GOOS – 208
GCOS – 187
WCRP – 15/2014

Report of the Seventeenth Session of the Ocean Observations Panel for Climate (OOPC-17)

21st -23rd July 2014

CSIC Instituto de Ciencias del Mar, Barcelona, Spain.

www.ioc-goos.org/oopc17

The Ocean Observations Panel for Climate is sponsored by the Global Ocean Observing System the Global Climate Observing System and the World Climate Research Program. OOPC provides advice and guidance on observations to the Joint Commission for Oceanography and Marine Meteorology.

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Contents

1. Introduction

The Seventeenth session of the Ocean Observations Panel for Climate was held at the CSIC Instituto de Ciencias del Mar[1], Barcelona, Spain from the 21st to the 23rd of July, immediately followed by the Third Session of the Global Ocean Observing System Steering Committee. Attendees were welcomed by the Institute Director, Albert Palanques Monteys, and the panel would like to thank the Instituto de Ciencias Del Mar for the generous welcome and hospitality in Barcelona.

The meeting was attended by OOPC Members, 2 invited experts, and representatives of the CLIVAR basin Panels. In addition, a 'Science Break' was held on the second afternoon to give the panel an opportunity to hear about the range of science related to OOPC priorities that was being carried out at the host institute.

The agenda was structured around the OOPC work plan, and progress and priorities were considered in the context of reporting requirements to the Global Ocean Observing System (GOOS) and the Global Climate Observing System (GCOS), as well as fostering connections with WCRP and other stakeholders.
All presentations from the meeting, including the science break talks, are available at www.ioc-goos.org/oopc17

2. Communications and connections

The many connections that OOPC has to foster and facilitate were highlighted as a challenge, and a number of general actions were identified to facilitate routine communication with the ocean observing, modeling and user communities as well as sibling panels in GOOS and GCOS.

3. Work Plan Discussions

The main focus of the meeting was to assess progress against the OOPC 2013-2018 Work Plan, and set priorities for the 2014-2016 period. Hence, the agenda was structured around Work Plan topics. The 2014 update of the Work Plan is available as appendix 3 to this report, and includes details of progress to date and prioritized actions going forward.

Key areas of focus for OOPC are:

1. Articulating and reviewing specifications for observations by variable and by network, to feed into GCOS and GOOS reporting processes.
2. Coordinating system based evaluations of the observing system; both in reviewing mature systems, and planning for new ones.
3. Reviewing status, implementation and risks to the observing system.

3.1. Setting requirements for observations by variable

Upcoming priorities are driven by timelines for preparing the GCOS Status Report (2015) and next Implementation Plan (2016), and GOOS Strategic Mapping process. Hence a strong focus is needed on setting the specifications for observations by variable and by network, which will require significant coordination with the ocean observing community. To date, a first draft of variable specifications was carried out, coordinated through OOPC members and experts in the community. Improvements to the template were discussed, as well as a process for developing and improving the specifications and seeking input and feedback from the broader user community ahead of the next OOPC meeting (OOPC-18). The specifications will need to include coastal requirements, and these logically separate out when talking about processes. Coastal requirements presents a significant challenge to OOPC, and co-chairs/secretariat will work with John Wilkin to identify a group of experts discuss how best to include coastal requirements. See further details and actions in section 2.1 of the OOPC Work Plan. These activities will also feed into the development of variable based observing system performance metrics.

[1] Consejo Superior de Investigaciones Cientificas (CSIC) Instituto de Ciencias del Mar http://www.icm.csic.es/

3.2. Articulating requirements and contributions of networks

A next priority ahead of the next OOPC meeting will be to develop network specifications, articulating their contributions to delivering against variable requirements. This will be coordinated by the OOPC secretariat in consultation with the Observations Coordination Group of JCOMM, and with the support of the JCOMMOPS secretariat (see section 2.2 of the OOPC Work Plan for more information). This work will also include the development and improvement of network based implementation metrics.

3.3. Observing System Evaluations

In parallel, the OOPC is coordinating systems based evaluations of observing requirements and their implementation. The Tropical Pacific Observing System (TPOS) evaluation was successfully undertaken in 2013/14 culminating in a workshop based on whitepaper input (see www.ioc-goos.org/tpos2020): the main recommendation from the workshop was the establishment of the TPOS 2020 Project which will have its first Steering Committee meeting in October 2014 (see www.ioc-goos.org/tpos2020sc1). The panel discussed the success of this process and lessons learnt for future evaluations. Future evaluations and priority areas were also discussed.

Priorities for the next systems based evaluation were discussed by the panel based on the key areas identified in the Work Plan (see section 4). These include:

1) The Deep Ocean Observing system
2) Boundary Currents and Interbasin Flows
3) Observations for reducing uncertainties in Air Sea Flux estimates
4) The upper ocean thermal observing system
5) Polar Seas
6) Regional and Coastal Seas

The Work plan sets the background and context in each of these areas, including status of relevant activities to assist the panel in deciding how best to prioritise future activities. A review of the Upper Ocean Thermal observing system has been identified as a priority for a number of years, following a recommendation from GCOS. However, incremental progress is being made through a number of related activities. In addition, the development of the Surface/Subsurface Temperature variable specifications and network contributions will also allow the panel to assess required adjustments to the observing system.

It was decided that other priorities are also being addressed through regional activities, which should be monitored by OOPC, and connected to as needed. OOPC will revisit whether a focused panel activity is needed in the future. This includes observations for reducing uncertainties in air sea flux estimates and the polar seas. For the Deep Ocean Observing System, the strategy has developed as a cross cutting GOOS activity. However, OOPC has a role to play in ensuring the necessary activities are connected up, such as plans for Deep Argo, and OceanSITES deep sensors, and to facilitate discussion and feedback from the user community, such as CLIVAR panels. Significant discussion was focused on how to make progress towards the coasts. The EOV Specifications will ultimately need to include coastal requirements, and OOPC is considering how best to undertake this, perhaps through identifying one or two of the existing ECVs, and working to develop and improve the observations and products in coastal waters for that variable, but the panel felt it was also important to integrate coastal regions into the systems based activities and evaluations.

The panel spent significant time in discussion on the requirements for observing the global ocean circulation (both surface wind driven, and overturning/density driven), and associated heat, salt and mass fluxes. An evaluation to cover such a broad area was identified as being too ambitious, and should be addressed incrementally. Hence, it was decided that given the amount of activity focused on observations of boundary currents (both short term and long term), evaluation focused on comparing and contrasting these approaches, and the different mixes of technologies would be a useful next step. A boundary current focus provides a concrete next step in setting requirements for observations towards the coast, and by focusing on boundary currents and shelf interactions, the connection between open ocean and coastal processes can be articulated.

4. ‘Science Break’ Talks by host institute.

An afternoon session of talks by the host institute allowed OOPC members and guests to learn about the institutes activities, and discuss with members of the scientific staff. The Institute director, Albert Palanques Monteys gave an overview of the institute activities, and then a number of talks were given by the Physical Oceanography Group, covering research in satellite winds and salinity, coastal observatories, and tropical Atlantic circulation. The panel attendees were extremely impressed with the breadth and quality of the research activities, particularly given the size of the institute. All the talks are available on the meeting website.

5. Next steps including next OOPC Meeting

The OOPC continues to develop its panel membership to ensure it has the skills and connections needed to carry out the work plan. Following the OOPC-17 meeting, OOPC would like to officially welcome 3 new members to the panel, Prof. John Wilkin (Rutgers University, USA), Dr. Bernadette Sloyan (CSIRO, Australia) and Mr Steve Worley (UCAR, USA).

John Wilkin has 25 years’ experience developing model-based analysis systems for interdisciplinary research in coastal seas and the adjacent deep ocean. Presently, these projects emphasize variational methods for assimilation of in situ and remotely sensed observations and the design of coastal ocean observing networks. He has contributed to IOOS as a member of the Modeling and Analysis Steering Team. He is an advisor to the NASA Physical Oceanography Distributed Active Archive Center (PO-DAAC) and a member of NASA’s Ocean Surface Topography Science Team active in the Coastal Altimetry community. Wilkin is an associate developer of the Regional Ocean Modeling System (myroms.org) and co-convenes the annual ROMS User Workshops. He has participated in international summer schools training early career scientists on developments in modern Coastal Ocean Observing Systems and the interface between observing, modeling and ecosystems.

Dr. Bernadette Sloyan is an international leader in documenting and understanding the role of ocean circulation and variability in the global climate system. Her work has elucidated the importance of ocean key processes, mixing and air-sea interactions, in the Southern, Pacific and Indian Oceans that determine the ocean climate and moderate the rate and nature of climate change and variability through their role in the global energy, freshwater and carbon budgets. She is a major driver of research efforts in Australia to observe and quantify key ocean processes that determine ocean climate and variability using the Australian Integrated Marine Observing System (IMOS). Her position as the Co-Chair of the international Global Ocean Ship-based Hydrographic Investigations Program (GO_SHIP) and participation in sustained ocean observing systems (OOPC and IOCCP) are recognition of national and international leadership in ocean climate research. Bernadette brings valuable broad ranging experience across a range of observing technologies, and particularly in observing the ocean circulation and the deep ocean.

Dr Steve Worley has a long history of working in Data and Information Management. He manages the Research Data Archive at UCAR, and has been involved in a number of national and international data coordination activities, including the AMS Board on data stewardship, NASA JPL PODAAC Users Working Group Advisory Panel, and US Lead for the THORPEX Interactive Global Grand Ensemble (TIGGE) Archive. Steve therefore brings valuable information in data and information management to the panel.

Welcome to OOPC, John, Bernadette and Steve! We will continue to strengthen and diversify the panel by inviting experts to engage in activities. The current OOPC Membership is summarized below.

Name	Affiliation	Expertise	Year	Years
Robert Weller	USA	Air-sea fluxes; upper ocean	1996	18
Johnny Johannessen	Norway	Remote sensing	1999	15
Toshio Suga (co-chair)	Japan	Hydrography, Argo	2007	7
Eric Lindstrom (GOOS co chair)	USA	Satellite ocean observations	2010	4
Mark Bourassa (co-chair)	USA	Satellite winds, fluxes	2013	1
John Wilkin	USA	Coastal oceanography	2013	.5
Bernadette Sloyan	Australia	Ocean Circulation, Climate	2014	0
Steve Worley	USA	Data and information	2014	0

To align OOPC meetings with those of sibling panels in GCOS, and to feed into the GCOS Steering Committee Meetings, the next panel meeting, OOPC-18, will be held at Tohoku University, Sendai, Japan from the 14-16th April 2015, hosted by OOPC Co-Chair Toshio Suga. The meeting will be held in parallel with the GOOS Biogeochemistry Panel to enable discussions on cross cutting activities, and particularly requirements and implementation of physical and biogeochemical ocean Essential Climate Variables to feed into the upcoming GCOS reporting processes.

Discussion of surface fluxes as ECVs lead to the desire to plan a future OOPC meeting with overlap to the AOPC meeting.

6. Summary of Actions (from Work Plan).

- **Introduction;**
  - **Organisational Context**

Recommendation: OOPC to provide information to CLIVAR Panels on the status, threats, opportunities and issues in the observing system (summarized at each OOPC meeting, for discussion at upcoming panel meetings).

Recommendation: CLIVAR Panels (Basin Panels and GSOP) to provide guidance to OOPC on the use of the sustained observing system, including dependencies, inefficiencies, and gaps. (Each OOPC Panel Meeting)

Recommendation: The Secreratiat of OOPC, CLIVAR GSOP, JCOMM OCG and GODAE Oceanview to have routine telecons (quarterly). (OOPC Secretariat to coordinate)

- **Contributing to the GOOS and GCOS Assessment Processes**
  - **Evaluating requirements for Essential Ocean/Climate Variables**

Action: OOPC members to read across Variable Specifications to check for consistency, ways to improve the template and next steps for improving specifications. Send feedback to secretariat by the end of August. (OOPC Champions, co-chairs, secretariat).

Action: Draft high level societal drivers and general science questions for opening sections of specifications. Include climate, non-climate and coastal drivers. Deadline: end September. (OOPC Secretariat, in consultation with GOOS Office and co-chairs).

Action: Co-chairs and secretariat to improve templates, and ensure consistency across specifications (including with BGC). Seek additional input where needed by end September. Responses required by beginning of November. (Co-chairs/Secretariat)

Action: coastal variable requirements to be included in each specification at a process/application area level: Secretariat/Co-Chairs to work with John Wilkin to identify a team of experts to assist. Draft to be complete by December. Co-chairs and John Wilkin to discuss by telecon, in early September (Secretariat to coordinate). (Include Jose, Pierre Yves).

Action: Early December: Final draft Specifications to be made available to the community for comment, SWOT analysis (GCOS/GOOS Sibling Panels, CLIVAR Panels, GRAs, etc). Send out in December/January, comment by end of February; with a view to finalizing ahead of OOPC-18. (Secretariat to develop distribution plan and collate feedback).

Recommendation: Develop a plan for advertising and socializing the Ocean ECVs/Physics EOVs. Including

- Presentation of a GOOS webinar
- Secretariat to explore other options.
- Ocean Sciences, 2016: All EOVs (All 3 GOOS Panels).

Question to GOOS SC: What will the update and review process for GOOS EOVs be?

Recommendation to GCOS: Update the Biogeochemical Ocean ECVs to reflect the proposed EOVs as part of the next implementation plan: i.e. replace ‘pCO2’/’Acidity’ with ‘Carbonate System’

Recommendation to GCOS: Consider the need for fluxes ECVs (Air-Sea, Land-Ocean) as part of the next GCOS implementation Plan.

- **Observing element/network status and metrics**

Action: Test Networks specification template with established observing networks.

- Work with JCOMMOPS to pre-populate existing information gathered to date (gathered ahead of OCG-5, and as part of the variables exercise) through October 2014,
- Seek input from network representatives (by February 2015) for discussion at OOPC-18.

Action: Coordinate observing system implementation metrics by network with the JCOMM Observations Programme Area and JCOMMOPS (OOPC Secretariat to facilitate).

Recommendation to GOOS SC and JCOMM OCG: More pro-active approach to assessing risks and vulnerabilities to the observing system is needed, and how to mitigate it. i.e. Articulating ship time requirements to support the observing system.

> **Action**: JCOMM OCG to provide Network Status talk for each OOPC Meeting, highlighting issues and risks.

Action: OOPC to revisit existing GCOS Implementation plan network requirements and whether they should be tweaked ahead of the next IP (improving integration/optimization?). (To be addressed in the context of EOV/Network specification activity in coming 6/12 Months: for discussion at OOPC-18).

- **Developing and assessing products and information**

    - **Development and application of Ocean Indices**

Recommendation: Ocean Indices should continue to be promoted by OOPC, but they should link to other groups who work on the applications/impacts activities. Strengthen connection to the observing system.

Recommendation for GOOS/GCOS SC: Highlight products, uses and applications of EOV/ECV observations on programme websites, including climate and ocean indices in the context of communications and outreach activities.

    - **Other priorities**

Action: Steve Worley/Co-Chairs Panel to discuss next steps based on the Keeley Data Report and role of OOPC, in consultation with OCG. Steve to present at the next OOPC Meeting (April 2015)

Action: Steve Worley to attend JCOMM OCG, April 2015, Cape Town.

- **Systems based Evaluations**

    - **Developing approaches for assessing scales and accuracy requirements of observations**

Action: Update the paper on quantitative approaches to Observing System Evaluation based on feedback from OOPC-16, and engaging OSEval TT, GOOS Biogeochemistry Panel. (Mark Bourassa to coordinate with David Berry, Gilles Larnicol, Toste Tanhua) (By OOPC-18)

Action: Develop guidelines and tool for variable based metrics against requirements, using statistics methods (Mark Bourassa in consultation with David Berry) (Priority activity for 2014-16)

- Add more networks, sampling variability and the network specific sampling to the Berry et al. statistical tool. This action will require an assessment of what represents independent sampling (e.g., ship passages and satellite overpasses rather than the number of observations). (Mark Bourassa with David Berry)
- Action: Longer term: update the tool to reflect how different observation networks interact. One obvious target is bias reduction through the use of a high quality network.

Recommendation: identify 1 surface and 1 subsurface variable to test the concepts of variable based metrics against requirements

Action: Contact GHRSST re calculating the statistical performance of the SST observations to capture the (spatial/temporal) ENSO Signal, based on Bourassa/Berry guidelines. (Co-Chairs to write to GHRSST Chair/Office) (By end October, based on trial guidelines above)

Action: Contact US AMOC Team re. calculating the statistical performance of the observing system to capture the (spatial/temporal) AMOC signal. (Co-Chairs to write to US AMOC Science Team, AtlantOS PIs) (by End of October).

Action: Identify sampling requirements for measuring changes in extremes: initially test with surface winds and waves. This addresses the observing system's ability to identifying the distribution of values for an ECV, with a focus on the high impact events. (time line: one year)

    - **Tropical Pacific Observing System**

Recommendation: Consider TPOS 2020 SC and Task Team Members as future OOPC members to address OOPC expert gaps. (Weidong Yu will be attending the next OOPC meeting).

- **Deep Ocean Observing System**

Recommendation: OOPC to work with DOOS to facilitate connections the observing community in the development of DOOS Implementation.

> **Action:** DOOS telecon to be organized between DOOS, GSOP, Interested basin reps, and GOV OSEval TT, Deep Argo, OceanSITES (DOOS Coordinator to organise)
>
> **Action:** DOOS Whitepaper to be sent to CLIVAR Basin Panels/GSOP (other groups? Decadal Prediction panel?) for comment. (OOPC secretariat to coordinate discussions)
>
> **Action:** Strawman Locations for OceanSITES SBE 37 Temperature sensors will be discussed by the DOOS Physics TT, and then sent to CLIVAR Basin Panels/GSOP for input (Bob Weller/Bernadette Sloyan; OOPC Secretariat/DOOS Coordinator to coordinate distribution)

- **Boundary Currents and Inter-basin flows, shelf interactions.**

Action: Katy to draft a template for evaluation proposal and include background information to frame activity for discussion with community/seeking funding. (September)

Action: Toshio (Broadscale), Bernadette (Boundary/Deep), John (Shelf/Coastal), Mark (fluxes), Gilles (OSEVal) to define scope, a possible activity strawman and groups/individuals to engage, etc., focusing on boundary currents/shelf interactions. Inc. Argo enhancement plans. (by end October)

Action: Request CLIVAR Panels provide information on boundary current observations and process study activities (existing, historical, planned), approaches and underlying questions (concrete recommendations that would allow us to scope the resource requirements; Modelling challenges, phenomena you need to observe and what you might need to leave in place for modeling) to feed into proposed Boundary Currents evaluation. (Boundary Currents Scoping team).

- **Observations for reducing uncertainties in Air Sea Flux Estimates**

Action: Write to the coordinators of the WGNE/OOPC SURFA project, requesting status report, and reiterating OOPC's support for this activity (contact names required)

Action: Request an update on regional flux activities (TPOS and SOOS) for the OOPC-18 meeting (2015**)**

Action: Discuss cross cutting activities on fluxes with AOPC chair/vice chair ahead of and in the sidelines of the GCOS SC meeting. (OOPC Co-chairs)

- **Polar Seas**

Recommendation: keep regional polar activities as watching brief, and engage as needed (i.e. SOOS Air Sea Fluxes Workshop)

Action: request a webinar from the organizers of the SOOS under ice workshop (October 2014), once the report is available (mid 2014)

Recommendation : Coastal requirements to be considered as an integrated components of OOPC core activities, in developing variable specifications and the evaluation of boundary current-shelf interactions

Appendix 1: Agenda

Monday 21st July		
08.30	Arrival, coffee, registration	
1. Opening and overview. (chair: Toshio Suga)		
09.00-09.20	1.1. Welcome from co-chairs, local host, introductions.	Mark Bourassa and Toshio Suga.
09.20-09.30	1.2. Overview of Agenda, aims, expectation of the meeting. Approval of Agenda.	Mark Bourassa and Toshio Suga
09.30-10.00	1.3. State of the Ocean Update (Ocean Indices) + Discussion	Ed Harrison
2. Sponsor Guidance, planning and reporting (Chair: Mark Bourassa)		
10.00-10.20	2.1. GCOS update, process for Status Report and next Implementation Plan	Carolin Richter
10.20-10.40	2.2. GOOS update. planning and reporting ()	Eric Lindstrom/Albert Fischer
10.40-11.00	Coffee Break	
11.00-11.40.	2.4. Discussion; reporting processes, drivers and priorities for OOPC Work Plan going forward, e.g. Observations for climate Impacts, Mitigation, Adaptation, integration/connections with sibling panels	Led by Mark Bourassa and Toshio Suga
3. Implementing the OOPC Work Plan (Chair: Toshio Suga)		
11.40-12.00	3.1. Overview of OOPC Work Plan, development, status, next steps.	Mark Bourassa and Toshio Suga
12.00-13.30	Lunch	
13.30-13.40	3.2. Introducing Observing System Evaluations.	Toshio Suga
13.40-14.10	3.3. Tropical Pacific Observing System 2020	Toshio Suga and Katy Hill
14.10-14.40	3.4. Deep Ocean Observing Strategy	Eric Lindstrom, Bernadette Sloyan
14.40-15.40	3.5. Discussion: lessons learnt, formation of projects, next steps and next priorities. E.g. Boundary Currents, Upper Ocean Thermal, Fluxes, network developments (e.g. Argo, Drifters).	Led by Mark Bourassa and Toshio Suga
15.40-16.20	Coffee	
4. Evaluating EOVs/ECV requirements: Feedback on strengths/issues of specifications setting: including coastal requirements **(Chair: Mark Bourassa)**		
16.20-16.30	4.1. Introduction	Mark Bourassa
16.30-16.50	4.2. Sea Surface Temperature and Salinity	Mark Bourassa (for Johnny Johanesen)
16.50-17.10	4.3. Sea Level	Eric Lindstrom and John Wilkin
17.10-17.30	4.4. Sea State and Sea Ice	Mark Bourassa
17.30-17.50	4.5. Surface Current and Subsurface Current	Bob Weller
17.50-18.00	Wrap up first day.	

Tuesday 22nd July		
9.00-9.10	Recap from 1st Day	Mark Bourassa/Toshio Suga
09.10-9.40	4.6. Subsurface Temperature and Salinity, Tracers	Toshio Suga
09.40-10.20	4.7. Biogeochemical ECVs/Proposed EOVs ()	Maciej Telczsewski
10.40-11.10	Coffee	
11.10-11.50	4.8. Evaluating coastal observation requirements and implementation globally, inc. Discussion.	John Wilkin
11.50-12.30	4.9. Discussion, and next steps for EOV specifications, connection to GCOS/GOOS Reporting.	Mark Bourassa/Toshio Suga
12.30-14.00	Lunch	
14.00-17.00	**5. 'Science Break'. Ocean Observing and the CSIC Institute de Ciences del Mar. (Chair: Toshio Suga/Mark Bourassa)**	
14.00-14.30	Overview: institute activities.	TBC
14.30-14.50	Zonal jets and recirculations in the tropical Atlantic Ocean	Josep Lluis Pelegri
14.50-15.10	Citclops: Citizen Observatory for Coast and Ocean Optical Monitoring	Carine Simon and Jaume Piera
15.10-15.30	ENSO monitoring using SMOS salinity fields	Joaquim Ballabrera
15.30-16.00	Coffee	
16.00-16.20	Ice, climate, and economics - Arctic research on change	Pedro Elosegui:
16.20-16.40	Small-scale wind variability as depicted by satellite scatterometers: a valuable source of air-sea interaction information	Marcos Portabella
16.40-17.00	Discussion.	

Wednesday 23rd July		
9.00-9.10	Recap from 2nd Day	
6. Setting observing system requirements, feedbacks in observing system design: CLIVAR (Chair: Toshio Suga)		
9.10-9.40	6.1. Overview, pan CLIVAR Sustained Obs breakout	Bob Weller, Katy Hill
9.40-10.00	6.2 Global Synthesis and Observations Panel	Catia Domingues
10.00-10.20	6.3. Atlantic Panel	Bob Weller (for Peter Brandt)
10.20-10.40	6.4. Pacific Panel	Alex Ganachaud
10.40-11.10	Coffee	
11.10-11.30	6.5. Indian Ocean Panel	M. Ravichandran
11.30-11.50	6.6. Southern Ocean Panel	Lynne Talley
11.50-12.30	6.7. Discussion: connections and feedbacks, role of CLIVAR panels in observing system development and evaluations, GOOS Projects, (process studies feedback into sustained obs design, etc.)	
12.30-14.00	Lunch	
7.. Qualitative and quantitative approaches to observing system design and evaluation. (Chair: Mark Bourassa)		
14.00-14.20	7.1. Statistical approaches	Mark Bourassa
14.20-14.40	7.2. Modelling Approaches and activities of the GODAE OceanView Observing System Evaluation Task Team	Gilles Larnicol
14.40-15.00	7.3. Development of observing system metrics	Albert Fischer/ David Legler
15.00-15.30	7.4. Discussion.	
15.30-16.00	Coffee	
16.00-16.50	**8. Discussion: Collaborative activities to progress in 2014-16 (Mark Bourassa/Toshio Suga).**	
16.50-17.00	**9. Timing/location of next meeting, close of meeting. (proposed: Japan, April 2015)**	

Appendix 2: Attendees

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Appendix 3: Work Plan.

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OOPC Ocean Observations Panel for Climate

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