

## Report to CLIVAR SSG-18

**Panel or Working Group:** Global Synthesis and Observations Panel (GSOP)

### **1. Contributions to developing CLIVAR science and fit, where appropriate, to the CLIVAR imperatives**

GSOP has actively contributed to the writing up of CLIVAR Imperatives document, in particular Imperative V (Data synthesis, analysis, reanalysis and uncertainty) and Imperative VI (Ocean observing system).

One of the main contributions from GSOP to CLIVAR science is the evaluation of the current generation of ocean synthesis/reanalysis products and the use of them to study several important aspects of the global ocean circulation. The evaluation has led to several improvements in the products. It has led especially to several papers comparing several ocean synthesis products and thereby to first specifications of uncertainties in ocean syntheses, however GSOP recognizes that much more such comparison work is needed. The KlimaCampus in Hamburg is now providing available ocean syntheses in a common format to all interested researchers, following up the Ocean Synthesis Directory developed by GSOP. This was especially requested by the modelling community who is looking for easy-to-use products for model initialization ([http://icdc.zmaw.de/easy\\_init\\_ocean.html?&L=1](http://icdc.zmaw.de/easy_init_ocean.html?&L=1))

GSOP has also increased collaboration with GODAE OceanView and as such, is organizing a meeting that will provide a forum for the exchange of ideas on ocean data assimilation and ocean forecasting. The workshop is intended to be a mix of oral presentations, open discussion, and poster presentations. Some specific goals of the workshop include demonstration of the value of in situ and satellite observations on short-term, seasonal and decadal forecast systems, review and inter-comparison of class 4 metrics from operational short-range forecast systems, and linking inter-comparison and monitoring activities within GODAE OceanView to those of CLIVAR.

The other main activity of GSOP revolves around coordination of observations associated with CLIVAR and GOOS programs. GSOP is actively involved in supporting the globally sustained ocean observing system through interactions with Argo, GO-SHIP and SOOP (XBT component) and OOPC. GSOP provides a link amongst the observation, synthesis and climate model communities. Through this linkage we are pursuing open and timely access to observational data for the climate science community. As an example of fostering cooperation between different components of the observation program GO-SHIP is collaborating with Argo to ensure that the high quality CTD data is available for the calibration and quality control of the Argo profiles, providing opportunities for float deployment in remote regions of the global ocean and enabling calibration of XBT's via simultaneous XBT drops at hydrographic stations. GSOP has also fostered the examination of the XBT program to ensure community consensus on methods to remove fall-rate bias in this data set, and standardisation of meta-data reporting. GSOP is playing an active role in scoping the science needs, observational strategy and methods of a deep ocean (below 2000 m) observational program.

While the interaction of GSOP with recognised international programs (Argo, Go-SHIP and SOOP) has been positive, we have been unable to stimulate cooperation and communication amongst the data assemble centres (DACs) and CLIVAR basin orientated process studies due to lack of appropriate support. The lack of coordination amongst the

DACs and CLIVAR process studies has resulted in the situation that GSOP is unable to assess whether the observational data is reaching the appropriate DACs and therefore the wider climate science community.

## **2. Cooperation with other WCRP projects, outside bodies (eg. IGBP) and links to applications**

GSOP is a co-sponsor (together with IOCCP, and in collaboration with the SOLAS-IMBER Carbon Coordination Group) of the Global Ocean Ship-based Hydrographic Investigations Panel (GO\_SHIP). The programme brings together interests from physical hydrography, carbon, biogeochemistry, Argo, OceanSITES, and other users and collectors of hydrographic data. GSOP has links to SOOP, in particular the XBT component of this program, and is the CLIVAR representative at OOPC meetings.

## **3. Workshops/meetings held**

- GO-SHIP Open Community Meeting (21 Feb 2010, Portland, USA)
- Second XBT fall rate (August 2010) – Hamburg, Germany
- WGOMD-GSOP Workshop: Decadal Variability, Predictability and Prediction: Understanding the role of the Ocean (20 -23 Sep 2010) – Boulder, USA
- Observed and Model-Simulated Property Changes in the Deep Ocean of the Southern Hemisphere. Quantifying the rate of deep ocean change and assessment of state of observing system (21-23 June 2010) - Hobart, Australia

## **4. New activities being planned, including timeline**

- GSOP-5 panel meeting, 11-13 May 2011, Grenoble, France
- Co-hosting with GODAE OceanView Workshop on Observing System Evaluation and Inter-Comparison, 13-17 June 2011, Santa Cruz, CA, USA
- Promotion and help with co-ordination of assessment of state of Climate using observation and models for IPCC AR5
- Support of The First XBT Science Workshop: Building a Multi-Decadal Upper Ocean Temperature Record, Melbourne 7-8 July 2011
- GSOP expects to hold a GSOP-6 panel meeting late in 2012 and would also like to sponsor an Ocean or Coupled Reanalysis workshop in 2012. It may be possible to hold these 2 events at the same time (to be discussed at GSOP-5)
- GSOP would like to organize a Data Management meeting which would bring together several programmes, including WCRP core projects involved with data QC, archiving and distribution, aimed at ensuring centralized and timely access to ocean observations.. This workshop would try to organize best practices for standardization (metadata, file format, etc) across functioning CLIVAR DACs and those other groups, with the objective of supporting science and data access for climate monitoring and downstream applications eg. decadal prediction. However without CLIVAR travel support (so far unforthcoming) the DACs and other data managers would be unable to participate.

## **5. Workshops/meetings planned (see ANNEX B also)**

- GSOP Workshop for Assembly of Observational Data for Climate and Decadal Prediction and Predictability.
- 6th GSOP meeting + Ocean or Coupled Reanalysis Workshop

## **6. Issues for the SSG**

- With the formation of the new WCRP “Data Council”, there will be an overlap of activities among GSOP, OOPC and the Council. This needs to be clarified – what role and or interaction is envisaged between GSOP and the WCRP data Council. .
- Lack of support to host data management workshop. This is linked to above also. Unclear who now has responsibility regarding co-ordination of such data groups and ensuring that CLIVAR process data are available to the climate community via a centralized data distribution network
- Unclear directives and expected interaction between different CLIVAR and WCRP working groups. For example previous directive that CLIVAR is to take on WCRP lead in air-sea fluxes through GSOP, ensuring link with GEWEX SeaFlux activity (GSOP co-chairs)

## Annex B

### Proforma for CLIVAR Panel and Working Group requests for SSG approval for meetings

Requests should be made through D/ICPO (Robert.Molinari@noc.soton.ac.uk), against the following headings:

1. **Panel or Working Group:** Global Synthesis and Observations Panel (GSOP)
2. **Title of meeting or workshop:** GSOP Workshop for Assembly of Observational Data for Climate and Decadal Prediction and Predictability.
3. **Proposed venue:** Europe: To be discussed at GSOP5 in Grenoble, May 11-13<sup>th</sup> 2011
4. **Proposed dates:** 2012
5. **Proposed attendees, including likely number:**
  - Some GSOP members and other scientific experts (5)
  - OOPC representatives (2)
  - Data centers (e.g. CLIVAR DACs, OceanSITES, Argo, etc...) (20)
  - NODCs, IODE, JCOMM, etc (5)
  - Others (CLIVAR, SCOR, and other officials) (5)
6. **Rationale, motivation and justification, including: relevance to CLIVAR themes & JSC cross cutting topics and any cross-panel/working group links and interactions involved:**

As the Earth's climate enters a new era where it is forced by human activities, it is critically important to maintain an observing system capable of detecting, documenting and predicting global climate change and variability at a multitude of time scales. Recent CLIVAR sponsored workshops have focused on various aspect of the climate decadal predictability and prediction problem (Earth-System Initialization for Decadal Predictions (EASYINIT) workshop and WGOMD-GSOP Workshop on Decadal Variability, Predictability, and Prediction: Understanding the Role of the Ocean). These workshops have addressed key questions including:

- Observed decadal variability: What is the observed decadal variability in the climate system (observations and syntheses)? What are the observed climate impacts? What are the observed signals in the ocean? Are the present ocean observations adequate for decadal variability studies? What new observations are needed?
- Predictability and state of the ocean models: Is there any predictability in the climate system? What are the sources of such predictability? What are the roles of natural and forced variability? Are the ocean models up to the task?
- Physical Mechanisms: What are the sources of decadal variability? What determines the propagation and decay of decadal anomalies? What are the physical mechanisms in the ocean for decadal variability? How robust are these mechanisms?
- Initial conditions, predictions, and verification: What observation can be used to verify predictions? What initialization techniques are used in the community? Are

they robust in their outcomes across different models? What fields should be carefully initialized in the ocean? Is any one of the initialization approaches clearly superior to the others? What are the common verification techniques? amongst other topics.

All these key questions surrounding climate change (anthropogenic forced) and decadal variability of the global climate system, such as estimating long term trends, assessing decadal predictability, and development of decadal predictions, rely heavily on a globally distributed ocean observing system. These observations must be of sufficiently high quality to both detect and interpret the structure and processes leading to the climate variability and forced climate change signals. Experience to date suggests that such high quality data sets can only be achieved through an integrated ocean observations system that has the following traits:

- Adopts and documents “best practices” for observing activities,
- Assembles observational data as well as supporting information that place individual observations in the context of ocean variability,
- Reviews and documents data quality, particularly in the context of historical and other coincident measurements,
- Characterizes instrumental and observing system biases,
- Provides timely access to complete data and metadata in a readily useable form for the operational and research users.
- Is responsive to feedback on the basis of analysis and applications from the operational and research users

Unfortunately, these *requirements* are not met for many ocean data streams. Consequently, ready accessibility to the needed high quality observational data sets for these climate and decadal-focused climate studies is not assured.

CLIVAR’s long-range vision to address these needs has been until now to provide a climate data catalogue. This catalogue would be developed through the establishment of active communication amongst the current data management groups, including functioning CLIVAR Data Assembly Centers (DACs), Argo, OceanSITES, XBT, NODC’s, and other JCOMMOPS data coordination centres. As a first step toward achieving this vision, a workshop for data management of ocean data for climate decadal variability, predictability, and prediction is presented here. This need, to properly manage and deliver climate quality data to the operational and research user communities is also a key goal of the new WCRP Data Council and we therefore believe that this workshop could provide key input to that council, helping to define the data management architecture of a really useful climate quality ocean observing system.

## **7. Specific objectives and key agenda items:**

- Review scientific needs and value of an integrated ocean resource (in terms of the science of decadal climate changes)
- Identify key data attributes/components/best practices of an ocean data resource that will meet these needs
- Develop a minimal set of common information (e.g. parameter descriptions, quality control information) necessary for data integration.
- Identify key data streams/variables as well as relevant data centers/activities that can be responsible for contributing these to the ocean data resource
- Improve "catalogs" of ocean data observations of value during the past ~50 yrs (particularly those observations that are difficult to access)
- Exchange ideas, tools, and advanced technical resources and ideas useful to data managers and users

- Encourage and facilitate the exchange of past, present, and future ocean observational data and information

A draft agenda is described below:

Day 1: review scientific motivation and specific needs for observational data and a responsive data system; invited talks on data and information availability and challenges to meeting scientific needs; invited presentation from WCRP Data Council; poster session highlighting data center activities, etc.

Questions: what are the key observational variables and information needed by the climate community? What is/isn't currently available? Key challenges to meeting these needs and addressing gaps?

Day 2: presentations on best practices for data assembly, quality assessment/logging, interoperability/exchange, metadata, searching, and distribution for climate observations; cross-cutting standards of practice with atmospheric and EO communities; presentations on increasing interoperability/integration across data centers through standardization, etc

Questions: What are the models and best practices in ocean data management to meet the scientific needs? What is missing? What needs improvement? What are some ideas for increasing integration across the ocean data enterprise?

Day 3: The way forward (perhaps have some breakout groups): what are some reasonable 3-5yr goals and milestones towards building catalogues, increasing interoperability/integration, etc. What can be done through increased collaboration and coordination (ie without a lot of new resources)? In what areas can the research community, NODCs, and real-time communities better cooperate to meet needs of decadal climate researchers?

Day 4: Breakout groups finish, breakouts report, dismiss by lunchtime

#### **8. Anticipated outcomes (deliverables):**

- Improve "catalogs" of ocean data observations of value during the past ~50 years, particularly those observations that are difficult to access i.e. ocean velocity.
- Exchange ideas, tools, and advanced technical resources and ideas useful to data managers and users
- Encourage and facilitate the exchange of past, present, and future ocean observational data and information

9. **Format:** 3 and half day meeting.

#### **10. Science Organising Committee (if relevant)**

GSOP co-chairs, Matt Palmer(GSOP, UK MET Office), Steve Diggs (CCHDO)

#### **11. Local Organising Committee (if relevant)**

Nico Caltabiano (ICPO)

#### **12. Proposed funding sources and anticipated funding requested from WCRP:**

US\$ 20K. The organising committee will also seek funding from other groups like US CLIVAR, IODE, etc...

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Requests should be made through D/ICPO (Robert.Molinari@noc.soton.ac.uk), against the following headings:

1. **Panel or Working Group:** Global Synthesis and Observations Panel (GSOP)
2. **Title of meeting or workshop:** 6th GSOP meeting + Ocean or Coupled Reanalysis Workshop
3. **Proposed venue:** TBD
4. **Proposed dates:** Fall 2012
5. **Proposed attendees, including likely number:** GSOP Members, Basin Panel chairs, other relevant experts.
6. **Rationale, motivation and justification, including: relevance to CLIVAR themes & JSC cross cutting topics and any cross-panel/working group links and interactions involved:**
  - Assess progress on preparing observation data sets for decadal prediction and reanalysis models; Joint objectives with WCRP Data Council on improving accessibility of data
  - Review of ocean synthesis efforts, reanalysis models and initialised climate predictions forming input to IPCC AR5
  - Review progress on Coupled Data Assimilation and Synthesis
  - Improve and define joint activities with OOPC and GODAE OceanView
7. **Specific objectives and key agenda items:** Specific objectives will be discussed at GSOP-5 meeting
8. **Anticipated outcomes (deliverables):** Meeting report
9. **Format:** 1.5 days for panel meeting and 2.5 days for reanalysis workshop
10. **Science Organising Committee (if relevant):** GSOP co-chairs
11. **Local Organising Committee (if relevant):** Nico Caltabiano (ICPO)
12. **Proposed funding sources and anticipated funding requested from WCRP:**  
US\$ 15K