processing and archiving, to supplying end users for research and policy development. The CARBON-OPS website has just been launched at <http://www.bodc.ac.uk/carbon-ops/>.

Why monitor CO₂? - There is increasing demand by Governments and scientists for indicators of carbon dioxide (CO₂) and related variables, such as pH, for the marine environment. Carbon monitoring has been proposed as an essential part of the Global Ocean and Climate Observing Systems (GOOS and GCOS) and is required to support global climate change predictions. Changes in atmospheric CO₂ concentration, ocean temperature, winds, salinity and phytoplankton growth could all affect the ability of the ocean to absorb atmospheric CO₂.

How are the data collected? - Data are collected by Plymouth Marine Laboratory's new, automated "Live pCO₂" measurement systems (built by Dartcom) on five UK research ships in the Southern Ocean, Atlantic/Pacific Oceans and NW European shelf seas (mainly Irish Sea and English Channel). These send data in near-real time, via satellite communication systems, to the British Oceanographic Data Centre (BODC), where they are automatically processed, quality controlled and archived.

Who is using the data? - The data will be delivered to the UK Met Office and other end users for testing predictions from operational ocean models. The models will then be used to generate indicator products to assist with climate and environmental policy decisions by providing information on changes in ocean CO₂ uptake, seawater pH and potential impacts on global climate and marine ecosystems. Other users of the data can register online to download the data.

Where can I find out more? - The CARBON-OPS website has just been launched. To learn more about the CARBON-OPS project and view the latest CO₂ measurements, please visit <http://www.bodc.ac.uk/carbon-ops/> or e-mail nhmo@pml.ac.uk for further information.

For more information: Visit <http://www.bodc.ac.uk/carbon-ops/> or e-mail Nick Hardman-Mountford at nhmo@pml.ac.uk

The Ocean in a High CO₂ World-II: Abstract Deadline 31 May

The second symposium on *The Ocean in a High-CO₂ World*, to be held from 6-9 October 2008 in Monaco, is being convened by 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). 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 4th day (October 9) will be a half-day session for the meeting summary and press conference. **The abstract deadline for the symposium is 31 May.** The sponsors would like to remind potential participants that 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 and submit abstracts 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. Invited speakers and topics include

- Andy Knoll (Harvard, USA) - Paleo-evolution and Adaptation
- Ken Caldeira (Carnegie Institute of Washington, Stanford, USA) - Paleo-chemistry

- Peter Haugan (Geophysical Institute, Uni. Bergen, Norway) - CO2 Disposal
- Ulf Reibesell (IFM-GEOMAR, Germany) - Physiology overview / autotrophs
- Antje Boetius (Max-Planck Institute for Marine Microbiology, Germany) - Physiology overview / microbes
- Hans-Otto Poertner (Alfred Wegener Institute, Germany) - Physiology overview / invertebrates to fish
- Richard Feely (PMEL, NOAA, USA) - Predications and scenarios
- Hein de Baar (NIOZ, Netherlands) - Effects of changes in carbonate chemistry on nutrient and metal speciation
- Jean-Pierre Gattuso (CNRS, France) - Corals and coralline algae
- Vicki Fabry (California State Uni., USA) - Pteropods, bivalves, forams
- Jonathan Erez (Institute of Earth Science, Hebrew Uni., Israel) - Mechanisms of calcification
- Laurent Bopp (CNRS, France) - Biogeochemical consequences
- Yukihiro Nojiri (NIES, Japan) – Acidification simulation experiments with benthic animals.
- Jan Helge Fosså (Institute of Marine Research, Norway) - Potential consequences of ocean acidification on fisheries.
- Carol Turley (Plymouth Marine Laboratory, UK) – Day 4: Research Highlights Overview
- Hermann Held (Potsdam Institute for Climate Impact Research, Germany) – Day 4: Economics of Ocean Acidification
- Judith Kildow (Monterey Bay Aquarium Research Institute, USA) – Day 4: Policy and Management Options

For more information: Visit the Conference Management site at: <http://www.highco2world-ii.org>

Upcoming Meetings – May – August 2008

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| 19-23 May
Gijon, Spain | Effects of Climate Change on the World's Oceans
http://www.pices.int/meetings/international_symposia/2008_symposia/Climate_change/climate_background_3.aspx |
| 19-23 May
Guayaquil, Ecuador | The International Maritime Organization London Convention Scientific Group Meeting on Ocean Fertilization.
http://www.imo.org/Environment/mainframe.asp?topic_id=1517 |
| 21 May
Amsterdam,
Netherlands | EU FP7 Coordination Action Carbon Observing System (COCOS) Kick-off Meeting |
| 10-13 June
Nice, France | EU FP7 European Project on Ocean Acidification (EPOCA) Kick-off Meeting
http://epoca-project.eu/ |
| 16-17 June
UNESCO, Paris | The Surface Ocean CO2 Atlas Project – 2nd Technical Meeting
http://www.ioccp.org > Synthesis Groups |
| 18-19 June
UNESCO, Paris | Carbon in the Atlantic (CARINA) meeting
http://www.carbon-synthesis.org/ > Atlantic Ocean Carbon Synthesis |

24 June – 1 July
UNESCO, Paris

IOC Executive Council
<http://www.ioc-unesco.org>

21-24 July
Woods Hole, USA

Ocean Carbon and Biogeochemistry Summer Workshop
<http://www.us-ocb.org>