GEWEX
WCRP

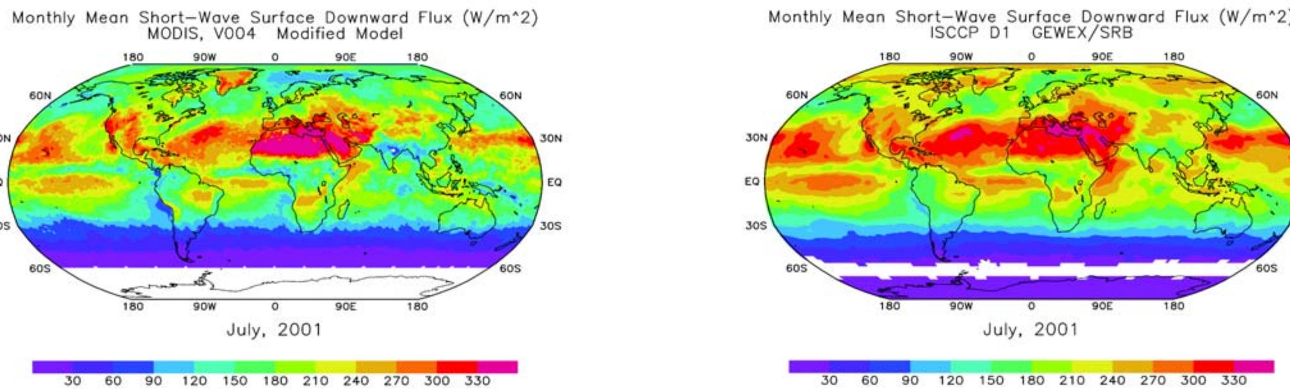
Global Energy and Water Cycle Experiment

NEWS

Vol. 13, No. 4 November 2003

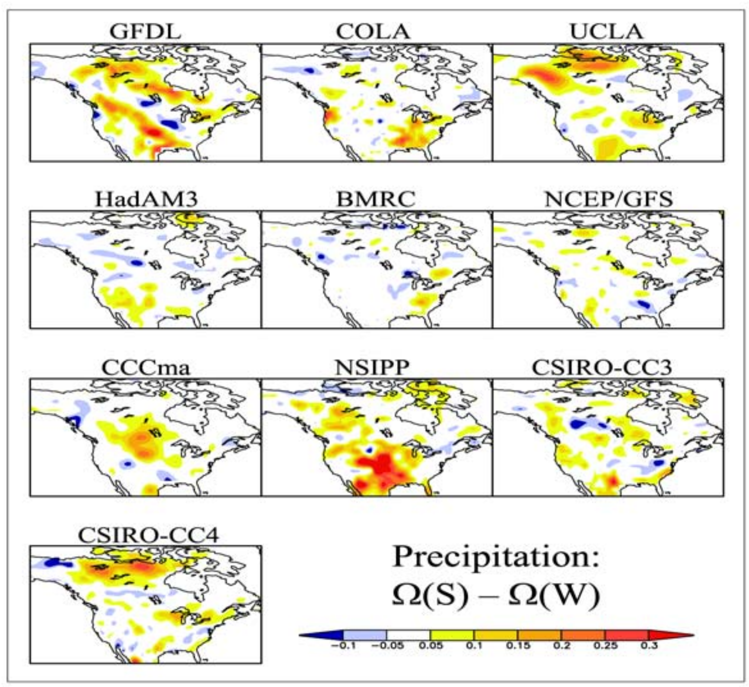
World Climate Research Programme–WCRP

FIRST USE OF MODIS DATA TO CROSS-CALIBRATE WITH GEWEX/SRB DATA SETS



The estimated surface downward shortwave fluxes using MODIS information for July 2001, as well as those derived with the GEWEX/Surface Radiation Budget (SRB) Project model with International Satellite Cloud Climatology Project (ISCCP) D1 data. ***The comparison shows that the two approaches driven with independent input data yield similar global patterns.*** *See article on Page 4.*

GLACE RESULTS SHOW THAT SOIL MOISTURE'S IMPACT ON PRECIPITATION VARIES WITH AGCM



Degree to which subsurface soil moisture variations influence precipitation in nine Atmospheric General Circulation Models (AGCMs), as determined in the Global Land Atmosphere Coupling Experiment (GLACE). Ten panels are shown because one AGCM employed two different land surface schemes. *See article on Page 6.*

What's New

COMMENTARY

RICHARD G. LAWFORD IS THE NEW DIRECTOR OF IGPO

David Carson, Director
World Climate Research Programme

Soroosh Sorooshian, Chairman
GEWEX Scientific Steering Group

We are pleased to announce that Richard G. Lawford has been selected as the new Director of the International GEWEX Project Office (IGPO). We consider the GEWEX research community fortunate to have Rick step in after the outstanding leadership of Paul Try as IGPO director for over a decade.

Rick has many years of experience with GEWEX, beginning in 1991 as Chief of the Hydrological Processes Division at the Canadian Climate Centre, when he helped launch the Mackenzie GEWEX Study (MAGS), which has led to findings about the water balance in the Mackenzie River Basin and the role of freshwater fluxes into the Arctic Ocean.

In 1995, Rick moved to NOAA's Office of Global Programs in Silver Spring, Maryland, USA to become Program Manager of the GEWEX Continental-scale International Project (GCIP). Through Rick's oversight, GCIP advanced the forecast capabilities of the National Weather Service and brought together the atmospheric and hydrological communities to work on coupled modeling studies. He oversaw the successful transition of GCIP into the GEWEX Americas Prediction Project (GAPP).

Since 2001, Rick has also served as part-time Director of the Global Water Cycle Program Office, an interagency water cycle program that he helped establish, and which serves as a US liaison to a number of international organizations, including UNESCO and the Integrated Global Observing Strategy (IGOS)-Partnership (P). As Director, he coordinated the development of the IGOS-P Water Cycle Theme of which the Coordinated Enhanced Observing Period (CEOP) is the first element.

We both have known and worked with Rick on GEWEX related activities for nearly 8 years and look forward to working with him as IGPO Director. With over 30 years of experience in research, science policy, applied and operational meteorology, and his extensive knowledge of GEWEX and international and interagency science programs, Rick will ensure strong leadership for IGPO.

We are also delighted to report that Dawn Erlich will continue to support GEWEX as the Editor of GEWEX News, webmaster, publications specialist, and coordinator of project activities and meetings. Joseph Trowell will also continue to provide graphic design, publication, meeting, and administrative support.

We will continue to benefit from the part-time involvement of Paul Try and Robert Schiffer for scientific and programmatic support, and Sam Benedict with primary responsibilities as International Coordinator for CEOP. Gilles Sommeria, Senior Scientific Officer of the WCRP Joint Planning Staff, continues to be the primary focal point for GEWEX at WCRP in Geneva. The range of GEWEX activities is a long one and we are happy that with the appointment of Rick as IGPO director, we have a very strong team to face the challenges of GEWEX Phase II.

Contents

UPDATE ON THE GEWEX AMERICAS PREDICTION PROJECT (GAPP)

Rick Lawford[1], Jin Huang[2], Jared Entin[3]

[1]UCAR/NOAA Office of Global Programs
[2]NOAA Office of Global Programs
[3]NASA Earth Science Enterprise

The GEWEX Americas Prediction Project (GAPP) has been gaining momentum as a number of projects have been funded over the past 2 years through the NOAA Office of Global Programs (OGP) and the NASA Earth Science Enterprise to support this initiative. The GAPP initiative has two primary objectives, namely:

- Develop and demonstrate a capability to make reliable monthly and seasonal predictions of precipitation and land surface variables through improved understanding and representation of the land surface and related hydrometeorological and boundary layer processes in climate prediction models.
- Interpret and transfer the results of improved seasonal predictions for the optimal management of water resources.

GAPP is steadily gaining the stature and name recognition of its predecessor, the GEWEX Continental-scale International Project (GCIP), and is producing data sets and model improvements that will be a legacy for it and its sponsors. While GAPP is proceeding with a focus on land-atmosphere interactions and hydrology similar to GCIP, it has a larger geographical domain (the contiguous USA) and a clearer focus on addressing intraseasonal to interseasonal prediction. It encompasses process studies in complex regions involving land and ocean forcing of the atmosphere and in the complex terrain of the western Cordillera. New opportunities are being developed for linking GAPP with global domain studies through the Coordinated Enhanced Observing Period (CEOP) and to areas such as the La Plata River Basin through transferability studies. In addition, the heritage data sets and model developments realized through GCIP are being used in GAPP for model development. GAPP continues to stress the development of products for application in the water resource sector. Within GAPP, a NOAA Core project is playing a central role in facilitating science developments to reach operational prediction services.

One of the newest developments is the release of the Regional Reanalysis products (see figure at the top of Page 16). The Regional Reanalysis Project is using a recent version of the NOAH land surface model, along with the Eta model to produce a 25-year data set of reanalysis products (1979–2004). This product is being generated at 32 km resolution for the domain of North America. A unique feature of this product is the precipitation assimilation scheme that allows both surface and atmospheric conditions to be updated by precipitation observations rather than the model precipitation output. Preliminary assessments indicate that this approach will produce precipitation products (and related fields) that will be substantial improvements over the Global Reanalysis precipitation and other water cycle products. Just as the Global Reanalysis products were widely used, it is anticipated that these products will be used extensively and will lead to many new research findings about interseasonal and interannual variability over North America.

GAPP is expected to make major contributions to the US Climate Change Science Program through its Global Water Cycle activity. The GAPP implementation plan will include a number of initiatives that will directly address water cycle priorities. For example, special mountain hydrometeorology activities being planned for the western Cordillera will help to address issues related to complex terrain and its effects on precipitation and runoff. More generally, GAPP will be a major contributor in addressing questions related to "uncertainties in seasonal and interannual predictions of water cycle variables" and "improvements to global and regional models to reduce these uncertainties."

In addition to the on-going opportunities GAPP offers for working with other Continental Scale Experiments through the the GEWEX Hydrometeorology Panel (Baltic Sea Experiment, GEWEX Asian Monsoon Experiment, Large Scale Biosphere-Atmosphere Experiment in Amazonia, Mackenzie GEWEX Study, Murray-Darling Basin), CEOP is providing new opportunities for involvement of the GAPP science community in both domestic and international priorities. This effort, which currently involves the assemblage of data sets for the period of July 2001 to December 2004, is involving a number of US institutions, including some that are not associated with GAPP and some agencies supported directly by GAPP. GAPP's contributions to this program include support for the production of regional and global model outputs (National Centers for Environmental Prediction) and for the CEOP data management module, and coordination and formatting of reference site data from the GAPP area of study (University Corporation for Atmospheric Research). Some of these efforts also support the Integrated Global Observing Strategy (IGOS)-Partnership (P) as CEOP is the initial project within the emerging IGOS-P Water Cycle theme.

One of the new developments within GAPP has been the initiation of cooperative activities with the Climate Variability and Predictability/Pan American Climate Studies Program and the contributions of those new projects to understanding the North American Monsoon System. The North American Monsoon Experiment is a concerted effort to address the monsoon system by studying three tiers across North America. GAPP goals are best addressed through Tiers II (southern USA) and III (covers entire contiguous USA) although there are also potential benefits from process studies from the field phase for Tier I (Gulf of California and environs). In addition, a new thrust within NOAA OGP, known as the Climate Prediction Program for the Americas, is aimed at consolidating efforts related to Intraseasonal-Seasonal Predictions, and will influence some of GAPP's future priorities.

GAPP programmatics have become quite complex due to collaborations with other programs, coordination of activities with multiple agencies and commitments to global scale WCRP programs. For this reason GAPP program management has felt an increasing need for stronger scientific guidance in managing the program. To this end a Scientific Advisory Group (SAG), chaired by Dr. Paul Houser of NASA's Goddard Space Flight Center, has been formed to provide advice and direction to the program managers for GAPP. The SAG will also interface with the US Water Cycle Scientific Steering Committee on relevant issues.

GAPP offers the US hydrometeorological science community an opportunity to become involved in addressing major climate issues that will be central to the interseasonal and interannual prediction activities of NOAA and also to support related NASA goals. In addition to funding meritorious projects, GAPP management wants to work with scientific groups and individuals who wish to analyze GAPP data and utilize GAPP infrastructure in a way that contributes to GAPP's goals. Anyone with an interest in contributing to this ambitious effort is invited to dialogue with Drs. Jin Huang and Jared Entin about the possibilities.

FIRST USE OF MODIS DATA TO CROSS-CALIBRATE WITH GEWEX/SRB DATA SETS

Rachel Pinker[1], Hengmao Wang[1], Michael King[2], and Steven Platnick[2]

[1]Department of Meteorology, University of Maryland, [2]NASA/Goddard Space Flight Center

Many attempts have been made to use satellite data to estimate surface shortwave fluxes at both regional and global scales. The emphasis has been on the use of geostationary satellites to capture the diurnal variability in cloud distributions that determines the amount of energy received at the surface during the course of a day. Due to their instrument configurations, many of these satellites are limited in their capability to accurately detect cloud or aerosol optical properties that are important elements of the radiation budget. Polar orbiting satellites tend to have higher spatial resolution than the geostationary satellites, as well as more spectrally resolving bands. The Moderate Resolution Imaging Spectroradiometer (MODIS) instrument onboard the Terra and Aqua satellites, a state-of-the-art sensor with 36 spectral bands and onboard calibration of both solar and infrared bands, has the capability for measuring atmospheric and surface properties with higher accuracy and consistency than previous Earth observation imagers. Therefore, it is important to utilize such observations to evaluate the performance of algorithms applied to satellites that do not provide direct information on cloud and aerosol optical characteristics.

To enable the use of independently derived optical parameters from multi-spectral satellite observations, the GEWEX/Surface Radiation Budget (SRB) Project model (Pinker et al., 1995; 2003) has been modified for use with observations from the Advanced Earth Observation Satellite (ADEOS II) Midori II and tested previously with proxy data (Wang et al., 2002). In the present study, it was implemented with data from MODIS, which provide parameters similar to those that will be forthcoming from GLI onboard Midori II, and that have already been extensively tested and reprocessed (King et al., 2003; Platnick et al., 2003).

For the modified version of the inference scheme, the parameters needed to drive the SRB are: viewing geometry, column water vapor, column ozone amount, cloud fraction, cloud optical thickness, aerosol optical depth and spectral surface albedo. In the current study, monthly mean MODIS data for July, August and September of 2001 were used. The monthly mean Cloud Fraction Total, Cloud Optical Thickness Combined, Optical Depth Land And Ocean aerosol, Total Ozone, and Atmospheric Water Vapor were taken from the 1° x 1° resolution Level-4 MODIS atmosphere monthly global product processed with the latest collection from four algorithms. The missing aerosol optical depths over arid areas were filled from the MODIS-Global Ozone Chemistry Aerosol Radiation Transport (GOCART) integrated monthly aerosol optical depth data provided by school of Earth and Atmosphere Sciences, Georgia Institute of Technology (Yu et al., 2003). Missing cloud optical thickness values were replaced by interpolated values.

The spectral surface parameters used to calculate spectral surface albedo were taken from the MODIS Bidirectional Reflectance Distribution Function (BRDF) and albedo product (MOD43B) at the 0.25° resolution (Lucht et al., 2000; Schaaf et al., 2002). The three weighting parameters associated with the RossThickLiSparse Reciprocal BRDF model that best describes the anisotropy of each pixel are provided for each of the MODIS spectral bands as well as for the three broad bands (0.3–0.7 µm, 0.7–5.0 µm, and 0.3–5.0 µm). For the two broad bands (0.3–0.7 µm, 0.7–5.0 µm), these parameters were used with simple polynomials to estimate the white sky albedo and the black sky albedo for the monthly mean solar zenith angle.

The estimated surface downward shortwave fluxes using the above MODIS information, as well as those derived with the GEWEX/SRB model using the International Satellite Cloud Climatology Project (ISCCP) D1 data (Rossow and Schiffer, 1991; 1999), are shown for July 2001 in the figure at the top of Page 1**.** For the ISCCP D1 data, the monthly mean fluxes were obtained by averaging the daily means that were obtained by integration of 3-hourly instantaneous fluxes. To make the results from the two data sets coherent, when using the MODIS parameters, the monthly mean viewing geometry was used with the instantaneous observations, multiplied by day length and divided by 24 hours to get the monthly mean values. **The comparison shows that the two approaches driven with independent input data, yield similar global patterns.** Over land, especially over Africa, estimates of fluxes from MODIS are higher than those from ISCCP D1, whereas over oceans, fluxes from ISCCP D1 tend to be larger than those from MODIS. This may be attributed to the cloud amount differences between these two data sets, as well as differences in cloud optical depth, as illustrated in the figure at the bottom of Page 16**.** In general, surface shortwave fluxes from ISCCP D1 are larger than those from MODIS. The lower temporal resolution of polar orbit satellites as compared to geostationary satellites may also contribute to these differences. Additional work is needed to reconcile the two.

To benefit from the detailed cloud information provided by MODIS, cloud types and their corresponding optical depth will be incorporated into the next version of the inference scheme.

The ability to derive global radiative fluxes from the same high quality instrument is important for many new research initiatives. For example, under the Coordinated Enhanced Observing Period (CEOP) activity (Grassl, 2002) that started in the summer of 2001, issues to be addressed include those related to water and energy fluxes over land areas, monsoonal circulations, extension of derived products (e.g., ISCCP, GPCP, SRB, GVaP, ISLSCP) from operational satellites and validation from new satellite systems. Under CEOP, simultaneous observations will be collected over several GEWEX Continental Scale Experiment (CSE) sites, as well as over additional regions of climatic significance. This will allow testing the transfer of techniques and models between different continental-scale regions and predicting water-related parameters at scales suitable for assimilation into global NWP models. **CEOP will also provide an opportunity to evaluate the usefulness of ongoing operational satellites and new generation experimental satellites in hydrological research, and to improve NWP and climate predictions. The radiative fluxes derived from MODIS could serve as a calibration reference for estimates derived from other satellites, as well as a means of cross-calibrating between the many different sensors in use.**

Acknowledgments

The work on surface radiative fluxes was supported under grants NAG59634 from NASA EOD/IDS and RDC101GC1 from the National Space Development Agency of Japan to the University of Maryland. The ISCCP D1 data were obtained from the NASA Langley Research Center Atmospheric Sciences Data Center. The authors acknowledge the developers of the GrADS software.

References

Grassl, H., 2002. CEOP-Global Monitoring for Improved Prediction. *CEOP Newsletter* No. 2.

King, M. D., W. P. Menzel, Y. J. Kaufman, D. Tanré, et al., 2003. Cloud and Aerosol Properties, Perceptible Water, and Profiles of Temperature and Humidity from MODIS**.** *IEEE Trans. Geosci. Remote Sens*., **41,** 442-458.

Lucht, W., C. B. Schaaf, and A. H. Strahler, 2000. An Algorithm for the Retrieval of Albedo from Space Using Semi-empirical BRDF Models. *IEEE Trans. Geosci. Remote Sens.,* **38,** 977-998.

(Contined on Page 15)

FIRST RESULTS FROM GLACE

(Impact of Soil Moisture on Precip Prediction)

Randal Koster[1], Zhichang Guo[2], and Paul Dirmeyer[2]

[1]NASA/Goddard Space Flight Center
[2]Center for Ocean-Land-Atmosphere Studies

To what extent do land surface moisture and temperature states affect the evolution of weather and the generation of precipitation? How does a human-induced change in land cover affect local and remote weather, if at all? Such questions lie at the heart of much recent climate research. Atmospheric General Circulation Models (AGCM) are often used to address these questions, and the results can be enlightening. Nevertheless, the results are also often model-dependent, strongly reducing their significance. In particular, AGCMs are known to have different degrees of "land-atmosphere coupling strength" (Koster et al., 2002), that is, different degrees to which the atmosphere responds to anomalies in land surface state. Models with different inherent coupling strengths can lead to vastly different conclusions about climate sensitivity, to the consternation and confusion of the scientific community.

The strength of land-atmosphere coupling in an AGCM is central to land impact studies but is neither well understood nor well documented. The vast majority of AGCM studies appear to accept the model's implicit land-atmosphere coupling strength on faith, not addressing either its realism or how it compares with that in other models. This is arguably a major deficiency in the current state of the science. The quantification and documentation of the coupling strength across a broad range of models would be valuable, if only to serve as a frame of reference when interpreting the experimental results of any particular model. This quantification and documentation is indeed the goal of the Global Land Atmosphere Coupling Experiment (GLACE), an experiment jointly sponsored by the GEWEX Global Land Atmosphere System Study and the Climate Variability and Predictability (CLIVAR) Working Group on Seasonal-to-Interannual Prediction.

Each AGCM group participating in GLACE performs the same experiment, a series of boreal summer simulations designed to isolate the inherent coupling strength in the model used. Three ensembles of simulations are produced, as follows:

- Ensemble W: Sixteen 92-day simulations spanning June 1– August 31 using prescribed Sea Surface Temperatures (SST) from a particular year of interest.

- Ensemble R: Sixteen simulations spanning the same time period and using the same SSTs, but with the following twist: all simulations are forced to maintain the same geographically varying time series of land surface prognostic variables (e.g., soil moistures, surface and subsurface temperatures). This is achieved by replacing, at every time step, the prognostic variables' values with those produced at that time step by a particular member of Ensemble W.

- Ensemble S: The same as Ensemble R, except that only the subsurface soil moisture prognostic variables are forced to be identical amongst the member simulations.

Note the implications of this experimental design. In Ensemble R, the atmospheres in all member simulations see the same time-varying, spatially varying anomalies of temperature and moisture at the land surface. If all members of Ensemble R produce, for example, a large rainfall in Spain in the middle of July and very little rainfall there during the rest of the period, and if similar coherence amongst simulations is absent in Ensemble W, then we can conclude that the rainfall signal there is strongly tied to – and indeed was induced by – the land surface state. In other words, the degree of land-atmosphere coupling (from either local or remote states) is very high. Conversely, if the members of Ensemble R show no coherence in their precipitation signal, we can conclude that atmospheric chaos overwhelms the land surface signal and thus that the land-atmosphere coupling strength in the model is very low.

Ensemble S has important implications for seasonal forecasting. Subsurface soil moisture is the land state that, during summer, has the greatest memory and thus the greatest potential for contributing to seasonal forecasts. Ensemble S is designed to quantify the responsiveness of the atmosphere to this potentially predictable land variable.

Fifteen AGCM groups expressed an interest in participating in GLACE when it was introduced in February of 2003. At present, nine groups have completed the simulations. Two others are actively running them, giving an expected total of at least 11 participating models.

The coherence of precipitation among the members of a simulation is measured here as Ω, a derived parameter that varies from 0 (implying a complete lack of coherence) to 1 (implying maximal coherence, such that all simulations produce exactly the same time series of precipitation). See Koster et al., 2002, for details on its calculation. In essence, Ω is a measure of the ratio of "signal" to "total" variance. By subtracting the Ω value for Ensemble W from that of Ensemble R, we isolate the impact of the land state on this coherence from that of all other influences, such as variations in the SST field. In other words, we objectively quantify the land-atmosphere coupling strength.

Similarly, by subtracting the Ω value for Ensemble W from that for Ensemble S, we quantify the impact of subsurface moisture on the evolution of precipitation. The figure on the bottom of Page 1 shows the Ω(S) – Ω(W) differences over North America for nine of the participating GLACE models. Precipitation data were aggregated to 6-day totals prior to computing the statistic. The plotted parameter thus effectively shows the fraction of the total precipitation variance (for 6-day totals) explained by subsurface soil moisture anomalies.

Notice the strong model dependence in the degree to which soil moisture controls precipitation. The NASA Seasonal-to-Interannual Prediction Program (NSIPP) model appears to be an outlier, having a somewhat stronger soil moisture–atmosphere connection in the central United States than the other models. The Australia Bureau of Meteorology Research Centre (BMRC) and NOAA National Centers for Environmental Prediction (NCEP) models, on the other hand, have a very weak coupling – for these models, atmospheric chaos overwhelms the soil moisture contribution to the precipitation signal. (Note that the blue shading in the panels indicates a certain level of sampling error in the generation of the statistic; a roughly equivalent amount of light yellow shading can be ignored.) The feedback strength at high latitudes in the Australia Commonwealth Scientific and Industrial Research Organization (CSIRO) model appears to be sensitive to the land surface scheme used. Work is proceeding to explain the spatial patterns of the models' signals, relating them, for example, to variations in hydrological regime.

Which model best represents nature? We cannot say. The GLACE project unfortunately cannot address the realism of simulated coupling strength, since direct measurements of land-atmosphere interaction at large scales simply do not exist. **Again, GLACE's main aim is to document land-atmosphere coupling strength across a broad range of models, to allow individual models to be characterized as having a relatively strong, intermediate, or weak coupling. Only when this fundamental characteristic of an AGCM is quantified can a land impact modeling study be properly interpreted and understood in the context of parallel modeling studies.** Note that as models change and evolve, the GLACE experiments can be re-run easily, and the inherent coupling strength of the newer model version can be put immediately into context.

GLACE results (which, by the way, will also focus on the land's connection to air temperature) indeed highlight a very uncertain aspect of AGCM modeling, an aspect that demands attention from model developers. By improving the realism of the mechanisms controlling land-atmosphere coupling strength (e.g., moist convection, boundary layer structure, and evaporation), modelers can hope to have more confidence in the coupling strength they simulate, even if this coupling strength cannot be measured in nature. Hopefully, the broad disparity shown in the figure on Page 1 will diminish as models improve.

Further details regarding GLACE may be found at http://glace.gsfc.nasa.gov/.

Acknowledgments

For the generation of the figure on Page 1, we acknowledge invaluable contributions from the following participants: Tony Gordon and Sergey Malyshev (Geophysical Fluid Dynamics Laboratory); Yongkang Xue and Ratko Vasic (University of California, Los Angeles); David Lawrence, Peter Cox, and Chris Taylor (Hadley Centre); Bryant McAvaney (BMRC); Sarah Lu and Ken Mitchell (NCEP); Diana Verseghy and Edmond Chan (Canadian Centre for Climate Modelling and Analysis); Ping Liu (NSIPP); and Eva Kowalczyk and Harvey Davies (CSIRO).

Reference

Koster, R. D., P. A. Dirmeyer, A. N. Hahmann, R. Ijpelaar, L. Tyahla, P. Cox, and M. J. Suarez, 2002. Comparing the Degree of Land-atmosphere Interaction in Four Atmospheric General Circulation Models. *J. Hydromet.*, **3**, 363-375.

AFRICAN MONSOON MULTIDISCIPLINARY ANALYSIS (AMMA) PROJECT

Thierry Lebel[1], Jean-Luc Redelsperger[2], and Chris Thorncroft[3]

[1]LTHE, Grenoble, France, [2]CNRM, Toulouse, France, [3]SUNY at Albany, USA

Recognizing the societal need to develop strategies that reduce the socioeconomic impacts of the variability of the West African Monsoon (WAM), the African Monsoon Multidisciplinary Analysis (AMMA) Project will facilitate the multidisciplinary research required to provide improved predictions of the WAM and its impacts on daily-to-decadal timescales. It will promote international coordination of relevant ongoing activities, necessary basic research and a multi-year field campaign over West Africa (see figure below) and the tropical Atlantic to support this research and achieve the following objectives:

1) Improve our understanding of the WAM and its influence on the physical, chemical and biological environment regionally and globally.
2) Provide the underpinning science that relates climate variability to issues of health, water resources and food security for West African nations and defining relevant monitoring strategies.
3) Ensure that the multidisciplinary research is effectively integrated with prediction and decision-making activity.

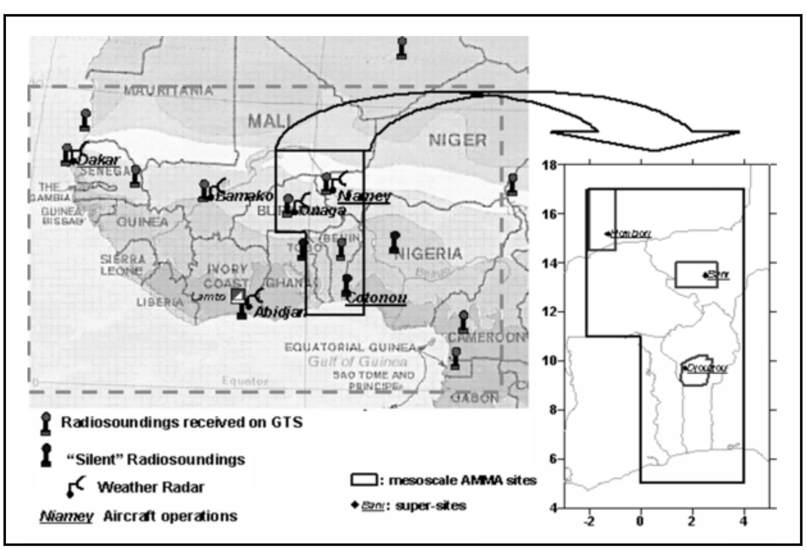
AMMA will extend the work done in the GEWEX Continental-Scale Affiliate, Couplage de l'Atmosphère Tropicale et du Cycle Hydrologique (CATCH), and promote research on four interacting spatial scales: (i) global scale, where consideration is given to how the WAM interacts with the globe; (ii) regional scale, where monsoon processes are emphasized including scale interactions and the coupled land-ocean-atmosphere system; (iii) mesoscale, where convective systems and processes operating at the catchment scale are emphasized; and (iv) local scale where hydrology and links with applications including agriculture are emphasized.

The interannual and interdecadal variability of the WAM is well documented and has motivated considerable research in this area. The dramatic change from wet conditions in the 1950s and '60s to much drier conditions in the 1970s, '80s and '90s over the whole region represents one of the strongest interdecadal signals on the planet in the 20th century. Superimposed on this, marked interannual variations have resulted in extremely dry years with devastating environmental and socio-economic impacts.

Further motivation for research concerned with the WAM and its variability comes from recognizing the role of Africa on the rest of the world. Latent heat release in deep cumulonimbus clouds in the Intertropical Convergence Zone (ITCZ) over Africa represents one of the major heat sources on the planet. Its annual migration and associated regional circulations impact other tropical regions, as exemplified by the known correlation between Sahelian rainfall and Atlantic hurricane frequency.

The West African region is the world's largest source of aerosols. The emissions are modulated by the activity of the WAM but, in contrast to other surface impacts, they feed back directly on climate. The biogeneic and anthropogenic chemical emissions and transport over the African region are also controlled by the WAM and they impact the global chemical cycles.

AMMA is planned to be a multi-year project and will involve three observing periods. It should be underlined here that the enhancement of observa-



The AMMA observing region over West Africa with the location of radiosounding stations (including examples of key stations that need reactivating for AMMA), operational radar and possible airports for aircraft operations. Also indicated in the figure is the region where surface and atmospheric observations will be enhanced along a climatic transect (right) that includes three mesoscale sites that form part of the CATCH hydrological project (http://www.lthe.hmg.inpg.fr/Web_Catch/accueil_Catch_fr.html).

tions during these different periods will provide a unique opportunity to determine future operational monitoring necessary to improve weather and climate forecasts over the West African region.

The Long-term Observing Period (LOP) is concerned with observations of two types: (i) unarchived historical observations to study interannual-to-decadal variability of the WAM; and (ii) additional long-term observations (2002–2010) to document and analyze the interannual variability of the WAM.

The Enhanced Observing Period (EOP) (2004–2006) is designed to serve as a link between the LOP and the SOP (below). Its main objective is to document over a climatic transect the annual cycle of the surface conditions and atmosphere and to study the surface memory effects at the seasonal scale.

The Special Observing Period (SOP) will focus on detailed observations of specific processes and weather systems at various key stages of the rainy season during three periods in the summer of 2006: (i) monsoon onset (15 May–30 June); (ii) Peak monsoon (1 July–14 August); and (iii) late monsoon (15 August–15 September).

Satellite observations will strongly contribute to the objectives of the project by providing key variables of the surface/atmosphere system (e.g., Meteosat/MSG, ENVISAT, TRMM, AURA, AQUA-Train, TERRA, SMOS). It is a major challenge to exploit this large volume of data (20 years for Meteosat, for example) by optimizing the retrievals and data analysis for monitoring, as well as validation of models and assimilation.

Motivated by the strong societal and science issues national and international efforts are underway to help mobilize the extra funding needed to achieve all the AMMA aims. The AMMA web pages below will provide more information about the AMMA project and how it is progressing nationally and internationally. Contact e-mails in Europe, the USA and Africa are also included below.

AMMA website: http://medias.obs-mip.fr/amma/
AMMA-US website: http://www.joss.ucar.edu/amma

Contacts in Europe:
Jean-Luc Redelsperger <jean-luc.redelsperger@meteo.fr>
Doug Parker <doug@env.leeds.ac.uk>
Thierry Lebel <Thierry.lebel@hmg.inpg.fr>
Andreas Fink <fink@meteo.uni-koeln.de>

Contacts in the USA:
Peter Lamb <plamb@ou.edu>
Chris Thorncroft <chris@atmos.albany.edu>

Contacts in Africa:
Cherif Diop <Cherifdiop@hotmail.com>
Abou Amani <amani@sahel.agrhymet.ne>
Leykan Oyebande <lekanoye@hotmail.com>
AMMA African Network <ammanet@medias.cnes.fr>

WORKSHOP/MEETING SUMMARIES

GLASS SCIENCE PANEL MEETING
(Recent Results and New Initiatives)

25–27 August 2003
Tucson, Arizona USA

Paul Dirmeyer
Center for Ocean-Land-Atmosphere Studies

The GEWEX Global Land-Atmosphere System Study (GLASS) Science Panel meeting was held in conjunction with the Project for Intercomparison of Land-surface Parameterization Schemes (PILPS) San Pedro/Sevilleta kick-off workshop. The meeting was hosted by the Sustainability of semi-Arid Hydrology and Riparian Areas (SAHRA) Project, the National Science Foundation Science, and the Technology Center at the University of Arizona (UA).

GLASS is the element of the GEWEX Modeling and Prediction Panel (GMPP) concerned with simulation of the terrestrial state variables and fluxes using land surface schemes (LSS) and the interactions between land and atmosphere. GLASS is ostensibly divided into four actions that constitute a two-by-two matrix; one axis being coupled (land-atmosphere) versus offline (land-only) modeling, and the other being local (point, plot and catchment scale) versus large-scale (continental to global) modeling.

PILPS is the local uncoupled component of GLASS. Much of the workshop was given to the planning and assessment for the PILPS San Pedro/Sevilleta experiment, set to begin in October. PILPS San Pedro/Sevilleta is a multi-model comparison in the PILPS vein, led by Luis Bastidas (Utah State University), Hoshin Gupta and Bart Nijssen (UA), and Eric Small (University of Colorado). PILPS San Pedro/Sevilleta is a unique experiment in three ways. It is the first PILPS study in a semi-arid region, with study sites in Arizona and New Mexico. Second, code for performing a multi-criteria optimization procedure developed by Gupta and Bastidas will be made available to all model participants for calibration of their schemes. Third, the experiment will be a direct test of spatial transferability of surface parameters, as is commonly practiced but not validated in weather, climate and hydrologic models. Terri Hogue (University of California, Los Angeles) also presented some test-bed results for the experiment using the NOAH LSS. The website for the experiment is http://www.sahra.arizona.edu/pilpssanpedro/.

Updates on other PILPS activities, past and future, were also presented. **Nicolas Viovy (Laboratoire des Sciences du Climat et de l'Environnement) presented a summary of results from the PILPS C-1 experiment, which was the first to compare the abilities of LSSs with explicit carbon cycles.** A well monitored and documented wooded EuroFlux site in the Netherlands was used as the setting for the modeling experiment. Participants were asked to simulate the growth of the forest stand over the last 100 years (from the time it was planted at a previously cleared site), and then to simulate the fluxes of water, energy and carbon over the last few years, when intensive monitoring has been in place. **Some of the more outstanding results include the divergence among the dynamic vegetation models in their simulation of biomass growth and carbon fixation over the last century while simulating similar net ecosystem exchange, and the happy fact that incorporation of carbon components into LSSs appeared to have no deleterious effect on their simulation of the surface energy balance.** Han Dolman (Vrije Universiteit Amsterdam) gave an overview of FluxNet sites that could be used for follow-on studies that could examine the link between carbon and water.

Ann Henderson-Sellers (Australian Nuclear Science and Technology Organization) presented a summary of the PILPS program to date, and put forward a proposal for an isotopic PILPS study in the future, where the ability of LSSs to simulate the fluxes of traceable chemical constituents could be tested. The panel encouraged a proof-of-concept exercise to be conducted, with an eye towards marrying carbon and water isotopic modeling, as well as nutrients and other passive tracers.

There were several reports on projects that are currently underway. Paul Dirmeyer and Xiang Gao [Center for Ocean-Land-Atmosphere Studies (COLA)] reported on progress with the second Global Soil Wetness Project (GSWP-2), which is a multi-model large-scale offline simulation of the land surface state variables and fluxes over the period 1986-1995. Over a dozen modeling groups are completing baseline simulations, and will be submitting their results to the project's Inter-Comparison Center (ICC) at the University of Tokyo by the end of October. **One of the new elements in GSWP-2 is a focus on remote sensing applications. The project will test the ability of multiple LSSs to simulate infrared (thermal) and microwave (soil wetness) brightness temperatures as observed from remote sensing platforms.** For more information about GSWP-2, see http://www.iges.org/gswp/.

Randy Koster (NASA/GSFC/GMAO) and Zhichang Guo (COLA) compiled an update of the Global Land-Atmosphere Coupling Experiment (GLACE), a joint project with the CLIVAR Working Group on Seasonal-to-Interannual Prediction. The experiment aims to quantify the strength of land-atmosphere coupling and its variability among most of the major climate models in use around the world. Integrations from five GCMs had been completed, with a total of 10–12 expected to be available by the end of September. Preliminary results showed the expected spread among models of the sensitivity of simulated precipitation to the land surface thermal and moisture state. (See GLACE article on Page 6.)

Proposals from Paul Houser and Christa Peters-Lidard (NASA/GSFC/HSB) were heard regarding the local coupled action. A workshop was held in De Bild, Netherlands last year to initiate progress in this area, which is responsible for exploring the local interplay between the land surface and planetary boundary layer (PBL) with an eye toward improved assimilation of both surface and atmospheric data. Houser argued the need for a field study to isolate conditions when land-atmosphere interactions are most important, to study whether the absence of coupling in PILPS-type experiments compromises their general applicability, and to discern the important differences between land data assimilation in coupled versus offline configurations. Peters-Lidard proposed a project for testing coupled LSS-PBL models. The panel encouraged collaboration with the GEWEX Atmospheric Boundary Layer Study (GABLS). Peters-Lidard and Bart van der Hurk will write a white paper to motivate an implementation workshop.

GLASS is also addressing crosscutting issues in the climate modeling community. One involves the continuing problem of initialization of soil wetness in climate models, and the lack of transferability of soil moisture data sets from one model to another. GLASS is preparing a summary paper on the issue to educate the broader modeling community as to the pitfalls of treating soil moisture as a uniformly defined quantity across models, with some proof-of-concept simulations to illustrate the point.

Another issue of concern to the panel is the application of LSSs in regional models. The regional modeling community is not well connected to the global modeling community who seem to do much of the land model development work. LSSs in regional models are often not well initialized, and the panel perceives that the regional modeling community underestimates the severity of this problem. This is particularly worrisome because of the question of scale – the same parameterizations are used but land surface errors are a more acute problem for regional models as they cannot perform a self-contained spin-up. A workshop on the topic is being considered to bring the land surface and regional modeling communities together. A potential stage for such a workshop may be the African Monsoon Multidisciplinary Analysis (AMMA) Project. (See Page 8 for a description of AMMA.)

Other topics discussed included a briefing on urban modeling from Martin Best (UKMO), a briefing on the Integrated Land Ecosystem – Atmosphere Processes Study and discussion of the status of the International Satellite Land Surface Climatology Project with Pavel Kabat (Alterra). There was also discussion of a proposed new initiative within GMPP focusing on modeling of the diurnal cycle, brought up by Jan Polcher (CNRS/LMD). The initiative is aimed to improve communication and collaboration across the three modeling studies in GMPP (land surface, cloud, and boundary layer).

NEW GLASS CHAIR

Dr. Paul Dirmeyer, Research Scientist at the Center for Ocean-Land-Atmosphere Studies (COLA), is the new chair of the Global Land-Atmosphere System Study (GLASS). Paul chaired and oversaw the successful completion of the first Global Soil Wetness Project (GSWP) and is now chairing the follow-on, GSWP-2. He replaces Dr. Jan Polcher, Laboratoire de Météorologie Dynamique du CNRS, the founder and first chair of GLASS. Jan is chairman of the GEWEX Modeling and Prediction Panel (GMPP) and remains involved in GLASS activities, including the data standardization effort and open-source software bazaar he co-founded as an instrument to aid GLASS research, which has been adopted and used by many land modeling projects outside of GEWEX.

GABLS WORKSHOP ON STABLE BOUNDARY LAYERS

22–26 September 2003
University of the Balearic Islands, Mallorca, Spain

Albert A.M. Holtslag[1], Robert J. Beare[2], and Joan Cuxart Rodamilans[3]

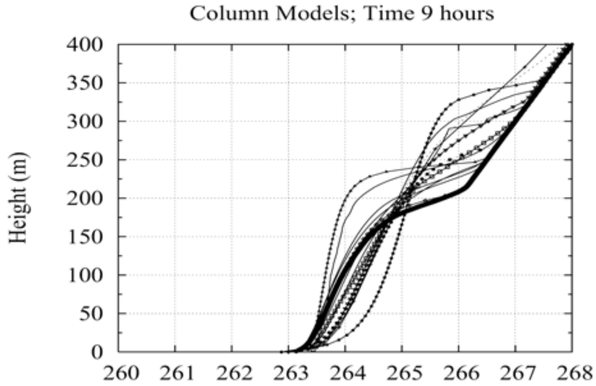
[1]Meteorology and Air Quality Section, Wageningen University, The Netherlands
[2]Met Office (UK),
[3]University of the Balearic Islands, Mallorca (SP)

The GEWEX Atmospheric Boundary Layer Study (GABLS) aims to improve the understanding and the representation of the atmospheric boundary layer in regional and large-scale climate models. **Recall that much of the warming predicted by climate models is during stable conditions over land and ice (either in winter or at night). Consequently, the first focus of GABLS is on the representation of the atmospheric Stable Boundary Layer (SBL) (see Holtslag, 2003 for more background information).**

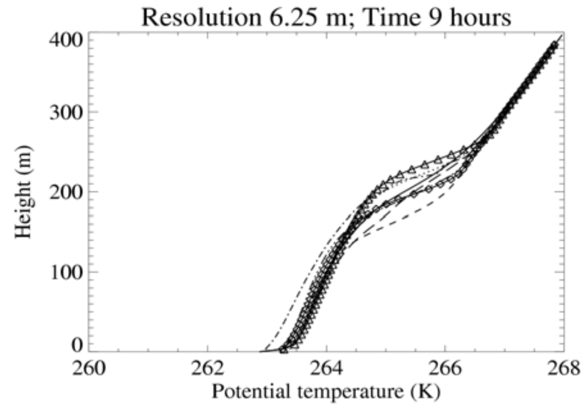
On the basis of previous discussions and meetings, a benchmark case was selected to discuss the state of the art and to compare the skills of single column (1D) models and Large-Eddy Simulation (LES) models. The case is based on the results presented in a study by Kosovic and Curry (2000) for a shear-driven, stable case over ice. As such the boundary layer is driven by an imposed, uniform geostrophic wind, with a specified surface-cooling rate, which attains a quasi-steady state SBL (after about 9 hours). The specifications of the case and the forcing conditions have been distributed to the community in the previous year. Consequently, about 10 groups participated in the comparison for the LES models and more than 10 groups for the 1D models.

The findings were presented at a workshop. which was attended by about 30 scientists. Discussion sessions were held on the results for the different models, and presentations were given on the specifications of the different models, as well as presentations on how to analyze the model results. Also, presentations were given on existing observations, proposals for new data (including laboratory experiments) and on recent developments in theory.

The purpose of the single-column intercomparison was to check the performance of any turbulence or



A comparison of the results for potential temperature of the 1D models for the selected GABLS case.



A comparison of the results for potential temperature of the LES models for the selected GABLS case.

vertical diffusion scheme for the selected case. As an example, the figure above shows the outcome for the potential temperature profile as represented by (most of) the 1D models after 9 hours of cooling. Similar differences appear in the mean wind profiles, as well as the turbulent fluxes and other model outputs. Thus, with the same initial conditions and forcing conditions, the models indicate a large range of results. It appears that this is very strongly related to the choice of the turbulent length scale in the turbulence schemes, and not so much to the vertical resolution. As expected, typically the operational models allow for enhanced mixing resulting in deep boundary layers, while research models, some of which have been adjusted for the present case, show less mixing (more in agreement with data and LES). This issue will be explored further.

The results for the different LES models are given in the figure in the next column. These results are much closer to each other than shown in the figure above for the 1D models. Note that most of the LES models are given at grid length of 6.25 meters. Sensitivity tests indicated that most of the remaining spread is attributable to differences in formulation and configuration of the sub-grid model. However, even at very high resolution of 2 meters, some LES models did not converge, although those that were performed at a 1-meter resolution indicated a good degree of convergence. It seems that if resolution increases, the SBL decreases. This indicates that more work on the representation of the subgrid scales in LES is still needed (in particular, near the surface). Note that LES of SBLs only began in the early 1990s and since then significant progress is made as indicated by the current findings.

At the workshop several options were explored for future activities. It was suggested that the studies with LES and 1D should follow different routes for SBLs. As such it is felt that 1D proposals should be compared to real data to see if they fulfill the requirements of the climate models. Meanwhile, LES must advance more carefully towards stronger stratification, taking special consideration on the developments of the subgrid scale modeling.

Participants attending the GABLS Workshop.

The 1D models are ready now to compare with more elaborate data, such as for cases with stronger cooling over different types of surfaces and increasing complexity. As such, it was discussed to set up a new case over land dealing with the full diurnal cycle. It was also suggested to run the models with a simple surface energy budget (rather than the prescribed cooling) to allow for feedbacks between the land surface and the boundary layer. It should not be difficult to find suitable cases in the existing data sets (e.g., ARM, CASES-99, Cabauw, Lindenberg, SABLES98, AMERIFLUX, EUROFLUX). In addition, suggestions were made to explore observations over the Baltic Sea and at Antarctica (notably Halley).

It is foreseen that the outcome of the Mallorca Workshop will be presented in a number of journal papers, as well as a meeting connected to the upcoming "Boundary Layers and Turbulence Conference," in Portland, Maine, USA, August 2004. If you would like to participate in the current 1D model intercomparison (open until January 1, 2004) please contact Joan Cuxart Rodamilans (joan.cuxart@uib.es). If you have suggestions or are willing to prepare a benchmark case on your data, please contact Bert Holtslag (Bert.Holtslag@wur.nl). Please also consult http://www.gewex.org/ or http://www.met.wau.nl/ for updates on GABLS activities in the near future.

Acknowledgments

We wish to thank all participants at the Mallorca Workshop and the involved modeling groups for their inputs and comments. In particular, we would like to acknowledge Malcolm MacVean, Anne McCabe, Maria Jimenez, and Laura Conangla for their help in the preparation of the selected case study and the involved handling of data and model results.

References

Holtslag, A. A. M., 2003. GABLS Initiates Intercomparison for Stable Boundary Layers. *GEWEX News*, 13 (May 2003), p.7-8.

Kosovic, B. and J. A. Curry, 2000. A Large Eddy Simulation Study of a Quasi-steady, Stable Stratified Atmospheric Boundary Layer. *J. Atmos. Sci.*, **57,** 1052-1068.

9TH ANNUAL MEETING OF GHP AND FIVE FOCUSED WORKSHOPS

Lüneburg, Germany
September 22–26, 2003

John Roads, GHP Chair
Scripps ECPC, UCSD, La Jolla, California

The ninth annual meeting of the GEWEX Hydrometeorology Panel (GHP) was hosted by Hans-Jörg Isemer, GKSS Research Centre, Geesthacht, and Hartmut Grassl, Max-Planck-Institute (MPI) for Meteorology, Hamburg. The meeting began with focused workshops on five GHP initiatives: 1) Water and Energy Budget Studies (WEBS), chaired by J. Roads; 2) Water Resources Application Project (WRAP), chaired by L. Martz; 3) Sources and Cycling of Water (SCW), chaired by M. Bosilovich; 4) Extremes, chaired by R. Stewart; and 5) Predictability, chaired by J. Marengo.

A workshop on the Coordinated Enhanced Observing Period (CEOP), chaired by S. Benedict was also held during the meeting. From its early beginnings as a GHP working group, CEOP eventually became a project of the World Climate Research Programme, with major contributions from GEWEX. Of particular interest during the workshop was the developing model data archive, a major contribution from the Baltic Sea Experiment (BALTEX), which was described by H. Luther and M. Lautenschlager. S. Williams described the extensive *in situ* data archive, which is a major contribution of the GEWEX Americas Prediction Project (GAPP). J. Matsumoto described the University of Tokyo remote sensing archive, a major contribution of the GEWEX Asian Monsoon Experiment (GAME). It should be noted that all of the Continental-Scale Experiments are contributors to the CEOP *in situ* measurements, model output, and remote sensing products. A number of presentations were given describing the developing science investigations that will be using the extensive international multi-sensor model CEOP data sets.

The official GHP meeting began after the focused workshops. Summary presentations of progress and plans for the coming year were given by the GEWEX Continental-Scale Experiments (CSE) and affiliated representatives, GEWEX and affiliated global projects, and the GHP working groups.

CSE reports were presented for: the Mackenzie GEWEX Experiment (MAGS) by K. Szeto; GAPP by R. Lawford; the Large Scale Biosphere-Atmosphere Experiment (LBA) by J. Marengo; BALTEX by H. J. Isemer; GAME by T. Yasunari; and the Murray-Darling Basin (MDB) Project by A. Seed. The GHP was especially interested in learning how these CSEs are planning to evolve in the near- and long-term. Some of the original CSEs now have sunset dates for their projects and new regional initiatives will have to be undertaken for them to remain viable in the face of the many new challenges facing the scientific community.

C. Mechoso made a persuasive presentation on why the La Plata River Basin (LPB) experiment should be considered for official status as a GEWEX CSE. The CSE representatives unanimously agreed that the LPB would be able to eventually fully meet all of the established GHP criteria. The GHP will, therefore, be forwarding its recommendation to the GEWEX SSG that LPB be recognized as an official GEWEX CSE.

Presentations were also made from affiliated GEWEX global projects, including: 1) Thomas Maurer described the Global Runoff Data Center (GRDC), which will be working with GHP/WEBS; 2) B. Rudolf described the Global Precipitation Climatology Center (GPCC), which will also be working with GHP/WEBS. A. Hall described the International Association of Hydrologic Sciences (IAHS) and its interest in working with GHP/WRAP on the IAHS Prediction of Ungauged Basins (PUB) initiative and in defining additional hydrologic reference sites for CEOP. D. Lettenmaier described aspects of the Global Water Systems Project (GWSP), which may also be useful for links to GHP/WRAP. P. Aggarwal described the International Atomic Energy Agency (IAEA) and its interest in using isotopes and working with GHP/SCW to understand water sources and sinks. The GHP was especially encouraged that IAEA will be sponsoring a workshop on isotope modeling in the near future in order to accelerate progress.

Representatives of a few international regional model intercomparison projects were also invited to make presentations to the GHP. G. Takle described the US based Project to Intercompare Regional Climate Situations (PIRCS) Project. J. Marengo described a beginning study over Brazil. B. Rockel described a potential project focused on the GHP CSEs. H. Berbery described regional modeling efforts for LPB. Currently, these regional projects work independently, but given that each of them has substantial international involvement and is making substantial contributions to GEWEX/GHP transferability goals, it may be of interest to develop a GHP Transferability Working Group. This will be explored further during the coming year.

On the last day, summary presentations were made by the chairs of the various GHP working groups on their plans for the coming year. GHP/WEBS and WRAP are now actively developing project plans that will ultimately include GHP-wide papers; objectives and plans for these projects will be reported on at the GEWEX Scientific Steering Group Meeting in January in Morocco. The SCW, Extremes, Predictability, and Transferability working groups are just beginning and may have focused workshops next year along with the Data Management Working Group. The 10th annual GHP meeting (August or September 2004) will be hosted by LPB in Montevideo, Uruguay.

Attendees at the 9th annual GHP meeting included: (front row, left to right) K. Masuda, B. Rudolf, A. Hall, J. Roads, G. Sommeria, S. Köppe, S. Sorooshian, A. Sugimoto, T. Yasunari, J. Matsumoto, P. Aggarwal, K. Szeto; (back row, left to right) L. Horta, L. Martz, G. Takle, J. Tomasella, B. Rockel, D. Lettenmaier, S. Williams, J. Marengo, R. Stewart, S. Benedict, A. Seed, D. Noone, R. Lawford, J. Bradd, H.-J. Isemer, T. Maurer, H. Berbery.

GEWEX FLIES ABOARD THE SHUTTLE

Piers Sellers, NASA astronaut and former GEWEX scientist, carried the GEWEX logo aboard the space shuttle Atlantis in October 2002. In the photograph above, Piers (left) is presenting a GEWEX certificate recognizing the event to David Carson, Director of the World Climate Research Programme, at a short ceremony that was held at the University of Maryland, Baltimore Campus (UMBC) on August 4, 2003. Photograph courtesy of UMBC.

FIRST USE OF MODIS DATA...

(Continued from Page 5)

Pinker, R. T., I. Laszlo, C. H. Whitlock and T. P. Charlock, 1995. Radiative Flux Opens New Window on Climate Research. *EOS,* 76, No. 15, April 11.

Pinker, R. T., J. D. Tarpley, I. Laszlo, K. E. Mitchell, et al., 2003. Surface Radiation Budgets in Support of the GEWEX Continental Scale International Project (GCIP) and the GEWEX Americas Prediction Project (GAPP), including the North American Land Data Assimilation System (NLDAS) Project. *J. Geophys. Res*., in press.

Platnick, S., M. D. King, S. A. Ackerman, W. P. Menzel, B. A. Baum, J. C. Riédi, and R. A. Frey, 2003. The MODIS Cloud Products: Algorithms and Examples from Terra. *IEEE Trans. Geosci. Remote Sens*., **41,** 459-473.

Rossow, W. B. and R. A. Schiffer, 1991. ISCCP Cloud Data Products. *Bull. Amer. Meteor. Soc*. **72,** 2-20.

Rossow W. B. and R. A. Schiffer, 1999. Advances in Understanding Clouds from ISCCP. *Bull. Amer. Meteor. Soc*., **80,** 2261-2287.

Schaaf, C. B., F. Gao, A. H. Strahler, W. Lucht, et al., 2002. First Operational BRDF, Albedo and Nadir Reflectance Products from MODIS. *Remote Sens. Environ.,* **83,** 135-148.

Wang, H., Takashi Y. Nakajima, Akiko Higurashi, Teruyuki Nakajima, et al., 2002. A Multi-Satellite Approach to Estimate Radiative Fluxes over the Oceans. Spring AGU, Washington, DC, May 28–June 1.

Yu, H., R. E. Dickinson, M. Chin, Y. J. Kaufman, et al., 2003. Annual Cycle of Global Distributions of Aerosol Optical Depth from Integration of MODIS Retrievals and GOCART Model Simulations, 2003. *J. Geophys. Res.,* **108(D3),** 4128, doi: 10.1029/2002JD002717.

GEWEX/WCRP MEETINGS CALENDAR

For calendar updates, see the GEWEX web site: http://www.gewex.org

10–11 November 2003—8th GAME-ISP MEETING, Khon Kaen, Thailand.

10–13 November 2003—14TH SESSION OF THE GEWEX RADIATION PANEL, Victoria, British Columbia, Canada.

10–14 November 2003—19TH SESSION OF THE CAS/JSC WORKING GROUP ON NUMERICAL EXPERIMENTATION (WGNE)/7TH SESSION OF THE GEWEX MODELLING AND PREDICTION PANEL (GMPP), Salvador, Brazil.

11–14 November 2003—ACSYS FINAL SCIENCE CONFERENCE AARI, St. Petersburg, Russia.

12–14 November 2003—MAGS ANNUAL MEETING #9, Montreal, Canada.

13–14 November 2003—WORKSHOP ON PROBLEMS WITH CLOUDS AND 3-D RADIATIVE TRANSFER, Victoria, British Columbia, Canada.

10–15 January 2004—84th ANNUAL AMERICAN METEOROLOGICAL SOCIETY Meeting, Seattle, Washington.

26–30 January 2004—16TH SESSION OF THE GEWEX SSG, Marrakesh, Morocco.

2–4 Febuary 2004—WORKSHOP ON SEMI-ARID REGIONS, Marrakesh, Morocco.

1–6 March 2004—25TH SESSION OF THE WCRP JOINT SCIENTIFIC COMMITTEE, Moscow, Russian Federation.

10–12 March 2004—THIRD CEOP IMPLEMENTATION PLANNING MEETING, Irvine, California, USA.

24–28 May 2004—4TH STUDY CONFERENCE ON BALTEX, Island of Bornholm, Denmark.

GEWEX NEWS

Published by the International GEWEX Project Office

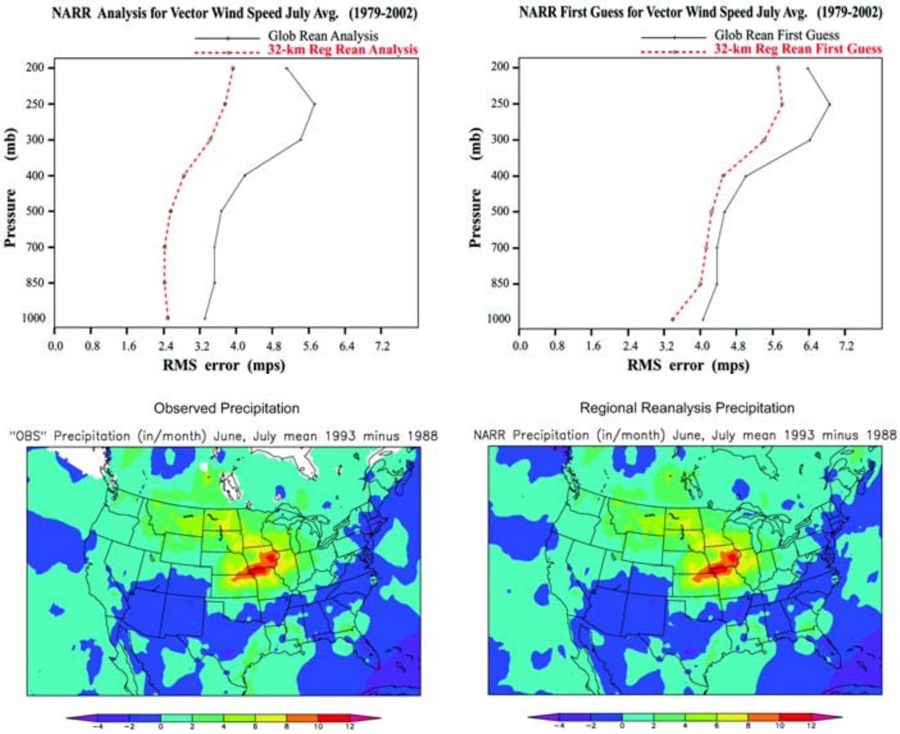
Richard G. Lawford, Director

Mail: International GEWEX Project Office
1010 Wayne Avenue, Suite 450
Silver Spring, MD 20910, USA
Tel: (301) 565-8345
Fax: (301) 565-8279
E-mail: gewex@gewex.org
WWW Site: http://www.gewex.org

Editor: Dawn P. Erlich
Layout: Joseph L. Trowell

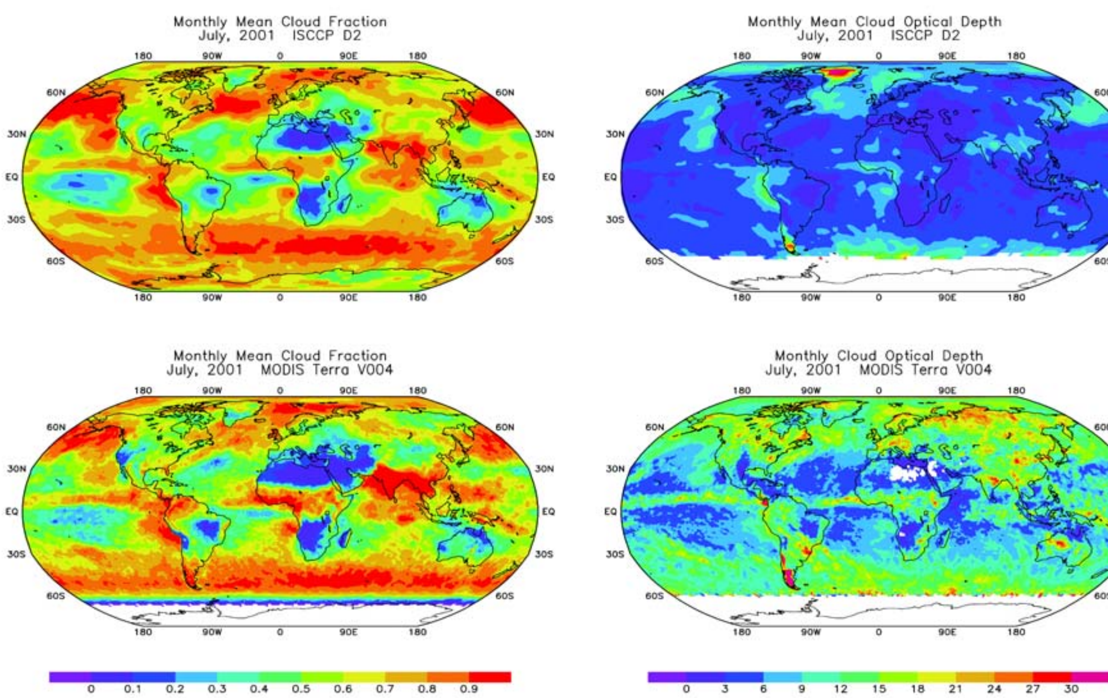
NEW 24-YEAR REGIONAL REANALYSIS NOW AVAILABLE

(http://wwwt.emc.ncep.noaa.gov/mmb/rreanl/index.html)



Top panels show fits to RAOBS of the NCEP North America Regional Reanalysis (NARR) winds, 24-year average (1979–1992) for July, analyses (left) and first guess fields (right) [dashed lines]; and the NCEP/DOE global reanalysis (GR) [solid lines]. The bottom left panel shows the NARR "observed" precipitation that is assimilated by the NARR system over land and over southern portions of the oceans, monthly average, July 1993 minus 1988. Bottom right panel: Same, but NARR generated precipitation. See related article on Page 3.

FIRST MODIS AND GEWEX/SRB COMPARISON SHOWS REGIONAL DIFFERENCES



Over land, especially over Africa, estimates of fluxes from MODIS are higher than those from ISCCP D1, whereas over oceans, fluxes from ISCCP D1 tend to be larger than those from MODIS. This may be attributed to the cloud amount differences between these two data sets, as well as differences in cloud optical depth, as illustrated above. See article on Page 4.