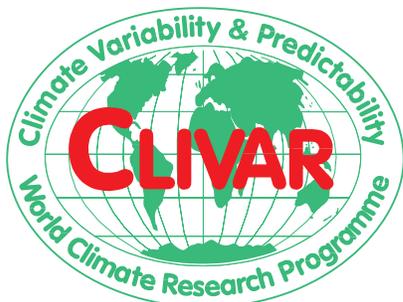


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Project Report

Report of the 11th Session of the CLIVAR Atlantic Implementation Panel

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ACTION ITEMS

ACTION: Engage GSOP and WGOMD to develop a joint proposal for funding agencies to provide funding for data products and analysis (co-chairs)

ACTION: Panel to develop with WGOMD a strategy for analysis of AMOC in AR5 models (co-chairs, Anne-Marie Treguier)

ACTION: Contact SAMOC PIs to inform that Mauricio Mata will represent AIP at their meetings (ICPO)

ACTION: Contact OOPC about a Deep Ocean Observing Strategy for the Atlantic (Ruth Curry, Molly Baringer)

ACTION: Highlight availability of THOR datasets on AIP webpage (ICPO)

ACTION: Initiate discussion with CLIVAR panels and draft list of observations and activities on AMOC in the future (Bogi Hansen, Ruth Curry, Molly Baringer, Bill Johns, Silvia Garzoli)

ACTION: Contact GSOP to determine involvement of AIP on air-sea fluxes activities (Tom Farrar)

ACTION: Discuss AIP's Terms of Reference and propose to the CLIVAR SSG in case of changes (co-chairs, ICPO)

1. Atlantic Panel overview and Terms of reference

Laurent Terray and Peter Brandt , AIP co-chairs, welcomed all panel members and invitees. Apologies were sent by Bogi Hansen and Mathieu Rouault.

The CLIVAR Atlantic Implementation Panel (AIP) is a part of the CLIVAR organization. The panel is in charge of implementing the CLIVAR science plan in the Atlantic sector. More specifically its Terms of Reference are:

1. To recommend and oversee the implementation of observations in the Atlantic Ocean sector and of research on Atlantic climate variability and predictability, in order to meet the objectives outlined in CLIVARs Science and Initial Implementation Plans, particularly with respect to the Principal Research Areas D1 (NAO), D2 (TAV), D3 (THC), and anthropogenic climate change.
2. To collaborate with JSC/CLIVAR WGCM, WGOMD, and WGSIP in order to contribute to the design of appropriate numerical experiments and to jointly define and implement the requirements for data sets needed to validate and initialize models.
3. To liaise with relevant CLIVARs panels, in particular the Arctic Climate Panel, the Southern Ocean Panel, and the VAMOS and VACS panels to ensure that best use is made of resources from regional research programs.
4. To liaise with GSOP, OOPC, PIRATA, ARGO, and the IOC-CO2 panel to ensure that CLIVAR benefits from and contributes to GEOSS.
5. To liaise with relevant interdisciplinary SCOR-IGBP groups such as PAGES, GLOBEC, IMBER, and SOLAS and with regional Atlantic marine ecosystem research programs such as BCLME and GCLME to ensure that CLIVAR benefits from and provides input to these programs.
6. To respond to needs from stakeholders and facilitate the transfer of knowledge from science to operations and applications with respect to Atlantic climate variability and predictability issues.
7. To report to the CLIVAR SSG.

2. The Atlantic observational network session

Peter Brandt presented a summary of the Tropical Atlantic Climate Experiment (TACE), which is a focused observational and modeling effort in the tropical Atlantic to advance the predictability of climate variability in the surrounding region and to provide a basis for assessment and improvement of coupled models. The PIRATA buoy network is the backbone of the tropical Atlantic observing system that foster research in the region. TACE, which incorporates PIRATA data, is a collection of different process studies. 2011 is the nominal end of TACE and there will be a final conference in September 10-14, 2012 in Kiel, Germany. Parallel to TACE, the German SFB 754 (Climate-Biogeochemistry Interactions in the Tropical Ocean) project, which started in 2008 and now moved into its second phase (2012-2015), focus on tropical oxygen minimum zones (OMZ) in the Atlantic and Pacific. It includes 8 projects in the thematic area "Circulation

and Oxygen” and 8 projects in thematic area “Redox-dependent Biogeochemistry” with tightly integrated modelling and field-work activities.

The panel discussed the coordination of activities within TACE. One issue raised was that links between modelers and observationalists were not well coordinated and this interaction needs to be improved. A synthesis of TACE datasets needs to be done, which could be used for comparison with models and to support the understanding of model biases in the tropical Atlantic. One way to achieve this would be following the concept of US CLIVAR Climate Process Teams (CPT). CPTs would effectively link process-oriented research to coupled climate model development. However, there is no counterpart for this concept in Europe and this could make things difficult. One possible way forward would be to engage other CLIVAR panels for a detailed proposal on what is the best approach for providing such dataset in a format that is also useful to the modelling and ocean synthesis community. Such proposal could be sent to funding agencies that would support synthesis activities.

ACTION: Engage GSOP and WGOMD to develop a joint proposal for funding agencies to provide funding for data products and analysis (co-chairs)

Anne-Marie Treguier reported on the French/European OVIDE and DRAKKAR projects. OVIDE, which had from 2002 to 2010 five occupations of the A25 sections, has the following objectives: (a) Quantify the variability of the volume transports across the A25 line; (b) Quantify how this variability impacts that of the MOC and heat transport; (c) Define proxies of the main current variability from sustained observing systems. Some future occupations can happen as part of the GEOTRACES project. In East Greenland there is a 17-year transport time series reconstructed from altimetry to understand the Irminger Sea transport variability.

The DRAKKAR project coordinates model configurations based on NEMO, with collaboration from groups in Grenoble, Brest, Paris, Mercator Toulouse, GEOMAR Kiel and NOC Southampton. Some of the groups have developed a study with good results of exchanges between Arctic-Atlantic, with analysis on freshwater balance. There is not much interest from the DRAKKAR community in the tropical Atlantic, with focus of activities in global issues.

Bill Johns, chair of the US AMOC Science Team, gave a brief overview of the current status of the programme. US AMOC has forty projects currently funded, and four Task Teams (Observations, Variability, Mechanisms and Predictability, and Sensitivity), which assess the science generated by the scientific projects. On the modelling side, the CLIVAR Working Group on Ocean Model Development (WGOMD) has plans to analyse AMOC in AR5 models and AIP should get involved in this activity.

ACTION: Panel to develop with WGOMD a strategy for analysis of AMOC in AR5 models (co-chairs, Anne-Marie Treguier)

Bill Johns also presented a summary of the current activities under RAPID-WATCH programme, funded by UK’s Natural Environment Research Council (NERC). The main objectives of the project are: (a) to obtain a decade of MOC observations 2004-2014, working with international partners (U. Miami, AOML, MPI, BIO) and funders (e.g. NSF, NOAA); and, (b) to exploit these data (with other data) to determine and interpret recent changes in the Atlantic MOC, assess the risk of rapid climate change, and investigate the potential for (decadal) predictions of the MOC and its impacts on climate. RAPID-WATCH has also been working closely with Hadley Centre on decadal prediction, and has five projects funded. The programme will undergo an international

review in January 2012, and will determine whether the observational system should become operational beyond 2014.

Plans for the development and implementation of the South Atlantic Meridional Overturning Circulation (SAMOC) were presented by Silvia Garzoli. The main objective of the SAMOC program is to resolve the mean and varying components of the MOC, as well as the heat and freshwater transport by the MOC in the South Atlantic, all of which are crucial to improving our understanding of climate system variability. SAMOC aims to provide a means to observe and model the changes in the relative contributions of different water masses to the upper ocean return flow of the MOC in the South Atlantic that could significantly impact the properties of the North Atlantic MOC waters over time. AIP should have a presence in SAMOC meetings in order to address any issues that could be seen as important for the panel. Mauricio Mata agreed to serve as a contact.

ACTION: Contact SAMOC PIs to inform that Mauricio Mata will represent AIP at their meetings (ICPO)

Silvia Garzoli also talked about deep Argo floats and more generally about the development of a deep ocean observations network. At OceanObs09, a strong case was made for the value of the core Argo Program, and enhancements such as Deep Argo were recommended. Since OceanObs09, new investments in the OS have bypassed Argo, and indeed core Argo may be threatened by budget cuts in several Argo partner nations. Any Deep Argo presupposes a healthy core program plus new resources for the added tasks. Although prototype deep floats and gliders have been announced, development of Deep Argo will require several years for instrument design and evolution, including both platforms and CTDs, before the capabilities are known. Until the capabilities of deep floats are known, the design of deep ocean observing system should remain open. Iteration will be needed to match the space and time-scales of a deep ocean observing system with the practical limitations imposed by the evolving technologies. The panel had a brief discussion on this issue and consider that the number of deep observations is very important particularly for the Atlantic. Also, it is necessary to increase the critical mass of scientists interested in the deep ocean. Another problem is resources for instrumentation and deployment since it can be very expensive.

The GCOS/GOOS/WCRP Ocean Observations Panel for Climate (OOPC) is developing a Deep Ocean Observing Strategy and the panel need to make sure that this strategy takes into account the specific need for the Atlantic basin. Ruth Curry and Molly Baringer have agreed to contact the committee and support the development of a Deep Ocean Observing Strategy for the Atlantic.

ACTION: Contact OOPC about a Deep Ocean Observing Strategy for the Atlantic (Ruth Curry, Molly Baringer)

Bill Johns have also briefly presented the plan for Overturning in the Subpolar North Atlantic Program (OSNAP). The program's main objective is to quantify the large-scale, low-frequency, full water-column net fluxes of mass, heat and fresh water associated with the meridional overturning circulation in the subpolar North Atlantic, and has partner from several US institutions, as well as from the UK, Canada, Germany and the Netherlands. The primary interdisciplinary linkages for this planned program are with biogeochemistry, ocean biology and the cryosphere. OSNAP's planned array will use some instruments already deployed and others, which have not been funded yet. A white paper is being developed prior to proposals being submitted aiming at securing funds for instrumentation.

Torsten Kanzow reported on the EU-THOR project and other European AMOC initiatives and plans. EU-THOR has several observational components and it nominally ends in 2012. PIs are

already in contact with EU and have received positive signs that it could be extended on a phase II. The EU-THOR project includes several sites that have been occupied and provide monitoring of different water masses and/or currents. Maintenance of those sites is funded by different countries. One issue raised by the panel is how it is possible to increase the availability of data for model intercomparison. In the case of data part of the THOR project, they are freely available via THOR's website, however data need to be requested.

ACTION: Highlight availability of THOR datasets on AIP webpage (ICPO)

The panel has discussed at length the best ways of coordination and integration of all these activities related to the Atlantic MOC. In relation to all projects, either in place or being proposed, the role of the panel would be paying close attention and supporting the coordination of observations and modeling strategies. The support for an international coordination was particularly clear, as it is necessary to establish a stronger coordination between researchers involved in OSNAP and THOR for phase 2. There should be a coordination of the information that both projects can provide.

The panel also discussed what are the priorities in observations and activities on AMOC in the future. It was agreed that a list should be compiled, initially with focus on the North Atlantic, but looking at expanding it for the whole system. Because it is seen that the modelling community has not been well organised for the whole AMOC system, it is necessary to engage CLIVAR modelling groups and GSOP when drafting the list, in addition to all AMOC projects. One specific activity could be the coordination of model intercomparison, with AIP making recommendations to WGOMD.

ACTION: Initiate discussion with CLIVAR panels and draft list of observations and activities on AMOC in the future (Bogi Hansen, Ruth Curry, Molly Baringer, Bill Johns, Silvia Garzoli)

3. Joint AIP-VAMOS session

With the organisation by AIP and VAMOS of the “Workshop on Coupled Ocean-Atmosphere-Land Processes in the Tropical Atlantic”, both panels decided to have a joint session that would help with the discussion of the outcomes of the workshop.

The discussion was based on the fact that several hypotheses for the existence of the Atlantic tropical biases have been proposed (local versus remote processes) but the participants recognize that ultimately the issue is a coupled problem. This clearly calls for a closer interaction of Atlantic Panel and VAMOS with CLIVAR modeling panels (WGOMD, WGSIP).

In terms of spatial scale, there was a proposal to define a 2-tier approach to study the problem: one larger scale that would interact with other regions, and one smaller region, more focused on the Southeastern Atlantic. The potential feedback from the Amazon region seems to be an important mechanism and should also be considered as those biases can be affecting prediction on the Americas. Some model intercomparison activities should also be considered. It is clearly necessary that both modelling and observations communities should work closely in this topic of research.

There are already some activities and projects that have been collecting data in the tropical region (e.g. IASCLIP), and therefore should be better integrated. Also, there are plenty of historical data that could be used for a synthesis activity. One possible solution for coordination could be the formation of a Task Team that would investigate the problem further.

4. AIP linkages

Mauricio Mata gave an overview of links between Atlantic and Southern Oceans. He reported on the latest discussions about the Southern Ocean Observing System (SOOS), and the key science challenges. It is also important to notice that SAMOC is very much integrated with SOOS. Mauricio Mata also informed the group about the Patagonian Experiment (PATEX) which is trying to understand the uptake of CO₂ in the South Atlantic region. It is important for the panel to keep track of process studies that link with the biogeochemistry community.

Tom Farrar updated the panel on the state of the art of in situ air-sea fluxes. Direct covariance flux measurements are becoming more widespread, but there are still problems as they are difficult to make. Intercomparisons between groups would be very valuable. Measurement of bulk variables has improved (quality and quantity), but challenges are ongoing and new errors have developed. Bulk flux algorithms are much improved since early 1990's, but problems remain at high and low wind speeds. As the CLIVAR Global Synthesis and Observations Panel (GSOP) will promote some discussion on these issues, AIP should be involved in any activities developed by GSOP.

ACTION: Contact GSOP to determine involvement of AIP on air-sea fluxes activities (Tom Farrar)

Tom Farrar also provided a brief overview on the Salinity Processes in the Upper Ocean Regional Study (SPURS). SPURS is a multi-agency (NASA, NOAA, NSF) and multi-national (US, Spain, France, Ireland, UK) project, designed to exploit new autonomous technology (Floats, gliders, drifters, etc.), and linked to but not dependent on Aquarius salinity satellite mission. The water cycle is a key climate change issue with major societal impact, and most of the water cycle involves the oceans (i.e., evaporation and precipitation are mainly over oceans). Salinity is a sensitive indicator of changes in the water cycle, and recent trends suggest that the water cycle is accelerating at a much greater rate than models predict. SPURS is designed to study the oceanic processes that influence upper-ocean salinity.

Suzana Camargo briefed the panel on the activities of the US CLIVAR Hurricane Working Group. The main objectives of this WG is to provide an improved understanding of interannual variability and trends of tropical cyclone activity (20th century to present), and quantifying changes in the characteristics of tropical cyclones under a warming climate. The WG plan to perform high-resolution model simulations by various model groups using the same forcing and develop tropical cyclone diagnostic common metrics for these experiments. There is also a series of coordination of the evaluation and reporting of the experiments, with model output datasets available for community.

5. Modelling activities

Doug Smith reported on the decadal prediction activities at the UK MetOffice, particularly on the Impact of initialisation on hindcast skill, AMOC at 45N in assimilation experiments, Atlantic

tropical storms. Main findings are that some experiments with coupled models show a clear influence of the sub-polar gyre on the tropical Atlantic. There has also been some progress with initialization with skills, mainly in the sub-polar gyre, which reflect in skills for predicting tropical storms. Saharan rainfall could be affected as well, because of the shift of the Intertropical Convergence Zone (ITCZ).

The panel has also discussed strategies for analysis of CMIP5 data in the Atlantic region. As noted before, the panel will discuss with WGOMD a strategy for analysis of AMOC in AR5 models. Some work has been done in comparing model results and observations with Hydrobase, which has an improved statistics of errors. These analyses could be expanded to incorporate CMIP5 data.

6. Panel business

Panel members have briefly discussed the panel's Terms of Reference (ToRs) and how they would fit in WCRP's new structure. Although no final decision on WCRP's new structure has been made at the time of the meeting, it is recognised that the panel should propose the best strategy for CLIVAR science in the Atlantic region. The panel decided that further discussion would take place by email among members.

ACTION: Discuss AIP's Terms of Reference and propose to the CLIVAR SSG in case of changes (co-chairs, ICPO)

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Meeting agenda

CLIVAR Atlantic Implementation Panel – 11th meeting Mar 25 -26, 2011 Miami, FL, USA

Agenda (24 March 2011)

Friday, Mar 25th 2011

Session: The Atlantic observational network (P. Brandt)

13:30 Welcome and charge to the meeting (L.Terray, P. Brandt)

13:40 TACE - summary of present status (P. Brandt)

14:00 French/European projects in the North Atlantic – OVIDE and DRAKKAR (A. M. Treguier)

14:10 US-AMOC (B. Johns)

14:30 RAPID-WATCH (B. Johns)

14:50 SAMOC and Deep Argo (S. Garzoli)

15:10 EU-THOR and European AMOC initiatives / plans (T. Kanzow)

15:30 OSNAP (B. Johns)

15:40 Coffee break

16:10 Discussion: how can AIP help in the coordination of an integrated AMOC observing system? Is there scope for an AMOC WG?

18:00 End of day

Saturday, Mar 26th 2011

Session: VAMOS/AIP joint session

8:30 Update on U.S. CLIVAR Activities (Mike Patterson)

8:45 Update on GEWEX Goals and Imperatives (Peter van Oevelen)

9:00 Update on IASCLiP (Art Douglas)

9:15 CLIVAR ICPO – CLIVAR Imperatives (Bob Molinari)

9:30 Discussion on how VAMOS/AIP can push forward some of the outcome of the Workshop

End of VAMOS/AIP joint session

10:10 Coffee break

Motivation for following talks: current state of the art including both observation and models, burning and unsolved questions and future needs in terms of observational and modelling programs.

10:30 Links Atlantic and Southern Oceans (M. Mata)

10:50 Air-sea interaction: current state of art regarding air-sea fluxes and SPURS (T. Farrar)

11:10 US CLIVAR Hurricanes WG (S. Camargo)

11:25 Discussion: role of AIP in coordinating activities (from issues above)

12:30 Lunch

13:30 CMIP5: what is expected from the AIP? How much can we be involved? (L. Terray)

13:50 Decadal prediction (D. Smith)

14:10 Discussion on modelling issues

15:00 AIP involvement in the WCRP OSC (co-chairs)

15:30 CLIVAR in the new WCRP structure / AIP Terms of Reference (co-chairs)

16:00 Review of action items

16:15 Panel membership

16:30 End of meeting