

WORLD METEOROLOGICAL ORGANIZATION

INTERGOVERNMENTAL OCEANOGRAPHIC
COMMISSION (OF UNESCO)

JOINT WMO/IOC TECHNICAL COMMISSION FOR
OCEANOGRAPHY AND MARINE METEOROLOGY (JCOMM)
SHIP OBSERVATIONS TEAM

SOT-IV/Doc. I-3.1.1
(15.II.2007)

FOURTH SESSION

ITEM I-3.1.1

GENEVA, SWITZERLAND, 16 TO 21 APRIL 2007

Original: ENGLISH

REPORT FROM THE OOPC

(Submitted by D. E. Harrison, OOPC chair, and A. Fischer, OOPC Tech. Secretariat)

Summary and purpose of document

The GCOS-GOOS-WCRP Ocean Observations Panel for Climate (OOPC)

ACTION PROPOSED

The Ship Observations Team is invited to review the information contained in this report and comment as necessary. Specific invitations for comment by the SOT are highlighted in bold face.

Appendix: A. (Draft) Guide To Making Climate Quality Meteorological And Flux Measurements At Sea (Bradley, Fairall)

DISCUSSION

The Ocean Observations Panel for Climate (OOPC) is a scientific expert advisory group charged with making recommendations for a sustained global ocean observing system for climate in support of the goals of its sponsors: the Global Climate Observing System (GCOS), the Global Ocean Observing System (GOOS), and the World Climate Research Programme (WCRP). It also reports to JCOMM on requirements; many of the *in situ* networks of the global module of GOOS are coordinated by JCOMM groups including the Ship Observations Team (SOT). The OOPC aids in the development of strategies for evaluation and evolution of the system and of its recommendations, and supports global ocean observing activities by interested parties through liaison and advocacy. Relations with the WCRP Climate Variability and Predictability project (CLIVAR) remain strong, and CLIVAR ocean basin panel representatives are the key to the functioning of the OOPC, providing regional expertise for evaluation and recommendations.

The sustained global ocean observing system for climate is designed to provide data and information products for: climate monitoring and forecasting, climate assessment, and climate research. It is also the foundation for global operational oceanography, including global weather prediction and marine forecasting, and global and coastal ocean prediction.

The basic recommendations for the global module of GOOS, also the ocean module of GCOS, are written into the ocean chapters of [two reports](#)¹ to the UN Framework Convention on Climate Change (UNFCCC), published in 2003 and in late 2004. The ocean chapter of the GCOS Implementation Plan (GCOS-92, the second of the reports referenced above) was adopted by JCOMM-II as the basis for the work plan for the Observations Programme Area.

The SOT contribution to this global observing system comes from VOS including the VOS_{Clim} program and from the SOOP network of XBT lines.

This report will focus on the specific requirements for observing networks coordinated by the SOT, on the state of the system, on recent evolution of plans with direct impact to the SOT, and on future activities led by the OOPC that may influence guidance on requirements given to the SOT.

1. Requirements of SOT

1.1 VOS and VOS_{Clim}

While emphasizing the importance of VOS data as a part of the global module of GOOS and ocean module of GCOS, the OOPC and GCOS-92 do not set a specific target for the VOS network. GCOS-92 calls for “Improve[d] meta-data acquisition and management for a selected, expanding subset of VOS (VOS_{Clim}) together with improved measurement systems.” The VOS_{Clim} project called for an initial recruitment of 200 ships, with the idea that the enhancements would eventually be applied to as much of the VOS fleet as possible.

Document I-3.1.2 (immediately following) describes the need to improve scientific statements of the specific requirements for VOS and VOS_{Clim}, and the OOPC **invites the SOT** to consider the recommendations of that document.

1.2 SOOP

Systematic sampling of the global ocean is needed to fully characterize oceanic climate variability. GCOS-92 calls for the implementation of 41 SOOP XBT/XCTD trans-oceanic sections, and the SOT Technical coordinator reports against these sections.

A discussion of future global requirements for SOOP takes place in Doc. V-4.1.

2. State of the observing system

¹ The Second Adequacy Report and the GCOS Implementation Plan, both available at: <http://ioc3.unesco.org/oopc/documents/background.php>

2.1 SOT networks

The JCOMM Observations Programme Area Coordinator reports on the progress of the SOT networks based on the goals set by GCOS-92: an initial recruitment of 200 ships in the VOSCLim programme, and the 41 repeat SOOP XBT/XCTD trans-oceanic sections. This systematic reporting is an important element in building advocacy with national governments and agencies for sustained support of the ocean observing networks. The OOPC **invites the SOT** to consider the adequacy of its arrangements for this reporting.

The OOPC would also like to see a closer communications link between the operators on the SOOPIP panel and the CLIVAR basin panels. This link between the primary consumer of the data (the scientists represented regionally on the CLIVAR basin panels) and the providers, who have the best understanding of the constraints in operating the lines, has the potential to be mutually beneficial. The OOPC **invites the SOT (particularly SOOPIP) to consider** the most appropriate mechanism for two-way sustained communication with CLIVAR basin panels on line performance, difficulties in implementation, and the science results coming from the data provided. Currently, the OOPC provides this mechanism, but in a less-than-optimal manner.

2.2 Overall

The ocean observing system for climate is making progress on many fronts, through the efforts and funding of national and international projects and programs. At the end of 2006 the *in situ* network elements of the system were estimated to be 57% complete. The overall pace of progress has slowed (45% in 2003, 48% in 2004, 55% in 2005), although that masks remarkable progress made by Argo (2801 of a target 3000 floats in early March 2007); by the increasing real-time access to GLOSS tide gauge data, thanks to international support following the tsunami of December 2004; and with the surface drifting buoy network coordinated by DBCP, which now has a number of buoys reporting multiple times per day.

Progress with real-time metadata transmission is underway thanks to the JCOMM "Meta-T" pilot project. Awareness is growing within the ocean research community of the utility of real-time transmission of initial observations, as is the importance of improving metadata practices generally.

The OOPC web site on the [state of the ocean](#)² is gaining visibility and will be used to display new indices as they are developed. It was designed as a tool for basic evaluation of the capabilities of the observing system, by reporting key ocean climate indices and their uncertainty; and as a tool for advocacy about the capabilities of the ocean observing system for climate. The need for interesting indices based on subsurface ocean variability remains high, and is the subject of ongoing dialogue with CLIVAR groups. Subsurface indices draw on all available data, including SOOP XBT lines, Argo profiles, and moored array data. Suggestions for particular indices from the SOT are welcome.

Research programs continue to provide much of the support for global module activities; only limited progress has been reported of national actions for sustained observations and/or analysis activities. This remains a great challenge for the sustenance of the ocean observing system.

3. Recent evolution of plans and advocacy

3.1 Specific for SOT

Frank Bradley (CSIRO, Canberra, Australia) and Chris Fairall (NOAA, Boulder CO, USA) have drafted a guide to making climate-quality meteorological and flux measurements at sea (Appendix A). The drafting included input from scientists involved in the OceanSITES time series initiative and members of the Task Team for VOSCLim. The OOPC **invites the SOT (particularly VOSP) to consider**: a) how best to provide feedback on this draft (perhaps through the Task Team on VOSCLim), and b) how to eventually integrate the advice from this guide into the overall VOS programme.

In January 2006, GOOS and CLIVAR published an [implementation plan](#)³ of their joint Indian Ocean Panel, which described the major ocean-related scientific questions for GOOS and CLIVAR in the

² http://ioc.unesco.org/oopc/state_of_the_ocean/

³ <http://www.ioc-goos.org/goos-152>

region, and made specific recommendations for observing networks. It **prioritized the recommendations for SOOP in the region**, and determined that the high-priority lines were IX01, IX08, IX09N/IX10E, IX12, IX15/IX21, IX22 and PX02.

At its last meeting in May 2006, the OOPC considered a sustained observing plan for the Indonesian Throughflow region, and endorsed a network consisting of an ADCP mooring monitoring the Makassar Strait, overview satellite altimetry and tide gauge measurements, and four high-frequency repeat XBT/XCTD lines:

- **Inflow:** Startup of a XBT/XCTD high-frequency (2-week) line extending from Mindanao (Philippines) to northwestern Irian Jaya (Indonesia)
- **Outflow:** Continuation of the IX1 XBT/XCTD high-frequency (2-week) line; as well as shallow pressure gauges in the outflow passages
- **Interior:** Continuation of the IX22/PX11 (north-south) and PX02 (east-west) XBT/XCTD lines across the Indonesian Seas at 2-week frequency

Details can be found in the [OOPC-11 report](#)⁴. The OOPC **invites the SOT (particularly SOOPIP) to consider** these enhanced recommendations for the Indonesian Throughflow.

3.2 General

Improved and more detailed recommendations for ocean satellite missions have been brought to the attention of the Committee on Earth Observation Satellites (CEOS) and the UNFCCC. After publication of the GCOS Implementation Plan (IP) at the end of 2004, the UNFCCC asked CEOS for a report on how they planned to respond to the GCOS IP. CEOS asked for more detail on the requirements for satellite missions, and the two reports, a [GCOS IP supplement on systematic observation requirements for satellite-based products](#)⁵ and the [CEOS response to the GCOS IP](#)⁶ were released in September 2006, recommending actions for satellite ocean observations of sea ice, sea level, SST, ocean colour, sea state, salinity, and in ocean reanalyses. The engagement from the satellite agencies has been promising, and will need continued follow-up.

The publication of the Intergovernmental Panel on Climate Change (IPCC) Working Group I report on the physical basis of climate change (2 February 2007) brought a lot of public attention to the issue of climate change, and noted contributions from global ocean observations, as well as some of the areas where observations and research were lacking ([see story](#)⁷). As societal vulnerability to climate is often felt through extremes, improved climate predictability on interannual to decadal timescales (in which ocean observations and coupled forecasting systems are critical) has large potential social benefit.

The current composite *in situ* surface and subsurface networks described by the GCOS IP are in fact a collection of independent observing networks that coordinate through OOPC and JCOMM. Three of these networks (Argo profiling floats, DBCP surface drifters, and SOOP XBT lines) currently fund two technical coordinators at JCOMMOPS, and have found significant advantages in this cooperation. The Observations Programme Area of JCOMM hosted a roundtable in May 2006 on the possibilities for reinforcing and expanding this resource and this will again be a major point on their agenda in April 2007, when the specifications for a call for proposals for an expanded Observing Platform Support center will be discussed and finalized. The OOPC believes a reinforced center will be a critical element in strengthening the ocean observing system for climate, and **invites the SOT** to consider how it would best contribute and benefit to such a center.

National reports on contributions and expected future commitments to both global and coastal modules of GOOS, including all aspects of the system (observations, data management, products and services, and coordination) have been requested for the upcoming [June meeting of I-GOOS](#)⁸. The secretariat has worked to make sure that the reporting guidelines are consistent with the reporting needs of nations under the UNFCCC, and requests for information from JCOMM.

⁴ <http://ioc.unesco.org/oopc/oopc-11/>

⁵ <http://ioc3.unesco.org/oopc/documents/background/gcos-107.pdf>

⁶ <http://ioc3.unesco.org/oopc/documents/background/CEOS%20Response%20to%20the%20GCOS%20IP.pdf>

⁷ <http://www.ioc-goos.org/content/view/81>

⁸ <http://www.ioc-goos.org/igoos8>

4. Future activities that may provide guidance to SOT

The Global Ocean Data Assimilation Experiment (GODAE) and the OOPC will be holding a workshop on Observing System Evaluations (OSE) and Observing System Simulation Experiments (OSSE) 5-7 November 2007 in Paris. The workshop will focus on reviewing OSE and OSSE work, on identifying robust features, and on developing preliminary recommendations for the observing system. Some specific topics will be low/high resolution altimetry, Argo, tropical moorings, high resolution SST, and new observing techniques (e.g., gliders, salinity). The development of these tools, along with expert judgment, will inform evolution of the recommendations for the global system.

The OOPC is participating, along with the International Ocean Carbon Coordination Project (IOCCP) and other interested groups, in organizing a symposium on multi-disciplinary sensors and systems for autonomous observations of the global oceans, targeted for 2008 ("OceanSensors08"). The development, testing, and proliferation of new sensors will advance our ability to observe a larger number of biogeochemical and ecosystems variables on a global scale. The objectives of the symposium would be to foster the exchange of information (including through a sensor database), assess the technology needed to meet observing system goals, and providing valuable input into a proposed general ocean observations symposium (see below).

OOPC recommendations can be in many cases traced back to the science and technology presented at the OceanObs99 conference in San Rafael (1999). The OOPC has considered, and has been encouraged by the GCOS Steering Committee, to plan with other interested groups a new conference focused on global ocean observations, in about 2009, ten years after San Rafael. The goals of this conference would be to take stock in progress and in major advances in scientific knowledge from the observing system, and to focus on challenges and opportunities, including new technologies, and new opportunities for global measurements of biogeochemical and ecosystem variables. This meeting would also address some of the evolutions necessary in the recommendations for the ocean observing system for climate, including plans for deep ocean observations (sub-Argo), improved monitoring of critical transports, and sustained polar ocean observations. The recommendations from this conference would form the basis to update GCOS-92.

The input of the SOT on any of these activities is welcome.

APPENDIX A

**(DRAFT) GUIDE TO MAKING CLIMATE QUALITY METEOROLOGICAL AND FLUX
MEASUREMENTS AT SEA (BRADLEY, FAIRALL)**