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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Third Symposium on The Ocean in a High-CO_2 World international planning committee and venue selected

A consortium of institutions and organizations from Monterey, California has successfully bid to host the third symposium on The Ocean in a High-CO_2 World in autumn 2012. The symposium aims to attract more than 300 of the world's leading scientists to discuss the impacts of ocean acidification on marine organisms, ecosystems, and biogeochemical cycles. It will also cover socio-economic consequences of ocean acidification, including policy and management implications.

The symposium is sponsored by the Scientific Committee on Oceanic Research (SCOR), Intergovernmental Oceanographic Commission (IOC) of UNESCO, and International Geosphere-Biosphere Programme (IGBP), which selected the Monterey consortium from eight bids to host the meeting. The international Planning Committee is led by Prof. Dr. Ulf Riebesell of the Leibniz Institute of Marine Sciences (Germany), and the local organization is led by Dr. Jim Barry of Monterey Bay Aquarium Research Institute and supported by a consortium of institutions.

The symposium is the third in a series and will build on the successes of the Paris and Monaco symposia in 2004 and 2008, respectively. The Paris meeting was seminal in identifying the magnitude of ocean acidification for marine ecosystems and the outcomes of the Monaco symposium, focusing on the advances in knowledge of the affects on marine organisms, also made an impact on a broader audience through a Summary for Policymakers and the Monaco Declaration.

The international planning committee will meet in December 2010 to develop the

scientific program for the symposium. Please contact Ed Urban (Ed.Urban@scor-int.org) if you would like to provide ideas for symposium topics. Inputs will be collated and provided to the planning committee.

More information: http://www.ocean-acidification.net/
To subscribe to email updates: secretariat@scor-int.org

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Guide to Best Practices for Ocean Acidification Research and Data Reporting now available online

Ocean acidification is an undisputed fact. The ocean presently takes up one-fourth of the carbon CO_2 emitted to the atmosphere from human activities. As this CO_2 dissolves in the surface ocean, it reacts with seawater to form carbonic acid, increasing ocean acidity and shifting the partitioning of inorganic carbon species towards increased CO_2 and dissolved inorganic carbon, and decreased concentration of carbonate ion.

While our understanding of the possible consequences of ocean acidification is still rudimentary, both the scientific community and the society at large are increasingly concerned about the possible risks associated with ocean acidification for marine organisms and ecosystems.

As this new and pressing field of marine research gains momentum, many in our community, including representatives of coordinated research projects, international

scientific organisations, funding agencies, and scientists in this field felt the need to provide guidelines and standards for ocean acidification research.

To initiate this process, the European Project on Ocean Acidification (EPOCA) and the Intergovernmental Oceanographic Commission (IOC) jointly invited over 40 leading scientists active in ocean acidification research to a meeting at the Leibniz Institute of Marine Science (IFM-GEOMAR) in Kiel, Germany on 19-21 November 2008. At the meeting, which was sponsored by EPOCA, IOC, the Scientific Council on Oceanic Research (SCOR), the U.S. Ocean Carbon and Biogeochemistry Project (OCB) and the Kiel Excellence Cluster "The Future Ocean", the basic structure and contents of the guide was agreed upon and an outline was drafted. In the following months, the workshop participants and additional invited experts prepared draft manuscripts for each of the sections, which were subsequently reviewed by independent experts and revised according to their recommendations. Starting 15 May 2009, the guide was made publicly available for an open community review.

The final version of the guide is now published:

Riebesell U., Fabry V. J., Hansson L. & Gattuso J.-P. (Eds.), 2010.
Guide to best practices for ocean acidification research and data reporting, 260 p.
Luxembourg: Publications Office of the European Union.

It is available free of charge on the EPOCA web site (http://www.epoca-project.eu/index.php/Home/Guide-to-OA-Research/). It is envisioned to revisit and possibly revise the guide to accommodate new developments in the field in a few years time.

Please contact Lina Hansson (hansson@obs-vlfr.fr) at the EPOCA project office to obtain printed copies of the guide, which will be available shortly.

We are very grateful to all colleagues who have committed their precious time to the preparation of this guide as chapter editors, lead and contributing authors, and reviewers.

On behalf of the writing team,
Ulf Riebesell, Victoria J. Fabry, Lina Hansson and Jean-Pierre Gattuso (editors)

LDEO Database Version 2009 now available from CDIAC

Approximately 4.75 million measurements of surface water partial pressure of CO_2 obtained over the global oceans during 1968-2009 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-CO_2 analyzer systems and have been quality-controlled based on the stability of the system performance, the reliability of calibrations for CO_2 analysis, and the internal consistency of data. To allow re-examination of the data in the future, a number of measured

parameters relevant to pCO_2 measurements are listed. The overall uncertainty for the pCO_2 values listed is estimated to be +/- 2.5 μatm on the average.

For simplicity and for ease of reference, this version is referred to as 2009, meaning that data collected through 31 December 2009 has been included. It is our intention to update this database annually. There are 42 new cruise/ship files in this update. In addition, some editing has been performed on existing files so this should be considered a "V2009" file. Also we have added a column reporting the partial pressure of CO_2 in seawater in units of Pascals.

The data presented in this database include the analyses of partial pressure of CO_2 (pCO_2), 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 pCO_2 data set is available free of charge as a numeric data package (NDP) from the Carbon Dioxide Information Analysis Center (CDIAC) (http://cdiac.ornl.gov/oceans/LDEO_Underway_Database/). The NDP consists of the oceanographic data files and this printed documentation, which describes the procedures and methods used to obtain the data.

Takahashi, T., S.C. Sutherland, and A. Kozyr. 2010. Global Ocean Surface Water Partial Pressure of CO_2 Database: Measurements Performed During 1968-2009 (Version 2009). ORNL/CDIAC-152, NDP-088(V2009). Carbon Dioxide Information Analysis Center, Oak Ridge National Laboratory, U.S. Department of Energy, Oak Ridge, Tennessee, doi: 10.3334/CDIAC/otg.ndp088(V2009).

-Alex Kozyr (CDIAC)

Surface Ocean CO_2 Atlas (SOCAT) Project Update

The Surface Ocean CO_2 Atlas (SOCAT) is an international effort to create a global data base of the fugacity of carbon dioxide (fCO_2) in oceanic surface waters (http://www.socat.info/). Two data products will be made available as part of SOCAT: 1) a uniform, quality controlled surface water fCO_2 data set and 2) a gridded monthly, global product with no interpolation. These SOCAT products will enable scientists to study temporal and spatial variations in oceanic CO_2 and will provide a validation and baseline for modelling studies. Regular updates of the SOCAT products are envisaged.

The SOCAT effort depends on the submission of high quality carbon data to the Carbon Dioxide Information Analysis Center (CDIAC) by scientists across the globe, recalculation of fCO_2 following a well-defined protocol and quality control of the data by SOCAT participants. The data compilation is an ongoing process, so data can be submitted at any time for inclusion in the next SOCAT version. The Live Access Server (LAS) provides access to the vast data set to SOCAT participants during quality control and will allow the public to explore and download the data and gridded products once released. The current version of SOCAT (version 1.3) contains 7.6 million recalculated fCO_2 values from 2175 voyages between 1968 and 2007 (Figure 1). The participants aim

to finish the quality control of SOCAT version 1.3 by 1 October 2010. The first public release of the SOCAT products (version 1.3) is planned for early 2011.

This large effort has several key figures, notably Benjamin Pfeil, Are Olsen (University of Bergen, Norway), Steven Hankin, Jeremy Malczyk, Denis Pierrot (National Oceanic and Atmospheric Administration, USA), the regional group leaders and the global team. SOCAT is supported by UNESCO-IOC/SCOR-IOCCP (Scientific Committee on Oceanic Research - International Ocean Carbon Coordination Project), SOLAS (Surface Ocean Lower Atmosphere Study) and IMBER (Integrated Marine Biogeochemistry and Ecosystem Research). Support for SOCAT workshops has also been received from European Union COST Action 735, NIES (National Institute for Environmental Studies, Japan) and CSIRO (Commonwealth Scientific and Industrial Research Organisation, Australia).

- Dorothee Bakker (University of East Anglia, UK)

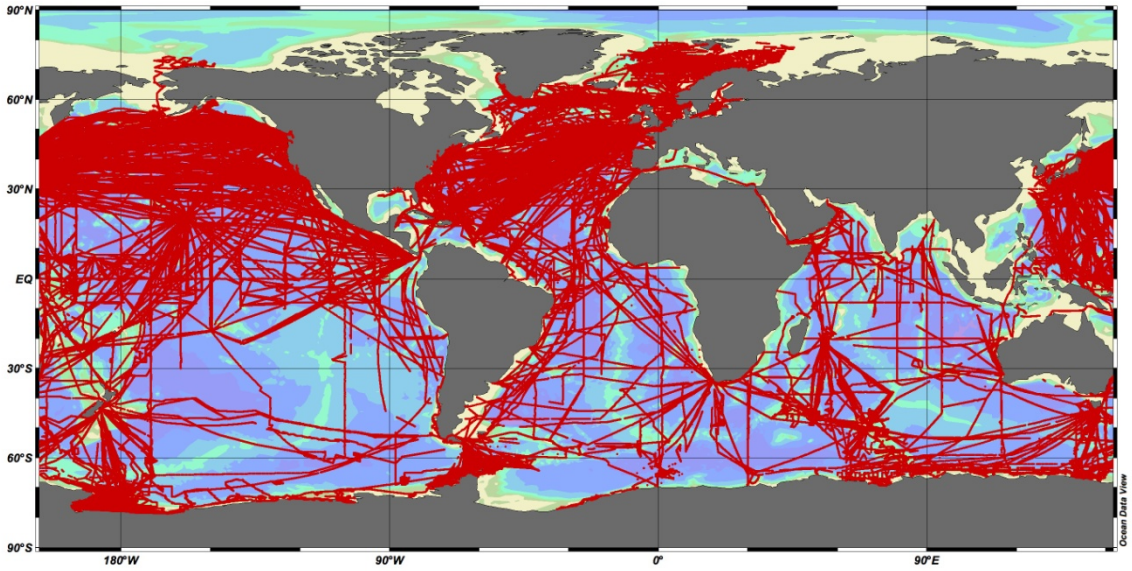

Figure 1. Location of surface water fCO_2 data in SOCAT version 1.3 (figure by Benjamin Pfeil).

Recent Workshops

SOCAT Southern Ocean Regional Workshop, Hobart, Australia

In June 2009, during the SOCAT meeting in Norwich (UEA, report http://www.ioccp.org/Workshops.html or http://www.socat.info), it was decided that the Southern Ocean SOCAT group would organise a meeting in Hobart, Tasmania.

From 16-18 June 2010, the Southern Ocean and Indian Ocean SOCAT groups (16 participants) met in Hobart to discuss a) progress on the SOCAT Quality Control, b)

revisiting LAS tools for SOCAT developed by Jeremy Malczyk and Steve Hankin at NOAA/PMEL, c) future observations in the regions, and d) to consider synthesis related to the SOCAT database, including for delivering products for the AR5. The progress on the Pacific SOCAT group was also reported.

The Southern and Indian Ocean groups agreed to finalise the SOCAT QC2 analysis before October 2010, with a proposed public release of SOCAT in April 2011. The SOCAT regional groups for the Atlantic, Pacific and Coastal Oceans are being approached to seek agreement on suitable timelines for release of the database.

The Southern and Indian SOCAT meeting in Hobart was supported by IOCCP, SOLAS and CSIRO, with national support from Japan and France. Many people at CSIRO-Hobart have contributed to the success of this meeting. We would especially like to thank Kristina Paterson and Bernadette Sloyan.

A complete report of this meeting will available by the end of July 2010 on the IOCCP, SOCAT, SOLAS and IMBER websites.

-Nicolas Metzl and Bronte Tilbrook

Southern and Indian Oceans SOCAT participants enjoyed a sunny day in Hobart during austral winter (16-18 June 2010).

PACIFICA data synthesis workshop, Tokyo, Japan

Twenty experts on hydrographic/chemical observations and data management from Canada, Korea, Japan and United States met in Tokyo on 2-4 June 2010 to discuss the 2nd-level quality control of PACIFICA. PACIFICA is the synthesized database of CO_2 and its related parameters for the interior of the Pacific Ocean. It now includes data sets from 265 cruises including the total of 14 cruises of CLIVAR Repeat Hydrography and many of several repeat lines such as 137ºE, Line-P, station KNOT and A-line that is not in GLODAP.

Following the agreements in the previous workshop held in Jeju, Korea, in October 2009 as a part of PICES annual meeting, the studies on data in order to quantify systematic difference in the reported values, i.e., 2nd level QC, has been started on the basis of the cross-over analyses for the data from deep in the ocean. Thanks to the Toste Tanhua and Steven van Heuven who have developed Matlab routines for the cross-over analysis in CARINA project, PACIFICA is also using the same routines for its efficient cross-over analyses and the inversions.

In this workshop, the selection of "Core Cruise", settings for the variety of variables for cross-over analysis, weighting in the inversions, minimum adjustments and so on that are potentially unique to the Pacific were discussed on the basis of the oceanographic and methodological knowledges and several preliminary runs of cross-over analyses. The status of the QC of the ocean CFCs data and that of data collection and some 2nd-level QC activitie in the marginal seas were also reported. Finally, action items toward the completion of 2nd-level QC were discussed and agreed. The next workshop of PACIFICA is planned as part of PICES annual meeting in October this year in Portland, USA, to complete the 2nd-level QC. PACIFICA is to be publicly available from Marine Information Research Center (MIRC) in Japan and Carbon Dioxide Information and Analysis Center (CDIAC) in USA.

-Masao Ishii (MRI-JMA)