U.S. CLIVAR
VARIATIONS
Spring 2004, Vol. 2, No. 1

FROM THE DIRECTOR

Welcome to Baltimore!

by David M. Legler, director

On behalf of the local organizers, I want to add my warmest welcome to all attendees of the 1st International CLIVAR Science Conference. We received an unprecedented 700-plus abstracts in response to the call for presentations. Abstracts were received from researchers in 56 countries, including over 40 abstracts from the South American region – a region where CLIVAR has helped catalyze several international activities.

As CLIVAR moves full throttle into its implementation phase, we are seeing an increase in the visibility of CLIVAR in many areas, not only in the number of journal papers, but also in the preparation and leadership of major national and international assessments such as the IPCC Fourth Assessment (AR4).

As the successes of CLIVAR become more evident, so to is the interest at the local, regional, national, and international levels in utilizing improved prediction capabilities and improved projections provided by global earth system models to explore

Continued on Page Two

Climate Process Teams: A New Approach to Improving Climate Models

by Christopher Bretherton, University of Washington; Raffaele Ferrari, Massachusetts Institute of Technology, and Sonya Legg, Woods Hole Oceanographic Institution

Climate models are incorporating ever more sophisticated physical parameterizations of a myriad of atmospheric and oceanic physical processes such as turbulent mixing, air-sea fluxes, cloud microphysics, and radiative transfer. Imperfect or missing parameterizations are a major source of model error and uncertainty in forecasting natural climate variability and anthropogenic climate change. Development of effective parameterizations is challenging. It requires a good physical understanding of how the relevant process relates to the overall ocean and atmosphere dynamics, and a careful consideration of issues related to model resolution and numerical formulation. IPCC-class modeling centers must often rely on a remarkably small and busy group of scientists to both improve their parameterization suite and to incorporate it in their models. As a result, parameterizations in atmospheric and oceanic general circulation models (AGCM and OGCMs) do not reflect recent advances in our understanding of the corresponding processes gained from new observations

Continued on Page Two

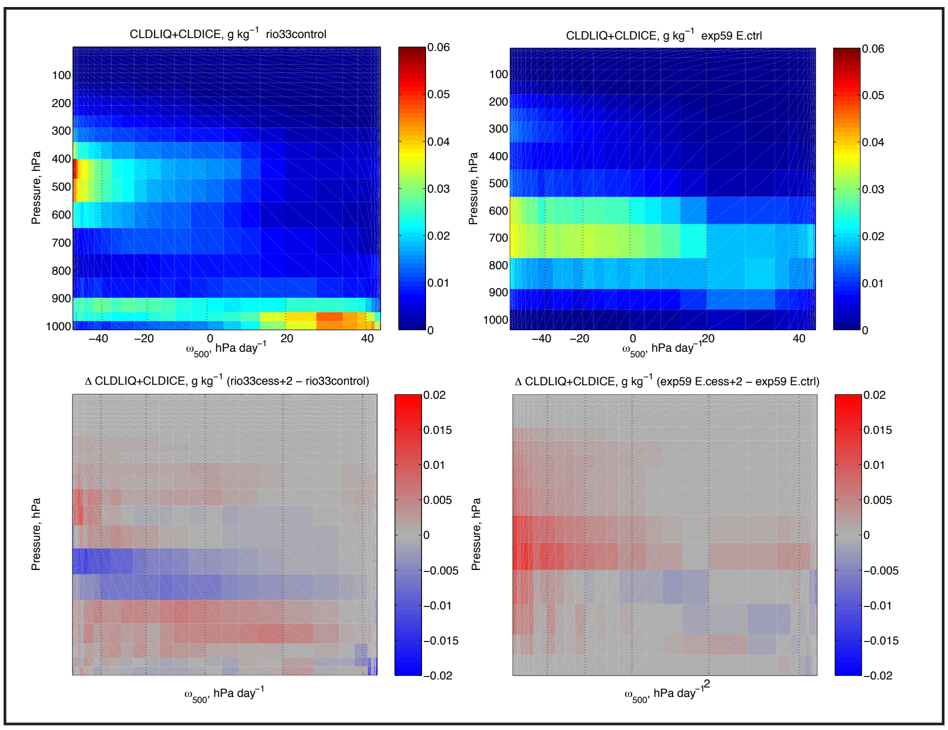

FIGURE 1. Top: Climatological cloud condensate profiles over ocean grid columns in 30°S-30°N, for near-IPCC versions of the NCAR (left) and GFDL (right) AGCMs, binned by monthly-mean 500. Bottom: Perturbations to these profiles caused by a uniform 2 K increase in SST.

U.S. CLIMATE VARIABILITY AND PREDICTABILITY
1717 Pennsylvania Avenue, NW, Suite 250, Washington, DC 20006• www.usclivar.org

Continued from Page One

mitigation options to reduce the potential deleterious impacts of future adverse conditions and to optimize practices and management to take advantage of possible favorable conditions. Increasingly programs like CLIVAR contribute more directly to most applications of climate information. In an effort to highlight the significant cultural and scientific challenges that still lie before us, Thursday's program will explore how CLIVAR may provide and communicate helpful knowledge, capabilities, and products.

I hope you find the facilities, accommodations, restaurants, and the plentiful distractions offered by the city of Baltimore, including the beautiful Inner Harbor, to be equal in quality to the excellent science presented at the Conference. If the Conference organizers can add in any way to the enjoyment of your stay, please drop by the Conference office and talk to one of the very helpful staff.

Best wishes for a stimulating, exciting, as well as a productive conference. ■

Variations

Published two to three times per year by
U.S. CLIVAR Office
1717 Pennsylvania Ave., NW,
Suite 250, Washington, DC 20006
(202) 419-3471

Staff: **Dr. David M. Legler**, *Editor*
Cathy Stephens,
Assistant Editor and Staff Writer

This newsletter is supported through contributions to the U.S. CLIVAR Office by NASA, NOAA—Office of Global Programs, and NSF.

A New Approach to Improving Climate Models

Continued from Page One

and detailed process studies. This is arguably the biggest current bottleneck in improving high-end climate models in the U. S.

An enormous investment in climate, atmospheric and oceanic research is justified on the grounds that it will improve climate models. However decades pass before the results of this research are translated into useful parameterization schemes. Hence, in early 2001, Chris Bretherton, Paul Schopf and David Battisti proposed the concept of Climate Process and Modeling Teams (CPTs) to the U. S. CLIVAR Scientific Steering Committee (SSC). The idea of a CPT is to fund a small group of observationalists, theoreticians, small-scale modelers, and scientists at the modeling centers to work closely together to improve parameterizations of a particular process in one or more IPCC-class models. The U.S. CLIVAR leadership worked hard to promote this idea; NOAA, NSF and NASA were enthusiastic and agreed to solicit requests for funding pilot CPTs to test whether this concept is effective in practice. When asked by the CLIVAR leadership to suggest top priority topics, the major modeling centers suggested cloud feedbacks on climate change and ocean mixing processes, so these were chosen as priority areas in the solicitation.

> **Imperfect or missing parameterizations are a major source of model error and uncertainty in forecasting natural climate varability and anthropogenic climate change.**

One atmospheric cloud feedbacks and two ocean mixing CPTs have been funded for three years starting in October 2003. The two ocean CPTs are smaller and more focused than the atmospheric CPT; thus we may gain understanding of the optimal group size and organization for this type of activity. As these pilot CPTs mature, their linkages to international efforts will increase. The rest of this article describes these pilot CPTs in more detail.

Low-Latitude Cloud Feedbacks on Climate Sensitivity CPT

Motivation

A principal uncertainty in projecting anthropogenically-induced climate change over the next fifty years is the role of cloud feedbacks. In early 2003, when this CPT was first conceived, two leading U.S. atmospheric general circulation models coupled to mixed layer ocean models had dramatically different equilibrium responses to doubling of carbon dioxide (CO_2) concentrations. The NCAR-led Community Atmosphere Model (CAM2.0) predicted a global-mean surface air temperature increase of approximately 2 K, while the GFDL Atmospheric Model (AM2.6) predicted a global-mean surface air temperature increase of over 4.5 K. Low-altitude cloud changes, especially over the subtropical ocean, explained much of this discrepancy. CAM2.0 predicted increased low cloud fraction in these regions, enhancing global albedo to produce a negative feedback on CO2-induced greenhouse warming. AM2.6 did precisely the opposite.

`In early 2004, both models were finalized for the IPCC Fourth Assessment as CAM3 and AM2.12. They now have nearly identical temperature changes of 2.5-3 K in response to CO_2 doubling. Each model has experienced large changes in its cloud feedbacks associated with various changes in physical parameterizations of cloud microphysics, turbulent and convective processes. Does this convergence of answers represent true improvement in our ability to simulate cloud feedbacks in AGCMs? We currently do not know, but Fig. 1, created by CPT scientist Matt Wyant of the University of Washington, suggests caution. It shows profiles of cloud condensate for preliminary versions of the IPCC versions of the NCAR and GFDL models, for ocean grid columns in 30°S-30°N binned by monthly-mean climatological 500 hPa vertical pressure velocity w_{500}. This segregates heavily precipitating regimes with extensive deep moist con-

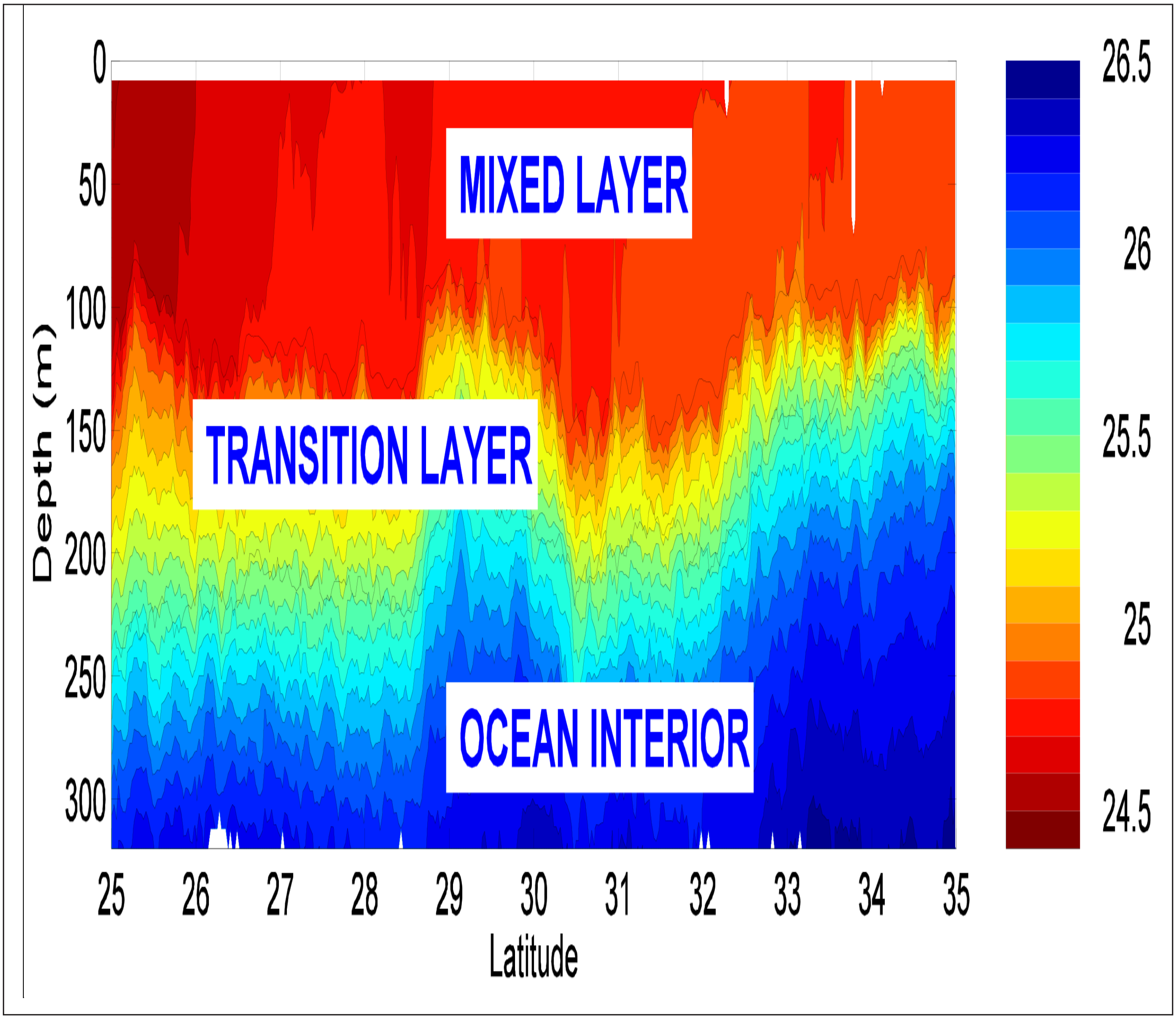

FIGURE 2. Potential density as measured in the North Pacific, 140°W and 25-35°N, during the Spice experiment (Ferrari and Rudnick, 2000). The section has a 3 km horizontal resolution and 4 m vertical resolution. Three distinct layers characterize the upper ocean: the mixed-layer where strong turbulent motions maintain density vertically homogeneous, the ocean interior where turbulence is weak and eddy motions are directed along density surfaces, and a transition layer between the two characterized by enhanced stratification and large velocity shears.

vection ($w_{500} < 0$) from subsidence regimes with primarily boundary layer cloud ($w_{500} > 0$). The NCAR model simulates extensive cloud near the sea-surface in subsidence regimes and more anvil cirrus near 200 hPa near the tropopause, while the GFDL model has much more cloud condensate at intermediate levels. It is thus not surprising that when both models are subject to the same climate perturbation – a uniform warming of SST by 2 K — their regime-binned response in cloud condensate is rather different. Hence, the similarity in their overall climate sensitivity may be serendipitous. `Cloud feedbacks have been always regarded as a major uncertainty, and increasing model sophistication has expanded new sources of uncertainty as fast as it has reduced old ones. However, the 'fire hose' of multifaceted new satellite observations of clouds and related physical processes, together with rapid increases in our ability to model the turbulent circulations within cloud systems and new field studies lend hope for potential progress.

Objectives

The goals of this CPT are:

(1) To carefully understand how low-latitude cloud feedbacks simulated in different versions of three leading U.S. AGCMs relate to underlying physical parameterizations;

(2) To critique and improve physical para-

Continued from Page One

meterizations central to cloud evolution using recent in-situ and satellite datasets and process-modeling efforts.

Low-latitude clouds are particularly dependent on parameterizations for sub-gridscale moist convection, turbulence, horizontal cloud inhomogeneity, and cloud microphysics. Furthermore, GCM experience suggests that errors in low-latitude cloud processes have major impacts on the simulated tropical general circulation (especially when coupled to the ocean) and its variability. Clouds associated with extratropical cyclones may be at least as important as low-latitude clouds in determining global cloud feedbacks on climate sensitivity; while such clouds are not our immediate focus we anticipate that our CPT approach will also help in understanding extratropical and polar cloud feedbacks.

Table 1 lists the core group of 9 funded PIs from academia, NASA, and NOAA with a direct interest in physical parameterization of cloud-related processes. It also lists the CPT PIs from the three participating modeling groups involved (NCAR, GFDL, and NASA's GMAO) and the CPT advisory group of 11 more scientists. Most advisory group members are experts in various types of cloud observations and process modeling. A few represent other GCM groups and one is from NCEP. Thus, this is a somewhat broader effort than the ocean CPTs.

Elements of this CPT's strategy include:

(1) Making use of single-column modeling tools and datasets (e.g. at the ARM sites) for in-depth understanding of cloud processes, parameterization intercomparison, and effective comparison with cloud-resolving models. This will be coordinated with the GEWEX Cloud System Study working groups.

(2) Three working groups (boundary layer clouds, deep convection, subgrid cloud/microphysical inhomogeneity) to critique parameterizations in particular models and define potential improvements.

(3) Careful diagnosis and fuller understanding of cloud feedbacks to climate perturbations in multiple versions of all three models, as well as in Colorado State University's 'superparameterized' version of CAM in which most of the physical parameterization suite is replaced by a small CRM at each gridpoint.

(4) Use of new and upcoming satellite datasets (e.g. MODIS, CERES, CloudSat, etc.), together with the climate variability in the existing satellite and surface record to evaluate the realism of cloud feedbacks in the three models.

Activities

The first meeting of the CPT was held at NCAR in November 2003. An archive of climatological and climate-perturbed simulations for each model was set up for this meeting, and is being carefully analyzed. Similar simulations with the CSU 'super-parameterized' CAM, a major computational challenge, are just being started. PIs Kuan-Man Xu and Brian Mapes will be leading an intercomparison of single-column and CRM simulations of radiative-convective equilibrium above tropical oceans of various surface temperatures to learn whether this is a useful paradigm for understanding cloud feedbacks in tropical deep convective cloud systems. Other formal collaborative activities are also being planned. CPT liaison scientists at GFDL (hired already) and NCAR (hiring in process) will be critical in facilitating interactions between the outside investigators and the participating modeling groups. The web site in Table 1 includes further information about the CPT.

TABLE 1

Low-Latitude Cloud Feedbacks CPT

Lead PI	C. Bretherton (U. Washington)
Other core group PIs	M. Khairoutdinov (CSU), C. Lappen (CSU), B. Mapes (NOAA/CDC), J. Norris (Scripps), R. Pincus (NOAA/CDC), B. Stevens (UCLA), K.-M. Xu (NASA/GSFC), M. Zhang (SUNY),
Advisory panel	B. Albrecht (U. Miami), G. Farquhar (U. Illinois), C. Fairall (NOAA/ETL), S. Ghan (PNL), R. Mechoso (UCLA), H.-L. Pan (NCEP), D. Randall (CSU), D. Raymond (New Mex. Tech.), M. Suarez (NASA/GMAO), R. Weller (WHOI)
Modeling centers (with P.I.)	NCAR (J. Kiehl) GFDL (I. Held) GMAO (J. Bacmeister)
Web site	http://www.atmos.washington.edu/~breth/CPT-clouds.html

Ocean Eddy Mixed-Layer Interactions CPT

Motivation

The two properties of the ocean that matter most directly for climate studies are the sea surface temperature and the depth of the surface mixed layer (proportional to the short-term effective ocean heat capacity). Furthermore the upper ocean controls the biological productivity of the sea, sea-level change, and sequestration of anthropogenic tracers. Thus OGCMs ability to simulate mixed layer dynamics is of crucial importance to our understanding of climate.

Recent observations by Ferrari and Rudnick (members of this CPT) in the Northern Pacific, and by Speer and Rintoul in the Southern Ocean suggest, unexpectedly, that lateral transport by oceanic eddy motions with scales of 10-50 km modify substantially sea surface temperature, salinity and mixed-layer depth. Present climate models lack the resolution to capture the lateral transport by these eddies explicitly and hence must resort to parameterizing their effect. Parameterization schemes have been derived for the ocean interior below the mixed layer, where the strong density stratification constrains eddy motions to be directed along density surfaces. Near the surface, however, boundary-layer turbulence overcomes the along-density constraints and the dynamics of the eddy fluxes is not well understood.

Recent work by CPT scientists Ferrari and McWilliams shows that the current approach of neglecting lateral eddy fluxes

TABLE 2

Ocean Eddy Mixed-Layer Interactions CPT

Lead PI	R. Ferrari (MIT)
Other core group PIs	W. Dewar (FSU), G. Flierl (MIT), J. Marshall (MIT), J. McWilliams (UCLA), D. Rudnick (Scripps), S. Smith (NYU), K. Speer (FSU), A. Tandon (U. Mass.), G. Vallis (Princeton), M. Visbeck (LDEO), R. Weller (WHOI)
Modeling centers (with P.I.)	NCAR (P. Gent and W. Large) GFDL (R. Hallberg and S. Griffies) GSFC (D. Adamec)
Web site	http://cpt-emilie.org

in the upper ocean can introduce biases of up to a few degrees in sea surface temperatures. During the first six months of work, members of this CPT have tackled the problem of deriving parameterization schemes for the across-density eddy fluxes in the surface mixed layer. Now the attention has shifted to the transition layer (Fig.2), a region just below the mixed layer composed of waters that typically sit in the quiet ocean interior, but are occasionally entrained in the turbulent mixed layer through eddy heaving or sudden vertical displacements of the mixed layer base. The transition layer is where ocean eddy fluxes change their direction from along-density to across-density. We currently lack a good understanding of the physics of this region, and we cannot derive parameterizations that capture the details of this transition. Members of the CPT are thus actively analyzing observations and running high-resolution numerical simulations of the transition region.

Objectives

The goals of the CPT are:

1) To gain a better understanding of the effect of transient eddy motions in the upper ocean and their impact on ocean-atmosphere interactions
2) To develop parameterizations of these effects for IPCC-class climate models based on the knowledge acquired in recent observations and numerical studies.

In order to achieve this goal, the following team efforts are planned:

(a) Examining the statistics of mesoscale eddy fluxes in the upper ocean from existing SeaSoar profiles, moored data, and meteorological data.
(b) Running a hierarchy of numerical models of increasing complexity to study the interaction between the mean ocean circulation, the lateral eddy transports, and the boundary layer turbulence in the upper ocean.
(c) Developing new parameterizations of mesoscale transports which incorporate knowledge gained from the observations and process studies.
(d) Implementing and testing the new parameterizations in ocean general circulation models and in coupled ocean-atmosphere models.

Activities

Table 2 lists the CPT participants and web site. A meeting was held at NCAR in December 2003 to coordinate the activities of the team; presentations are on the web site. D. Rudnick and R. Weller are compiling a set of statistics of upper ocean eddies form a variety of data sets that will be essential to validate numerical simulations. Groups at UCLA, GFDL, and MIT are setting up a hierarchy of high-resolution numerical models that will serve as testbeds for new parameterizations. Suggestions for improvement of extant parameterization emerged during the workshop and are being tested in the ocean circulation model at MIT. Postdoctoral researchers have been hired at Scripps and Miami. Postdoctoral researchers will shortly begin at MIT, GFDL, and UCLA. The postdoctoral researchers are key top the success of the team, because they will lead the development, implementation, and testing of the new parameterization in regional and global simulations.

Gravity Current Entrainment CPT

Motivation

Dense water formed through cooling or evaporation in marginal seas (e.g. the Greenland-Iceland-Norwegian sea, the Mediterranean sea) or on coastal shelves (e.g. the Antarctic Shelf) enters the general ocean circulation by flowing over topographic features including narrow channels (e.g. Denmark Straits, Gibraltar Straits) and down the continental slopes. As the dense water descends it entrains ambient water, which mixes with the

TABLE 3

Deep Ocean Gravity Current Entrainment CPT

Lead PI	S. Legg (WHOI)
Other core group PIs	J. Yang (WHOI), J. Price (WHOI), H. Peters (Miami), E. Chassignet (Miami), T. Ozgokmen (Miami), T. Ezer (Princeton), A. Gordon(LDEO), P. Schopf (GMU)
Collaborators	A. Bower (WHOI), C. Cenedese (WHOI), J. Whitehead (WHOI), L. Pratt (WHOI), K. Helfrich (WHOI), J. Girton (WHOI), M. Timmermans (WHOI), M. McCartney (WHOI), V. Sheremet (URI), G. Sutyrin (URI), A. Adcroft (MIT), A. Thurnherr (LDEO), D. Adamec (NASA)
Modeling centers (with P.I.)	NCAR (W. Large and G. Danabasoglu) GFDL (R. Hallberg and S. Griffies)
Web site	http://cpt-gce.org

dense water, modifying the tracer properties and volume of the dense water. Present climate models do not have sufficient resolution to capture the small scale processes responsible for entrainment, and hence cannot correctly simulate the properties of the dense water masses which result, some of which (e.g. North Atlantic Deep Water, Mediterranean Overflow water, Antarctic Bottom Water) play very important roles in the large-scale ocean circulation.

Objectives

Our overall objective is to use knowledge gained from recent observations of dense overflows and laboratory and numerical process studies to improve the representation of dense gravity currents and their entrainment in climate models. We plan to achieve this goal by:

(a) Examining the entrainment in recent observations, especially those of Denmark Straits overflow, Faroe Bank Channel, Mediterranean Outflow, Red Sea Overflow and Antarctic Slope overflows, as well as laboratory and numerical process studies;

(b) Developing new and enhanced parameterizations of entrainment which incorporate knowledge gained from the observations and process studies;

(c) Implementing and testing the new parameterizations in ocean general circulation models.

Activities

Table 3 lists the CPT participants and web site. In early December 2003, the CPT held its first workshop in Boulder, including presentations (available from the web site) on recent observations, process studies and large scale modeling approaches. Currently observationalists are compiling a comparison of different observed overflows, including parameters for comparison with regional numerical simulations. Several team members have been comparing simulations of idealized overflows using different model types. Now we plan to develop regional and global simulations of overflows using several different models, to serve as testbeds for new parameterizations. A postdoctoral researcher has been hired at Miami, and postdoctoral researchers will shortly begin at Woods Hole and GFDL. These postdocs will soon begin exploring new parameterizations and implementing them in the regional and global simulations. ■

NAME Field Campaign Gets Underway

By Cathy Stephens, U.S. CLIVAR Office

During June, July and August, 2004, the Enhanced Observing Period (EOP) of the North American Monsoon Experiment (NAME) will be underway. This field experiment will provide a comprehensive short term (one warm season) depiction of precipitation, circulation and surface conditions in the monsoon region of North America. The objectives of this particular field study are as follows:

- To describe the daily cycle of convective rainfall over the region;
- To clarify relationships between convection and moisture flux from the Gulf of Mexico and Gulf of California;
- To describe the structure/location of precipitation systems, including mesoscale convective systems (MCS) within the diurnal cycle;
- To diagnose mechanisms that force mesoscale rainfall systems for adequate modeling;
- To clarify Gulf of California surge/low level jet/precipitation relationships.

As part of this EOP, two 15-day cruises will take oceanographic observations near the mouth of the Gulf of California. Atmospheric profiles will be obtained from a comprehensive network of radiosondes and windprofilers in Northwestern Mexico and the southwestern United States as well as from aircraft observations over the Gulf of California and to the west of Baja California. NAME will also install approximately 1100 simple raingauges and over 100 event logging raingauges that resolve the daily cycle in Mexico and the Baja Peninsula. NCEP will provide near real time monitoring of the atmospheric circu-

NAME is a joint CLIVAR-GEWEX process study and the North American implementation of the WCRP/CLIVAR/VAMOS Program. Its overall aim is to determine the sources and limits of predictability of warm season precipitation over North America, with emphasis on time scales ranging from seasonal to interannual.

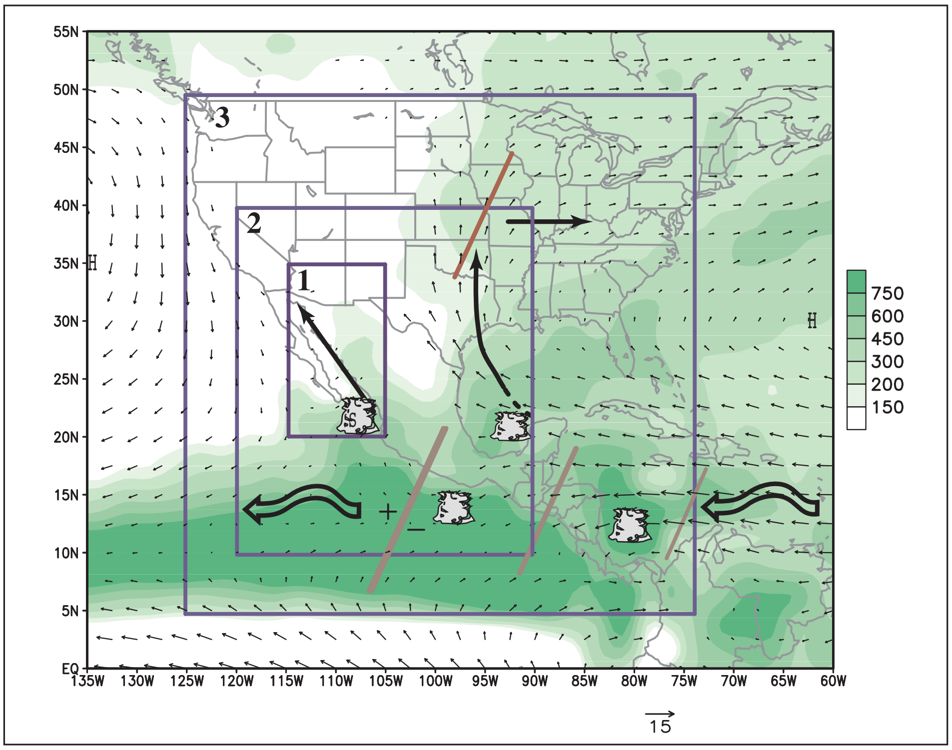

FIGURE 1. **Schematic Illustrating the multi-tiered approach of the North American Monsoon Experiment (NAME). The schematic also shows mean (July-September 1979-1995) 925-hPa vector wind and merged satellite estimates and raingauge observations of precipitation (shading) in millimeters. Circulation data are taken from the NCEP/ NCAR Reanalysis archive.**

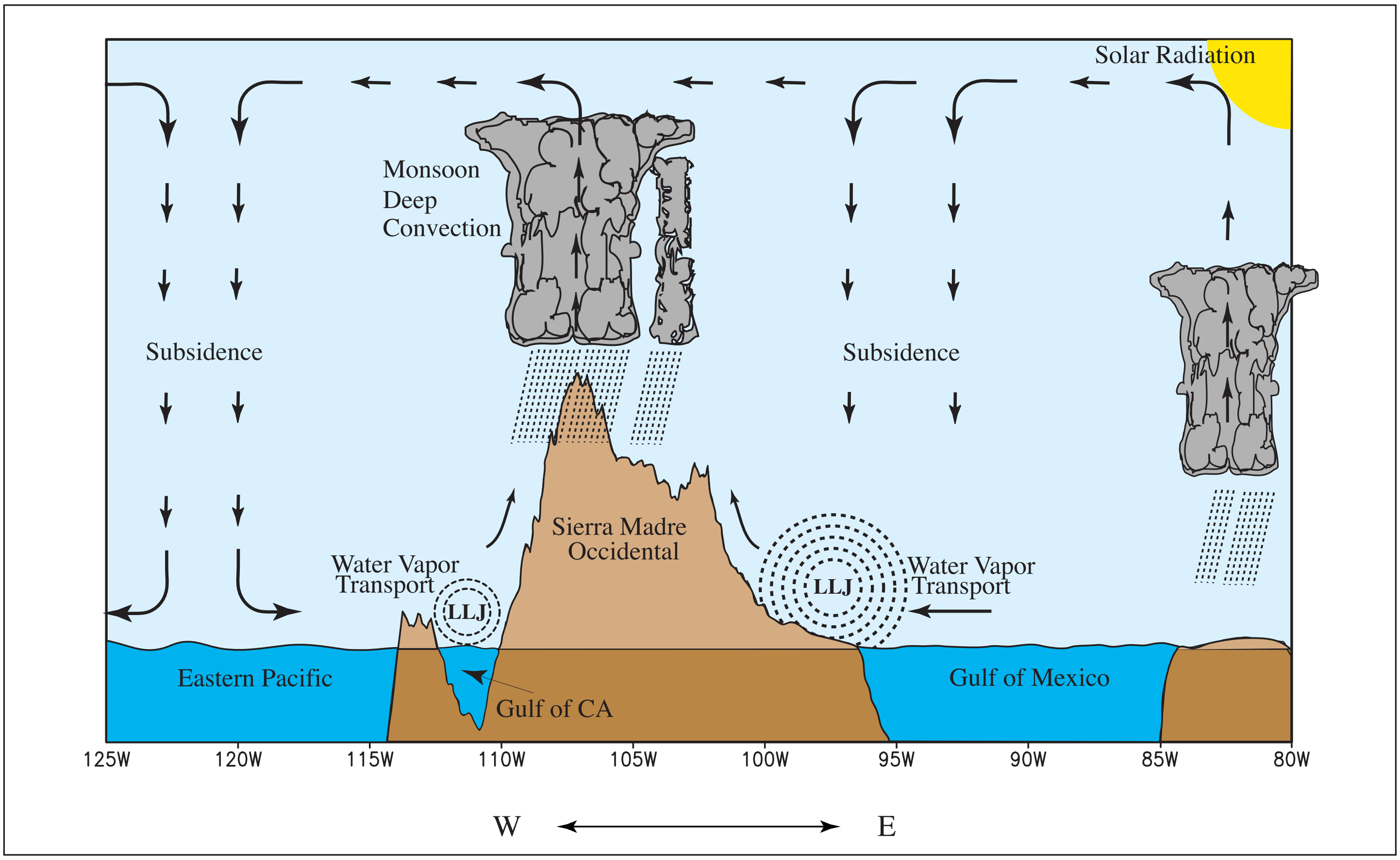

FIGURE 2. **Schematic vertical (longitude-pressure) cross section through the North American Monsoon System at 27.5°N. Topography data was used to establish the horizontal scale and NCEP/NCAR Reanalysis wind and divergence fields were used to establish the vertical circulations.**

lation, land surface, and hydro-meteorological conditions. In addition, the NASA Terrestrial Hydrology Program is sponsoring a NAME Soil Moisture Field Campaign which includes a network of in situ observations of soil moisture, temperature and precipitation over parts of Northwestern Mexico, together with aircraft and satellite mapping.

NAME is a joint CLIVAR-GEWEX process study and the North American implementation of the WCRP/CLIVAR/VAMOS Program. Its overall aim is to determine the sources and limits of predictability of warm season precipitation over North America, with emphasis on time scales ranging from seasonal to interannual. In order to achieve this goal, NAME seeks to improve observations as well as to improve the ability of climate models to simulate various components and time scales comprising the weather and climate of the North American Monsoon System (NAMS). Specifically, NAME's scientific objectives as outlined in in the NAME Science Plan (http://www.joss.ucar.edu/name) include better understanding and a more realistic simulation of:

- Warm season convective processes in complex terrain;
- Intraseasonal variability of the monsoon;
- Response of warm season circulation and precipitation to slowly varying, potentially predictable oceanic and continental boundary conditions;
- The evolution of the North American monsoon and its variability.

Prior to the upcoming 2004 EOP, a modeling strategy was outlined for NAME. It was recognized that there are three distinct roles that observations play in model development and assessment. These roles are: (1) to guide model development by providing constraints on model simulations at the process level (*e.g.* convection, land/atmosphere and ocean/atmosphere interactions); (2) to help assess the validity of model simulations of key NAMS phenomena (*e.g.* low level jets, tropical storms, Gulf surges), and the linkages to regional and larger scale climate variability; and (3) to provide initial and boundary conditions, and verification data for model predictions.

The first steps in implementing this strategy were discussed at a June 2003 workshop entitled The North American Monsoon Assessment Project (NAMAP). Six regional and global modeling groups participated in the simulation of the 1990 summer monsoon. The goal was to establish baseline control simulations for more focused research as well as to provide measurement targets for the NAME 2004 Field Campaign. NAMAP concluded that (1) all models simulated a summer precipitation maximum, although the global models have a delayed monsoon onset; (2) surface quantities such as temperature and latent and sensible heat fluxes are poorly constrained and are vastly different in the models; and (3) a low level jet occurs, but it is only weakly tied to North American monsoon precipitation, therefore confirming the need for close observation in the 2004 field experiment. Following the upcoming 2004 EOP, NAMAP II will focus on the simulation of the northern summer of 2004. In addition, NAME is expanding its modeling activities to include model and forecast system development (*e.g.* multiyear seasonal simulations of the daily cycle of convection), experimental prediction (*e.g.* sensitivity to

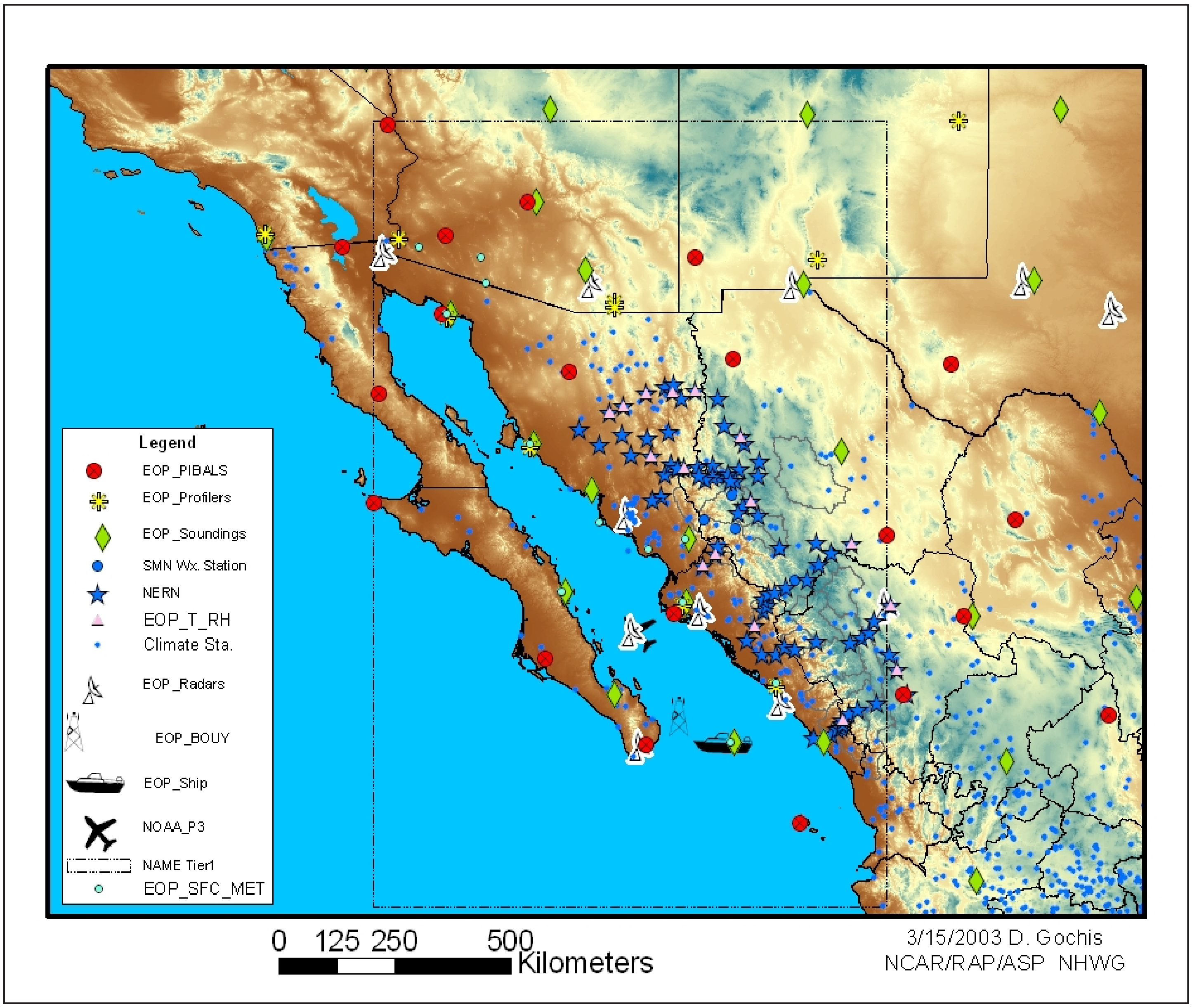

FIGURE 3. Instrument Networks for the NAME 2004 Enhanced Observing Period.

SST and soil moisture) and product development (*e.g.* North American seasonal forecasts).

While the upcoming 2004 EOP for NAME will enhance the understanding and hopefully the predictive capabilities of the monsoon system, additional field efforts are encouraged. Further extensions of NAME are being actively sought through international collaboration facilitated by the US CLIVAR Pan American implementation panel and the CLIVAR VAMOS panel. ■

Additional NAME information is available at the following web site: http://www.joss.ucar.edu/name

Subscribe to the U.S. CLIVAR monthly news-gram

In March 2004, the U.S. CLIVAR Office began issuing a monthly news-gram . These news briefs are intended to highlight upcoming scientific meetings and events in addition to announcing climate research opportunities. Previous news-grams have issued calls for proposals from NOAA, NASA, NSF and START, as well as announcing the opportunity to comment on the draft guidelines for the synthesis and assessment products being prepared by the Climate Change Science Program (CCSP).

The news-gram is issued at the beginning of each month via email to anyone interested in receiving it. To subscribe or unsubscribe to the U.S. CLIVAR news-gram mailing list, please send a message to news-gram@usclivar.org. Likewise, any announcements to be made public to the climate science community can be sent to the U.S. CLIVAR Office for distribution in upcoming news briefs. Please send the information to news-gram@usclivar.org. Each monthly issue of the news-gram is also available via the U.S. CLIVAR web site (www.usclivar.org).

PRELIMINARY FINDINGS

An occasional feature highlighting early results from US CLIVAR Programs

The U.S. CLIVAR and Carbon Repeat Hydrography program, which first began planning three years ago, is now in its implementation phase. The jointly designed observational program (Figure 1), supported by both NOAA and NSF, was designed to meet the needs of the CLIVAR and Carbon research programs, particularly for studies addressing the carbon system, heat and freshwater storage and flux, deep and shallow water mass and ventilation, as well as calibrating autonomous sensors (e.g. Argo floats) and calibrating climate models. During the planned cruises a set of core underway and deep-ocean measurements will be recorded and made available. Additional, more specialized, observation suites will be added on some cruises.

To date, preliminary data from four cruises have been made available (see http://ushydro.ucsd.edu/table_data_links.html). The A20 meridional cruise along 52W, from 43N to 7N, was occupied in the fall of 2003. It was last occupied during the WOCE program in 1997 (and even earlier in the mid-1980's). Preliminary results comparing the 2003 and 1997 cruises indicate (Figure A, B) that the Subtropical Mode Water (neutral densities between 26.4 and 26.6) layer has thinned since 1997 and its oxygen concentration decreased – both suggesting weaker convective ventilation. Upper Labrador Sea Water (neutral density between 27.8 and 27.875) shows (Figure C, D) lower salinity and higher oxygen values as far south as 33N. This is consistent with a continued southward movement of strongly ventilated Labrador Sea water formed in the early 1990's. ■

For further informationon the A20 cruise, contact John Toole, Woods Hole Oceanographic Institution, jtoole@whoi.edu.

Further Information on the U.S. CLIVAR and Carbon Repeat Hydrographic Program: http://ushydro.ucsd.edu/

Further Information on international planning for repeat hydrographic cruises: http://www.clivar.org/carbon_hydro/

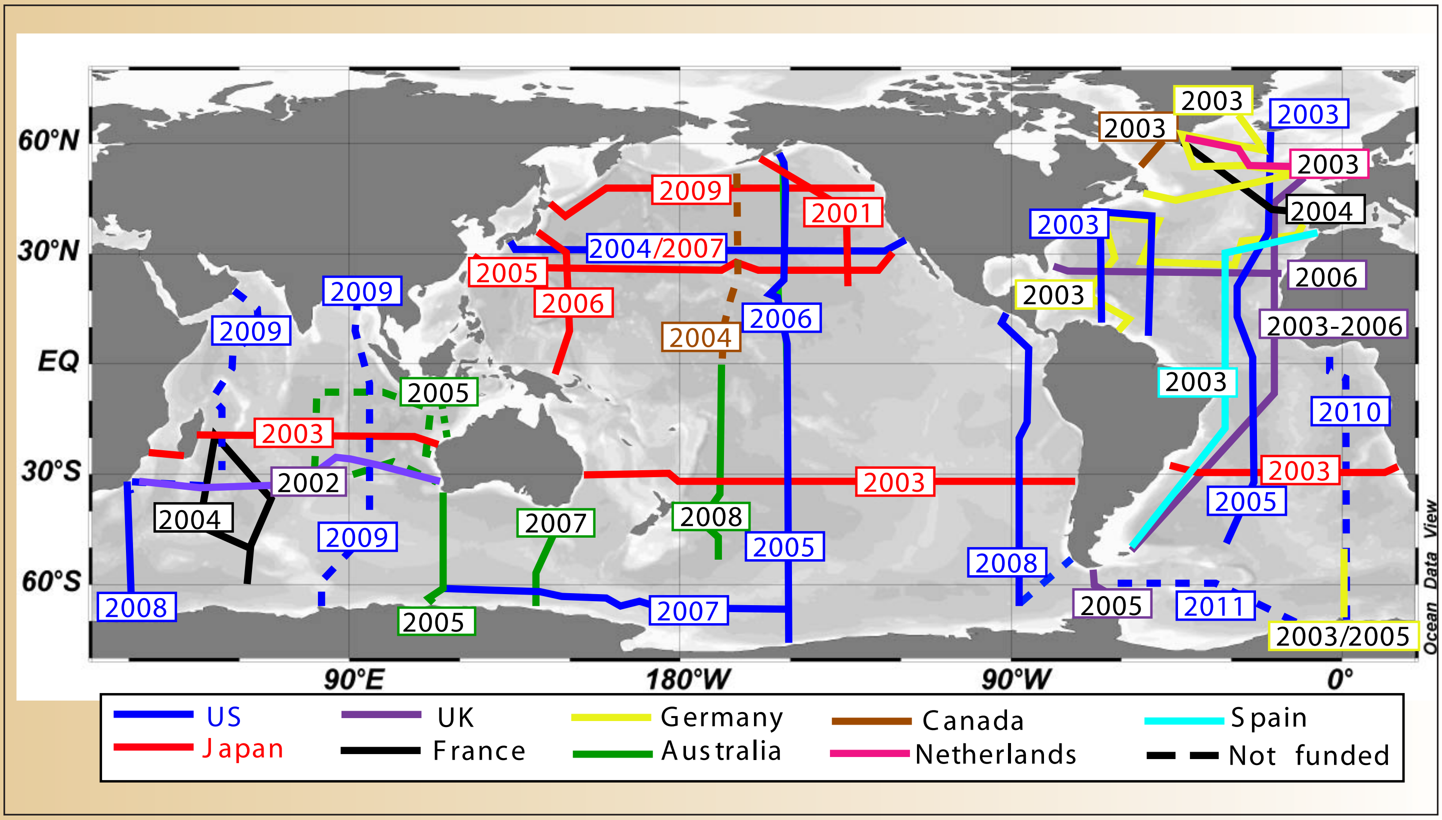

FIGURE 1: International plans for repeat hydrographic measurements indicating the U.S. CLIVAR/Carbon planned cruises (blue). The solid lines are funded cruises and dashed lines are planned, but not yet funded.

PRELIMINARY FINDINGS

(continued)

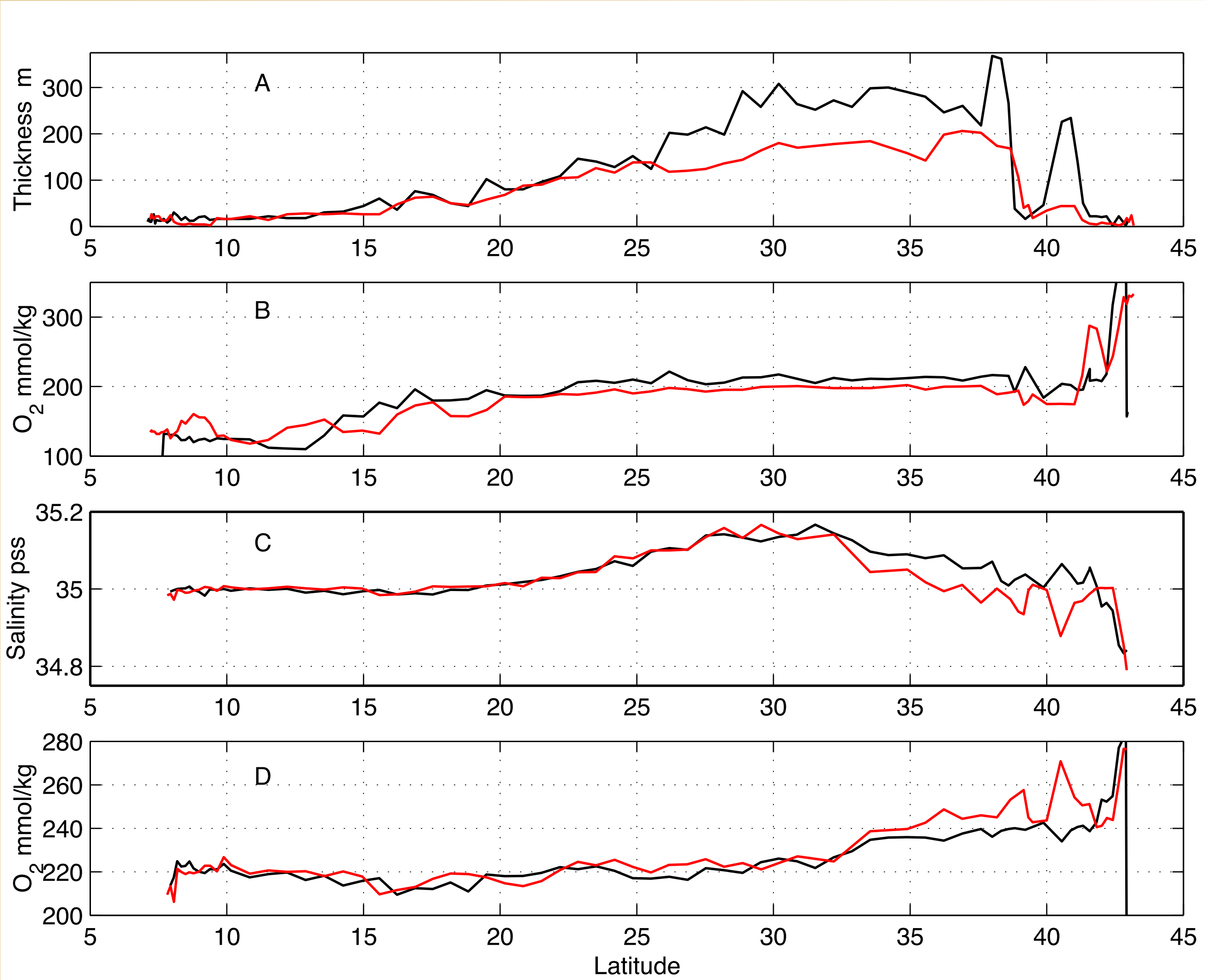

Figure A & B: Thickness and oxygen of the Subtropical Mode Water layer as defined by Hall et al, 2004 (neutral densities between 26.4 and 26.6) along A20/52W line in 1997 (black) and 2003 (red).

Figure C & D: Salinity and oxygen of the Upper Labrador Sea Water layer as defined by Hall et al, 2004 (neutral densities between 27.8 and 27.875) along A20/52W line in 1997 (black) and 2003 (red).

Calendar of CLIVAR and CLIVAR-related meetings

1st International CLIVAR Science Conference
21-25 June 2004
Baltimore, Maryland
Attendance: Open
Contact: U.S. CLIVAR Project Office (usco@clivar.org), http://www.clivar2004.org

13th International CLIVAR Scientific Steering Group Meeting
27 June – 29 June 2004
Baltimore, Maryland
Attendance: By invitation
Contact: icpo@soc.soton.ac.uk
http://www.clivar.org

2nd International Conference on Climate Impacts Assessment (SICCIA)
27 June – 2 July 2004
Grainau, Germany
Attendance: Open
Contact: Philip Mote (Philip@atmos.washington.edu), http://jisao.washington.edu/PNWimpacts/Workshops/SICCIA

Community Climate System Model Meeting
7-9 July 2004
Sante Fe, NM
Attendance: Limited
Contact: http://www.ccsm.ucar.edu

IPCC Climate Sensitivity Workshop
26-29 July 2004
Paris, France
Attendance: By invitation
Contact: Bryant McAvaney (b.mcavaney@born.gov.au)

3rd SPARC General Assembly
1-6 Aug 2004
Victoria, BC
Attendance: Open
Contact: N. McFarlane (Norm.McFarlane@ec.gc.ca)
http://sparc.seos.uvic.ca

13th Conference on Interactions of the Sea and Atmosphere (AMS)
9-13 August 2004
Portland, ME
Attendance: Open
Contact: http://www.ametsoc.org

AGU Western Pacific Geophysics Meeting
16-20 August 2004
Honolulu, HI
Attendance: Open
Contact: http://www.agu.org/meetings/wp04

GAPP PI Meeting
30-31 August 2004
Boulder, CO
Attendance: By invitation
Contact:
http://www.ecpc.ucsd.edu/projects/ghp/ghp.html

Climate Change in High Latitudes
1-3 September 2004
Bergen, Norway
Attendance: Open
Contact: http://www.bjerknes.uib.no/conference2004

Workshop on Atlantic Thermohaline Circulation
13-16 September 2004
Kiel, Germany
Attendance: Open
Contact: Claus Boening, cboening@ifm.uni-kiel.de;
http://www.ifm.uni-kiel.de/allgemein/naw2004.htm

Antarctic Peninsula Climate Variability
16-18 September 2004
Cambridge, UK
Attendance: Open
Contact: David Vaughan (dgv@bas.ac.uk) ;
http://www.antarctica.ac.uk/met/AP2004

U.S. CLIVAR SSC-12 Meeting
21-23 September 2004
Woods Hole, MA
Attendance: By invitation
Contact: David Legler (legler@usclivar.org)

SOLAS Open Science Conference
10-14 October 2004
Halifax, Canada
Attendance: Open
Contact: Daniela Turk (solas@dal.ca);
http://www.uea.ac.uk/env/solas

Ocean Mixing Symposium
11-14 October 2004
Victoria, British Columbia
Attendance: Open
Contact:
http://www.jhu.edu/scor/WG121Symposium.htm

CLIVAR Working Group Interannual to Seasonal Prediction
14-16 October 2004
Exeter, UK
Attendance: By invitation
Contact: Andreas Villwock (avillwock@awi-bremerhaven.de)

PICES 13th Annual Meeting & CLIVAR-PICES Workshop (23-24)
14-24 October 2004
Honolulu, HI
Attendance: Open
Contact:
http://www.pices.int/meetings/annual/Pices13/scientific_program.aspx

NOAA 29th Climate Diagnostic and Prediction Workshop
18-22 October 2004
Wisconsin
Attendance: Open
Contact: http://www.noaa.gov

CLIVAR Workshop on Ensemble Methods
18-21 October 2004
Exeter, UK
Attendance: Open
Contact: Andreas Villwock (avillwock@awi-bremerhaven.de);
http://cccmameetings.seos.uvic.ca/ensemble

JSC/CLIVAR Working Group on Coupled Modeling
25-29 October 2004
Japan
Attendance: By invitation
Contact: Andreas Villwock (avillwock@awi-bremerhaven.de);
http://cccmameetings.seos.uvic.ca/ensemble

2nd GODAE Symposium
1-3 November 2004
St. Petersberg, FL
Attendance: Open
Contact: Gary Mitchum (mitchum@marine.usf.edu);
http://www.bom.gov.au/GODAE

CLIVAR Ocean Reanalysis Workshop
8-10 November 2004
Boulder, CO
Attendance: Limited
Contact:
www.clivar.org/organization/gsop/implementation/ocean_reanalysis.html

AGU 2004 Fall Meeting
13-17 December 2004
San Francisco, CA
Attendance: Open
Contact: http://www.agu.org

85th AMS Annual Meeting
9-13 January 2005
San Diego, CA
Attendance: Open
Contact: http://www.ametsoc.org

U.S. CLIVAR Atlantic Implementation Panel Workshop
30 January – 3 February 2005
Miami, FL
Attendance: Open
Contact: Walter Robinson (robinson@atmos.uiuc.edu),
Martin Visbeck (visbeck@ldeo.columbia.edu)

U.S. CLIVAR OFFICE
1717 Pennsylvania Avenue, NW
Suite 250
Washington, DC 20006

Subscription requests, and changes of address should be sent to the attention of the U.S. CLIVAR Office (usco@usclivar.org)