IOCCP Scientific Steering Group – 1st Session

IOCCP Report No. 3

Saturday, October 1
Omni Interlocken Conference Center
Broomfield, Colorado
Omni Center Boardroom

Background Documents (will be separate links)

- IOCCP Progress Report, August 2005
- International Ocean Carbon Stakeholders Meeting Report, December 2004
- Repeat Hydrography Workshop Documents and Participant Status
- Draft Underway CO_2 System document
- GlobColour Project Information
- Time Series Draft Inventory
- Process Studies Draft Inventory
- Presentations from members at SSG meeting

1. AGENDA

9:00-10:00 Chris, Maria	**IOCCP Overview**
10:00-11:00 Truls, Arne	**SOLAS / IMBER Joint Carbon Coordination Group**
11:00-11:15	Coffee
11:15-12:15 Masao	**Repeat Hydrography Workshop**
12:15-12:30 Chris	**CLIVAR Basin Panel Representatives**
12:30-13:30	Lunch
13:30-14:30 Bronte	**Underway Measurements**
14:30-15:00 Cyril	**GlobColour Project**
15:00-15:30 Nick	**Time Series Measurements**
15:00-15:15	Coffee
15:15 – 15:45 Helmuth (replacement)	**Coastal Observations**
15:45-16:15 Cindy (replacement)	**Process Studies**
16:15 – 16:45 Dorothee	**Data Set Development**
16:45 – 17:15 Maria	**Ocean Carbon Directory**
17:15 – 18:00 Chris, Maria	**Closing**

2. PARTICIPANTS LIST

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II. Project Office

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III. Guests

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3. REPORT

1. IOCCP Overview

Background documents:
Agenda, Participant List, The Progress Report August 2005, and International Ocean Carbon Stakeholders Meeting Report December 2004.

Discussion:
Chairman Chris Sabine opened the meeting and welcomed the members to the first SSG meeting. After introductions of the members, Sabine and project coordinator Maria Hood provided a brief overview of history of the IOCCP and its function as a communication and coordination service for the international ocean carbon community.

Several members were confused about the distinction between IOCCP and the global research programs, how these programs could work together most efficiently without duplication, and how the IOCCP would evolve without a targeted science focus. Sabine and Hood reiterated that the IOCCP deals with technical coordination issues that cut across all research programs and that its principle mission is working with the research programs to develop a sustained observing system for research that will continue beyond the lifetime of any single research project. Executive Officers Jeff Hare (SOLAS) and Sylvie Roy (IMBER), and Arne Koertzinger and Truls Johannessen, co-chairs of the SOLAS-IMBER carbon group (referred to hereafter as the S.I.C.), provided examples of how the S.I.C. and IOCCP worked together smoothly earlier in the week at the S.I.C. meeting to identify tasks that were most appropriate for each group (discussed in section 2 of this report). Sabine noted that the IOCCP also serves as an Ocean Carbon Directory (as the web-site title indicates), which provides a focal point for directing questions from the community to the appropriate groups. IOCCP activities are open to all in the ocean carbon community and the IOCCP SSG creates appropriate working groups for each IOCCP activity. In keeping with this open approach, information on all IOCCP activities will be provided quasi-continuously on the web-site to engage community participation and input.

Actions:
1. SSG members thought it would be useful to have a short mission statement prominently placed on the web-site to describe more clearly the IOCCP functions. *[Responsible member: MH. Timeframe: immediate]*.

2. SOLAS / IMBER Joint Carbon Coordination Group

Background documents:
SOLAS-IMBER Joint Implementation Plan for Carbon – in preparation.

Discussion:
Truls Johannessen and Arne Koertzinger provided some background information on the development of the joint S.I.C. and informed the SSG that a joint SOLAS-IMBER carbon implementation plan was being finalized by the S.I.C. During the S.I.C. meeting earlier in the week (attended also by SSG members Hood, Sabine, Fukasawa, Bates, and Tilbrook) three working groups were established to oversee implementation of carbon in these research programs: 1) surface ocean (lead: Nicolas Metzl), 2) interior ocean (lead: Niki Gruber), and 3) climate sensitivities and feedbacks (lead: Kitack Lee). Sabine noted that this structure mapped well onto the groups and themes of both the U.S. Ocean Carbon Cycle and Climate (OCCC) activity and the EU CarboOcean projects, but noted that the S.I.C. group was missing the issue of carbon mitigation strategies, although the IMBER Science Plan and Implementation Strategy clearly includes this. Johannessen and Koertzinger said that this topic would be treated as a science issue in the S.I.C. working group on Climate

Sensitivities and Feedbacks, and that the IOCCP should assist in directing appropriate science issues and actions to this group. Sabine also noted that the issue of data synthesis is something that the S.I.C. should take the lead on, but that it is an important issue that lies close to the boundary of both groups, and that the IOCCP would actively assist the S.I.C. to implement these activities as they develop.

During the breakout sessions of those new S.I.C. working groups at the S.I.C. meeting earlier in the week, participants outlined milestones to be achieved within the first year. The Climate Sensitivities and Feedbacks Working Group noted that there was an immediate need to develop guidelines and protocols for mesocosm experiments, and requested the IOCCP's assistance in pulling together appropriate scientists from different research programs to develop these.

It also became clear at the S.I.C. meeting that there was a need for a central information source on sensor / instrument development for carbon and biogeochemical variables and that this was an appropriate task for the IOCCP to undertake as a service for all the research programs. During the SSG meeting, this was discussed further, and the group decided that the web-based inventory of sensors should be developed using a standard template of information that would include information on the sensor's development status, with additional information about the sensor's success and failure rates, and detailed contact information.

The Surface Ocean Working Group of the S.I.C. identified a need to improve the link between atmospheric and oceanic CO_2 measurements to get climate-quality atmospheric CO_2 measurements from ships. The S.I.C. requested the IOCCP to assist in identifying the appropriate groups in the atmospheric CO_2 community and in determining what is needed to move this forward.

At the SOLAS/IMBER meeting, there was also a discussion about providing information on the different methods being used to calculate anthropogenic CO_2, and it was noted that Aida Rios had recently hosted a meeting to discuss this issue. This is an important issue that should be followed up by the S.I.C., and IOCCP will assist as needed.

The IOCCP brought to the attention of the S.I.C. a request it had recently received to co-sponsor a meeting on climate-relevant carbon and biogeochemical processes in the Indian Ocean, with a view to integrating carbon and biogeochemical measurements into the developing Indian ocean observing system. The proposal had been reviewed and discussed between Sabine, Hood, and Tilbrook (CLIVAR Indian Ocean Panel representative), and it seemed obvious that this request is more appropriate for the S.I.C. to handle, since the issue is purely scientific at this point rather than one of technical coordination. The S.I.C. agreed to review the proposal and to follow-up on the possibility of co-sponsoring this meeting.

Actions:
1. Both the SSG and the S.I.C. recognize the importance of having joint meetings, and agreed to try to co-locate / co-host the meetings of these two groups whenever possible. [*Responsible members: Hood, Sabine, Johannessen, Koertzinger. Timeframe: 1 year*].

2. The IOCCP will assist S.I.C. Working Group on Climate Sensitivities and Feedbacks to develop guidelines and protocols for mesocosm experiments. [*Responsible members: K. Lee, C. Lee, Hood, Riebesell. Timeframe: email discussion group to begin within the month*.]

3. The IOCCP will develop an on-line inventory of autonomous sensors available or under development. [*Responsible members: Hood, Sabine, Koertzinger. Timeframe: email discussion group to begin within the month*.]

4. The S.I.C. Working Group on the Surface Ocean will take the lead on determining how best to establish a closer link to the atmospheric CO_2 community for measurements from underway ships. [*Responsible members: Britt Stephens and Roger Dargaville. Timeframe: email discussion group to begin within the month*.]

5. The S.I.C. agreed to review the proposal to co-sponsor a meeting on climate-relevant carbon and biogeochemical processes in the Indian Ocean. [*Responsible members: Hood to send proposal to Hare and Roy for follow up. Timeframe: immediate*.]

3. Repeat Hydrography Workshop

Background Document:
PPT of Fukasawa presented at the meeting; International Repeat Hydrography Workshop Information Sheet and web-site
http://www.ioccp.org/RepeatHydrog2005.htm

Discussion:
Masao Fukasawa provided an overview of the Terms of Reference and implementation status of this workshop, co-sponsored by the IOCCP and CLIVAR (see background documents). He noted that there were currently 53 participants, with 30 from the chemical oceanography side and 20 physical oceanographers.

He initiated a discussion on the future of ship-based hydrography, suggesting that the carbon community may need to consider taking the lead on developing a system of sustained repeat hydrography, since this activity is increasingly driven by carbon rather than physical oceanography. There is also an immediate need to redefine the sampling strategy of repeat hydrography to meet the needs of other programs such as Argo, which needs deep measurements and rapid release of data to ground truth the float data.

Several SSG members also highlighted the need to pull together past and present repeat hydrography information and data that go beyond the WOCE or CLIVAR lines, noting that many hydrography programs and stations were never part of either of these programs. Past data, current implementation, and future planning of repeat hydrography is central to many ocean carbon research programs, and the SSG supported the idea that the carbon community may need to consider the feasibility of developing an international project office to oversee and coordinate the implementation of a sustained ship-based repeat hydrography activity, working closely with the research programs to develop and evolve sampling strategies and data synthesis activities. It was also noted that carbon and biogeochemical observations in the ocean interior will increasingly build on autonomous sensors in the future, and that the information and coordination of these activities, when implemented on a large scale, should be integrated into the hydrography program.

Actions:
1. Implementation of the International Repeat Hydrography Meeting, November 14-16, Shonan Village, Japan. [*Responsible members: Fukasawa, Sabine, Hood, Tilbrook. Timeframe: November 2005, with on-line report of meeting available by early 2006*].

2. Based on outcomes of the November hydrography meeting, the IOCCP will begin investigating the interest and feasibility of establishing a sustained international project office for repeat hydrography in collaboration with the S.I.C., CLIVAR, and the

GCOS-GOOS-WCRP Ocean Observations Panel for Climate. [*Responsible members: Hood, Sabine. Timeframe: Late 2005 / early 2006 with report to interested groups on feasibility and necessary steps.*]

4. CLIVAR Basin Panel Representatives

Background Documents:
None.

Discussion:
Sabine led this discussion, listing the current carbon representatives on the CLIVAR Basin Panels:
Atlantic – Arne Koertzinger
Pacific – Dick Feely
Indian – Bronte Tilbrook
Southern – Niki Gruber

Sabine briefly described the Global Synthesis and Observations Panel (GSOP) of CLIVAR, which is meant to unite the work of the basin panels into a "big picture" view of these activities. GSOP may seem to be the most appropriate level for carbon to deal with, but the interactions between individual scientists and programs are better at the basin panel level. It was also noted that different panels are at different levels of maturity, and some are more useful than others at this point. There was some concern about the Indian Ocean Panel, since the work tends to focus only on the tropics, whereas the subtropics and temperate waters are also important for the carbon hydrography air-sea flux work. After a brief discussion, the general feeling among the SSG members was that having carbon representatives on these Panels is useful and productive, and that it is also useful for Sabine and Fukasawa to continue to meet at the GSOP level.

Actions:
1. The basin panel representatives will continue to attend the meetings, supported by IOCCP funds for at least one more year. The usefulness of such representation will be re-evaluated at the IOCCP's 2006 meeting. [*Responsible members: Koertzinger, Feely, replacement for Tilbrook, Gruber, Hood for administration. Timeframe: Atlantic (October 2005, Venice, Italy), Pacific (February 2006, Honolulu Hawaii), Indian(March 2006, Reunion Island), Southern Ocean (June 2005 / attended by Mario Hoppema)*]

2. Make clear links on the web-site from the hydrography pages to the CLIVAR Basin Panel pages. [*Responsible member: Hood. Timeframe: immediately.*]

5. Underway Measurements

Background Documents:
Presentation of Tilbrook at the meeting; Draft underway CO_2 measurement report.

Discussion:
Tilbrook noted that advances have been made in developing more standardized underway systems, and that the recent work of Craig Neill and Rik Wanninkhof to engage General Oceanics in the commercial development of the Neill system is a major step forward.

Tilbrook noted that we are still hampered by large uncertainties in the calculations of CO_2 flux. A recent assessment of CO_2 fluxes from a biogeochemical model by Lenton et al. (see presentation) suggests that a Southern Ocean sampling of a grid of 3° latitude, 30° longitude, 4 times per year should be sufficient to resolve fluxes to +/- 0.1 PgC/yr. This sort of sampling coverage would require extra ships (both research and

VOS), drifting buoys, and time-series stations and is about double the current sampling resolution.

Several members of the SSG provided information on recent studies of autocorrelation scales for pCO_2 variability and studies that are being undertaken currently to examine issues of the sampling density required to meet research goals of estimating air-sea flux of CO_2 to ±0.1 Pg C /yr. Tilbrook suggested it is time to pull together an international program to start implementing these activities in a coordinated way based on what we already know.

Hood provided the SSG with suggestions from Dick Feely about how to move forward on this issue: "I suggest that the IOCCP sponsor a workshop devoted to developing the scientific basis for VOS Network Design and Data Synthesis efforts. This workshop could have the following components:

1. Review what we've learned so far about the variability of ocean CO_2 sources and sinks from observations, GCM models and inverse models.
2. Review what we've learned about network design from auto correlation studies. Where are the high-priority regions for new VOS measurements?
3. Develop firm plans for an international distributed network.
4. Develop plans for an internationally supported data synthesis effort."

The SSG felt that this was the best way to move forward, and that this workshop should be co-sponsored by the S.I.C. The S.I.C. representatives agreed that this was a key issue for working group 1.

Hood provided a brief overview of the Ship Observations Team (SOT) of the Joint Technical Committee on Oceanography and Marine Meteorology (JCOMM), sponsored by the WMO and IOC. This group has asked the carbon community, via the IOCCP, to join the SOT so that the oceanographic community can have a unified and coordinated approach to dealing with commercial shipping companies. There is a fear that too many oceanographers acting on their own with shipping companies may inadvertently put the whole activity at risk. The SOT provides an international contact for shipping companies and scientists, and can reassure the shipping companies of standard procedures, past and present success stories, and recognition of the shipping companies as contributors to the Global Ocean / Climate Observing System. This also provides a useful service for the scientists, smoothing the negotiations with the companies and providing helpful expertise and services in establishing new programs. Arne Koertzinger provided an example of his recent experience working with the SOT group and strongly supported the idea of linking officially with this group.

Hood noted that the draft document, Underway pCO_2 Systems, was developed in response to a request from the SOT to have a general understanding of CO_2 systems, and to integrate this information into a report being presented to shipping companies on the needs for science compartments to be built on all new ships. The SSG members agreed that this was a useful document and partnership, and that we should pursue this strongly.

Actions:
1. Begin plans for an international workshop on developing the scientific basis for VOS Network Design and Data Synthesis efforts, joint with the S.I.C. group.
[*Responsible members: Tilbrook, Sabine (Feely), Hood, Johannessen, Koertzinger. Timeframe: begin email discussion group by the end of the month, with a major effort beginning after November workshop*.]

2. Establish a partnership with the JCOMM SOT and work with this group to develop an informational document on how the carbon community can use this group for on-going or future negotiations with shipping companies. [*Responsible member: Hood, Sabine. Timeframe: begin email discussions by the end of the month.*]

3. Continue developing the draft document, Underway pCO_2 Systems, with a goal of developing a generic document describing underway pCO_2 systems and ship requirements for use with the JCOMM SOT group. [*Responsible members: Tilbrook, Hood, with open community participation. Timeframe: begin circulating a new draft document by end November 2005 and/or after further discussions with JCOMM SOT to optimise needs for the document.*]

6. GlobColour Project

Background Documents:
Presentation of Moulin; GlobColour Project Information

Discussion:
Cyril Moulin presented an overview of current activities in remote sensing of ocean colour variables and modeling projects. Most of these issues are coordinated through the IOCCP partner program, the International Ocean-Colour Coordinating Group, although there is a need for a closer link with the carbon modeling community. Moulin provided a brief overview of the GlobColour project, but noted that the first meeting is not scheduled until early 2006 and that it was not clear what role IOCCP will actively play in this project. Dorothee Bakker mentioned a problem with obtaining Meris data, and Moulin noted that this was a problem that the IOCCG would be looking into.

Actions:
Moulin will attend the first GlobColour Meeting in early 2006 and report back to the IOCCP on how the carbon community can assist this project.

7. Time-Series Measurements

Background information:
Presentation of Bates from ICDC7; Ocean Carbon Time Series draft inventory

Discussion:
Nick Bates provided an overview of the draft document he developed for the IOCCP last month on past and present time-series stations measuring carbon variables. The SSG agreed that this was an excellent document with much useful information, and that we should finalize this as soon as possible to make it available in map and table form on the web. There were several stations that were missing (Sabine's activities and future plans, for example) and these gaps need to be filled. Bates noted that there were still some questions regarding how to display this information properly, such as the need to include repeat occupations of stations by ships and how to distinguish between surface and interior measurements. It was suggested that the map should be as interactive as possible, with pop up windows or rollover windows that provide general information about each station displayed. Ultimately, the IOCCP may need to develop a more sophisticated map and table database that will let users look at a combination of observation platforms (e.g., VOS stations and surface time-series stations; repeat hydrographic stations and interior time-series stations, etc). Bates briefly described the OceanSITES project and the data management for that group that includes near real-time data release using a central data directory (at IFREMER) pointing to netCDF files on scientists' individual web-servers. It remains to be seen if the carbon data can be integrated in this way.

Actions:

1. Finalize the inventory of information on current and planned time-series stations. [*Responsible members: Bates, Sabine, Hood. Timeframe: end of the month*.]

2. Determine an initial map / table display for the time series information, and work with CDIAC to determine need and feasibility to develop a more sophisticated database for all information displays. [*Responsible members: Hood, Sabine, Kozyr. Timeframe: initial maps and table to be added to the site by end of 2005; plans for new information display tools should begin soon, with a decision on how to implement a new system by early 2006*.]

8. Coastal Observations

Background Information:
None.

Discussion:
There was general agreement that an inventory of coastal carbon observations was needed that would also include key biogeochemical parameters as well (e.g., O_2, nutrients). Typically, the IOCCP inventories only deal with current and on-going projects rather than compiling information on datasets from past projects. Both LOICZ and the new NACP/OCCC coastal carbon projects were identified as possible sources of information on these activities.

Actions:
1. Develop an email discussion list of coastal ocean carbon scientists and modelers to determine what is useful and feasible for information and coordination services for this community. [*Responsible members: Thomas, Sabine, Hood. Timeframe: try to establish a plan and initial inventory by mid-2006*.]

9. Process Studies

Background Information:
Process Studies draft inventory.

Discussion:
Hood provided a brief overview of the draft inventory of projects. It was noted that very few of these dealt specifically with carbon, but were rather focused on broader biogeochemistry issues. Jeff Hare (SOLAS) informed the SSG that SOLAS and IMBER were considering developing a database of cruise information for all SOLAS and IMBER activities, and suggested that this may be an area for collaboration, with IOCCP helping to provide information from other projects. Hood also mentioned that POGO and SCOR are making plans to develop a database of cruise / research project activities, and this may also provide a good opportunity for collaboration.

Hood mentioned that the mesocosm guidelines project discussed in section 2 of this report would be carried out under the IOCCP "process studies" section under the guidance of SSG member Cindy Lee.

Actions:
1. Initiate a discussion with SOLAS, IMBER, and POGO/SCOR about plans for an information database on biogeochemical process studies, cruises, etc. IOCCP should assist, but not take a leading role in this activity. [Responsible members: Hare, Roy, Urban, Hood. Timeframe: begin email discussions as soon as possible, and provide input to Urban by Dec. 13.]

10. Data Set Development (Dorothee)

Background information:
None.

Discussions:
Dorothee Bakker provided a brief overview of some past and current dataset activities. During the EU - ORFOIS project, Bakker undertook the task of putting the CDIAC online pCO_2 data into one format (and subsequently adopted the IOCCP-recommended format after the Tsukuba 2004 workshop). As of last summer, she had completed about 1/3rd of the data sets, but noted that a good quality control still needed to be developed. Bakker was keen to finish the job, but the ORFOIS project ended and she had other commitments. Recently, Bakker has announced that she has found a volunteer to continue this work – Benjamin Pfeil, the data manager for CarboOcean. He is also determined to retrieve more CO_2 data from CarboOcean PIs and to make the data publicly accessible. Benjamin has worked closely with Alex Kozyr of CDIAC during the development of the CarboOcean data management plan, and Alex has offered his full support to continue this effort. Alex has also noted that CDIAC will soon start to receive new underway data from VOS projects that will need to be put in a format that is consistent with the "historical" databases being developed.

In addition, Sabine has suggested that, once these data are in a common format, NOAA could make them accessible via the Live Access Server (http://www.ferret.noaa.gov/Ferret/LAS/), which will allow people to visualize and subset the data using a variety of criteria. Sabine and colleagues (contact: Jonathan Callahan) have been working on a prototype of this system for the NOAA VOS data. It would be an excellent community service to get all the CDIAC data available via LAS as well.

Bakker noted that there are still concerns over appropriate acknowledgement for use of datasets. While there is a standard format for how to cite datasets in AGU journals, for example, this information is not regularly displayed along with metadata or with datasets in the data centers. The SSG suggested contacting data centers (especially CDIAC) to encourage them to include a visible reference for each data set and instructions on how to appropriately acknowledge data contributions. Additionally, the IOCCP should address this subject prominently on its web-site.

Johannessen reiterated the need to protect datasets that were being used by students, stating that the 2-year data release embargo policy may not be realistic in some cases. Hood reminded the group that CDIAC has the ability to provide information on datasets but make them inaccessible until the dataset contributors have approved their use. In this way, groups can deliver their datasets to CDIAC within the 2 year period with the provision that they are available upon approval by the contributor.

Sabine provided a brief overview of the on-going data qc/qa work of Bob Key for the CARINA data set. Key has taken the CARINA bottle data and has put it into the GLODAP data set (using a standard format for all data sets). He is in the process of carefully going through the data and assessing the quality relative to the existing GLODAP data, and is finding that some of the CARINA data are of excellent quality, while other data sets are not suitable to include in the GLODAP collection. Key is working with Alex Kozyr and the original CARINA PIs to obtain permission to release the good quality data sets if they are not already publicly available. Sabine stated that this type of work needed to be done for other regions as well. Bob Key is currently a scientific partner of the EU CarboOcean project and also of the S.I.C. group.

Actions:

1. Continue work on getting surface pCO_2 data holdings at CDIAC into a common format, and encouraging the public release of existing datasets to CDIAC for incorporation in the dataset. [*Responsible members: Bakker, Pfeil, Kozyr. Timeframe: open-ended*.]

2. NOAA PMEL will continue its experiments with making CDIAC datasets available via Live Access Server. [*Responsible members: Sabine. Timeframe: open-ended*.]

3. Encourage CDIAC to provide clear instructions on each dataset about how to acknowledge the data contributors. Provide information and instructions in a visible place on the IOCCP web-site. [*Responsible members: Hood, Sabine, Kozyr. Timeframe: immediately*.]

11. Ocean Carbon Directory

Background document:
see IOCCP web-site

Discussion:
Hood provided a brief overview of the IOCCP web-site and statistics. Average monthly statistics for number of individual visits to web pages since May 2005 (when the Ocean Carbon Directory was published):
1. Main IOCCP page = 489
2. Jobs = 150
3. About = 129
4. News = 133 (note: This becomes 2nd highest page hit in months where news bulletins are released)
5. High CO2 World = 113 (note: only based on 1 month since publication)
6. Documents = 92
7. Workshops = 90
8. Hydrography Maps and Tables = 78
9. Underway Maps and Tables = 67
10. Calendar = 65
Others in descending order: Contacts, Standards and Methods, Image Gallery, Data, Assessments
Number of people on IOCCP e-mail list: 140.

Hood described a new joint system developed with CDIAC for displaying information from the repeat hydrography program. Alex Kozyr of CDIAC has agreed to make repeat hydrography and VOS maps for the IOCCP, which will create one single source for up-to-date information and streamline our links between IOCCP information and CDIAC data. There are 2 types of maps: (1) the IOCCP map showing on-going and future planned cruises; and (2) the same map showing all post-WOCE hydrography cruises that have been completed, with indications of which cruises have submitted data and which have not (the "map of shame").

The SSG also pointed out that it is useful to have one composite map showing all hydrography lines that have any carbon data, extending back to the GEOSECS cruises. After the repeat hydrography meeting in November 2005, the needs for information and data displays will become more clear, and it was decided to wait until after this meeting to make an assessment of how best to provide all these services to the community.

The SSG agreed that quarterly e-based newsletters were useful and probably should not be any more frequent than this.

Actions:

1. Continue the e-based newsletters on a quarterly basis and maintain the web-site structure as is for the present. Include updates on time-series inventories as discussed in section 7 above. [Responsible member: Hood. Timeframe: on-going / open-ended.]

2. After the November workshop, discuss with CDIAC the needs for more or additional types of information and data links for hydrography and other platforms. See also discussion / actions in section 7. [*Responsible members: Sabine, Hood, Fukasawa, Kozyr, all. Timeframe: December 2006 for initial discussions*.]

4. Action Item List

1. SSG members thought it would be useful to have a short mission statement prominently placed on the web-site to describe more clearly the IOCCP functions. [*Responsible member: MH. Timeframe: immediate: Cost Implications: 0.]*

2. Both the SSG and the S.I.C. recognize the importance of having joint meetings, and agreed to try to co-locate / co-host the meetings of these two groups whenever possible. [*Responsible members: Hood, Sabine, Johannessen, Koertzinger. Timeframe: 1 year. Cost Implications: 0.*]

3. The IOCCP will assist S.I.C. Working Group on Climate Sensitivities and Feedbacks to develop guidelines and protocols for mesocosm experiments. [*Responsible members: K. Lee, C. Lee, Hood, Riebesell. Timeframe: email discussion group to begin within the month. Cost implications: up to $10k for 1 meeting + publication.*]

4. The IOCCP will develop an on-line inventory of autonomous sensors available or under development. [*Responsible members: Hood, Sabine, Koertzinger. Timeframe: email discussion group to begin within the month. Cost Implications: 0.*]

5. The S.I.C. Working Group on the Surface Ocean will take the lead on determining how best to establish a closer link to the atmospheric CO_2 community for measurements from underway ships. [*Responsible members: Britt Stephens and Roger Dargaville. Timeframe: email discussion group to begin within the month. Cost implications: 0.*]

6. The S.I.C. agreed to review the proposal to co-sponsor a meeting on climate-relevant carbon and biogeochemical processes in the Indian Ocean. [*Responsible members: Hood to send proposal to Hare and Roy for follow up. Timeframe: immediate. Cost Implications: 0 for IOCCP.*]

7. Implementation of the International Repeat Hydrography Meeting, November 14-16, Shonan Village, Japan. [*Responsible members: Fukasawa, Sabine, Hood, Tilbrook. Timeframe: November 2005, with on-line report of meeting available by early 2006. Cost Implications: $40-50k*].

8. Based on outcomes of the November hydrography meeting, the IOCCP will begin investigating the interest and feasibility of establishing a sustained international project office for repeat hydrography in collaboration with the S.I.C., CLIVAR, and the GCOS-GOOS-WCRP Ocean Observations Panel for Climate. Continue supporting carbon representatives to CLIVAR basin panels for 1 more year. [*Responsible members: Hood, Sabine. Timeframe: Late 2005 / early 2006 with*

report to interested groups on feasibility and necessary steps. Cost Implications: $8k for Basin Panel Rep Travel.]

9. Begin plans for an international workshop on developing the scientific basis for VOS Network Design and Data Synthesis efforts, joint with the S.I.C. group. [*Responsible members: Tilbrook, Sabine (Feely), Hood, Johannessen, Koertzinger. Timeframe: begin email discussion group by the end of the month, with a major effort beginning after November workshop. Cost Implications: $50k IOCCP.*]

10. Establish a partnership with the JCOMM SOT and work with this group to develop an informational document on how the carbon community can use this group for on-going and future negotiations with shipping companies. [*Responsible member: Hood, Sabine. Timeframe: begin email discussions by the end of the month. Cost Implications: 0.]*]

11. Continue developing the draft document, Underway pCO_2 Systems, with a goal of developing a generic document describing underway pCO_2 systems and ship requirements for use with the JCOMM SOT group. [*Responsible members: Tilbrook, Hood, with open community participation. Timeframe: begin circulating a new draft document by end November 2005 and/or after further discussions with JCOMM SOT to optimise needs for the document. Cost Implications: 0*]

12. Moulin will attend the first GlobColour Meeting in early 2006 and report back to the IOCCP on how the carbon community can assist this project. [*Cost Implications: $1.5k.]*

13. Finalize the inventory of information on current and planned time-series stations with carbon measurements. [*Responsible members: Bates, Sabine, Hood. Timeframe: end of the month. Cost Implications: 0.*]

14. Determine an initial map / table display for the time-series information, and work with CDIAC to determine need and feasibility to develop a more sophisticated database for all information displays. [*Responsible members: Hood, Sabine, Kozyr. Timeframe: initial maps and table to be added to the site by end of 2005; plans for new information display tools should begin soon, with a decision on how to implement a new system by early 2006. Cost Implications: possibly up to $10k for database development.*]

15. Develop an email discussion list of coastal ocean carbon scientists and modelers to determine what is useful and feasible for information and coordination services for this community. [*Responsible members: Thomas, Sabine, Hood. Timeframe: try to establish a plan and initial inventory by mid-2006. Cost Implications: 0.*]

16. Initiate a discussion with SOLAS, IMBER, and POGO/SCOR about plans for an information database on biogeochemical process studies, cruises, etc. IOCCP should assist, but not take a leading role in this activity. [*Responsible members: Hare, Roy, Urban, Hood. Timeframe: begin email discussions as soon as possible, and provide input to Urban by Dec. 13. Cost Implications: 0.*]

17. Continue work on getting surface pCO_2 data holdings at CDIAC into a common format, and encouraging the public release of existing datasets to CDIAC for incorporation in the dataset. [*Responsible members: Bakker, Pfeil, Kozyr. Timeframe: open-ended. Cost Implications: 0.*]

18. NOAA PMEL will continue its experiments with making CDIAC datasets available via Live Access Server. [*Responsible members: Sabine. Timeframe: open-ended. Cost Implications: 0.*]

19. Encourage CDIAC to provide clear instructions on each dataset about how to acknowledge the data contributors. Provide information and instructions in a visible place on the IOCCP web-site. [*Responsible members: Hood, Sabine, Kozyr. Timeframe: immediately. Cost Implications: 0.*]

20. Continue the e-based newsletters on a quarterly basis and maintain the web-site structure as is for the present. Include updates on time-series inventories as discussed in section 7 above. [*Responsible member: Hood. Timeframe: on-going / open-ended. Cost Implications: 0.*]

21. After the November workshop, discuss with CDIAC the needs for more or additional types of information and data links for hydrography and other platforms. See also discussion / actions in section 7. [*Responsible members: Sabine, Hood, Fukasawa, Kozyr, all. Timeframe: December 2006 for initial discussions. Cost Implications: 0.*]
