Meeting Summary: ***Global Ocean Ship-based Hydrographic Investigations Panel (GO_SHIP)***

1-2 November 2007

Victoria Convention Center, Victoria BC, Canada

I. Introduction

The first meeting of the Global Ocean Ship-based Hydrographic Investigations Panel (GO_SHIP) was held in Victoria B.C., Canada from 1-2 November. Maria Hood (IOCCP) welcomed the participants on behalf of IOCCP, CLIVAR, and SOLAS-IMBER, and thanked them for agreeing to serve on the committee. Participants are listed in Annex 1.

She reminded the members that the advisory group has been asked to develop a "blueprint" for a coordinated network of ship-based repeat hydrography within a < 2-year period that will be circulated widely for consultation and consensus on the way forward. This document will then be used by the sponsoring organizations as well as national agencies to discuss the ways and means to move forward with developing such a network. An initial target may be to have something to "launch" at the OceanObs 2009 meeting, which is a 10 year follow-up to the OceanObs99 meeting that launched many of the open ocean networks that are part of the sustained system today.

Hood also reminded the members that this is meant to be a fully integrated strategy, drawing on physics, chemistry, and biogeochemistry, and developed in collaboration with Argo, GEOTRACES, OceanSITES and other relevant networks

making and using ocean interior measurements. The sponsors felt that it was important to hold this first meeting with just the group members, and then to contact focal points in the other systems as the strategy develops.

Hood noted that it is anticipated that the work of the group will be carried out through one initial meeting of the advisory group (this meeting), with writing and editing to be completed via email and telephone conferences as possible. The Secretariat for this group will be provided by Maria Hood (International Ocean Carbon Coordination Project) and Nico Caltabiano (International CLIVAR Project Office). By 2009, it is possible that there will be a WMO-IOC International Observation Monitoring Center that will unite the project offices of the major open-ocean systems, including VOS, SOOP, XBT, DBCP, GLOSS, Argo, and OceanSITES, and this would be the most likely project office home for an eventual ship-based hydrography system.

Hood then reminded the group that the basic considerations for a ship-based repeat hydrography programme were discussed in November 2005 at the Shonan Village conference (add URL). While the group should not feel bound by the outcomes of those discussions, it may expedite the work of the group to refer to those discussions to its guide considerations and decisions.

The group reviewed and approved the Provisional Agenda given in Annex 2.

II. Terms of Reference and Panel Members

The group reviewed and approved its Terms of Reference as follows:

i. To develop the scientific justification and general strategy for a ship-based repeat hydrography network, building on existing programs and future plans, that will constitute the core global network, post-CLIVAR; considerations should include:

a) a set of basic requirements to define a minimum coordinated repeat hydrography network (e.g., sample spacing, repeat frequency, recommended core measurements, etc.);
b) an inventory of existing and planned sections that meet those criteria;
c) an assessment of other observing programs that can either contribute to or use hydrography data (e.g., Argo, OceanSITES, GEOTraces, etc.);
d) an assessment of data release needs to meet research and operational objectives;
e) an inventory of on-going or planned scientific synthesis activities (basin and global) that might benefit from closer collaboration;

f) guidelines for the transition from the CLIVAR hydrographic program to the new system, including sections, data and information management, and synthesis activities.

ii. To develop guidelines for a single global information and data center for ship-based repeat hydrography;

iii. To review and provide guidance on the need to update the WOCE hydrographic manual, including a review and update of data quality control issues.

The group includes the following experts:

Christopher Sabine (NOAA / PMEL, USA) – Dr. Sabine has been involved in large-scale carbon measurements from hydrographic survey cruises for over 15 years. He organized the Global Ocean Data Analysis Project (GLODAP) and has been active in the US and international global carbon planning efforts. His lab is currently responsible for 50% of the DIC measurements on the U.S. CLIVAR/Carbon Repeat Hydrography Program, is a member of the U.S. Repeat Hydrographic Oversight Committee and is chair of the International Ocean Carbon Coordination Project (IOCCP).

Masao Fukasawa (JAMSTEC, Japan) – Dr. Fukasawa is the Director General of the Institute of Observational Research for Global Change (IORGC) of JAMSTEC, which leads the implementation of Japanese post-WOCE global ocean observations, including repeat hydrography, Argo and surface mooring arrays. He was a member of the WOCE hydrography program and its synthesis and modeling working group from 1987-1989 and 1998-2002, respectively. He also participated in Japan WOCE as the PI of the Sub-Arctic Gyre Experiment (1998-2002) and has been engaged in the continuing implementation of repeat hydrography along WHP lines and in the scientific analysis of hydrographic data.

Nicolas Gruber (ETH-Z, Switzerland) - Prof. Gruber is chair of the interior ocean working group of the Joint SOLAS-IMBER Carbon Group and member of the scientific steering committee of IMBER. He was a member of the planning and oversight committee of the U.S. Repeat Hydrographic Program from 2002 until 2006. He is also chair of the Oxygen on Argo planning group, which seeks to add oxygen sensors onto profiling floats.

Prof. Gruber's expertise is in the analysis and interpretation of large-scale ocean data sets, using a range of methods, ranging from statistical analyses to assimilation of observations into coupled physical-ecological-biogeochemical models.

Bernadette Sloyan (CSIRO, Australia) - Dr Sloyan is a co-chair of the CLIVAR Global Synthesis and Observation Panel (GSOP). She has been involved in the planning, collection and analysis of repeat hydrographic data since 2002, and is also involved in a number of CLIVAR-sponsored ocean process studies.

Gregory C. Johnson (NOAA / PMEL, USA) – Dr. Johnson is a member of the U.S. Repeat Hydrographic Oversight Committee and has been involved in large-scale hydrographic data collection and analysis for 20 years. He has participated in related planning activities from WOCE through CLIVAR. He has also been contributing to Argo since its inception. He has participated in the development of delayed-mode quality-control procedures for hydrographic data from Argo floats, and is currently providing floats for the Argo array.

Toste Tanhua (IfM-GEOMAR, Germany) - Dr. Tanhua has been involved in oceanic transient tracer (CFCs) data collection for or 15 years. He is involved in the Atlantic Carbon Synthesis project (CARINA database) for which he chairs the North Atlantic group. Dr Tanhua has also been nominated to represent carbon synthesis activities in CLIVAR GSOP.

Arne Körtzinger (IfM-GEOMAR, Germany; Co-Chair) – Prof. Körtzinger is co-chair of the Joint SOLAS-IMBER Carbon Group and member of the scientific steering committee of IMBER. He is also carbon representative on the CLIVAR Atlantic Implementation Panel. For nearly 15 years Prof. Körtzinger has been involved in large-scale surface and interior ocean carbon measurements from a variety of platforms, including research vessels, Voluntary Observing Ships, mooring, and floats. More recently he has been involved in an initiative to develop and implement an official oxygen component for the international ARGO project.

III. Summary Decisions

The following summary provides the basic decisions made by the Panel in the initial development of a sustained system for repeat ship-based hydrography. These decisions will form the basis of the strategy document to be developed.

A. Scientific justification for repeat hydrography

1. Understanding the controls and distribution of natural and anthropogenic carbon, tracers, and biogeochemistry in the ocean interior.

2. Understanding changes in the abyssal ocean > 2 km (i.e., 52% of the global ocean), and impacts on global heat budget and sea-level.

3. Understanding the variability in water masses, ventilation, and pathways.

4. Quantifying transports.

5. Provides a platform for testing new sensors and techniques, and data to validate other platforms (e.g., Argo) and models.

Meeting these goals requires:

- Establishing sustained decadal full water column resurveys of the global ocean (~ limits of detection of anthropogenic carbon changes) to detect large changes in their state and evolution;
- A simultaneous suite of observations including physical variables, oxygen, nutrients, carbon system parameters, transient tracers, isotopes, etc.

B. Temporal sampling requirements and survey synopticity

Two types of surveys are required: (1) decadal surveys and (2) a sub-set of the decadal survey lines sampled at high frequency (repeats every 2-3 years). The decadal repeat survey requires full-basin synopticity over a < 3 year period (beginning in 2012). This level of synopticity may become less necessary as assimilation techniques develop, but is currently necessary to distinguish between spatial and temporal variability.

The first GO_SHIP survey to begin in 2012 will take into consideration the sample schedule already carried out during the CLIVAR programme in order to ensure close to decadal repeat frequency for each basin. For example, the Atlantic was sampled most densely between 2003-2005, the Pacific between 2005-2007, and the Indian is scheduled for 2007-2009, implying that the first GO_SHIP

survey would start with the Atlantic from 2012-2014 (unless the Atlantic is resurveyed between 2009-2012), the Pacific from 2015-2017, and the Indian from 2017-2019.

C. Spatial sampling requirements

I. Basin definitions

- Atlantic
- Pacific
- Indian
- Southern Ocean – sampling implemented with other basins
- Arctic – new and increasing in importance.

II. Line structure

Coast to coast (or ice)

III. Sampling resolution

Target horizontal resolution:

- Physical measurements: nominal 30 nm spacing; flexibility depending on topography and boundary currents.
- Carbon measurements: carbon and tracers at 60 nm or better.

Target vertical:

- Full water-column continuous physical and oxygen measurements.
- Discrete water sample analyses of other parameters, using between 24 and 36 bottles in the deep ocean.

IV. Repeat tracks

Will follow standard WOCE lines with small modifications as necessary, making allowances for ice, research clearances, connections to time-series stations where available, etc.

D. Core recommended variables

(see Section IV of this report for the hydrographic programme manual chapters to be reviewed.)

I. Decadal survey

- Ideally, core program lines should measure temperature, salinity, pressure, nitrate + nitrite (with clear reporting of what was measured), phosphate, silicate, oxygen, chloroflurocarbon tracers (CFC-11, -12), velocity using shipboard and lowered ADCP, and at least 2 carbon parameters (e.g., DIC,

Alk, pCO_2, pH). By 2012, it is anticipated that SF6 may also be able to be measured regularly by the majority of participating groups.

- DIC and ALK are the preferred pair, but spectrophotometric pH is a useful 3rd parameter because of high measurement precision and growing interest in ocean acidification.

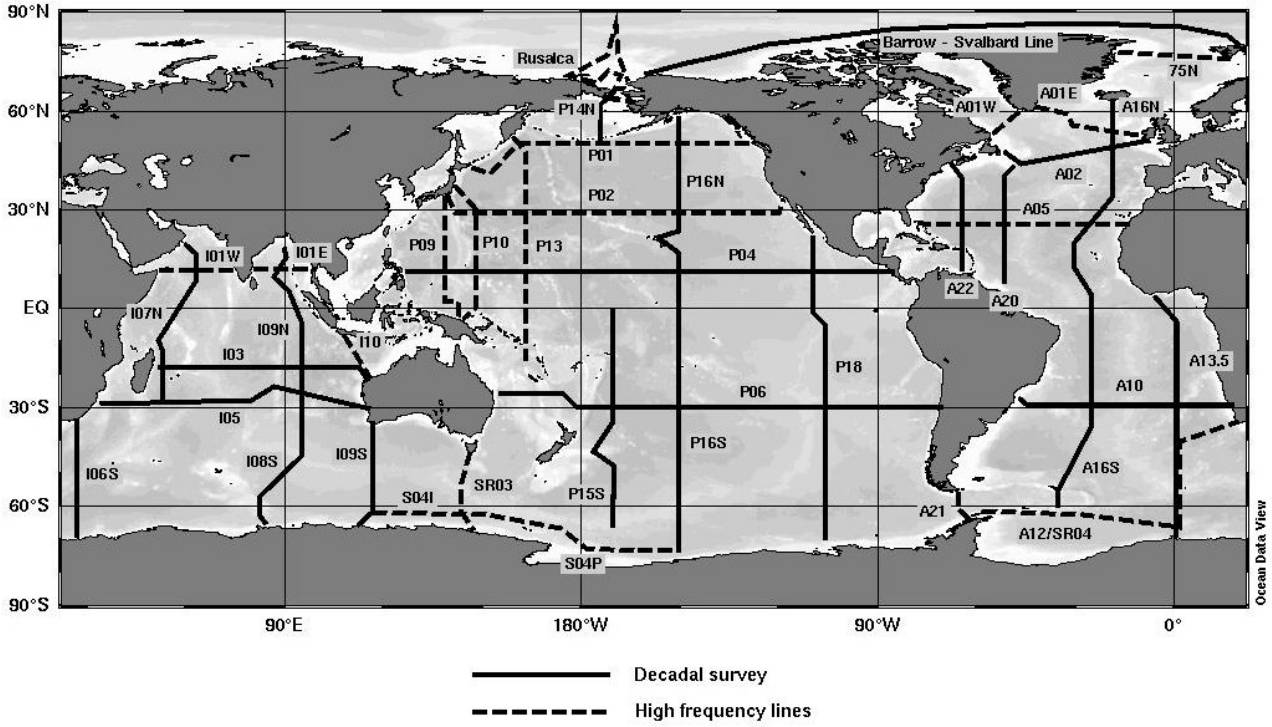
- Also recommended are separate measurements of NO_2 and NO_3, organics (POC, DOC), ^{13}C, and underway surface measurements (including pCO_2, pigments, and related biological parameters at the surface).

II. High frequency / other sustained repeat lines
T, S, O_2, Nutrients

E. Sustained Repeat Survey Lines (red = high frequency sections)

Atlantic	Pacific	Indian	Arctic
A22 and A20	**P1**	I9 N and I8 S	Barrow to Svalbard line (done on the *Healy* and *Oden* in 2005)
A16 N and S	**P2**	I9 S	**75 N**
A13.5	P4	I7N	**Rusalca**
A21	**P13** (maybe 14)	I5	
A01W	**P9 / P10**	I6S	
AR07E (A01E)	P6	I03	
A24N / A05	**SO4P** (modified / Ross Sea)	**I10** (if possible)	
A2	P15 S (Equator to 67 S when possible)	S4I to I9S (needs to connect to S4P)	
A10	P18	**I1 W and E**	
A12 / SRO4 (Weddell Sea line)	P16 N and S		
	SRO3		
	P14N (Aleutians and up)		

See map, below.



F. Data release / sharing

- Preliminary dataset released within 6 weeks (all data measured on the ship)
- 6 months for physical data
- 1 year for everything else (except for isotopes or tracers where not possible).

G. Regular Product development (various timescales)

- Individual section time-series studies
- Basin-scale changes (all variables)
- Global decadal uptake
- Integrate hydrography data into assimilation systems / techniques so that data coming from surveys are fed into the system on a regular basis.

H. Data and information center needs

Shipboard ADCP

ADCP Data Archive at the Japan Oceanographic Data Centre (JODC), Japan
Principal Contact: Minoru Odamaki
Email: mail@jodc.go.jp
Website: http://www.jodc.go.jp/goin/clivar.htm
Data: http://jdoss1.jodc.go.jp/cgi-bin/2001/feti_vector
Responsibilities: Shipboard ADCP data. The ADCP Data Archive at the JODC, together with the Hawaii Joint Archive for Shipboard ADCP, is co-responsable in seeking out CLIVAR principle investigators and data contacts for calibrated and quality-controlled shipboard ADCP datasets.

and

Hawaii Joint Archive for Shipboard ADCP, USA
Principal Contact: Patrick Caldwell
Email: caldwell@hawaii.edu
Website: http://ilikai.soest.hawaii.edu/sadcp/clivar.html
Data: http://ilikai.soest.hawaii.edu/sadcp/main_inv.html
Responsibilities: Shipboard ADCP data. The Hawaii Joint Archive for Shipboard ADCP, together with the ADCP Data Archive at the JODC, is co-responsable in seeking out CLIVAR principle investigators and data contacts for calibrated and quality-controlled shipboard ADCP datasets.

Lowered ADCP

LADCP Data Assembly Centre, LDEO, USA
Principal Contact: Andreas Thurnherr
Email: ant@ldeo.columbia.edu
Website: http://ladcp.ldeo.columbia.edu/ladcp/clivar/
Data: http://kage.ldeo.columbia.edu/SOURCES/.LDEO/.ClimateGroup/.PO/.LADCP/
Responsibilities: Lowered ADCP data. To collect, process, and make available LADCP data from CLIVAR and CLIVAR-relevant cruises.

Surface Meteorology

Surface Marine Meteorological Data Assembly Center, COAPS, FSU
Principal Contact: Shawn R. Smith
Email: smith@coaps.fsu.edu
Website: http://www.coaps.fsu.edu/RVSMDC/CLIVAR/
Data: http://www.coaps.fsu.edu/RVSMDC/html/data.shtml
Responsibilities: The CLIVAR Surface Marine Meteorology Data Assembly Center (DAC) is established at the Center for Ocean-Atmospheric Prediction Studies on the

campus of Florida State University. The mission of this DAC is to collect, quality control, distribute, and assure archival of underway surface meteorological observations from CLIVAR hydrographic cruises. Additional surface meteorology data will be accepted from CLIVAR-sponsored experiments in the marine environment. Data will be accepted from any U.S. or international hydrographic programs willing to provide their data to the DAC. We anticipate data submissions from research vessels and moored buoys that are either observed by nearly continuous recording systems or ship bridge officers. All surface meteorological data sent to the DAC will be placed in a common, metadata-inclusive format and will undergo automated and visual data quality assessment. Data quality evaluation procedures implemented for WOCE and TOGA-COARE will be utilized to produce the value-added data sets. Data quality reports and value-added products will be distributed freely to the scientific community and feedback on data quality will be sent to data providers. Finally, the DAC will ensure the long-term archival of all submitted data at national archive centers.

CTD hydrography

Investigate the feasibility of developing a system that is compatible with / linked to the Argo and OceanSITES data management system at IFREMER. Take into consideration recent collaborations between CCHDO and Coriolis Centre for hydrographic data.

Discrete Carbon

Carbon Dioxide Information Analysis Center - Ocean CO2 (World Data Center for Atmospheric Trace Gases)

Principle Contact: Alex Kozyr

Email: ako@ornl.gov

Website: http://cdiac.esd.ornl.gov/oceans/home.html

Data: http://cdiac.esd.ornl.gov/oceans/RepeatSections/clivar_introd.html

Responsibilities: Since 1993 CDIAC has been serving the ocean scientific community as the central repository for the carbon dioxide data measured on the WOCE/JGOFS cruises. CDIAC receives WOCE hydrographic and tracer data from the WHPO. Thus all U.. and most foreign WOCE hydrographic, chemical and carbon data are available now through the CDIAC Ocean data web page. Most of the data at CDIAC are available as published and electronic Numeric Data Packages (NDPs). The CDIAC_WOCE Ocean Data View (ODV) Collection that includes all WOCE sections with CO_2 measurements as well as hydrographic and nutrient measurements is now available through CDIAC WWW. CDIAC communicates frequently with the scientific measurement groups and individual PIs. This has helped CDIAC build the largest atmospheric and oceanic carbon data sets in the world, with the highest quality data. As new carbon data measurements will be made on the repeat hydrographic sections, CDIAC is ready to continue its support to the WHPO/CCHDO in CO_2 data processing and archival. CDIAC and the WHPO cooperate closely: CDIAC receives many CO_2-related data files directly, and also some from the WHPO. CDIAC carries out all data management functions for CO_2-

related data and the WHPO handles these functions for the CTD, hydrographic, and tracer data. The WHPO merges into its data files the latest versions of the CO_2-related data as received from CDIAC. CDIAC uses the latest versions of the hydrographic data in its files. The WHPO is the primary provider of the data to NODC/WDC-A. Both facilities distribute data in formats agreed to be their user communities.

Underway Data

For the time being, CDIAC Ocean CO_2 is managing all underway data (physical and chemical) on hydrographic research ships. For future development, investigate the feasibility of linking a system to initiatives such as GOSUD or the JCOMM SOOP/VOS networks.

Carbon Dioxide Information Analysis Center - Ocean CO_2 (World Data Center for Atmospheric Trace Gases)
Principle Contact: Alex Kozyr
Email: ako@ornl.gov
Website: http://cdiac.esd.ornl.gov/oceans/global_pco2.html

IV. Hydrographic Program Manual Decisions

Chapters / OPERATIONS	Suggested Reviewers	Notes / Actions
Standards and Laboratory Calibration	Scripps Group (Jim Swift et al.)	Hood to follow up.
CFCs, ^{3}He-tritium and small volume radiocarbon	John Bullister and Toste Tanhua (measurement methods for CFCs and SF_6)	Tanhua to follow up. SF_6 needs to be added.
CFC data processing quality control steps (including SF_6)	John Bullister and Toste Tanhua	Tanhua to follow up.
Salinity measurements	Kawano / JAMSTEC	Fukasawa to follow up.
Helium isotopes and tritium	Bill Jenkins et al.	Hood to follow up.
Protocol for continuous flow automated analysis of seawater nutrients	Aoyama / MRI	Fukasawa to follow up. Also mention the development of nutrient standards led by Aoyama.
Dissolved oxygen (also determination of DO by Winkler titration)	Chris Langdon of Leif Anderson / potentiometric techniques	Tanhua to follow up.
^{14}C; Sigma CO_2 by accelerator mass	Anne McNichol / Bill	Hood to follow-up.

spec.	Jenkins	
^{13}C	Paul Quay	Sabine to follow up.
Underway measurements / Overview	TBD.	Hood to ask VOS/SOOP/GOSUD people if this is needed
ADCP measurements and navigation	Jules Hummon / UH	Greg to follow up.
Near-surface temperature, salinity, and bathymetry measurements	TBD.	Hood to ask VOS/SOOP/GOSUD people if this is needed
Meteorological measurements from research ships	Shawn Smith / FSU	Hood to follow up.
Underway pCO_2	Dickson	Completed with release of new guide.
Introduction to CTD methods	Uchida, Johnson, and Joyce	Johnson to follow up.
CTD oxygen calibration procedures	Uchida, Johnson, and Joyce	Johnson to follow up.
Calculation of physical properties of seawater	SCOR group – McDougall and Millero	Johnson to follow up.
Optimal operation of Seabird system	Johnson and Swift Group	Johnson to follow up.
LADCP (new)	Andreas Thurnherr et al., LDEO	Sloyan / Tanhua to follow up.
Notes: • Eliminating chapters on: Collection of ^{85}Kr and ^{39}Ar samples; Large volume sampling; improving NBIS MK IIIB measurements;. • Adding new sections on LADCP and SF_6 measurements.		

For data reporting section of manual: The data reporting system manual will depend on eventual agreements for data management with IFREMER and the other WOCE / CLIVAR DACS. This will need to be followed up as consultations evolve and decisions are made.

V. Action Items

1. Send meeting and decisions summary to GO_SHIP members and sponsors as soon as possible, with a view to getting input from co-sponsors and 2 absentee members. [Responsible: Hood. Timeframe: end November 2007]

2. Develop a 1st draft strategy document based on decisions and input for review and consultations by members and sponsors. [Responsible: Hood et al. Timeframe: January 2008 for 1st draft to members and affiliated programmes (Argo, GEOTraces, etc.). Draft for open community review by May 2008 with final white paper for end 2008.]

3. Contact Jim Swift and CCHDO group to see if they will set up a site at CCHDO to provide access to revised versions and a system for open comments from the community. [Responsible: Sabine. Timeframe: December].

4. Finalize action list on Hydrographic Manual and contact reviewers to see if they accept to review / edit the chapters, with an initial deadline of June 2008. [Responsible: Hood. Timeframe: December].

5. Investigate the feasibility of developing a data management system for CTD profiles and a data / info directory for the post 2012 system at IFREMER. [Responsible: Hood. Timeframe: January].

6. Consultation, support, and preparation for 2009 OceanObs, including initial decisions on project office support, structure, linkages, etc. [Responsible: Hood et al. Timeframe: May 2008 following white paper release.]

Annex I.
Participant List

I. GO_SHIP Members

Masao Fukasawa Japan Agency for Marine-Earth Science and Technology (JAMSTEC) Institute of Observational Research for Global Change (IORGC) 2-15 Natsushima, Yokosuka, Kanagawa, 237-0061 Japan Email: fksw@jamstec.go.jp	**Bernadette Sloyan** CSIRO Atmospheric and Marine Research P.O. Box 1538 Hobart, Tasmania, Australia Email: Bernadette.Sloyan@csiro.au
Gregory Johnson DOC/NOAA/PMEL/OCRD 7600 Sand Point Way NE, Bldg. 3 Seattle WA 98115-6349, USA Email: gregory.c.johnson@noaa.gov	**Toste Tanhua** Leibniz Institute of Marine Sciences Marine Biogeochemistry Duesternbrooker Weg 20 D-24105 Kiel, Germany Email: ttanhua@ifm-geomar.de
Chris Sabine NOAA/PMEL 7600 Sand Point Way NE Seattle, WA 98115, USA Email: chris.sabine@noaa.gov	**Arne Körtzinger** *(unable to attend)* Marine Biogeochemistry Leibniz-Institut fur Meereswissenschaften Düsternbrooker Weg 20 D-24105 Kiel, Germany Email: akoertzinger@ifm-geomar.de
Nicolas Gruber *(unable to attend)* Institute of Biogeochemistry and Pollutant Dynamics Department of Environmental Sciences Swiss Federal Institute of Technology (ETH), Switzerland Email: nicolas.gruber@env.ethz.ch	**Maria Hood** *(Secretariat)* International Ocean Carbon Coordination Project Intergovernmental Oceanographic Commission, UNESCO Email: m.hood@unesco.org

II. Guests

Akiko Yamada
Japan Agency for Marine-Earth Science and Technology (JAMSTEC)
Institute of Observational Research for Global Change (IORGC)
2-15 Natsushima, Yokosuka, Kanagawa,
237-0061 Japan

E-mail: ayamada@jamstec.go.jp

Alexander Kozyr
Carbon Dioxide Information Analysis Center
Environmental Sciences Division
Oak Ridge National Laboratory
U.S. Department of Energy
Building 1509, Mail Stop 6335
Oak Ridge, TN 37831-6335 U.S.A.
Email: kozyra@ornl.gov

Julie Hall
Chair, Integrated Marine Biogeochemistry and Ecosystem Research (IMBER)
National Institute of Water and Atmosphere (NIWA)
PO Box 11 115, Hamilton, New Zealand
Email: j.hall@niwa.co.nz

Annex II.
Agenda

Day 1. November 1 2007

0900-0930	**I. Introduction and Background** Summary of decisions from Shonan Village meeting; Introduction of work and goals for this Advisory Group.
0930-0945	**II. Review of TORs for the group** Discussion, modification, agreement on a way forward.
0945 - 1730	**III. Justification and Requirements: First Discussions** i. Agreement on the basic science goals that require ship-based repeat hydrography – what is the scientific justification for developing a globally-coordinated, sustained hydrography programme? ii. Temporal considerations – coping with synopticity, frequency, and a multi-platform system. iii. Spatial considerations – sample spacing; section length (trans-basin, across straights, etc.) iv. Recommended core measurements – feasibility and guidelines; Standards and Best Practices?? v. Other platforms – what they contribute to meeting science goals; coordination issues. vi. Based on i-iii and v, and map of on-going / planned lines, what would the initial system look like? What's missing in terms of coverage? Coordination / Timing issues with other non-ship based platforms. vii. Data release / sharing issues (not just for ship-based, but also other platforms) viii. Data synthesis – developing regular data products?

Day 2. November 2 2007

0900-0915	**Summary from Day 1 and Introduction to Day 2** Adjustments to time schedule depending on items accomplished on day 1.

0915-1100	**IV. Data and information center needs** i. The ideal system ii. Existing hydrography data and information services iii. Existing good examples from other platforms iv. Way forward
1100-1500	**V. The Manual** i. Overview of data reporting and operations chapters – is this the best format to follow ? ii. Operations: Chapter review of what needs updating or adding iii. Data reporting: what needs updating or adding iv. Consideration of new needs for standards or best practices – need new agreements / workshops to agree on things? v. Who could update each chapter vi. Way forward
1500-1600	**VI. Way Forward** i. What do we call ourselves / this group and the system? ii. Homework assignments and due dates iii. Consultations iv. Next meeting