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CLIVAR

ANNUAL PROGRESS REPORT

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CLIVAR
Annual Progress Report
2007 for JSC-29



DELIVERED ADDED VALUE OF ACTIVITY / PROJECT

CLIVAR's mission is "to observe, simulate and predict changes in the Earth's climate system with a focus on ocean-atmosphere interactions, enabling better understanding of climate variability, predictability and change, to the benefit of society and the environment in which we live". In line with the WCRP overarching objectives and strategic plan, CLIVAR acts to encourage and facilitate national and international activities that contribute to our understanding of climate variability and our ability to provide improved climate predictions on seasonal, interannual, decadal and centennial timescales. It seeks to encourage the development and implementation of sustained observations of the climate system, field and modelling studies that help our understanding of climate processes and how they can be represented in models, analytical studies to assist our understanding of climate variability and coordinated effort in climate prediction. CLIVAR has a number of cross cutting science topics aligned with those currently providing the focus for WCRP: ENSO and other tropical modes of variability; monsoons; decadal variability; anthropogenic climate change (ACC); the role of the oceans in climate and climate prediction. CLIVAR's focus is on the physical climate system on both regional and global scales. It links with other programmes on the wider biogeochemical, ecological and human dimension aspects of the Earth system. In order to deliver CLIVAR Science, the CLIVAR SSG has established a number of global and regional panels and working groups¹. These, liaising as appropriate with other international bodies and national programmes, develop internationally coordinated activities attractive to national agency funding. The international dimension which CLIVAR brings adds value to the individual national agency efforts.

END USERS OF ACTIVITY / PROJECT OUTCOMES

End users include the sponsors of WCRP, a wide variety of international organizations including IPCC and UNFCCC, national agencies, the science community and beneficiaries of CLIVAR-sponsored workshops and training activities. In addition there are feedbacks (e.g. through IPCC) to policymakers and to governments and aid and planning agencies, commercial users and a wider public.

MAJOR ACTIVITIES AND ACHIEVEMENTS IN 2007

- A major highlight was the publication of the IPCC AR4 WG1 Report which featured much CLIVAR science. Many CLIVAR scientists also played leadership roles as convening lead authors, lead and contributing authors, and expert referees. One notable activity was coordination of the global coupled climate model runs by the WGCM and their archiving and dissemination for the worldwide research community by the PCMDI. Community access and analysis of this 35+ Tb data archive, from 15 modelling groups across 11 countries, continues unabated. As of November 2007, over 303 Tb of data had been downloaded by more than 1000 registered users and over 300 related journal articles had been published.

¹ These comprise the JSC/CLIVAR Working Group on Coupled Modelling (WGCM); Working Group on Seasonal to Interannual Prediction (WGSIP); the Working Group on Ocean Model Development (WGOMD). CCI/CLIVAR/JCOMM Expert Team on Climate Change Detection and Indices (ETCCDI); Global Synthesis and Observations Panel (GSOP); CLIVAR/PAGES Panel; Variability of the American Monsoon System (VAMOS) Panel; Variability of the African Climate System Panel (VACS); Asian Australian Monsoon Panel (AAMP); Atlantic Implementation Panel (AIP); Pacific Panel; CLIVAR//GOOS Indian Ocean Panel (IOP); CLIVAR/CliC/SCAR Southern Ocean Panel and the CliC/CLIVAR Arctic Climate Panel. The International CLIVAR Project Office (ICPO) is responsible for the coordination of the scientific and administrative aspects of CLIVAR, acting as the executive arm of the SSG under its general direction.

- Activity under WGCM (with IGBP AIMES) to set the strategy for the next generation climate simulations is underway (see below). Both WGCM and WGSIP are engaged in developing the protocol for the proposed “near term” decadal simulations out to ~2030.
- CLIVAR-organised the WCRP Seasonal Prediction Workshop (Barcelona, Spain, 4-7 June 2007) which gathered more than 180 scientists from 30 countries. WGSIP is coordinating the Climate system Historical Forecast Project (CHFP), formerly known as the WCRP TFSP Seasonal Prediction Experiment. The experimental design includes all the relevant interactions among land-ocean-atmosphere-ice (and thus defines a role for all WCRP core projects); use of observed climate forcing; emphasis on monsoon prediction; data management aspects and a call for diagnostic sub projects, following the CMIP protocol. An outcome of the workshop was a consensus statement on the current status of seasonal prediction, now available from the WCRP web site.
- WGOMD activities have been focussed on the completion of an intercomparison of 7 global ocean ice models run for 500 years using a fixed seasonal cycle of inputs to derive the atmospheric forcing. A joint paper for the peer-reviewed literature that documents the experimental design and simulation results of these CORE-I (Coordinated Ocean-ice Reference Experiment-I) integrations is in preparation.
- Extreme events continue to be the primary focal point for the ETCCDI. Their indices of extremes were used both in climate change detection work (benefiting from increased coverage enabled by capacity building ET sponsored workshops) and to describe observed and future changes in extremes projected by CMIP models. Both aspects contributed significantly to the WG1 AR4 Report. Current work is to further develop and publicize indices and indicators of climate change and variability through standardized software packages. New indices, with global coverage, are also being developed for heat stress, drought and greenhouse gas climate response.
- A hydrography advisory group, the “Global Ocean Ship-based Hydrographic Investigations Panel (GO-SHIP)” has been formed, co-sponsored between CLIVAR’s GSOP, the IOC International Ocean Carbon Coordination Project (IOCCP) and the SOLAS-IMBER carbon group. It brings together interests from physical hydrography, carbon, and biogeochemistry to develop guidelines and advice for the development of a globally coordinated network of sustained ship-based hydrographic sections that will become an integral component of the ocean observing system post-CLIVAR. The group is also leading a review of the WOCE Hydrographic Manual chapters and has contacted lead reviewers and authors to update each section. A meeting to initiate the activity was held in November 2007, in Victoria, B.C., Canada.
- GSOP held a 2nd Synthesis Evaluation Workshop at MIT in September 2007 aimed at coming to quantitative conclusions about which of the existing synthesis products can provide inputs useful for decadal studies. It also co-sponsored a Workshop on Ocean Velocity Measurements and their Applications held at Scripps, U.S. in November 2007. In liaison with the Ocean Observations Panel for Climate (OOPC), the panel has initiated plans for an OceanObs’09 symposium (see below).
- CLIVAR’s Ocean Basin Panels and GSOP continue to work with OOPC to address CLIVAR research needs for sustained observations. Argo, of which CLIVAR was an early co-sponsor, reached its goal of 3000 operating floats in October 2007.
- Under the AIP, the Tropical Atlantic Climate Experiment (TACE, running from 2006-10) has brought improved coverage of surface and subsurface data and dedicated process studies in the eastern tropical Atlantic. Building on the PIRATA array, French EGEE cruises, US and German programs, extended Argo coverage, a meteorological station at Sao Tome and additional moorings have all contributed. Modelling studies also form an integral component. The AIP organized a TACE/PIRATA meeting with AMMA at the AMMA Conference in Karlsruhe in November 2007. The panel has also contributed to development of plans for a project on the Western Tropical Pacific (WAVES) under VAMOS (white paper to be finalized in time for a workshop to held in Natal, Brazil in March 2008).
- Decadal predictability is now a focus for the AIP. The panel has promoted coordinated activities on this topic in the Atlantic, in particular RAPID/MOCHA, CLIMODE, German

CLIVAR-related activities and new EU Framework 7 proposals on decadal predictability and observations in the subpolar gyre. The AIP also co-organized a Subpolar Gyre workshop held in Kiel in March 2007 in conjunction with a panel meeting.

- In the South Atlantic, collaboration between AIP and CLIVAR's Southern Ocean Panel is coordinating and stimulating better coverage of observations and inter-basin exchange. NOAA/AOML activities are already ongoing (XBT line at 30S; new moorings are planned). In particular efforts are under way to monitor the heat and fresh water fluxes at 30S. A South Atlantic Workshop was held in Argentina in May 2007.
- Under CLIVAR's Pacific Panel, an ENSO-expert prediction forecast web-site has been developed that evaluates the seasonal forecasting skill of a multi-expert ensemble. It is being initially operated at APDRC for one year in experimental mode without public access. A white paper on ENSO metrics is also being developed. A workshop entitled "the Western Tropical Pacific – hatchery for ENSO and tropical teleconnections" was held in Guangzhou, China (26-28 November 2007), accompanied by a panel meeting.
- The Pacific Panel has been active in helping to develop the science plan, published in May 2007, for the South Pacific Ocean Circulation and Climate Experiment (SPICE), an implementation plan for which is in preparation. The panel is also coordinating links between SPICE, the VAMOS Ocean-Cloud-Atmosphere-Land Study (VOCALS) and NPOCE (the North-western Pacific Ocean Circulation Experiment).
- The Southern Ocean Panel continues to provide the lead for the IPY Climate of Antarctica and Southern Ocean (CASO) umbrella project and has drafted strategy recommendations for an integrated modeling effort in the Southern Ocean. The panel is also contributing to SCAR's development of the Southern Ocean Observing System (SOOS), a planning meeting for which was held in Bremen in October 2007.
- The IOP coordinates development of the sustained Indian Ocean Observing System (IndOOS) consisting of several observation platforms, including Argo floats, Volunteer Observing Ship XBT/XCTD sections, surface drifting buoys, the regional tide gauge network, a tropical moored buoy array, as well as the satellite observations. 15 sites in the tropical mooring array have been occupied, representing 32% of the total 47 sites proposed. The number of deployed Argo and surface drifting buoys in the Indian Ocean are closely reaching the planned coverage density, though continuous deployment efforts are needed to maintain this. Ship time shortage and vandalism are of increasing concern. A high level review of progress with IndOOS was carried out by the Indian Ocean GOOS regional alliance in December 2007.
- The work of the IOP also feeds directly into the efforts under CLIVAR's Asian-Australian Monsoon Panel (AAMP) to improve predictions of the Asian-Australian monsoon. The panel has been actively involved in organization of the APCC/CLIPAS project to analyse the A-A component of multi-model hindcast experiments. A set of metrics for assessment of the AAM in model simulations has also been developed, and efforts have been made to develop and compare forecast/simulation metrics for monsoon ISV (see below also). A major task for the chair of AAMP, in collaboration with GEWEX, has been the development of a Science Plan for the Asian Monsoon Years 2007-12 which coordinates some 21 regional projects and provides a major contribution to the WCRP International Monsoon Study cross cut. AAMP and GEWEX/MAHASRI jointly organized the third workshop on AMY (Yokohama, January 2008) to discuss the AMY Science Plan and initiate development of the AMY Implementation Plan.
- The US CLIVAR MJO Working Group has been leading work on the development of MJO diagnostics, the application of these to a suite of contemporary model simulations (coupled and uncoupled), and the development and operational implementation of an MJO forecast metric. The group held a workshop in Irvine CA, USA in November 2007 and a summary report is being prepared.
- Under CLIVAR's Variability of the African Climate System (VACS) Panel, the SAGRADEX programme for Southern Africa was initiated with a workshop in Cape Town in September 2007. Further development was also carried out on the web-based VACS African Climate Atlas, demonstrated at the GEO Summit in November 2007.
- Under CLIVAR VAMOS, planning for the VOCALS field program and associated

modeling efforts is well advanced. Advantage continues to be taken of the outcomes of the North American Monsoon Experiment (NAME) 2004 field campaign for diagnostic and modeling studies. The NAME 2004 data archive has now been completed as has the archive of value added products. A special issue of the *Journal of Climate* with approximately 25 articles has already been published with results from this campaign. Under the Monsoon Experiment South America (MESA), an assessment has been carried out of extreme event frequency changes (from the WCRP IPCC AR4 archive) and their impact on agricultural activities, with emphasis on seasonal climate prediction and extreme events, particularly drought in the MESA region. MESA Climate Indices have also been defined. In addition, the MESA Science and Implementation Plan is currently being revised and updated. VAMOS interactions with GEWEX in the La Plata basin (LPB) have continued with planning meetings for field studies and monitoring.

GOALS AND PLANS FOR MAJOR ACTIVITIES IN 2008 AND INTO 2009

- WGCM, in liaison with other groups, will continue to be engaged in setting the strategy for the next generation climate simulations that: (1) identifies new components in preparation for inclusion in AOGCMs (e.g. chemistry, aerosols, carbon cycle, dynamic vegetation); (2) establishes communication for coordination through the WCRP (WGCM and WGSIP in particular) and IGBP (AIMES in particular) and the Integrated Assessment (IA) modeling teams (the recently formed “scenarios consortium”); (3) proposes an experimental design for 21st century climate change experiments involving initialized short term (decadal prediction) experiments out to about 2030, and long term mitigation/adaptation experiments out to 2300; and (4) specifies the requirements for new stabilization scenarios (with regard to impacts, mitigation, and adaptation).
- WGSIP will coordinate the runs, data management and diagnostic sub projects for the Climate system Historical Forecast Project (see above).
- During 2008-9, WGOMD will explore the CORE-II experimental protocol which focuses on inter-annually varying forcing based on reanalysis and observational products, aiming for a peer-reviewed paper in late 2009. During 2008, WGOMD will also develop the concept of a “Repository for Evaluating Ocean Simulations”, giving web-based guidance on ocean model evaluation.
- The ETCCDI intends to initiate an assessment of the need for a detailed homogenization of extreme indices and develop a WMO guidance document, currently in the planning stage, on the analysis of extremes under “non stationary” conditions.
- The PAGES/CLIVAR Intersection Panel will hold a workshop on ‘Reducing and representing uncertainties in high resolution proxy data’ in Milemare-Trieste, Italy in June 2008. A panel meeting will be held in association with the workshop.
- The work of GO_SHIP (see above) will continue over the next 18 months to (i) develop a report that will be circulated widely for consultation and consensus on the way forward and (ii) update the WOCE Hydrographic Manuals.
- GSOP will contribute to the decadal prediction cross cut through ocean synthesis assessment. It will also develop a pilot project with the ocean carbon community on incorporating carbon data into ocean synthesis efforts, and it will encourage ocean synthesis groups to prepare a special IPY-period ocean synthesis. A major obstacle lies in the assimilation of ice data on which the panel is seeking inputs from CliC. Planning for OceanObs’09 will continue in collaboration with OOPC and others. The symposium will be held in Venice from 21-25 September 2009.
- Under the AIP, continued efforts and modeling will take place under TACE with enhanced observations during 2008 and organized modeling planned for 2008-10. The panel will also actively play a role in development and implementation of WAVES. AIP will convene a Decadal Predictability and MOC session at AGU Ocean Sciences, March 2008, Orlando, U.S. The panel will continue to contribute to EU and US efforts on MOC variability and predictability and will work with WGCM, GSOP and others on the planned WCRP cross cut decadal prediction studies. The next panel meeting will be in late 2008 in conjunction with a US predictability workshop. In 2009 a Workshop on Decadal Predictability is planned, possibly in collaboration with a new EU FP7 programme.
- Planned IndoOS deployments for 2008 include additional ATLAS moorings and ADCP

instruments by NOAA and NIO and further subsurface moorings (NIO). During 2008, the panel will also develop plans for MJO process studies in the region.

- AAMP will continue to develop its model intercomparison efforts building in particular on the CHFP and near term decadal experiments and others as a component of AMY. In addition, AAMP and MAIRS are jointly planning an “International workshop on Anthropogenic change of the Asian monsoon” (Nanjing, China, April 2008); AAMP is also helping to organize the WMO 4th International Monsoon Symposium (IWM-IV), (Beijing, China, October 2008).
- VACS will continue to implement SAGRADEX and other activities.
- The VOCALS Regional Experiment Field campaign will take place in October-November 2008. VOCALS is now a major international program with funding of order \$16-20 million. The La Plata Basin Regional Hydroclimate Project will in turn have monitoring activities and a field campaign with a focus on surface conditions in 2011. It is expected that the community at large will benefit from this experiment. In addition, MESA will continue its analysis of SALLJEX data and is planning the development of a field experiment (ANDEX) in the 2009-10 timeframe. ANDEX will be the link between MESA and VOCALS. An emerging focus is that of the Intra American Study of Climate Processes (IASCLIP) bridging the gaps between climate research for North America (NAME) and South America (MESA/SALLJEX/LPB) and for the Pacific (VAMOS) and Atlantic. VAMOS is working on its transition to this activity.
- AMMA, VACS (in association with AMMA) and VOCALS will seek in particular to provide key contributions to the JSC International Monsoon Study cross-cut.
- Note also a number of items under “outreach and capacity building” below.

INTERACTIONS (ESPECIALLY WITH WCRP’S SPONSORS & PARTNERS)

CLIVAR also has a wide variety of activities and therefore interactions. These include WCRP sponsor organisations, in particular with IOC through joint activity with GOOS (co-sponsorship of the IOP) and OOPC and the IOCCP. CLIVAR also has joint activity with IGBP Past Global Changes (PAGES) through the CLIVAR/PAGES Panel, and other links to IGBP through IMBER and GLOBEC. The WMO Commission for Climatology, JCOMM and CLIVAR jointly co-sponsor ETCCDI (delivering to each) and CLIVAR, CliC and SCAR the Southern Ocean Panel.

CHALLENGES AND CONSTRAINTS

Challenges for CLIVAR (and WCRP more generally) include:

- Determining the future vision for and shape of WCRP post the projects; this is seen as an urgent issue which could potentially be presented at WWC-3
- Given the current budgetary situation, maintaining the momentum and credibility of CLIVAR and WCRP and raising the appropriate levels of funds for activities.
- Obtaining “grass roots” buy-in to the cross cutting topics
- Determining the evolution of CLIVAR, including a focus on legacy, by its sunset date
- ICPO funding post March 31, 2010

An emerging constraint is the current process of budget allocation and management, including the difficulty of getting authority to spend. This is feeding back to the community (both within WCRP and more widely) resulting in adverse external perceptions.

PUBLICATIONS AND OTHER PRODUCTS

- *Special editions of Journals*

Journal of Climate, Vol 20, No. 9 (May 2007) Special edition: North American Monsoon Experiment (NAME)

Journal of Climate, Vol 20, No. 13 (Jul 2007) Special edition: Indian Ocean Climate

- *WOCE Pacific Atlas (January 2008)*

- *ICPO numbered publications to end January 2008 and since 1 April 2007:*

111 SPICE Science Plan

112 A strategy for climate change stabilization experiments with AOGCMs and ESMs

113 Report of the 4th Meeting of the CLIVAR/CliC/SCAR Southern Ocean Region Panel,

115 Report Of The Second Session Of The CCI/CLIVAR/JCOMM ETCCDI

116 CLIVAR/OOPC/Argo/GOOS/CPPS Workshop on the South Pacific

117 Report of the Tenth session of the JSC/CLIVAR WGCM

118 NAME Modelling and Data Assimilation: A Strategic Overview

119 NAME Science and Implementation Plan
 120 Report of the 8th meeting of the Atlantic Implementation Panel
 121 Report of the Second Session of the Global Synthesis and Observations Panel
 122 Report of CLIVAR SSG 14
 123 Report of the 4th meeting of the Indian Ocean Panel
 124 Report of the 11th Session of WGSIP
 125 Workshop Report: A monitoring system for heat and mass transports in the South Atlantic as a component of the Meridional Overturning Circulation.

- *Over 2007/8, editions of CLIVAR Exchanges were as follows:*
 Apr 2007, No 41 African Monsoon Multidisciplinary Analysis (AMMA)
 Jul 2007, No 42 Ocean Model Development and Assessment (edited by the late Peter Killworth)
 Oct 2007, No. 43 Seasonal Prediction
 Jan 2008, No. 44 Furthering the Science of Ocean Modelling

OUTREACH AND CAPACITY BUILDING ACTIVITIES

- The ETCCDI continues to provide workshops that have both capacity-building and enhanced spatial coverage of extremes indices as goals. The ET held a workshop on Climate Data Homogenization and Climate Change Indices in Central Africa, in April 2007 in Congo Brazzaville, jointly with the WMO Climate Data Management workshop on CLIMSOFT. Participants were from following countries: Angola, Cameroon, Congo, Central African Republic, Democratic Republic of Congo, Gabon, and Sao Tome & Principe. A further workshop was held in Vietnam in December 2007. A further capacity-building workshop to cover the Western Indian Ocean islands is at the proposal stage.
- VACS is exploring the potential for a follow-on to its capacity-building workshop on Southern and Eastern Climate predictability held in Dar es Salaam (July 2006)
- A Workshop on Climate Driving of Ecosystems has been organized under IGBP IMBER for April 2008 in Brest with the active involvement of the Atlantic Panel. This workshop is directed at graduate students and post-docs in marine biogeochemistry and ecosystems research. The workshop will involve lectures from CLIVAR scientists on climate variability and change, and hands-on exercises with Ocean Data View, Climate Explorer, Ocean Reanalysis, Atmospheric Reanalysis and IPCC model output data.
- CLIVAR's Pacific Panel will hold an ENSO Summer School in Hawaii, US in June 2008 aimed at graduate students and postdocs.

SCIENTIFIC STEERING COMMITTEE (SSC)

MEMBERSHIP CHANGES FOR CONSIDERATION

Given the current financial situation within WCRP, CLIVAR is not proposing to nominate replacements for the two SSG members whose term ends 31 December 2008. It does propose, however, to make one chair from each of its panels and working groups an ex-officio member of the SSG to aid buy-in to the programme.

IPO, PROGRAM ADMINISTRATION AND MANAGEMENT

Following a review of the work of the ICPO during 2007, the UK Natural Environment Research Council (NERC) agreed to extend the present contract for the ICPO for a further 2 years to 31 March 2010. A new bid to NERC will need to be made in the 2009 timeframe for support for the final years of CLIVAR. In addition, the ICPO continues to be generously supported by NASA, NOAA and NSF through US CLIVAR. Over recent months there has been some turnover of staff with one full time and one part time member leaving the office, replacements for which are currently being recruited. The current complement is 3.75 staff scientists (including vacancies) plus the Director and Office Manager. The Director, Office Manager and the vacant staff scientist posts continue to be hosted by the National Oceanography Centre, Southampton. Others are hosted by GFDL, Princeton, USA; IIM/CSIC, Vigo, Spain and the University of Buenos Aires. A full report of the work of the ICPO is at www.clivar.org/organization/ssg/ssg15/docs/ICPO_Report%20SSG15.pdf

ADDITIONAL COMMENTS FOR THE JSC

None

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