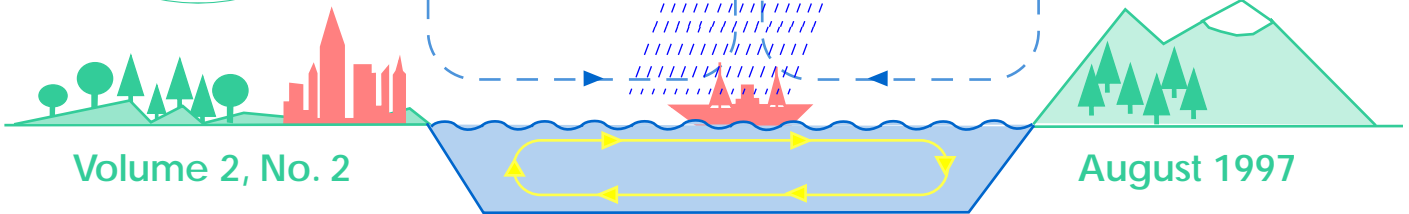


Exchanges



Volume 2, No. 2

August 1997

In this issue:

Editorial: Farewell Mike - Welcome Lydia	2
CLIVAR SSG Meets in Washington DC	3
Scientific Steering Group Refines CLIVAR Implementation Plan	4
Euroclivar - 3rd Session	5
Euroclivar Workshop on Cloud Feedbacks and Climate Change	6
CLIVAR NEG-1, Second Session	6
The El Niño Simulation Intercomparison Project (ENSIP)	8
Global Water Vapour in the World Climate Research Programme	9
International Sea Level Workshop	10
CLIVAR Publications	11
CLIVAR Calendar	12

CLIVAR

Research Programme

Principal Research Areas

Unifying Themes & Approaches

ENSO - Improving the Predictions	Prediction & Predictability
Variability of Asian-Australasian Monsoon	Global Modelling
Variability of American Monsoons	Downscaling
African Climate Variability	Global Sustained Observations
North Atlantic Oscillation	Improved Historical Data
Tropical Atlantic Variability	Paleoclimatic Data & Modelling
Atlantic Thermohaline Circulation	Reanalysis
Indo-Pacific Decadal Variability	Empirical Studies
Southern Ocean Thermohaline Variability	
Climate Change Prediction	
Climate Change Detection & Attribution	

Editorial: Farewell Mike - Welcome Lydia*ICPO Director, Mike Coughlan, Moves On.*

In July 1995 when the International CLIVAR Project Office (ICPO) opened in Hamburg for the first time it had Dr Michael Coughlan at the helm as the Director. Mike, a meteorologist by training, is with the Australian Bureau of Meteorology and while in Australia he participated in climate-related research and was instrumental with Bill Kininmonth in setting up the National Climate Centre in the Bureau. In the immediate previous 5 years he was attached to the NOAA Office of Global Programs in Washington D.C. where he took on the responsibility for developing a NOAA contribution to Global Energy and Water Cycle Experiment (GEWEX) and, as an OGP program manager, established the GEWEX Continental-scale International Project (GCIP) Project Office. In Washington he formed many valuable contacts especially with other programme managers in NOAA and other United States agencies, as well as around the world that have stood him in good stead.

Mike established a staff in Hamburg and enthusiastically began the task of developing a CLIVAR implementation plan working with Valery Detemmerman



in Geneva and the CLIVAR Scientific Steering Group. For CLIVAR he worked to establish a number of standing panels and working groups and he began the publication of the CLIVAR newsletter *Exchanges*. Indeed CLIVAR has flourished under his tenure to such an extent that he caught the eye of others, and he has now been appointed as the Director of the World Climate Programme Department at WMO Headquarters in Geneva, a position he takes up in September, immediately following the WCRP conference in Geneva.

Mike and his staff have facilitated and run many meetings of panels, working groups, committees, and workshops with a particular objective of realizing the first draft of the CLIVAR implementation plan. The latter is being published in two volumes. Volume one provides an overview and describes the framework of

INTERNATIONAL CLIVAR PROJECT OFFICE**DIRECTOR**

The Director of the World Climate Research Programme (WCRP) is calling for applications for the position of Director, International CLIVAR Project Office. The ICPO oversees the international coordination and implementation of CLIVAR and is located at the Max-Planck-Institute for Meteorology in Hamburg, Germany. Candidates should hold a Ph.D. or equivalent in atmospheric, oceanographic or other climate-related physical sciences and have considerable experience in the organisation of multi-disciplinary scientific projects. Candidates should also be fluent in English and be available for not less than four years starting as soon as possible after 1 May 1998.

The exact nature of the appointment will be determined in consultation with the successful candidate and the level of remuneration will be negotiated according to qualifications.

Letters of application with CV are to be received no later than **1 December 1997** and should be addressed to:

Director, WCRP,
c/o World Meteorological Organization
CP 2300,
CH-12111 Geneva 2,
Switzerland

Fax: +41 22 734 0357

global analysis and modelling activities plus regional focus programmes through which CLIVAR will be implemented. Volume two will provide much greater detail on the individual regional focus programmes. The first volume will be published in August 1997 in time for the WCRP conference and a draft of Volume 2 will also be available then. Bringing these to fruition has been the foremost task for Mike for a long time now and the fact that they are coming out as he leaves is a tangible accomplishment and a tribute to him.



Through Dr. Lennart Bengtsson and with German support, the ICPO is expected to remain in Hamburg, with Dr. Lydia Dumenil as Acting Director. Lydia is a senior scientist at the Max-Planck-Institut für Meteorologie in Hamburg. She studied Meteorology at the University of Cologne and after 5 years at the European Center for Medium Range Weather Forecasts in Reading she joined the group on theoretical meteorology at the University of Hamburg for 5 years. Since 1991 Lydia has been a member of Lennart Bengtsson's group at the MPI. She has a strong background on climate modelling with particular emphasis on the hydrological cycle and surface processes in atmospheric and coupled models. She has been a member of the CLIVAR Asian-Australian Monsoon Panel and has experience as an editor of *Climate Dynamics*. Moreover she has shown aptitude for organisation of meetings (e.g. several climate conferences) and has excellent communication skills. We welcome Lydia and look forward to working with her as we complete the first draft of the implementation plan and proceed with the CLIVAR Conference in April 1998 in Paris.

In the meantime, we will be advertising for a permanent director of the ICPO to take over about May 1998. With Mike Coughlan nearby and within reach, we believe CLIVAR has a strong friend in the World Climate Programme, and we wish him every success with his new appointment.

*Kevin Trenberth and Allyn Clarke
Co-chairs of the CLIVAR SSG*

CLIVAR SSG Meets in Washington DC

The CLIVAR Scientific Steering Group SSG met for its sixth session at the National Academy of Sciences in Washington DC, USA the week of 28 April. The main goals of the meeting were to review the current status of the draft implementation plan and to agree on a strategy to move the programme towards full implementation.

The SSG Chairs, Drs Clarke and Trenberth reviewed the relevant topics discussed at the eighteenth session of the Joint Scientific Committee for the WCRP which was held a month earlier. They noted in particular the decision to reconstitute CLIVAR NEG-2 as the Working Group on Coupled Modelling (WGCM), which would report to both the JSC and the CLIVAR SSG. This move was designed primarily to provide a clear WCRP interface with modelling activities associated with IPCC Working Group I, and to improve coordination of coupled modelling activities across all the WCRP projects.

In-depth Review of the Implementation Plan

SSG members had participated in many of the workshops and panel meetings that had been held in the past year to develop the Implementation Plan and individual members had taken responsibility to oversee the writing of various portions of the Plan. This Session was, however, the first opportunity the Group had to review the document as a whole. Each of the identified principal research areas (see following article) was briefly described and summaries presented of the reviews that had been made over the previous two months. The SSG provided feedback on each area and on the integrating elements of the Plan, and instructed the Project Office to work with the authors to finalise the document. In general it was felt that good progress had been made and that the document could be ready for publication by late summer. It was decided that a promotional overview document would be produced for the WCRP Conference in August and that a more detailed volume should be ready for wide distribution shortly thereafter. The latter would serve as the basis for discussions at an inter-governmental meeting to be held in Spring 1998 (see below).

Study Session on African Climate

Recognizing the importance of the African climate system in the context of global climate and the influ-

ence of global climate variations such as ENSO on the African climate, the CLIVAR Scientific Steering Group had identified *African Climate Variability* as one of the eleven principal research areas for CLIVAR and asked a small group of interested scientists to organize a study session at this meeting. Presentations were made by Prof. M. Jury (University of Zululand), Dr. P. Lamb (University of Oklahoma), and Dr. Y. Tourre (Lamont Doherty Earth Observatory of Columbia University). Based on these presentations and subsequent discussions, the SSG decided to form an African Climate Study Group. This Group would be responsible to the CLIVAR SSG for the development of a scientific plan and the conceptual design for an international project to investigate the variability and predictability of the African climate and to assess the climatic factors which contribute to phenomena such as desertification. The SSG noted that emphasis should be given to the research needed to determine the predictability of African climate and to underpin prediction, and not to the prediction process itself or the applications, which were being covered by other programmes.

"Let's go!" on American Monsoons

Prof. Carlos R. Mechoso reported on the Conference on American Monsoons (CONAM), which was held 17-20 March in Mexico City (see article in Exchanges Vol. 2. No.1) and which was co-sponsored by CLIVAR and the Inter American Institute (IAI). At this meeting scientists from a dozen nations reported on recent findings related to the North American and South American warm season monsoon systems, their controlling influences on the environments of both continents and their impacts on the socio-economic well-being of the many nations which come under their influence. Conference participants concluded that the time was right for a concerted international action to launch a research project on Variability of the American Monsoon Systems. The CLIVAR SSG welcomed this recommendation along with the acronym "VAMOS" which in Spanish means "Let's go!", and decided to create a VAMOS Panel whose first job would be to formulate a detailed scientific plan and conceptual design of such a project. Professor Mechoso of UCLA will chair the Panel.

CLIVAR Science at the National Level

Climate science inherently involves the entire globe, hence co-operation among nations is essential. The SSG plays a key role in facilitating the interna-

tional co-ordination of climate science, and accordingly devoted almost a full day to reports from representatives of national agencies and international groups about what they were doing or planning to do in support of CLIVAR objectives. At the end of the day it was clear that a great many CLIVAR-related activities were already underway or planned. Nevertheless, there was also the message that science-funding budgets in many countries were coming under increasing scrutiny and a coherent CLIVAR Implementation Plan could assist in securing funds for climate research.

CLIVAR Conference to go ahead

Considerable discussion revolved around the extent to which the CLIVAR implementation plan would actually influence national plans to contribute to an international programme. Could CLIVAR go beyond facilitating what countries were already planning to do and provide firm intellectual and organisational backing for a more coherent programme? The general sense was that, while CLIVAR should certainly do the former, we could not move forward effectively on the latter until we knew what individual nations were planning to do and what were their priorities relative to those that had been identified by the scientific community over the past year and were now embodied in the Implementation Plan. Hence the SSG decided to go ahead with plans for a major CLIVAR conference the week of 20 April 1998 at UNESCO Conference Centre in Paris, France. The Implementation Plan would serve as the basis for discussion, and nations would be asked to present how their plans and priorities would fit into the CLIVAR plan. Gaps would be identified and a strategy developed to fill them. A first announcement of the Conference will be issued in September.

V. Detemmerman

Scientific Steering Group Refines CLIVAR Implementation Plan

As noted above, the SSG has recently conducted an in-depth review of the outcome of the CLIVAR-sponsored planning meetings held over the past eighteen months. These meetings were convened to develop the broad framework for implementing CLIVAR and to identify specific areas of research for fleshing out that framework (see April, 1997 issue of Exchanges). The SSG decided that the Initial Implementation Plan should be detailed where ongoing and proposed ef-

forts are currently well-defined and should identify the directions that areas of focussed research are expected to take over the next 5-10 years. Updates to the implementation plan will be issued at irregular intervals as regionally oriented projects are developed and as the global programmes continue to evolve.

The key task was to prepare a credible implementation plan that has the global perspective necessary for studying the entire climate system and at the same time attractiveness to researchers and national funding agencies that may have scientific and practical interests focussed at a more regional scale. The path taken by the SSG was to structure a plan comprised of a number of principal research areas drawn together by a set of unifying themes and approaches. The principal research areas were refined down by the SSG to eleven and are grouped in a way that reflects their geographical and phenomenological bases (see figure, page 1). The effect is to generate an integrated research programme structure that extends from regional to global spatial scales and spans a broad spectrum of time scales.

An implementation plan requires concrete proposals for observations, process studies and modelling. This was achieved for the CLIVAR Implementation Plan by refining the scientific questions in the context of the identified principal research areas, by reviewing the state of knowledge and, to provide a sense of priority, through assessments of:

- prospects for advances in the science;
- readiness to proceed;
- technical feasibility and costs;
- probabilities for multiple payoffs;
- opportunities for collaboration with other programmes;
- balance amongst activities competing for resources; and
- the likelihood of early benefits to society.

The first of the two documents to develop the CLIVAR implementation plan along these lines has been published to coincide with the International Conference on the World Climate Research Programme: Achievements, Benefits and Challenges, Geneva, 26-28 August, 1997. This document outlines the framework of global analysis and modelling activities, and the principal research areas through which CLIVAR will be implemented. The second document, which is in preparation, will provide greater detail on each of the principal research areas and on important integrating activities such as global scale modelling and analysis. It is this second document that will form the

basis for discussion at the CLIVAR implementation conference now scheduled for Paris in April 1998.

The Implementation Plan will inevitably evolve in time and the challenge for CLIVAR is to identify the critical areas in which co-ordination and international infrastructure can make the research endeavours more effective. It is important to realise the depth of involvement already of the scientific community in pursuing the CLIVAR plan development; this will continue and broaden as the initial plan is circulated, and as nations commit to various tasks. The CLIVAR Scientific Steering Group is grateful to and thanks the many scientists who have stepped forward to participate in this process, and especially the chairpersons and organisers of the working groups, workshops and writing groups.

M. Coughlan

Euroclivar - 3rd Session

The Euroclivar committee met on 24 April for its third meeting. A principal discussion point was the status of the series of workshops being convened to help implement CLIVAR in Europe.

A workshop on 'Cloud Feedbacks and Climate Change' was recently held at the Hadley Centre. The general recommendations (see following article), are incorporated into a Euroclivar report, along with abstracts of each of the talks. Copies of the report are available from the Euroclivar Office.

"Past Climate Data" is the subject of the next workshop, to be held in Abisko, 1 - 3 September 1997.

A joint Euroclivar / UK DoE¹ workshop on 'Climate Change Detection and Attribution' will be held at the Hadley Centre in April 1998.

Other workshops, planned for 1998, cover a wide range of topics:

North Atlantic Climate Variability; Scale Interaction in the Tropics and Data Assimilation in OGCM's.

The next committee meeting (Bologna 9 - 10 October) will discuss recommendations to the European Union for Climate Variability Research under the next funding round (Fifth Framework Programme).

More information about Euroclivar can be found on <http://www.knmi.nl/euroclivar>

G. Komen

1. Department of Environment

Euroclivar Workshop on Cloud Feedbacks and Climate Change

April 9-11, 1997

A workshop on Cloud Feedbacks and Climate Change was held at the Hadley Centre for Climate Prediction and Research (April 9th-11th, 1997). There were 19 participants from Europe and two from the USA, whose specialist knowledge could not be covered by European participants. The aim of the workshop was to bring together European GCM modellers, cloud scale modellers and those involved in making and interpreting observations of cloud properties on a range of spatial scales, and to focus the shared expertise of these communities on improving cloud-climate feedbacks in GCMs. The long-term goal is to identify those cloud processes that are the most important in the determination of climate sensitivity.

The meeting was divided into 3 sessions; Modelling Cloud Feedbacks and Climate Change, Cloud Process Studies and Observations, Observational Impacts of Clouds. The final day was dedicated to workshop discussions and the preparation of general and specific recommendations towards improving our understanding of cloud feedback mechanisms.

The following general recommendations emerged from the discussions:

Modelling and data groups should put much more emphasis on studies to isolate specific cloud processes and mechanisms of cloud feedback. This can be achieved in a number of ways, for example, through greater use of 'synoptic type' or 'cloud system' composite studies or through the retention of more temporal and spatial information in both models and observations. Observational data studies should be designed to study relationships between variables that can also be studied within models (and vice-versa). Studies of mechanisms of cloud feedback require researchers to have a broad understanding of both model and observational data. Few people currently have both skills and there is a need to focus education and training to develop such cross-expertise.

Greater use should be made of the hierarchy of model and observations to integrate cloud studies across the range of scales. Models scales range from GCMs through single-column models to cloud-resolving models. Observations vary from *in-situ* aircraft measurements for individual clouds through lidar and radar measurements of synoptic systems to global

satellite measurements at around the GCM grid-scale. For the purposes of parameterization development, model validation and testing sensitivities and ultimately linking detailed observations on the cloud scale to cloud parameterizations on the GCM scale, a hierarchical approach to both modelling and observations is needed.

A WCRP-sponsored joint meeting between the WGRF and JSC/CLIVAR WGCM (formerly NEG-2) should be organised (by mid-1998) to discuss strategies for observation-to-model and model-to-model comparisons, the definition of cloud feedback, and the organisation of an international meeting on cloud feedbacks.

Reanalysis groups were urged to pay more attention to cloud and hydrological data. They should also establish better connections with groups in GEWEX and CLIVAR that are working on hydrological issues. This would help ensure that as much attention is paid to the correct production of cloud and related hydrological diagnostics from the next reanalysis projects as has been the case for the more basic model variables in the current reanalyses.

C.A. Senior

For more information:
Euroclivar Office
P.O. Box 210
3730 AE De Bilt
The Netherlands
Phone: + 31 30 2206 676/349
Fax: + 31 30 2210 407
e-mail: euroclivar@knmi.nl

CLIVAR NEG-1 comes to Hamburg

The Numerical Experimentation Group with the responsibilities for oversight of CLIVAR's seasonal to interannual modelling programme (NEG-1) met in Hamburg for its second session 12-15 May, 1997. Under the joint chairmanship of Neville Smith and Mark Cane, the Group conducted a thorough review of progress on the suite of activities initiated at its first session in Jamaica. The Group also examined the many links and interactions between these activities and those of other working groups and panels sponsored by CLIVAR, the WCRP and other programmes.

The principal activities being undertaken by NEG-1 are as follows:

El Niño/Southern Oscillation (ENSO) Simulation Intercomparison Project (ENSIP)

This project was initiated in association with the Coupled Model Intercomparison Project (CMIP) being sponsored by NEG-1's companion group, the Working Group on Coupled Modelling (formerly NEG-2). Fourteen models from around the world are participating in the project to investigate the simulations of ENSO in both global and regional domain coupled models. An up-to-date summary of the project can be found in the following article.

Study of Tropical Oceans in Coupled Models (STOIC)

This project is similar in design to ENSIP with an emphasis on oceans other than the Pacific. As to be expected, the number of modelling groups concentrating on areas outside the Pacific is less. Nevertheless, there have been sufficient participants for the Group to begin an examination of model strengths and deficiencies in a systematic way. For example, most models tended to exhibit the same cold bias in sea surface temperatures that they have exhibited for the Pacific.

Seasonal Modelling Intercomparison Project (SMIP)

The work carried out under this project mostly involves the co-ordination of two separate intercomparison projects being conducted under the U.S. Dynamical Seasonal Prediction Project (DSP) and the European Project on Prediction of Climate Variations on Seasonal to Interannual Timescales (PROVOST). It appears that while a number of global models run-out in predictive modes for several seasons are currently capable of capturing the sense of the large climatic swings, most errors occur when the climate of a particular season does not stray far from normal. Interpretation of forecasts also tends to be more problematical in these cases. The issue of an optimum model resolution too remains under debate and the Group resolved to continue the project over the next year.

Monsoon Simulations

At present this project is primarily focussed on the work of the European SHIVA Project using uncoupled model runs. Accordingly, there is considerable scope for collaboration with the second phase of the Atmospheric Modelling Intercomparison Project (AMIP), including the submission of sub-projects directed at monsoon problems. It is anticipated that modelling of monsoons under CLIVAR will increase as the two monsoon projects established under CLIVAR, viz. The Asian/Australian Monsoon and the

Variability of American Monsoon Systems (VAMOS) move into their respective implementation phases.

Intercomparison of NIÑO-3 Forecasts

The purpose of this project is to examine how well current experimental seasonal predictions of sea surface temperature in the so-called NIÑO-3 region of the equatorial Pacific (5°N-5°S, 150°W-90°W) perform against observed outcomes and how they compare amongst themselves. Predictions from several model types have been submitted, including those based on neural network analysis, principal oscillation pattern (POP) analysis as well as several derived from models with varying degrees of dynamical and physical complexity. The results are as yet preliminary and the Group agreed to extend the project, suggesting a number of strategies that might be followed in the analysis, e.g. characterising times when models perform well or perform badly. The workshop on Dynamic Extended Range Forecasting in Toulouse, France in November would provide a good opportunity for presenting the first results of the project.

Ocean Model Simulations

The objective here is to examine the response of various ocean models to the surface winds from the reanalyses of enhanced operational data sets carried by the European Centre for Medium Range Weather Forecasting and the U.S. National Centers for Environmental Prediction. The intercomparison will focus on the basic state and variability of the upper layers of the ocean in the tropics. The quality of the reanalysis products, their strengths and weaknesses are only beginning to emerge and the Group noted that some care will be needed in reaching a satisfactory level of commonality between the experimental set-ups adopted by participating groups.

Co-ordination Issues and Future Work

Since the completion of the TOGA Project there has been an upsurge in the number of groups throughout the world producing experimental seasonal predictions based on the knowledge obtained during or stimulated since by the TOGA efforts and, in particular, the ability to model certain facets of ENSO. Some prediction schemes have already moved into an operational domain with the forecasts being tested and evaluated by user groups in agriculture, industry and government. At the same time there are structures being established at national and international levels to place the routine production of seasonal to interannual prediction on a more secure and systematic footing. Accordingly, the Group spent some time

addressing how best to collaborate and work with the emerging new structures, and to continue to serve the needs of CLIVAR and the broader WCRP most effectively on problems of seasonal to interannual prediction. The challenge of predicting ENSO-driven outcomes remains significant, as do the challenges of predicting the onsets and year to year variability of monsoon systems throughout the world, including those over the African continent. Further, there was increasing recognition of the need to consider the effect that longer term, decadal-scale, variations can have on predictions based on modes of variability with time scales dominantly in the seasonal to interannual range. Finally, the potential for making seasonal to interannual climate predictions that will benefit those countries, mostly in the higher latitudes, that are not strongly affected by ENSO or monsoon circulations remains uncertain.

M. Coughlan

The El Niño Simulation Intercomparison Project (ENSIP)

M. Latif

*Max-Planck-Institut für Meteorologie, Bundesstr. 55,
D-20146 Hamburg, Germany,*

K. Sperber

*PCMDI, LLNL, P. O. Box 808, L-264 Livermore,
CA 94551, USA*

The El Niño Simulation Intercomparison Project (ENSIP) is an initiative undertaken under the auspices of the CLIVAR-GOALS Numerical Experimentation Group (NEG-1). It dovetails with the Coupled Model Intercomparison Project (CMIP) initiated by the JSC/CLIVAR Working Group on Coupled Modelling (WGCM, former NEG-2) and is aimed to document El Niño simulations in coupled ocean-atmosphere models. Outputs from 14 rather different coupled models have been collected so far, including regional and global models, including coarse-resolution and high-resolution models, and flux-corrected and freely running coupled models. ENSIP is a logical follow up of earlier intercomparison studies undertaken by Neelin and Latif et al. (1992) and Mechoso and Robertson et al. (1995).

Sets of monthly mean fields for a minimum of 20 years of model integration have been intercompared. Sea surface temperature (SST), wind stress and upper ocean heat content (300-400m) were investigated in order to obtain indications for the underlying ENSO dynamics in the different coupled models. Addition-

ally, two Indian Summer Monsoon indices were requested to study the interactions of the Indian Summer Monsoon with ENSO. Since air-sea interactions play a key role for the mean state and the annual cycle in the tropical Pacific also, the performance of the coupled models with respect to these two aspects was also investigated.

The following preliminary results are noted:

Most models show a cold bias at the equator and have problems in simulating SSTs near the boundaries.

Many models still have problems simulating the annual cycle, which applies even to flux corrected models.

The existence or absence of interannual variability does not seem to depend on the quality of the simulation of the mean state or the annual cycle. Also, there seems to be no relationship between the application of flux correction and the quality of a simulation of the interannual variability.

Only a few models show clear "delayed action oscillator"-type behaviour in upper ocean heat content and SST.

Most models show relatively strong anti-correlations between the two Indian Summer Monsoon Indices requested and tropical Pacific SSTAs, and this is consistent with what is known from observations.

The initial phase of ENSIP will be concluded by the end of July 1997. The results will be published as a WCRP report, and later a multi-author paper will be submitted to a refereed journal. An ENSIP-II will be initiated parallel to CMIP-II, dealing with the changes in the ENSO statistics in response to global warming.

References

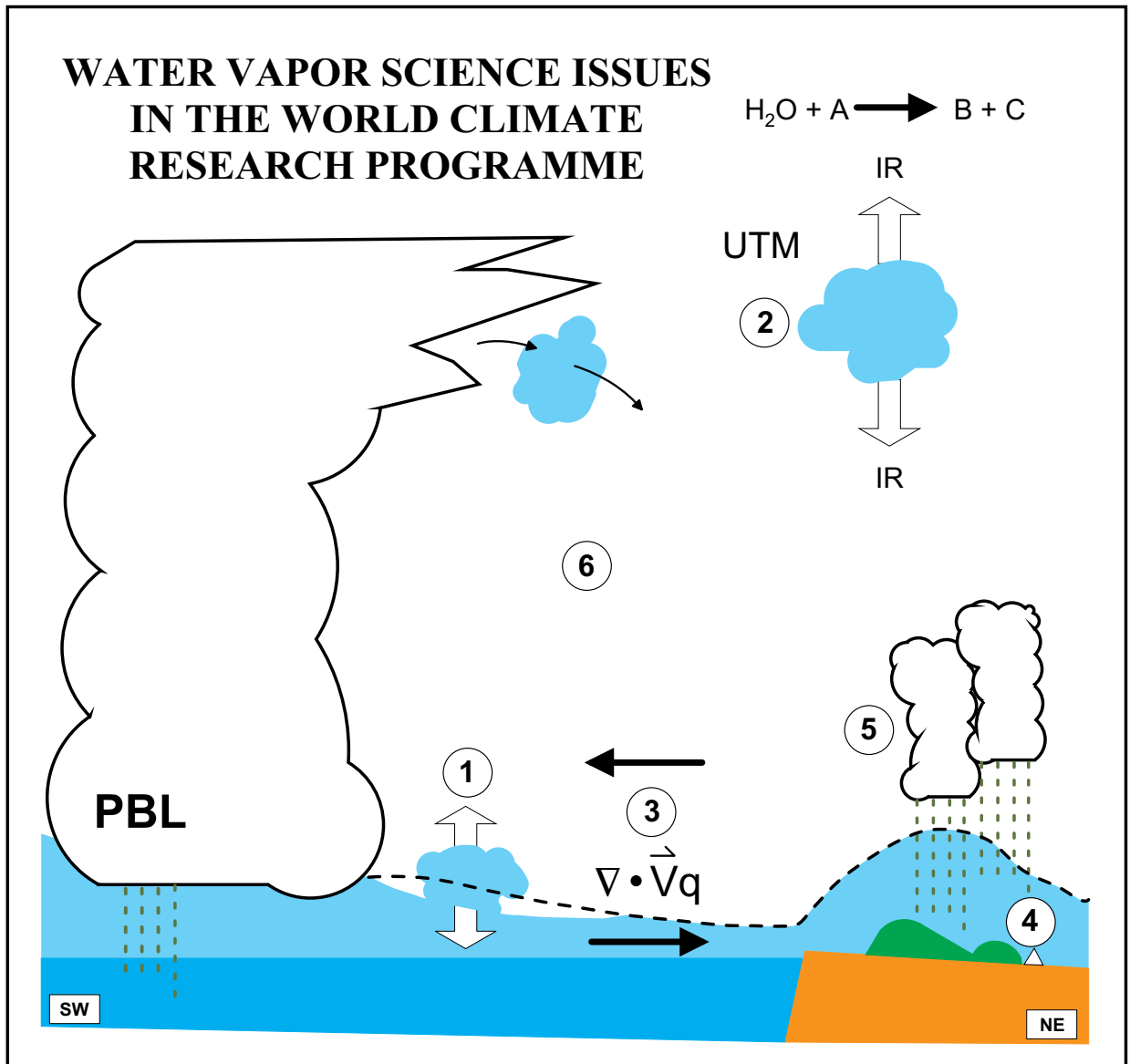
- Neelin, J.D., M. Latif, M.A.F. Allaart, M.A. Cane, U. Cubasch, W.L. Gates, P.R. Gent, M. Ghil, C. Gordon, N-C. Lau, C.R. Mechoso, G.A. Meehl, J.M. Oberhuber, S.G.H. Philander, P.S. Schopf, K.R. Sperber, A. Sterl, T. Tokioka, J. Tribbia, S.E. Zebiak. (1992) : Tropical Air-sea Interaction in General Circulation Models, *Climate Dynamics*, **7**, 73-104.
- Mechoso, C.R., A.W. Robertson, N. Barth, M.K. Davey, P. Delecluse, P.R. Gent, S. Ineson, B. Kirtman, M. Latif, H. Le Treut, T. Nagai, J.D. Neelin, S.G.H. Philander, J. Polcher, P.S. Schopf, T. Stockdale, M.J. Suarez, L. Terray, O. Thual, J.J. Tribbia (1995) : The seasonal cycle over the tropical Pacific in coupled ocean-atmosphere General Circulation Models, *Monthly Weather Review*, **123**, 2825-2838.

Global Water Vapour in the World Climate Research Programme

Thomas H. Vonder Haar

Colorado State University Fort Collins, Colorado 80523, USA

e-mail: vonderhaar@cira.colostate.edu



- ① Lower Troposphere Climate Feedback, T, Clouds, etc.
- ② Upper Troposphere / Lower Stratosphere “Greenhouse” and Chemical Effects
- ③ Horizontal Transports of Water Vapour / Latent Energy
- ④ Local and Regional Water Budgets; Atmosphere - Biosphere - Hydrosphere Interactions
- ⑤ Role of Water Vapour in Major Monsoon Systems
- ⑥ Assimilation and Representation of Water Vapour in Climate Models

Global and regional research on water vapour has always been a priority in both individual and programmatic climate research. Today a renewed emphasis on global water vapour research is stimulated by converging results of climate science studies as well as from new water vapour data sets and measurement methods. Some of the well-recognized research issues in the World Climate Research Programme (WCRP) are noted in the figure on page 9. The figure is a representation of a typical SW to NE cross-section of the earth-ocean-atmosphere system extending from the deep tropics into a subtropical continental area.

Science questions still remain concerning C.G. Simpson's hypothesis regarding lower tropospheric temperature/water vapour/cloud feedback ①. Results from time-dependent, carbon dioxide doubling scenarios from climate models show that lower tropospheric water content may increase by 25% thereby significantly affecting infrared radiation to the surface.

Numerous recent papers have discussed upper tropospheric moisture (UTM) and water vapour in the lower stratosphere with regard to mesoscale and large-scale atmospheric dynamics ②. Fortunately, new observations of several types are aiding research in this area.

Since we have not yet closed the problem of understanding large-scale energy transports in the climate system, new results on water vapour transport are required in parallel with new data on sensible heat and potential energy transport by the oceans and atmosphere ③.

Regional atmosphere-biosphere-hydrospheric interactions involving water vapour and other parameters ④ are under special climate study with the use of higher resolution, coupled models. Impacts ranging from local to global have been discussed in the literature.

As the principal energy source for Earth's several monsoon systems ⑤, detailed regional water vapour variability studies are planned by several groups. Finally, the assimilation of water vapour variations into short-range climate forecast models ⑥ and the proper representation of it in long-term climate simulations is an ongoing effort for model improvement and verification.

In recognition of these challenging climate research issues and the new opportunities for water vapour-related research, the WCRP has established the Global Water Vapour Project to share and focus ideas and results. It is a cross-cutting research project involving the CLIVAR, GEWEX, and SPARC programmes.

Additional collaborations are expected with scientists in ACSYS, WOCE, and certain elements of IGBP. Following a successful water vapour research pilot phase under GEWEX, the new, global project addressed to science questions such as those noted above will be implemented for the benefit of all WCRP science through the International GEWEX Project Office. A 7-year project is being planned based upon a series of national and international scientific workshops and meetings. Opportunities exist for scientists from all nations - and for specific national commitments - to contribute to the Project of the WCRP. Water in all its forms (vapour, liquid, and ice) has emerged as a keystone of research on interactions of the global energy and water budgets of the climate system.

Thomas H. Vonder Haar

International Sea Level Workshop

An International Sea Level Workshop was held in Honolulu, June 10-11. The effort was sponsored by the United States National Oceanic and Atmospheric Administration (NOAA) in co-operation with the CLIVAR Upper Ocean Panel (UOP), the WCRP/GCOS/GOOS Ocean Observation Panel for Climate (OOPC), and the GLOSS Group of Experts (GLOSS GE). The Workshop was chaired by Neville Smith (Australia), chairman of the OOPC; twenty one scientists from eight countries participated.

The effort sprang from the need to define the "subset" of tide gauge stations required for climate purposes. The Final Report of the OOSDP first documented this need. The CLIVAR Science Plan subsequently reinforced the requirement for design of a climate subset of tide gauge stations, as did the OOPC. The scientific agenda emerging from CLIVAR highlights the need for *in situ* sea level data for a variety of climate problems. The Workshop made a first attempt at articulating those needs and matching the available tide gauge sites against the requirements.

The agenda was directed toward considering the advantages and weaknesses of the tide gauge network for serving CLIVAR science needs. The Workshop was not looking for "sea level solutions," but rather for the contributions made by sea level data to the solution of climate problems. The sea level network was considered part of a larger, complex system; so account was taken of synergies, uniqueness, and possible proxies.

The success of the Workshop was due in large measure to the three key international panels (CLIVAR

UOP, OOPC, GLOSS GE) tackling the climate/sea level issue through this co-ordinated effort. The Workshop recommended that a permanent Scientific Working Group be established (with membership from the three panels) to facilitate global implementation according to the scientific requirements as specified by the various international programmes. The Group would also provide advice to the various programmes on the potential of the *in situ* sea level measurement system.

The Climate Sea Level Network Plan resulting from the Workshop will provide a substantial foundation for future operational and research activities. The Workshop Report will be available in the September 1997 time frame.

M. Johnson, NOAA/OGP

CLIVAR Publications

Publications available from the ICPO
(August 1997)

- CLIVAR: A study of climate variability and predictability - Science Plan;
- CLIVAR DecCen / ACC Numerical Experimentation Group (CLIVAR NEG-2) - Report of the first Session
- CLIVAR Upper Ocean Panel (CLIVAR UOP): - Report of the first Session
- CLIVAR GOALS Numerical Experimentation Group (CLIVAR NEG-1) - Report of the first Session
- CLIVAR DecCen / ACC Numerical Experimentation Group (CLIVAR NEG-2) - Report of the second Session

- CLIVAR GOALS Asian-Australian Monsoon Panel - Report of the first Session
- JCESS/CLIVAR Workshop on Decadal Variability
- CLIVAR Scientific Steering Group - Report of the fifth Session
- CLIVAR Upper Ocean Panel (CLIVAR UOP) - Report of the second session
- GCOS/CLIVAR TAO Implementation Panel, Report of the fifth Session, Nov. 1996. Copies are available from the TAO Project Office, NOAA/PMEL, Seattle, USA.
- TOGA Pseudo-stress Atlas 1985-1994, Volume 1: Tropical Atlantic, September 1996, Joint Publication by ORSTOM (IFREMER) and COAPS (FSU). Contact International CLIVAR Project Office or Jacques Servain at ORSTOM (IFREMER, Centre de Brest, Plouzane, France), e-mail: servain@orstom.fr
- Learning to Predict Climate Variations Associated with El Niño and the Southern Oscillation - Accomplishments and Legacies of the TOGA Program, National Academy Press, Washington D.C., 1996. Copies are available from WCRP Joint Planning Staff, the International CLIVAR Project Office or from National Academy Press, Washington D.C. (ISBN 0-309-05342-0).
- The PAGES/CLIVAR INTERSECTION - Report of a joint IGBP - WCRP Workshop, Venice, Italy, November 1994. Contact the PAGES Core Project Office or the International CLIVAR Project Office.

Please return to the International CLIVAR Project Office by mail or email (clivar@clivar.dkrz.de)

Special requests:

Change of address Remove as recipient

Please send **CLIVAR-Exchanges** to the following address:

Name: _____
(Title) (First) (M.I.) (Last)

Organization: _____

Mailing address: _____

City: _____ State: _____ Zip: _____ Country: _____

Telephone: _____ Fax: _____

E-mail address: _____

CLIVAR Calendar

1997	Meeting	Location	Attendance
Sept. 1 - 3	Euroclivar workshop on Past Climate Data	Abisko, Sweden	Invitation
Sept. 8 - 12	5th International Carbon Dioxide Conference	Cairns, Australia	Open
Sept. 8 - 12	ECMWF Seminar: Atmosphere-surface Interaction	Reading, UK	Limited
Sept. 22 - 25	Joint JSC/CLIVAR Working Group on Coupled Modelling (former NEG-2) - Third Session	Paris, France	Invitation
Oct. 6 - 10	22nd Annual Climate Diagnostics and Prediction Workshop	Berkeley, CA, USA	Open
Oct. 9 - 10	Euroclivar - 4th Session	Bologna, Italy	Invitation
Oct. 15 - 17	Monitoring the Ocean in the 2000s: An integrated Approach	Biarritz, France	Open
Oct. 15 - 18	A Symposium on Ocean Data for Scientists	Dublin, Ireland	Open
Oct. 27 - 31	WCRP First International Conference on Reanalyses	Silver Spring, USA	Open
Nov. 3 - 6	Polar Processes and Global Climate	Orcas Island, USA	Open
Nov. 4 - 6	CLIVAR/GCOS TAO Implementation Panel, 6th Session	Reading, UK	Invitation
Nov. 17 - 21	WMO International Workshop on Dynamical Extended Range Forecasting	Toulouse, France	Invitation
Dec. 8 - 12	MODSIM 97	Hobart, Australia	Open
Dec. 8 - 11	AGU Fall Meeting	San Francisco, USA	Open
1998	Meeting	Location	Attendance
Jan. 11 - 16	American Meteorological Society, 78th Annual Meeting	Phoenix, USA	Open
Feb. 9 - 13	Ocean Science Meeting	San Diego, USA	Open
March 9 - 12	Euroclivar Workshop on Climate Change Detection and Attribution	Bracknell, UK	Invitation
March 16 - 21	Joint Scientific Committee of WCRP - 19th Session	Cape Town, South Africa	Invitation
April 19 - 23	PAGES Open Science Meeting	London, UK	Open
April 20 - 24	23rd European Geophysical Society Meeting	Nice, France	Open
April 21 - 23	International Conference on Monsoon and Hydrologic Cycle	Kyongju, Korea	Open
May 24 - 29	International WOCE Conference	Halifax, Canada	Open
May 25 - 29	9th Conference on Satellite Meteorology and Oceanography	Paris, France	Open

CLIVAR - Exchanges

Newsletter of the Climate Variability and Predictability Programme (CLIVAR), published by the International CLIVAR Project Office, c/o Max-Planck-Institut für Meteorologie, Bundesstr. 55, D-20146 Hamburg, Germany, Tel.: +49-40-41173-412, Fax.: +49-40-41173-413, e-mail : clivar@clivar.dkrz.de

ISSN No.: 1026 - 0471

Note on Copyright

Permission to use any scientific material (text as well as figures) published in CLIVAR-Exchanges should be obtained from the authors.