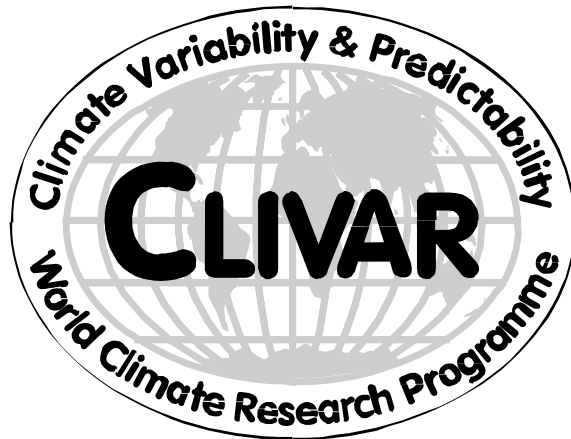


**INTERNATIONAL
COUNCIL FOR
SCIENCE**

**INTERGOVERNMENT
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OCEANOGRAPHIC
COMMISSION**

**WORLD
METEOROLOGICAL
ORGANIZATION**

WORLD CLIMATE RESEARCH PROGRAMME



**Report of the 2nd meeting of
CLIVAR Atlantic Implementation Panel**

1-2 December 2000, Orense, Spain.

January 2001

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CLIVAR is a component of the World Climate Research Programme (WCRP), which was established by WMO and ICSU, and is carried out in association with IOC and SCOR. The scientific planning and development of CLIVAR is under the guidance of the JSC Scientific Steering Group for CLIVAR assisted by the CLIVAR International Project Office. The Joint Scientific Committee (JSC) is the main body of WMO-ICSU-IOC formulating overall WCRP scientific concepts.

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Action Items

- 1) Prepare and distribute a document on GODAE activities to the panel members
(**E. Chassignet**)
- 2) Complete a document on CLIVAR on-going activities in the Atlantic, observations and modelling, and make it available to the panel members.
(**ICPO, R. Boscolo**)
- 3) Develop a database of information on data and data products in the Atlantic, relevant to CLIVAR, and make it available on the web in search mode.
(**ICPO, R. Boscolo, K. Bouton**)
- 4) Prepare a short document on the NAO and impact in the stratosphere. To be available to the CLIVAR SSG and SPARC before the next JSC meeting , March 2001.
(**R. Sutton and J. Hurrell**)
- 5) Liase with R. Mechoso (mechoso@cloud.atmos.ucla.edu) and Carlos Ereño (ereno@arnet.com.ar) of VAMOS for investigation on the functioning of radiosonde GCOS network in the S. America
(**Y. Kushnir and J. Hurrell**)
- 6) Liase with PAGES to investigate paleo-record availability for study of past NAO events
(**M. Visbeck, Y. Kusnir and M. McCartney**)
- 7) Prepare review comments on RR. Dickson proposed ASOF (Arctic-Subarctic Ocean Flux array) project
(**M.McCartney and P. Koltermann**)
- 8) The DecCen Atlantic Panel endorsed the initiative of holding a CLIVAR Tropical Atlantic Workshop in Paris. The following is proposed:
 - inform the scientific committee of the CLIVAR endorsement
 - solicit the scientific committee to submit a detailed plan and objectives of the workshop.
 - include Y. Kushnir and R. Sutton in the scientific committee
 - include a member of COOP in the scientific committee
 - hold the workshop in September 2001(**G. Reverdin**)
- 9) Inform C. Thorncroft (VACS panel co-Chair) of the CLIVAR Tropical Atlantic Workshop initiative and suggest to consider it as a forum for initiating discussions on additional required observations in the tropical Atlantic and Gulf of Guinea
(**R. Boscolo**)

10) COOP is charged with making sure that the South Atlantic has a good coverage with ARGO floats

(C. Koblinsky)

11) Produce a list of planned and proposed, cruises in the South Atlantic for a better co-ordination of float deployments.

(R. Boscolo)

12) Prepare a document on a set of hydrographic lines to be carried out in 2004 in the Atlantic. Co-ordinate the effort with the CO₂ community.

(M. McCartney, A. Clarke and P. Koltermann)

13) Next meeting to be held at NCAR, Boulder, USA, 15-16 June 2001, after a 3-day meeting of the Atlantic US PIs.

(M. Visbeck and R. Boscolo)

Background

The CLIVAR Atlantic Implementation Panel 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 references are:

1. To recommend and oversee the implementation of observations in the Atlantic Ocean sector, in order to meet the objectives outlined in CLIVAR's Science and Initial Implementation Plans, particularly with respect to the Principal Research Areas D1 (North Atlantic Oscillation), D2 (Tropical Atlantic Variability) and D2 (Atlantic Thermohaline Circulation).
2. To collaborate with JSC/CLIVAR Working Group on Coupled Modelling and CLIVAR Working Group on Seasonal-to-Interannual Prediction, in order to design appropriate numerical experiments, and to be aware of requirements set by these groups for data sets needed to validate models.
3. To liaise with the relevant CLIVAR panels, in particular Upper Ocean Panel and PIRATA Steering Group, to ensure that best use is made of resources from the global and equatorial research programs.
4. To liaise with Ocean Observation Panel for Climate and other relevant groups to ensure that CLIVAR benefits from and contributes to observations in GOOS and GCOS.
5. To report to the CLIVAR SSG.

The members of the CLIVAR Atlantic Implementation Panel are:

| | |
|--------------------|--|
| M. Visbeck (Chair) | Lamont Doherty Earth Observatory, Palisades, USA |
| A. Clarke | Bedford Institute of Oceanography, Dartmouth, Canada |
| A. Busalacchi | NASA Goddard Space Flight Center, Greenbelt, USA |
| T. Delworth | NOAA, GFDL, Princeton, USA |
| R. Dickson | Centre for Environment, Fisheries & Aquaculture Science, Lowestoft, UK |
| J. Hurrell | NCAR, Boulder, USA |
| K.-P. Koltermann | Bundesamt f. Seeschifffahrt u. Hydrographie, Hamburg, Germany |
| Y. Kushnir | Lamont-Doherty Earth Observatory, Palisades, USA |
| M. McCartney | Woods Hole Oceanographic Institution, Woods Hole, USA |
| A. Piola | Servicio de Hidrografia Naval, Buenos Aires, Argentina |
| Gilles Reverdin | Centre National d'Etudes Spatiales, Toulouse Cedex, France |
| Fritz Schott | Institut für Meereskunde, Kiel, Germany |
| Rowan Sutton | Oxford University, Oxford, UK |

Introduction

Allyn Clarke, Chairman of the CLIVAR Atlantic Panel, opened the meeting inviting the participants to introduce themselves (see Appendix 1 for the full list of participants).

John Gould, Director of the CLIVAR International Project Office, highlighted the responsibility of the panel in identifying key observations and modelling experiments for the improvement of climate prediction in the Atlantic sector. He also welcomed the full representation of the panel membership and the good timing of the meeting just after the AGU Chapman Conference on NAO (28 Nov. 1st Dec 2000, Orense Spain).

The issues of data resources and availability were brought to the attention of the panel. It was noted that the relationship between research laboratories and operational centres could be improved. The relationship between CLIVAR and GOOS was discussed. It was suggested that COOP could act as the link between CLIVAR and GOOS and that GODAE

(WWW.BoM.GOV.AU/bmrc/mrlr/nrs/oopc/godae/homepage.html) needed stronger links with the CLIVAR community.

ACTION 1: E. Chassignet to prepare and distribute a document on GODAE activities to the panel members

Related On-Going activities Document and Data Information System

Roberta Boscolo reported on two ICPO-initiated activities in support of the CLIVAR Atlantic Implementation phase:

- A document on the CLIVAR proposed, planned and on-going national projects in the Atlantic both observational and modelling. For each project the document will give a brief description of the objectives and contact of the principal investigators.
- A data-base of information on all the climatic data available or planned in the Atlantic. The database will include information on the data streams or products and how to get them.

Both document and database would help the panel in performing better international coordination and identifying areas where an international cooperation is needed.

ACTION 2: Roberta Boscolo to Complete a document on CLIVAR on-going activities in the Atlantic, observations and modelling, and make it available to the panel members.

ACTION 3: Roberta Boscolo and Katherine Bouton to develop a database of information on data and data products in the Atlantic, relevant to CLIVAR, and make it available on the web in search mode.

The Chapman Conference on NAO: summary and new insights

J. Hurrell, M. Visbeck and Y. Kushnir reported on how the recent conference on NAO (www.ldeo.columbia.edu/NAO/conference/chapman_conf_m.html) had provided a focus on the problems related on NAO impact on climate variability. The conference identified a small number of potential mechanisms that influence the NAO:

- Anthropogenic Climate Change and CO₂ emission
- Fluxes from stratosphere to troposphere

- Tropical SST

NAO predictability was another important issue highlighted by the conference. It was shown that it is still very difficult to predict NAO but a few methods have been developed that might lead to a predictive capability. The panel agreed that there is the need to identify structures for studying the impacts of the NAO as a phenomenon and to improve CLIVAR visibility by promoting a dialog between the science community and the end-users.

ACTION 4: R. Sutton and J. Hurrell to prepare a short document on the NAO and impact in the stratosphere. To be available to the CLIVAR SSG and SPARC before the next JSC meeting , March 2001.

ACTION 5: Y. Kushnir and J. Hurrell to liase with R. Mechoso (mechoso@cloud.atmos.ucla.edu) and Carlos Ereño (ereno@arnet.com.ar) of VAMOS for investigation on the functioning of radiosonde GCOS network in the S. America

ACTION 6: M. Visbeck, Y. Kushnir and M. McCartney to liase with PAGES to investigate paleo-record availability for study of past NAO events

High latitudes Climate Variability: the programme ASOF

Bob Dickson presented ASOF (Arctic Sub-Arctic Ocean Flux array) a 20-year monitoring activity involving the Atlantic arctic community. The main objective of ASOF is to establish arrays of instruments in the Arctic in order to add new observations to freshwater fluxes and better monitor their influence on the Thermohaline Circulation. ASOF would complement SEARCH, a US climate variability programme at high latitudes. Bob Dickson asked the panel to review the proposal (to be found under “publications” at www.clivar.org/organization/atlantic/index.htm) and sought the endorsement of CLIVAR for the ASOF programme.

ACTION 7: M.McCartney and P. Koltermann to prepare review comments on RR. Dickson proposed ASOF (Arctic-Subarctic Ocean Flux array) project

Tropical Atlantic and the PIRATA array

Tony Busalacchi reported on two recent PIRATA meetings in Brazil, Natal 11-12 April and Fortaleza 14 September, (www.pmel.noaa.gov/pirata or www.brest.ird.fr/pirata/piratafr.html):

- Data return (66%) is affected by fishing vandalism. It was suggested to service the buoys in the Atlantic every 6-months;
- Brazil intends to continue to participate in PIRATA, through INPE and DHN; Brazil is also supporting the creation of an operational base in Natal together with a centre of oceanography and climate study.
- IRD in France is taking the lead in processing all PIRATA CTD data and helping with the common formatting
- There is discussion on the possibility of expanding PIRATA to be the Tropical Atlantic Observing System.

Gilles Reverdin sought the endorsement of the panel to hold a Tropical Atlantic workshop in Paris, after the next PIRATA meeting, (May 2001), under the auspices of CLIVAR. The workshop is intended to focus on the need of a tropical Atlantic coordination in the ocean-climate observing system, including all kind of observations, and modelling. A coordinating mechanism could take the form of a committee chaired by Silvia Garzoli and several panels.

ACTION 8: The DecCen Atlantic Panel endorsed the initiative of holding a CLIVAR Tropical Atlantic Workshop in Paris. The following is proposed:

- inform the scientific committee of the CLIVAR endorsement
- solicit the scientific committee to submit a detailed plan and objectives of the workshop.
- include Y. Kushnir and R. Sutton in the scientific committee
- include a member of COOP in the scientific committee
- hold the workshop in September 2001

Tony Busalacchi described the initiative of a co-Laboratory for tropical Atlantic Ocean data dissemination and research (see Appendix 3 for details) and reported on the workshop on Shallow Tropical and Sub-tropical overturning cells., Venice 9-13 October (the full report is available under “publications” at www.clivar.org/organization/atlantic).

Roberta Boscolo has been in contact with the chairpersons of the CLIVAR panels whose scientific objectives benefit from a close relationship with the Atlantic Panel.

- S. Zebiak (chairman of WGSIP) reported that WGSIP is beginning a project to develop standard diagnostics and outputs from model simulations and predictions. The idea being that these can be tailored to the needs of users, but also to the needs of CLIVAR science questions that are being pursued by panels such as the Atlantic Panel. This is just beginning but would probably involve some interaction between our panels down the road. WGSIP is interested in predictability and prediction of Atlantic anomalies; also data assimilation in the Atlantic
- R. Mechoso (chairman of VAMOS) reported that a key part of the moisture flux onto the South American continent comes from the tropical Atlantic. This aspect has been already highlighted to the US Atlantic Panel: There are links between the South American climate and the tropical Atlantic. The US panel has recognised that these links and their mechanisms are important research topics. The other issue of concern with North America is the generation of hurricanes over the Atlantic.
- C. Thorncroft (chairman of VACS) reported that Africa-Clivar wishes to promote an increased observational component in the tropical Atlantic to support research and prediction activity for African climate. A particular area of interest to Africa-Clivar is in the equatorial Atlantic and in the Guinean Gulf around 10°S and between the Greenwich meridian and the African coast. This is not well covered by PIRATA at present but it is an important area for Africa-Clivar for two main reasons: (i) the West African rainy season is known to be sensitive to variability in the SSTs in this region and (ii) coupled models have problems simulating the mean climate there in association with poor simulations of stratocumulus and poor simulation of equatorial trapped ocean waves. Warm/cold events in the tropical Atlantic are closely related to

the zonal slopes of the sea surface. St Peter and St Paul Rocks at the equator (near 38°W) and Fernando Po at the equator in the extreme Gulf of Guinea may be ideal locations for tidal gauges in order to observe this. These observations may be helpful for real time assimilation, for model validation and real-time monitoring for prediction activity. ARGO floats will be deployed in the Atlantic and Indian Oceans. It is recommended that these should be deployed in collaboration with African colleagues.

ACTION 9: Roberta Boscolo to inform C. Thorncroft (VACS panel co-Chair) of the CLIVAR Tropical Atlantic Workshop initiative and suggest to consider it as a forum for initiating discussions on additional required observations in the tropical Atlantic and Gulf of Guinea

South Atlantic

Alberto Piola reported on the CLIVAR Southern Ocean Workshop in Perth, Australia, November 16-18 2000 (www.marine.csiro.au/conf/socio/soow.html) and on the South Atlantic research activities in South America:

- Correlation between land precipitation and SST anomalies
- Water mass conversion in western South Atlantic
- AAIW/SAMW circulation and its correlation with the observed SSTA in the Subtropics

Mathieu Rouault informed the panel by e-mail on the South Africa research activities in the South Atlantic (look at www.egs.uct.ac.za/~rouault for more details):

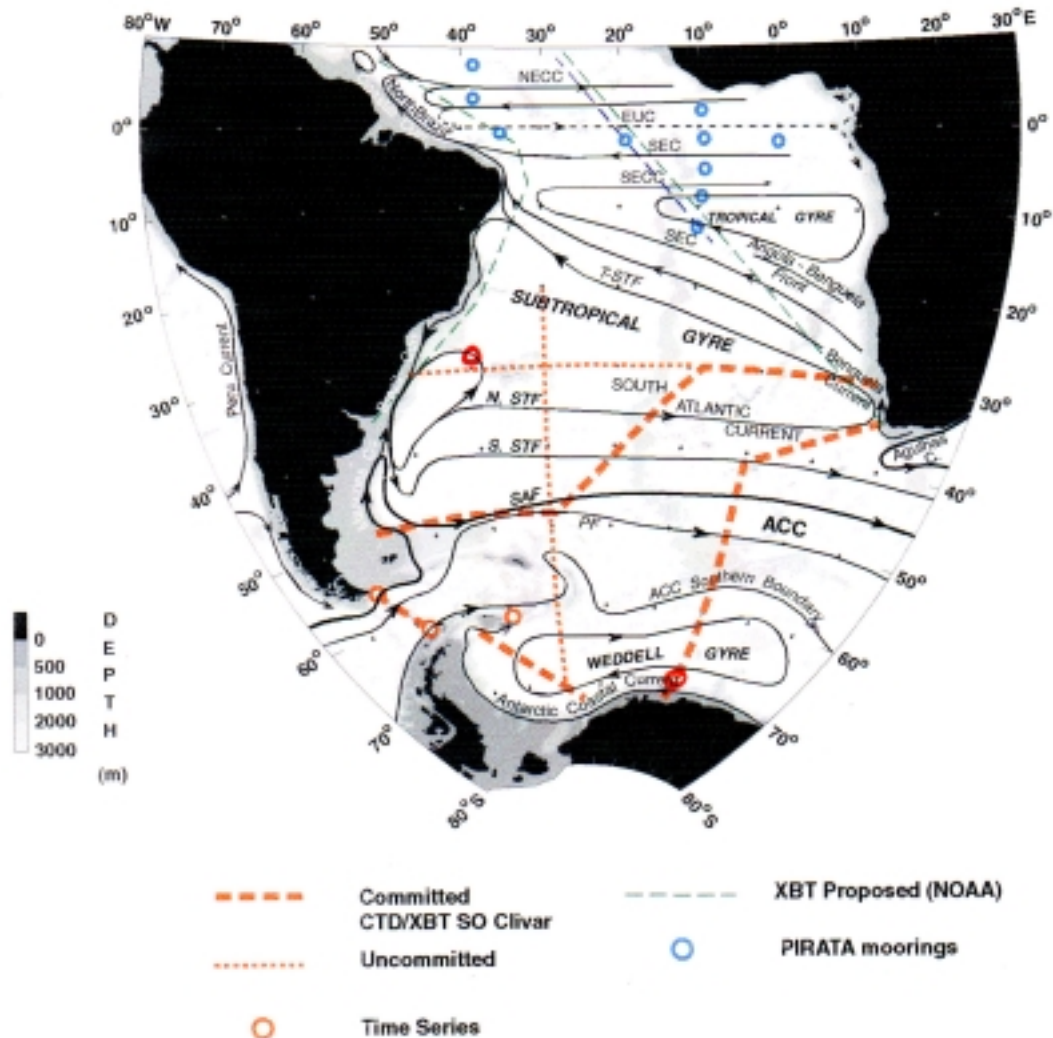
- Role of the Agulhas current on South Africa extreme rainfall events
- Role of the Atlantic in Walker and Hadley circulation in the south hemisphere and its relation to rainfall anomalies
- Role of Atlantic subtropical high on the Angola-Benguela system
- Warm anomaly in the Benguela/Angola system and application to fisheries
- Feasibility study of PIRATA extension.

Alberto Piola then showed the South Atlantic sustained observations, planned and proposed, here reported in Figure 1. It was pointed out by T. Delworth that the data coverage is quite poor.

ACTION 10: COOP is charged with making sure that the South Atlantic has a good coverage with ARGO floats

ACTION 11: Roberta Boscolo to produce a list of planned and proposed, cruises in the South Atlantic for a better co-ordination of float deployments.

Figure 1: South Atlantic sustained observations, planned and proposed.



Gilles Reverdin noted that ARGO decides on the parking depths of ARGO floats. On the other hand, some of the scientific objectives of CLIVAR might require shallower parking depths. The funding of these floats is often not through the same channels, and they are often not referred as ARGO floats. However it would be very valuable for these data to be public and processed through the same channels as the ARGO floats. The panel welcome the proposal of the Coriolis centre in Brest to process all profiling floats in the Atlantic.

The Atlantic Thermohaline Circulation

Allyn Clarke started the discussion noting that there are several cruises planned in the Atlantic for CO₂ measurements and suggested whether CLIVAR Atlantic should co-ordinate the hydrographic activities with the Carbon community.

ACTION 12: M. McCartney, A. Clarke and P. Koltermann to prepare a document on a set of hydrographic lines to be carried out in 2004 in the Atlantic. Co-ordinate the effort with the CO₂ community

Fritz Schott presented the CLIVAR hydrographic German activities:

- Mooring arrays in the sub-polar North Atlantic (www.ifm.uni-kiel.de/ro/sfb460/): Labrador Sea convection array, 53°N array in western Labrador Sea and Grand Banks array.
- Repeat deployments of moored current meter arrays in the NBUC area near 11°S. Multiyear records of transport and water mass variability in tropical sub-tropical Atlantic. Deployment of profiling T/S-floats for the determination of warm water pathways in western tropical Atlantic (www.ifm.uni-kiel.de/general/clivar/clivar-ta.html)
- The MOVE-Array consists of 3 CTD-moorings that cover the western basin of the North Atlantic between Guadeloupe and the Mid-Atlantic Ridge. About 16 Conductivity/Temperature Sensors are included in each mooring to sample the density structure of the NADW layer (1200 - 4500 m). (www.ifm.uni-kiel.de/general/clivar/send/clivar.html).

Michael McCartney introduced the US GAGE project that focuses on the narrow Guiana Basin near 16°N. GAGE is principally a moored current meter and temperature sensor experiment (6 moorings instrumented at 5 levels at and below 3000 m), supported by shipboard hydrography and acoustic Doppler current profiler measurements during the array deployment cruise in early 2000 and the array recovery cruise in early 2002. This enlarges the MOVE array to 10 moorings. The German programme will continue with a third year after the recovery of the GAGE equipment in early 2002, and it also is intended as a pilot program for a long term monitoring activity in the German contribution to CLIVAR. McCartney also reported on US the hydrographic programme in the Atlantic contained in ACVE (www.usclivar.org/USCLIVAR_VI/IMPL_PLANS/ATLANTIC/US_CLIVAR_ATL.HTM)

Gilles Reverdin noted that Ship-of-opportunity will remain relevant for monitoring the changes in water masses and in the transport of the warm branch of the meridional overturning cell. One such example is the ongoing work on the Nuka Arctica, a ship regularly crossing the Atlantic near 60°N between Denmark and western Greenland from April to December. The ship is equipped with a thermosalinograph, a hull-based acoustic Doppler current meter and is irregularly dropping XBTs along the way (future plans call for CO₂ monitoring in the surface waters; in addition to which the ship launches rawinsondes). The weakness of this particular monitoring project is that it is based on the efforts of individuals in France, Norway and USA, with little institutional backing. Another such project is with the Oleander between New York and Bermuda which has

provided a weekly monitoring of the Gulf Stream transport and water masses in the last 8 years.

Panel Organization

Allyn Clarke stood down from being Chairman of the panel and Martin Visbeck took over. Allyn Clarke will serve in the panel for another year. Discussion followed on how to extend the membership in order to include contacts/experts. The recommendations were

- South Africa (C. Reason)
- South and tropical Atlantic (S. Garzoli)
- Modelling Assimilation (V. Mehta)
- Mercator (?)
- Air-Sea fluxes (S. Anderson)

ACTION 13: Next meeting to be held at NCAR, Boulder, USA, 15-16 June 2001, after a 3-day meeting of the Atlantic US PIs.

APPENDIX 1: List of Attendees

| | | |
|---------------|------------------------------------|----------------------------|
| T. Busalacchi | ESSIC, University of Maryland, USA | tonyb@essic.umd.edu |
| A. Clarke | BIO, Halifax, Canada | ClarkeA@mar.dfo-mpo.gc.ca |
| T. Delworth | GFDL, Princeton University, USA | td@gfdl.gov |
| B. Dickson | CFAS, Lowestoft, UK | r.r.dickson@cefas.co.uk |
| J. Hurrell | NCAR, Boulder, USA | jhurrell@ucar.edu |
| P. Koltermann | BSH, Hamburg, Germany | koltermann@bsh.d400.de |
| Y. Kushnir | LDEO, Columbia University, USA | kushnir@ldeo.columbia.edu |
| M. McCartney | WHOI, Massachusetts, USA | mmccartney@whoi.edu |
| A. Piola | SHN, Buenos Aires, Argentina | apiola@hidro.gov.ar |
| G. Reverdin | LEGOS, Toulouse, France | gilles.reverdin@cnes.fr |
| F. Schott | IfM, University of Kiel, Germany | fschott@ifm.uni-kiel.de |
| R. Sutton | CGAM, University of Reading, UK | r.sutton@reading.ac.uk |
| M. Visbeck | LDEO, Columbia University, USA | visbeck@ldeo.columbia.edu |
| R. Boscolo | ICPO, Southampton, UK | rbos@soc.soton.ac.uk |
| E. Chassignet | RSMAS, University of Miami, USA | eric@akee.rsmas.miami.edu |
| J. Gould | ICPO, Southampton, UK | wjg@soc.soton.ac.uk |
| C. Koblinsky | NASA-GSFC, Maryland, USA | chet@neptune.gsfc.nasa.gov |
| D. Legler | US CLIVAR Office, Washington, USA | legler@usclivar.org |
| K. Mooney | NOAA-OGP, Maryland, USA | mooney@ogp.noaa.gov |
| J. Todd | NOAA-OGP, Maryland, USA | todd@ogp.noaa.gov |

APPENDIX 2: Agenda

29 November

18.30 - 20.00 Briefing and discussion on a proposed program ASOF (Arctic - Subarctic Ocean Flux array) to examine the variability in the Atlantic Thermohaline Circulation. In the presence of a limited number of panel members.

(discussion lead by Bob Dickson)

1 December

14.30 The International CLIVAR office is preparing a summary of the known on-going and planned programs in the Atlantic that are relevant to CLIVAR. Brief discussion on how we plan to use and modify this document in this and subsequent meetings.

(discussion lead by Roberta Boscolo)

15.15 Pull together information and ideas on the NAO / AO presented during the workshop:

- What scientific questions with regard to NAO/AO are we trying to address through an Atlantic CLIVAR program?
- What observations / analysis / modelling studies need to be sustained or added over the North Atlantic to address those questions?
- What observations / analysis / modelling studies do we already appear to have in place?
- What needs to be co-ordinated internationally?

(discussion lead by M. Visbeck, J. Hurrell and Y. Kushnir)

16.50 coffee break

17.10 ASOF revisited and discussed

(discussion lead by Allyn Clarke)

2 December

9:00 The tropical dipole / PIRATA / tropical processes in the Atlantic:

- Report on the PIRATA meetings in Natal and Fortaleza
- Report on the workshop on shallow tropical/subtropical overturning cells (STC) and their interaction with the atmosphere

(discussion lead by T. Busalacchi)

10.45 coffee break

11.00 Continuation of discussion and presentation of plans for holding a Tropical Atlantic Workshop under the auspices of CLIVAR

(discussion lead by Gilles Reverdin)

12.30 lunch

14.00 The South Atlantic.

- Implement global measurements in a sparsely sampled region.

- Investigate changes in the Indian to Atlantic heat and salt fluxes.
- Investigate changes in the oceanic fronts and their relationship to atmospheric systems and SST anomalies.
- Investigate changes in the Antarctic Intermediate Waters.
- Report on the Southern Ocean meeting in Perth, Australia

(discussion lead by A. Piola)

16.00 coffee break

16.20 The Atlantic Thermohaline Circulation

- Given the WOCE Atlantic survey in 1997, is 2004 during ARGO/GODAE a good time to do the repeat?
- What do we have in place or planned?
- What is needed?

(discussion lead by A. Clarke, F. Schott and M. McCartney)

17.30 Organization of the Panel: Suggestions for new members and decision on venue of the next meeting (M. Visbeck)

18.00 Review of the action items (R. Boscolo)

APPENDIX 3:

TropAtl.org: A Co-laboratory for tropical Atlantic Ocean data dissemination and research

V. Mehta, A. Busalacchi, J. Carton

Earth System Science Interdisciplinary Center, University of Maryland, USA

E. Campos

University of Sao Paolo, Brazil

S. Garzoli, R. Molinari

NOAA/Atlantic Oceanographic and Meteorological Laboratory, USA

Joao Lorenzetti

INPE, Brazil

M. McPhaden

NOAA/Pacific Marine Environmental Laboratory, USA

A. Moura

International Research Institute for Climate Prediction, USA

F. Schott

Institut fur Meereskunde, Germany

J. Servain

IRD, France

The Vision

To use capabilities of the current and Next Generation Internet with its associated Web and distributed computing technologies to disseminate tropical Atlantic Ocean data and data products to the research and applications communities via an international, multi-node, Web-based Co-laboratory

The scope of this Co-laboratory will be to

- Develop a portal to make operational and research observations of the tropical Atlantic, including research-ship traffic information and ancillary data, easy and freely available to research and applications communities in near-real time;
- Identify problems in and generate integrated data products from multi-source, multi-variable observations (e.g. objectively-analyzed and model-assimilated multi-dimensional data sets from remotely-sensed SST, ocean color, wind stress, sea-surface height, salinity; watermass properties from PIRATA buoys, ARGO floats, XBT's, and Volunteers Observing Ships; velocities from drifters; delayed-mode observations, etc.);
- Generate integrated data products from meteorological data, including in-situ and remotely-sensed meteorological observations relevant to the tropical Atlantic region assimilated in limited-area and global atmospheric models
- Integrate analysis and visualisation software with there data sets so that preliminary data analysis and visualisation can be performed by users without physically downloading the data sets;
- Co-ordinate there activities with the proposed oceanographic base in Natal, Brazil, and numerical weather prediction Centres such as NCEP, CPTEC, and ECMWF;

- Conduct observing-system experiments to fill gaps in the data and knowledge of the tropical Atlantic ocean-atmosphere system; and
- Generate experimental hindcasts, nowcasts, and multiyear outlooks of the state of the tropical Atlantic ocean-atmosphere system.

Such a Co-laboratory is needed because

- Traditionally, oceanographic and atmospheric observations are funded/collected by national agencies and are archived in the country that funded/collected them. A large number of such national archives of past data of the tropical Atlantic Ocean exist but are not easily available to researchers; sometimes, even the existence of such data sets is not widely known. Even currently-active observing programs are not widely known. These past and current data sets may be very useful in quantifying the role of the tropical Atlantic Ocean in generating regional and global climate variability and assessing climate predictability. Therefore, many CLIVAR Workshops and Panels have recommended that such data sets be made easily freely available to the user communities. A pilot project is needed to develop the concept of free, easy, and timely access to data, and to prove that such a concept can be made to work across national boundaries;
- Oceanographic observations are made usually in geographically-small areas over a limited period of time. In addition to their originally intended use, these data can also serve to provide a larger-scale picture of the ocean of some type of interpolation/extrapolation model-assimilation scheme is used to provide a dynamically-consistent and/or multivariable picture of the ocean state when the observations were made. Such data products can also be used to provide a reference or context of the past ocean states that can be used to evaluate the current and future ocean states;
- Several national and international agencies may be interested in supporting these activities. It may not be possible for them to support one or more existing mission-oriented research centres due to government regulations and/or institutional responsibilities;
- International climate research programs are implemented at the national levels. By allowing participation in such a Co-laboratory to individual or groups of researchers from several countries, a coherent and faster progress towards international program goals (e.g. CLIVAR) can be assured;
- Massive archival facilities are required to store and disseminate large data sets making centralisation of such facilities difficult and data dissemination from such facilities slow. A web-base Co-laboratory can exploit high-speed Internet communications and the availability of co-laboratory software and hardware systems connected to many server nodes to disseminate data and data products in near-real time; and
- Major investments of resources are required in global observing systems for long-term climate variability and predictability studies. The demonstration of such a Co-laboratory concept for the tropical Atlantic can later be expanded to include other geographical regions and data types, and would bring a higher level of national/international consensus and collaboration in planning and implementing long-term climate observing systems.

This Co-laboratory will contain

- A web-based portal with numerous server nodes;
- Analysis and visualisation software residing on one or more nodes; and
- One or more hard-copy archives of the available data and data products

Such an international Co-laboratory can be funded by

- Each national or international agency can support the Co-laboratory component(s) consistent with its mission; and
- Private organizations can support generation and dissemination of applications-oriented data and data products.

Oversight of this Co-laboratory can be provided by

- A group of eminent scientists to advise and monitor the Co-laboratory's activities;
- The CLIVAR Atlantic Panel to co-ordinate the Co-laboratory's activities with the science goals of CLIVAR; and
- A group of agency representatives to provide the Co-laboratory's resources requirements and monitor their use.

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