GEWEX WCRP
Global Energy and Water Cycle Experiment
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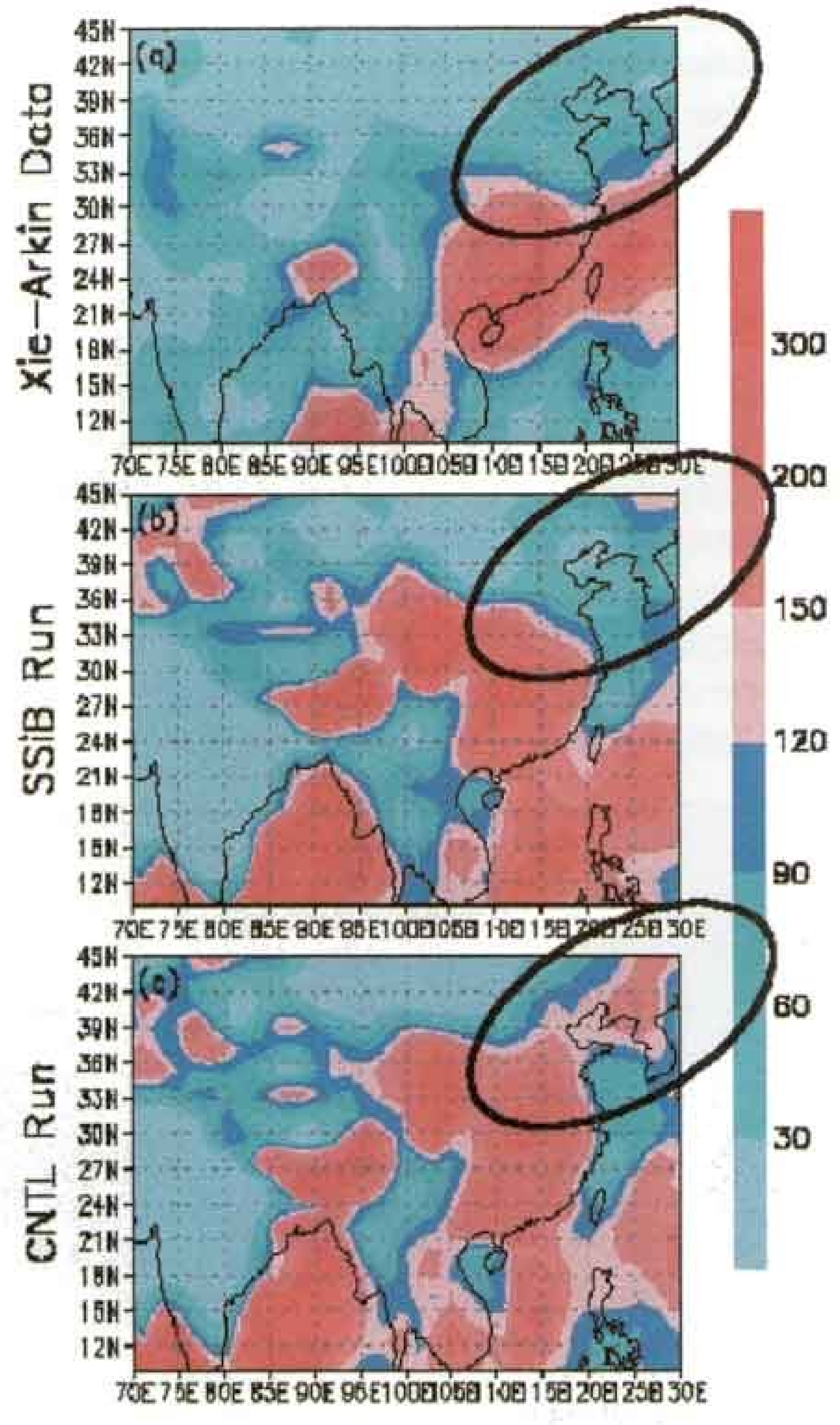
GEWEX MOVING INTO PHASE II

Exploitation of new satellites/models

BUILDING ON PHASE I ACCOMPLISHMENTS

See "GEWEX at Center Stage" (page 2) and "Achievements of GEWEX in 1990s" (page 3)

LAND SURFACE PROCESSES IMPACT MONSOON RAINFALL



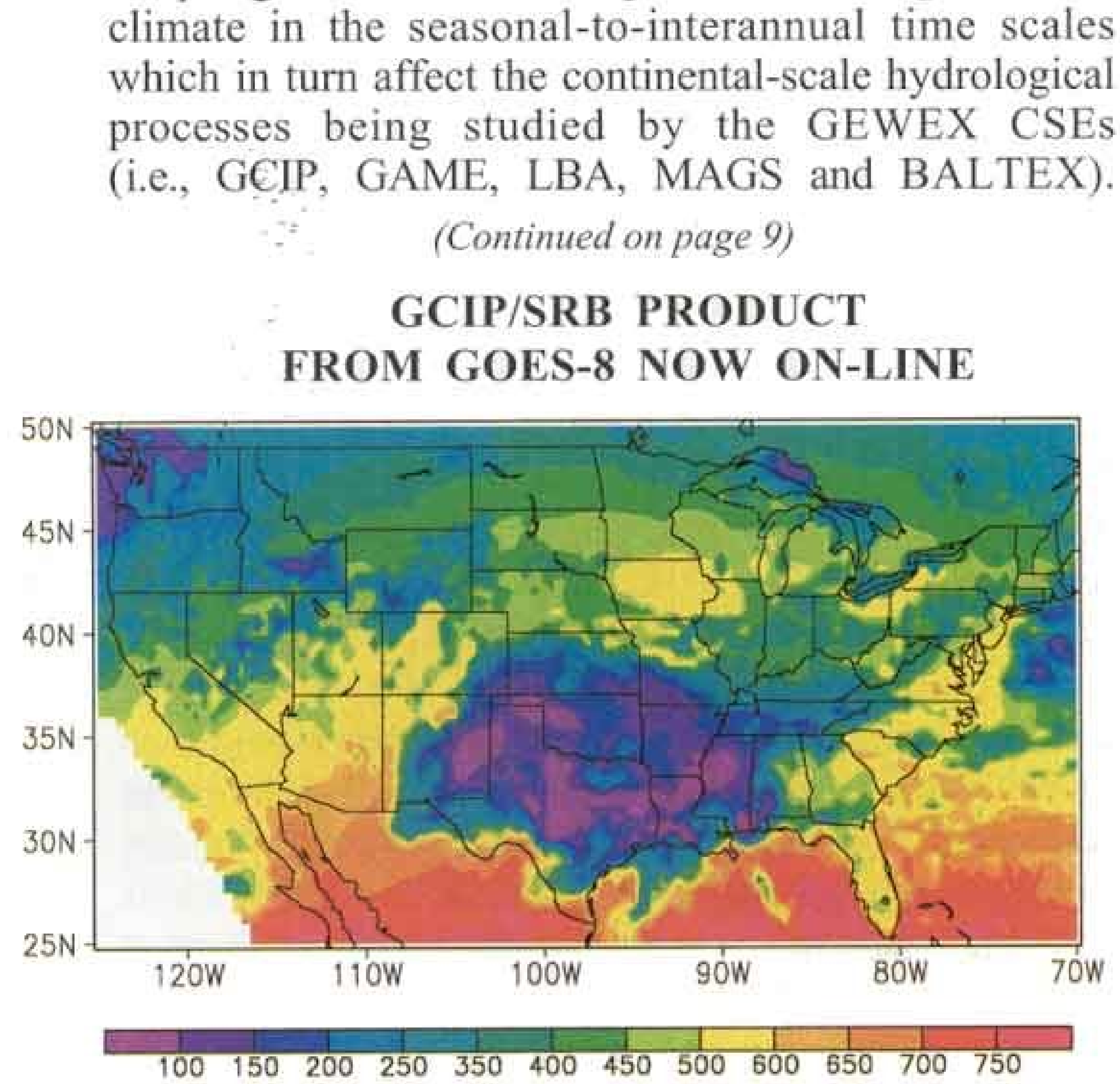
Compared with the observational data (panel a) in East Asia, the monsoon onset of rainfall in May is too strong in the original NCEP GCM, and the rainfall area approaches too far to the north (panel c); whereas the NCEP GCM/SSiB (panel b) correctly simulates the monsoon's onset. (See article on page 8.)

GEWEX COORDINATED ENHANCED OBSERVING PERIOD (CEOP) PLANNING ADVANCES

The CEOP planning is moving forward, building on extensions of the GEWEX Continental Scale Experiments (CSE) and the support of other GEWEX and WCRP projects (e.g., CLIVAR and ACSYS). The overall objective of CEOP is to address the influence of continental hydroclimatic processes on the predictability of global atmospheric circulation and changes in water resources, with a particular focus on the heat source and sink regions that drive and modify the climate system and its anomalies. The major equatorial heat source regions with their coupling to ENSO also impact the mid/high latitude climate in the seasonal-to-interannual time scales which in turn affect the continental-scale hydrological processes being studied by the GEWEX CSEs (i.e., GCIP, GAME, LBA, MAGS and BALTEX).

(Continued on page 9)

GCIP/SRB PRODUCT FROM GOES-8 NOW ON-LINE



Instantaneous Shortwave Downward flux (W/m^2) derived from NOAA/NESDIS GCIP SRB Estimates, January 29, 1999 (18h UTC). (See article on page 6.)

MY FINAL COMMENTARY:

GEWEX AT CENTER STAGE

Moustafa T. Chahine, Chairman, SSG

In 1989, following approval of the GEWEX objectives by the WCRP Joint Scientific Committee (JSC), the GEWEX Scientific Steering Group (SSG) decided it was necessary to start the program with a bold interdisciplinary effort. During this buildup phase GEWEX formed an alliance with a visionary group of international researchers from a number of fields who were poised to push forward with the study of processes that cut across the historic disciplinary boundaries among hydrologic, radiation, atmospheric and land-surface sciences. GEWEX also engaged experts in modeling techniques at the world's major weather prediction centers and secured the support of the space agencies in Europe, Asia and the Americas to provide new and improved space observations. The outcome of this period is a number of highly successful research experiments, observations, parameterizations and modeling studies of coupled land surface-atmospheric processes and cloud-atmospheric feedback processes. In addition, the teams of scientists and engineers who dedicated themselves to organizing the five GEWEX Continental-Scale Experiments during this phase have also promoted the use of GEWEX results by local and regional water-resource agencies, fostering links to a broad applications community.

GEWEX is now about to embark on its second phase, which will be characterized by the exploitation of the new observational data about to be delivered by the space agencies. This new phase aims to fulfill the GEWEX objective to "develop the ability to predict the variations of global and regional hydrologic processes and water resources and their response to environmental change." To this end, the GEWEX SSG initiated several programs in 1998 and 1999 to enhance collaborations with research teams in other programs of WCRP, in particular the Working Group on Numerical Experimentation (WGNE) and the Working Group on Coupled Modelling (WGCM). GEWEX is planning a new thrust in land-surface parameterization development and coupling to climate models and is discussing plans for a major air-land-ocean monsoon experiment in the western Pacific to be carried out in association with CLIVAR researchers. GEWEX continues also to strengthen and broaden its collaboration with scientists in other special agencies of the United Nations and in the International Geosphere-Biosphere Programme (IGBP).

The transition of GEWEX into this second phase will take place under new leadership, as I plan to step down as Chairman of the SSG in March 1999, following the JSC meeting in Kiel, Germany. However, before I leave my current role, I would like to take the remaining space in this final commentary to express my deep feeling of personal satisfaction in the achievements realized by the GEWEX team and add that I am fully confident that equally significant accomplishments will follow in the future. Those who contributed to GEWEX number in the thousands world-wide; those who devoted their skills and thoughts directly to the planning of the many GEWEX projects easily number in the hundreds. Still, it is important to single out a very small number of people who helped me, day-after-day, to carry out my responsibilities: Pierre Morel who started GEWEX while serving as Director of WCRP in Geneva; Hartmut Grassl who followed him as Director of the Geneva office; Tetsuzo Yasunari in Tokyo who served as Vice Chair of the GEWEX SSG; Roger Newson and Sam Benedict in Geneva; Paul Try in Washington, D.C; and Deborah Vane in Pasadena, California. From their respective posts, they kept a watchful and caring eye on GEWEX, literally 24 hours a day.

Thank you all.

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THE ACHIEVEMENTS OF GEWEX IN THE 1990s: *(A THANK-YOU NOTE TO MOUS CHAHINE)*

Anthony Hollingsworth
European Centre for Medium-Range Weather Forecasts

Over the past ten years, and based on its knowledge of the shortcomings of operational and research models, GEWEX through its many projects (e.g., GEWEX Cloud System Study, International Satellite Land-Surface Climatology Project) and working groups (e.g.,Working Group on Numerical Prediction, Working Group on Radiative Fluxes) has delivered many developments in model parameterizations relevant to the atmospheric hydrological cycle and its interactions with the land surface and biosphere. **To make these advances, GEWEX/WCRP developed an innovative and effective "GEWEX-methodology" for improving parameterizations**. The methodology involves active dialogue and exchange between field experimenters, operational forecasting and global climate modelling centres, the Large-Eddy-Simulation community and the remote-sensing community. The GEWEX methodology aims are:

(i) to identify the key gaps in our understanding of cloud/precipitation/land processes,

(ii) mount measurement programs to reduce the uncertainties,

(iii) formulate better models, and

(iv) provide independent verification of the resulting improvements.

By now, GEWEX's successful methodology has a sustained momentum which promises many new developments in the future. GEWEX has also been an effective advocate for a number of space missions (advanced sounders, doppler wind lidar, rain radar, cloud radar) which should deliver important new gains in understanding over the next 5–10 years.

Through the GEWEX process several assimilation and forecast centres such as ECMWF, National Centers for Environmental Prediction (NCEP), Data Assimilation Office (DAO) at NASA Goddard Space Flight Center, have remedied egregious defects in their model and assimilation systems, with resulting benefits for their forecasts. Building on these results, NCEP, ECMWF and DAO developed the confidence to use their improved systems for ambitious reanalysis projects, which have delivered the best available global gridded data sets on the atmospheric hydrological cycle and on global land surface properties. The parallel GEWEX data projects have played an essential role in validating the reanalyses. The reanalysis projects have been the basis for systematic predictability and prediction studies on seasonal forecasting. We have seen the fruits of the work of Tropical Ocean and Global Atmosphere (TOGA) program and of GEWEX in the remarkably successful real-time forecasts of the 1997/98 El Niño-Southern Oscillation (ENSO) event delivered by NCEP, ECMWF and many others. Although the problem of monsoon forecasts remains a considerable challenge, the progress of recent years has provided valuable insight on what is needed to make better monsoon forecasts.

ECMWF plans to start production of the ERA-40 analyses (for the time period of 1958–1998) in the summer of 1999, with completion towards the end of 2001. Preparations for this second reanalysis have benefitted from extensive diagnoses of the existing ERA-15 (1979 to 1993) reanalyses by GEWEX, by the successors of TOGA, by the Stratospheric Processes and their Role in Climate (SPARC), and by Arctic Climate System Study (ACSYS) scientists. ECMWF will use the 40-year reanalysis, *inter alia*, to deliver by 2003 a quantitative assessment of seasonal forecast skill for the period 1958-1998. ERA-40 and similar projects will thus provide an extensive database for assessing the role of land processes in seasonal forecasting.

GEWEX has pulled together the efforts of observationalists and modellers (mesoscale modellers, medium-range forecasters, and GCM modellers) in the major effort to produce a coordinated 2-year observing period for its five continental scale experiments on four continents. This effort has been a major stimulus to hydrometeorological modelling and is likely to produce many scientific benefits. Looking ahead, one may speculate a little. I expect

ACHIEVEMENTS OF GEWEX

(Continued from page 3)

that GEWEX will be called upon to work closely with ACSYS to study continental snow and ice processes in mountain massifs and on the plains. These processes are probably significant players in providing memory for seasonal forecasts. Both GEWEX and ACSYS will be involved in a sustained effort to improve the modelling of these processes because of their importance for mid-latitude continental spring floods and subsequent planting season. Besides providing better forecasts, NASA's Atmospheric Infrared Sounder (AIRS), EUMETSAT's interferometer IASI and NOAA's Advanced Microwave Sounder (AMSU) could perhaps be used synergistically to assess marine sources/sinks of carbon dioxide. If that is successful, the demands of the Kyoto protocol may lead WCRP and GEWEX to investigate what technologies would be needed to provide similar estimates over land. There will, therefore, be an increased emphasis in GEWEX on documenting and understanding the radiative properties of land surface and land cover, in order to improve the utilization of satellite sounding data over land.

GEWEX has been remarkably successful so far in its mission to understand and model the fast components of the climate system. The synergies GEWEX has developed between the abilities of diverse scientific communities augur well for the continued success of GEWEX and of WCRP. Much of the success of GEWEX in the 1990s is due to the considerable personal capabilities and scientific capabilities of its outgoing Chairman, Moustafa Chahine. We owe him a great debt.

GCSS NEW WORKING GROUP

The GEWEX Cloud System Study (GCSS) is adding a working group. The aim of the new group is to improve the understanding and model parameterization of cloud, radiative, and boundary layer processes in polar regions. The new Polar Clouds Working Group (WG5) chairperson is Dr. Judith Curry. The web site for WG5 is: http://paos.colorado.edu/~curryja/wg5/home.html.

IMPROVING ASSIMILATED GLOBAL DATA SETS USING SSM/I-DERIVED PRECIPITATION AND COLUMNAR MOISTURE OBSERVATIONS

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The use of assimilated data sets outside of their traditional weather forecasting applications was the subject of the WCRP First International Conference on Reanalysis (Newson, 1998). While reanalyses have proven useful for a wide variety of applications, **Newson reports two significant problems in all of the reanalysis products. First, there are signals of a non-geophysical origin due to the heterogeneity of the input data stream. Second, there are significant errors in the primary fields of the hydrological cycle such as precipitation, evaporation, and related cloud and moisture fields**. These errors, which are often physically uncorrelated, limit the utility of reanalyses. Strategies to improve the quality of reanalysis products include the improvement of the physical fidelity of the assimilating models, better treatment of the information in the observations through more sophisticated quality control and analysis techniques, and the use of new types of observations to directly constrain the parameters of the hydrological cycle.

In this report we show the impact of assimilating the surface precipitation and total precipitable water (TPW) estimates derived from Special Sensor Microwave Image (SSM/I) instruments into the Goddard Earth Observing System (GEOS) Data Assimilation System (DAS). We found that assimilating these data types improves not only the precipitation and moisture fields but also key climate parameters directly linked to convective activities such as the outgoing longwave radiation (OLR), clouds, surface radiation, and the large-scale circulation in the tropics.

The one-dimensional variational technique used to assimilate the 6-hour average, gridded SSM/I surface rainfall and TPW in the tropics is described in Hou et al. (1998). The SSM/I data consisted of the surface rain rate retrieved using the Goddard Profiling algorithm (Kummerow et al., 1996) and the TPW retrieval over the ocean by Wentz (1994).

We performed a series of parallel assimilation runs for December 1992, with and without the SSM/I observations from two Defense Meteorological Satellite Program (DMSP) satellites. We examined the limiting case in which errors in the observed rain rate and TPW are assumed to be negligible compared to errors in the model-generated fields to focus on two key questions: First, is there useful information in these SSM/I retrievals without error specifications? Second, are the physical parameterizations in the GEOS DAS sufficiently realistic to capitalize on this information?

The left panels (a) and (b) of the figure on the back page show that the December mean precipitation and TPW in the benchmark GEOS assimilation differ from the SSM/I observations. Panel (c) shows that the OLR from the GEOS benchmark also differs from the OLR derived from the Advanced Very High Resolution Radiometer (AVHRR) instrument onboard the NOAA-12 satellite. The three right-hand panels of the same figure show that assimilation of the SSM/I rainfall and TPW estimates significantly reduces the root-mean-square (rms) errors in all fields. While the small biases in rain rates are comparable to uncertainties in the SSM/I retrieval, the bias reduction in the TPW is significant. Since the GEOS DAS does not currently assimilate the NOAA OLR observation, the latter may be used to assess the overall impact of rainfall and TPW on the assimilation. **The panels on the right of the back page figure shows that assimilation of SSM/I rain rates and TPW yields a 46% reduction in the bias and a 26% reduction in the rms error in the OLR over the tropics. Overall, assimilating SSM/I rain rates improves cloud distributions and the cloudy-sky radiation, while assimilating TPW data reduces a lower-tropospheric moisture bias to improve the clear-sky radiation**. The improved clouds lead to solar radiation at the surface. There is also evidence that the large-scale circulation in the tropics is improved, resulting in reduced upper-tropospheric humidity biases, which may be inferred by comparing the synthetic brightness temperatures in the moisture channels of the TIROS Operational Vertical Sounder (TOVS) instruments with TOVS observations.

In summary, our results demonstrate that assimilation of SSM/I-derived rain rate and TPW can reduce the state-dependent systematic errors in the OLR, clouds, surface radiation, and the large-scale circulation in the assimilated data. The improved temporal and spatial distribution of precipitation should provide better surface flux estimates for use in land process models. **Although the GEOS assimilation with SSM/I rainfall and TPW data also yields better short-range forecasts, the impact is modest compared with improvements in the time-averaged fields.** This suggests that, in the presence of biases and other errors of the forecast model, it is possible to improve the time-averaged "climate content" in the assimilated data set without necessarily first improving the short-range forecast skill.

In this study we made a number of simplifying assumptions such as that the observation errors are small compared with the forecast errors and that there is no cross-correlation moisture and other state variables. Despite such simplifications, it is evident that incorporating the SSM/I rainfall and TPW data into the GEOS DAS improves the assimilation. These results provide a baseline for evaluating more sophisticated rainfall and TPW assimilation schemes—in particular, the performance of error covariance models in the optimal use of the information in these data types. The improvements shown in this example were obtained with observations from two SSM/I instruments. With the recent launch of the Tropical Rainfall Measuring Mission (TRMM) satellite, which adds yet another microwave instrument with improved resolution to the existing DMSP SSM/I instruments, we are optimistic that rainfall and TPW assimilation can provide an effective means for improving the quality of assimilated global data sets in the near future.

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OPERATIONAL GOES-8 SURFACE RADIATION BUDGET PRODUCTS FOR GCIP

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Among the goals of the GEWEX Continental-Scale International Project (GCIP) (WCRP-67, 1992), are: development of capabilities to determine the time/space variability of the hydrologic and energy budget over a continental scale; development and validation of macro-scale hydrologic models; and utilization of existing and future satellite observations to achieve these objectives. **The National Oceanic and Atmospheric Administration/National Environmental Satellite Data Information Service (NOAA/NESDIS) is supporting GCIP activities by developing new operational products from satellite observations (Leese, 1994), under support of the NOAA Climate and Global Change Research Program. Shortwave radiative fluxes at the surface and at the top of the atmosphere, as derived from GOES-8 observations, are part of this product. The shortwave radiative fluxes produced include both upwelling and downwelling global and diffuse quantities, as well as spectral components (e.g., the photosynthetically active radiation)**. This activity is a collaborative effort between NOAA/NESDIS, NOAA/NCEP, and the University of Maryland. NESDIS is instrumental in developing the interface between the GOES-8 satellite data and the inference models for the radiative fluxes, as well as the real time implementation (Tarpley et al., 1996); NOAA/NCEP provides information on the state of the atmosphere and the surface, as available from independent inputs (e.g., snow) into the ETA model, and the analyzed output fields (Rogers et al., 1996); and the University of Maryland is involved in radiative transfer inference model development, modifications (Pinker and Laszlo, 1992), validation against ground observations (Pinker et al., 1996), and data archiving and distribution. **The surface radiation budget (SRB) model is being implemented on an hourly basis, for 0.5 degree targets for an area bounded by 67° W–125° W longitude and 25° N–50° N latitude belts, in real time, using observations from GOES-8 (Menzel and Purdom, 1994)**. For each target, at appropriate forecast times, selected data from the NCEP regional forecast model are delivered to the satellite data stream, to serve as inputs to the SRB model. This approach ensures a timely and high quality information necessary as input to the satellite inference schemes. In turn, the derived radiative fluxes help to diagnose the NCEP forecast model as to its ability to predict correctly radiative fluxes. Initial evaluation of the product was done at several levels, such as running the model operationally and off-line for same cases, as well as evaluation against ground truth, as available from independent projects such as the Baseline Surface Radiation Network (BSRN), the Surface Radiation Monitoring Network (SURFRAD), the Atmospheric Radiation Measurement (ARM) Program, and other available networks.

The first version of the experimental real time product was implemented starting June 1995. The SRB data, as well as other NOAA/NESDIS products, can be viewed in real time at:

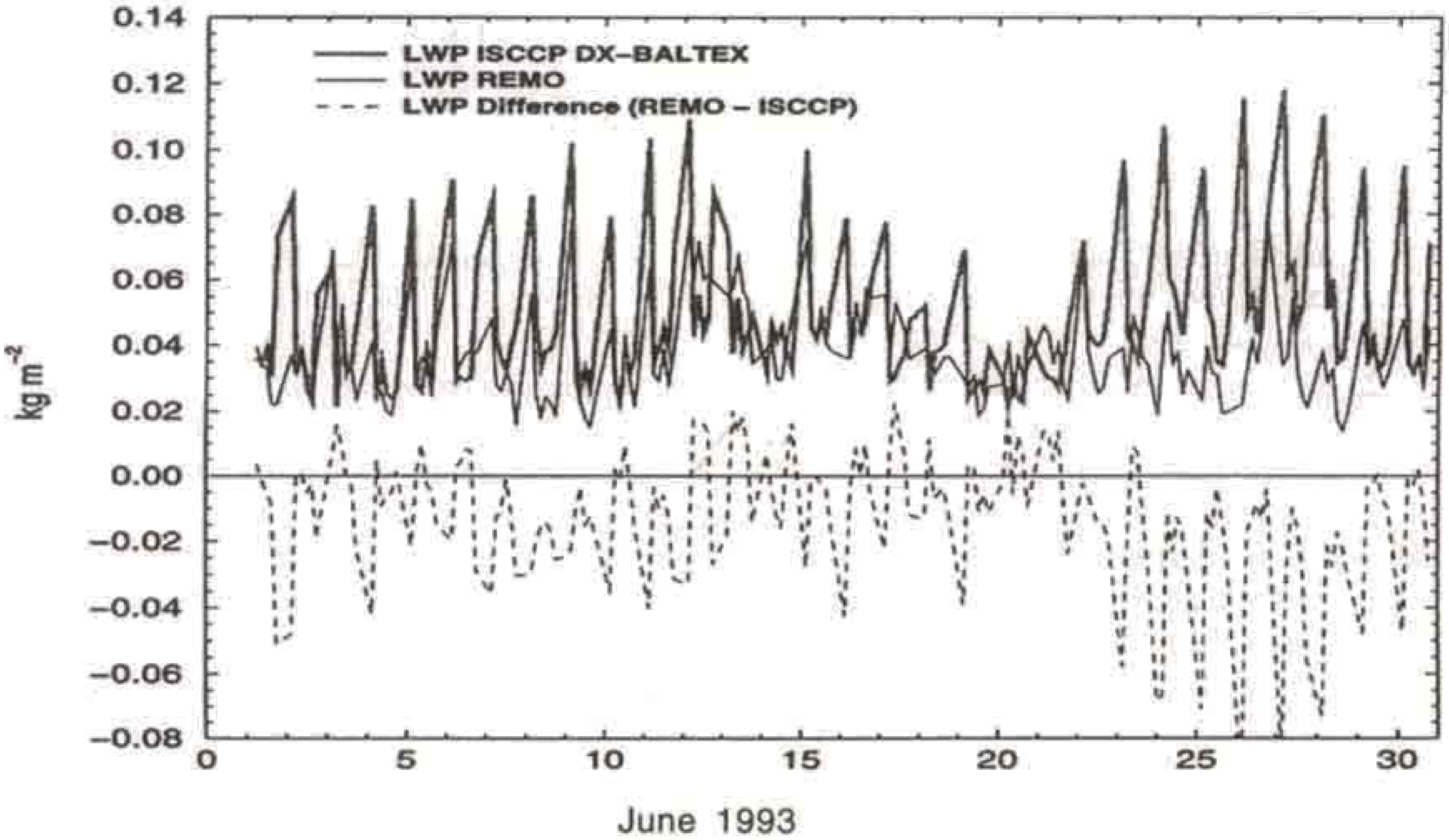
http://orbit-net.nesdis.noaa.gov/goes/gcip/

where they are kept for a period of about 2 days, for display purposes. Subsequently, all the input and output parameters produced in support of GCIP (presently, a total of 71), are stored at the University of Maryland, where the surface shortwave downward fluxes are evaluated against ground truth, partially quality controlled and prepared for distribution via a web and anonymous ftp site, as described at:

http://www.meto.umd.edu/~srb/gcip

Specifically, the instantaneous, hourly, daily, and monthly values of the total shortwave and the photosynthetically active radiation (PAR) at the surface and upward and downward shortwave fluxes at the top of the atmosphere, are provided. An example of the instantaneous surface shortwave radiation field is given in the figure on page 1.

For the longer term validation, the following information was used: 20 stations from the Illinois State Water Survey (Hollinger et al., 1994), 21 stations



Area mean of vertically integrated cloud liquid water in June 1993. Only date-times with more than 2000 observation points are taken. The area mean is calculated over all points where observations of the ISCCP-DX cloud flag CLOUD are available.

various GEWEX regional projects. Among the variables are a cloud flag (0/1 for clear/cloudy pixel) and the vertical integral of cloud liquid water, derived from the optical thickness. Time resolution and horizontal resolution are 3 hours and 30 km, respectively. For comparison, the data were transformed to the REMO grid, but no interpolation between the 30 km sampling was done. The following results refer only to those grid points where measurements are available. Consequently, the area mean values are not representative for the whole model area, but only for the strongly varying set of grid points covered at each date.

Cloud Cover

The ISCCP-parameter CLOUD can only assume the values 0 or 1 for clear or cloudy sky, respectively. In contrast, the model includes cloud cover as a continuous variable. Therefore, the mean value of CLOUD over a given set of grid points cannot be compared directly with the mean value of the corresponding model output. As a simple approach to overcome this discrepancy, the continuous cloud cover variable of the model is set to 1 if it is above a certain threshold value, and to 0 if it is below. After this transformation the area mean is calculated. Its value decreases with increasing threshold in a manner determined by the distribution of model cloud cover. In fact, all values between 0 and 1 can be obtained as mean values if the threshold is varied. Model and satellite data result in the same monthly mean for the threshold 0.3126. For thresholds between 0.2 and 0.5 the monthly mean value varies only slowly (between 0.75 and 0.63).

The figure on page 1 shows area means of the cloud cover at all available grid points for all days in June 1993. Model results come closer to the satellite data if the threshold transformation is applied. It should be noted that the agreement of the REMO and ISCCP time series in the figure on page 1 look good partly because the irregular sampling is reflected by all curves. More detailed investigations considering Meteosat and AVHRR data separately are under way.

Cloud Liquid Water

Further ISCCP-DX parameters which can be compared with the REMO output are vertically integrated cloud-liquid water and cloud-ice content. Here the uncertainties involved with the interpretation of the parameters may be higher than for the cloud flag. While cloud water is a prognostic variable in the model, it is derived from the optical thickness in the ISCCP data set (Rossow et al., 1996). This is accomplished by

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Over 350 papers received from 27 countries. For further information, consult GEWEX web site at: http://www.cais.com/gewex/

ASIAN MONSOON AND VEGETATION INTERACTIONS

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A coupled National Centers for Environmental Prediction General Circulation/Simplified Simple Biosphere (NCEP GCM/SSiB) model has been developed to investigate the interactions between land surface processes and climate, in particular the interactions between the land and monsoon system. A version with spectral triangular 62 truncation (T62) and a newly developed global vegetation map at the University of Maryland (UMNGEOG1) are used in this coupled model study. There are two soil layers in the original NCEP GCM, representing land surface processes. Using the original NCEP GCM and the NCEP GCM/SSiB, the models are integrated for 4 months from May 1, 3 and 4, 1987 to September 1, 3 and 4, 1987. This is the boreal monsoon season. The ensemble means were analyzed and results presented here for the East Asian Monsoon.

The most substantial differences between the NCEP GCM and the NCEP GCM/SSiB are the simulations in the monsoon regions. Results showing simulation differences in the African monsoon and the Mexican monsoon were recently reported (Xue et al., 1999). **Compared with the observational data (Xie and Arkin, 1998) in East Asia, the monsoon onset of rainfall in May is too strong in the original NCEP GCM and the rainfall area approaches too far to the north; whereas the NCEP GCM/SSiB correctly simulates the monsoon's onset (see figure on page 1) and the seasonal northward monsoon movement**. However, the extra rainfall in the Tibetan area due to the topography effect is not corrected in NCEP GCM/SSiB. In these experiments, the initial soil moisture is the same in two models. The only differences are the surface models and surface cover conditions: one with vegetation and the other with soil only. The results for African, Mexican and East Asian experiments all demonstrate that land surface processes affect the monsoon onset, evolution, and intensity at the synoptical and regional scales.

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TWO NEW DATA SETS AVAILABLE ON CD-ROM

GLOBAL PRECIPITATION CLIMATOLOGY PROJECT (87-97)

This CD-ROM contains 19 Version 1A precipitation products plus validation data and documentation for the period July 1987 through December 1997. Documentation and monthly mean merged satellite and gauge precipitation data on a 2.5 x 2.5 degree grid can be viewed using software on the CD-ROM. The CD-ROM can be obtained from Nancy Everson, NOAA/NESDIS E/RA2 Room 703B WWBG, 5200 Auth Road, Camp Springs, MD 20746-4304, USA, E-mail: neverson@nesdis.noaa.gov.

This data set is continually being extended and the latest precipitation products can be obtained via ftp from the following site:

ftp://ftp.ncdc.noaa.gov/pub/data/version1/

WATER VAPOR TRANSPORT DATA SET [87-88]

An upper-level water vapor transport data set has been derived from 19 months of daily geostationary satellite data and is now available free of charge on CD-ROM. Water vapor transport variables derived from GOES data spanning the 1987/1988 ENSO cycle were produced both as daily and monthly gridded and non-gridded values. The data set has been used for climate research applications that study upper-level water vapor transport variability on seasonal to interannual time scales. Other potential applications of this data set include: validation (or correlation) of other existing data sets of upper level humidity and winds, studying specific cases requiring synoptic to planetary scale data in the western hemisphere (e.g. 1988 drought, hurricane season evolution, and tropical convection), and for quantifying regional upper-level vapor fluxes. The preliminary methodology used to produce this data set was reported in GEWEX NEWS (August 1996, Vol. 6).

The data set was produced at the Global Hydrology and Climate Center (GHCC) in Huntsville, Alabama. The GHCC, established by NASA's Office of Mission to Planet Earth (now Earth Science Enterprise), is a partnership comprised of organizational elements from NASA Marshall Space Flight Center (MSFC), the Universities Space Research Association (USRA), and the Space Science and Technology Alliance of the State of Alabama (SSTA). To obtain a free copy of this CD, contact the Global Hydrology Resource Center (GHRC) ghrc@eos.nasa.gov. To find out more information about the procedures used to develop the data set, go to: **http://www.ghcc.msfc.nasa.gov/irgrp/validwv.html**.

CEOP PLANS ADVANCE

(Continued from page 1)

Collaboration with other WCRP activities is being driven by common science issues. For example, CLIVAR has plans to conduct field experiments on monsoonal circulations that are clearly linked to GEWEX land surface experiments.

CEOP is planned to take advantage of the opportunities offered by the new generation of satellites and the ability of major environmental prediction centers (e.g., ECMWF, NCEP and JMA) to run coupled (atmosphere-land-ocean-ice) models. These models require dynamically consistent global data sets.

Within the time frame of 2001–2002 the new generation of satellites will overlap satellites that provided atmospheric, surface, hydrological and oceanographic parameters to the global data sets developed by ISCCP, GVaP, GPCP, SRB, GACP and ISLSCP. The improved measurements during an overlap period will provide a linkage of the new to the old data sets to study trends in critical climate parameters back 10 to 20 years. For CEOP planning updates, consult the GEWEX Home Page: **www.cais.com/gewex/projects.html** and select under projects, GHP.

MEETING SUMMARIES

GLOBAL AEROSOL CLIMATOLOGY PROJECT SCIENCE TEAM MEETS

Robert J. Curran
NASA Headquarters

The Aerosol Radiative Forcing Science Team held its first meeting November 18–20, 1998 at the NASA Goddard Institute for Space Studies in New York City. This science team is the research portion of the Global Aerosol Climatology Project (GACP). The team was formed to coordinate research related to the radiative impact of aerosols on the Earth's climate. Specifically, it guides the development of a global aerosol climatology and through its individual and collaborative research investigations, provides a quantitative assessment of radiative forcing caused by atmospheric aerosols during the 20-year period of satellite observations. The first meeting gave the members an opportunity to learn about each other's research investigations and to initiate plans for collaborative research efforts. Over 50 team members affiliated with US and international institutions actively participated in this meeting. The agenda for the science team meeting, as well as additional information is available from the GACP web site: **http://www.giss.nasa.gov/gacp/**.

The science team meeting was organized into two major sections: introductory presentations were given in plenary, and focused sub-topic working groups met in parallel sessions. Short introductory presentations were given by the principal investigators of each of the 32 investigations selected for support by NASA through an open competition. A poster session was organized for the afternoon and evening of the second day. The presentations and posters initiated vigorous discussions amongst the participants.

Between the introductory and the sub-topic working group sections of the meeting was a special plenary session to address the "user" requirements for an aerosol climatology. The session was entitled: "Requirements for an aerosol climatology" and was jointly moderated by Drs. James Hansen and Anthony Del Genio. This session was one of the highlights of the meeting. It helped to focus subsequent discussions of the development of the aerosol climatology to the needs and hopes related to parameterizations of aerosol direct radiative forcing and indirect radiative forcing through the cloud physics parameterizations of climate models.

The final section of the meeting consisted of four parallel sub-sessions in which team members gathered into working groups to develop strategic approaches for accomplishing the objectives of the team. These working groups were a key accomplishment of the first science team meeting because they initiated much of the collaborative work to follow. Through various methods, including the GACP web page, members of the working groups will identify and plan their individual contributions. The results of these working group sub-sessions were summarized in plenary on the final day of the meeting. Reports on the status and conclusions of each of the working groups will be available on the GACP web site (www.giss.nasa.gov/gacp/). The sub-session topics and a statement of their conclusions follow: (a) Strategy for the development and use of algorithms for satellite retrieval of aerosol parameters and development of an aerosol climatology: *This session concluded with some ideas for modifications to the current algorithms, and additional ways to place error bars to validate the results;* (b) Strategy for the use of aerosol source data, transport models, and satellite data for the development of an integrated aerosol climatology (including source characterization/chemical, physical and radiative transformations/transport): *This session concluded with a draft list of suggestions for additional model runs, and ideas for modifications to current transport models; (c)* Strategy for use of surface, *in situ*, and field experiment measurements to give additional constraint to the aerosol measurements and for validation of derived aerosol climatology and to separate constraints from validation to avoid compromising integrity of validation: *This session concluded with a draft list of ideas for additional in situ and field measurements, and for modifications to current and planned measurement programs to better complement satellite observations. Identified for immediate attention was the need for a focused effort to catalog the scope and availability of surface and field measurements during the time frame of the climatology, and possibly to collect, reformat, or document some of that data; and (d)* Assess the global indirect forcing in our lifetime with error bars smaller than the mean in the studies of cloud/aerosol interactions: *This session concluded with a draft list of the specific contributions each source could make, some ideas about coordination, refinements to existing techniques, and new approaches.*

The final action of the science team was the nomination and election of a science team leader. Dr. Joyce Penner of the University of Michigan, agreed to serve as science team leader and is working with the team on an intercomparison study. The results of the intercomparisons, especially data set intercomparisons, will be the focus of the next aerosol radiative forcing science team meeting planned for mid to late August 1999.

GEWEX PROJECT RESULTS AND AWARDS PRESENTED AT THE AMS ANNUAL MEETING

9–15 January 1999
Dallas, Texas

The American Meteorological Society (AMS), like many professional geophysical scientific organizations, have each year an increasing number of presentations reporting results on GEWEX topics. There were reportedly 3,500 attendees at the 79th AMS Annual Meeting, organized by the AMS President, Gene Rasmusson. The theme, "Climate and Global Change with a Focus on the Americas," was reflected in the 12 Conferences and Symposia and invited lectures. Several prestigious awards were granted to people well-known to the GEWEX community. **Anthony Hollingsworth**, Head of Research and Deputy Director, European Centre for Medium-Range Weather Forecasts, received **The Jule G. Charney Award** in recognition of his outstanding research on four-dimensional data systems and numerical models. The Charney award is presented to a person for highly significant achievements in atmospheric, oceanic or hydrological sciences. **J. Michael Hall,** Director Office Global Programs, NOAA, was presented **The Cleveland Abbe Award** for Distinguished Service to Atmospheric Sciences by an Individual. The Abbe award is presented occasionally to a person who has contributed to the application of atmospheric sciences to general, social, economic, or humanitarian welfare. **Michael J. Mishchenko**, Physical Scientist, NASA Goddard Institute for Space Studies received **The Henry G. Houghton Award**. This award is given to a young scientist in recognition of research achievements in physical meteorology including atmospheric chemistry. He was recognized for innovative work on the theory of radiation scattering and application to remote sensing.

WCRP/GEWEX MEETINGS CALENDAR

For calendar updates and listing of GEWEX reports, see the GEWEX Web Site: http://www.cais.com/gewex/

15–20 March 1999—WCRP JOINT STEERING COMMITTEE MEETING, Kiel, Germany.

19–23 April 1999—EUROPEAN GEOPHYSICAL SOCIETY XXIV GENERAL ASSEMBLY, Hague, The Netherlands. GEWEX related sessions. For further information consult http://www.copernicus.org/EGS/EGS.html.

9–12 May 1999—ISLSCP, THE PAST 16 YEARS, International Space University, Strasbourg, France.

10–14 May 1999—GPCP USER WORKSHOP AND WGDM MEETING, Silver Spring, Maryland, USA.

17–19 May 1999—GCIP PRINCIPAL INVESTIGATOR MEETING AND WORKSHOP ON WATER AND ENERGY BUDGET, Washington, D.C. area

1–4 June 1999—AMERICAN GEOPHYSICAL SOCIETY SPRING MEETING, Boston, Massachusetts, USA. Sessions include Radiative Transfer in Cloudy Atmosphere, South China Sea Monsoon, TRMM Results, Air-Sea and GCMs.

7–9 June 1999—GEWEX RADIATION PANEL MEETING, Goddard Institute for Space Studies, New York, USA.

16–19 June 1999—THE THIRD INTERNATIONAL SCIENTIFIC CONFERENCE ON THE GLOBAL ENERGY AND WATER CYCLE, Beijing, China. This conference will be held in conjunction with the 4th Study Conference on the GEWEX Asian Monsoon Conference. For further information, contact Prof. Ding Yihui, National Climate Centre, China Meteorological Administration, No. 46, Baishiqiao Road, Western Suburb, Beijing 100061, China, Fax: 86-10-62176804 or consult GEWEX Web Site: http://www.cais.com/gewex/.

28 June–2 July 1999—AMERICAN METEOROLOGICAL SOCIETY CONFERENCE ON ATMOSPHERE RADIATION, Madison, Wisconsin, USA. For registration and hotel information contact AMS Meetings Department, Tel: 617-227-2426; Fax: 617-742-8718; E-mail: amsmtgs@meteorsoc.org.

19–30 July 1999—GHP-RELATED SYMPOSIA AND WORKSHOPS AT THE 22ND GENERAL ASSEMBLY OF THE INTERNATIONAL UNION OF GEODESY AND GEOPHYSICS (IUGG), Birmingham, UK. For further information contact School of Earth Sciences, Univ. of Birmingham, Edgbaston, Birmingham B15 2TT, UK; Fax: 44 121 414 4942; E-mail: IUGG99@bham.ac.uk.

23–27 August 1999—2ND INTERNATIONAL REANALYSIS CONFERENCE, Wokefield Park, Mortimer, Reading, U.K. For further information see http://www.ecmwf.int/conf/index.html.

14–17 September—GEWEX HYDROMETEOROLGY PANEL MEETING, GKSS, Geestacht, Germany.

4–8 October 1999—GEWEX/INSU INTERNATIONAL WORKSHOP ON MODELLING LAND-SURFACE ATMOSPHERE INTERACTIONS AND CLIMATE VARIABILITY, Gif-sur-Yvette, France.

GUIDELINES FOR SUBMITTING ARTICLES TO GEWEX NEWS

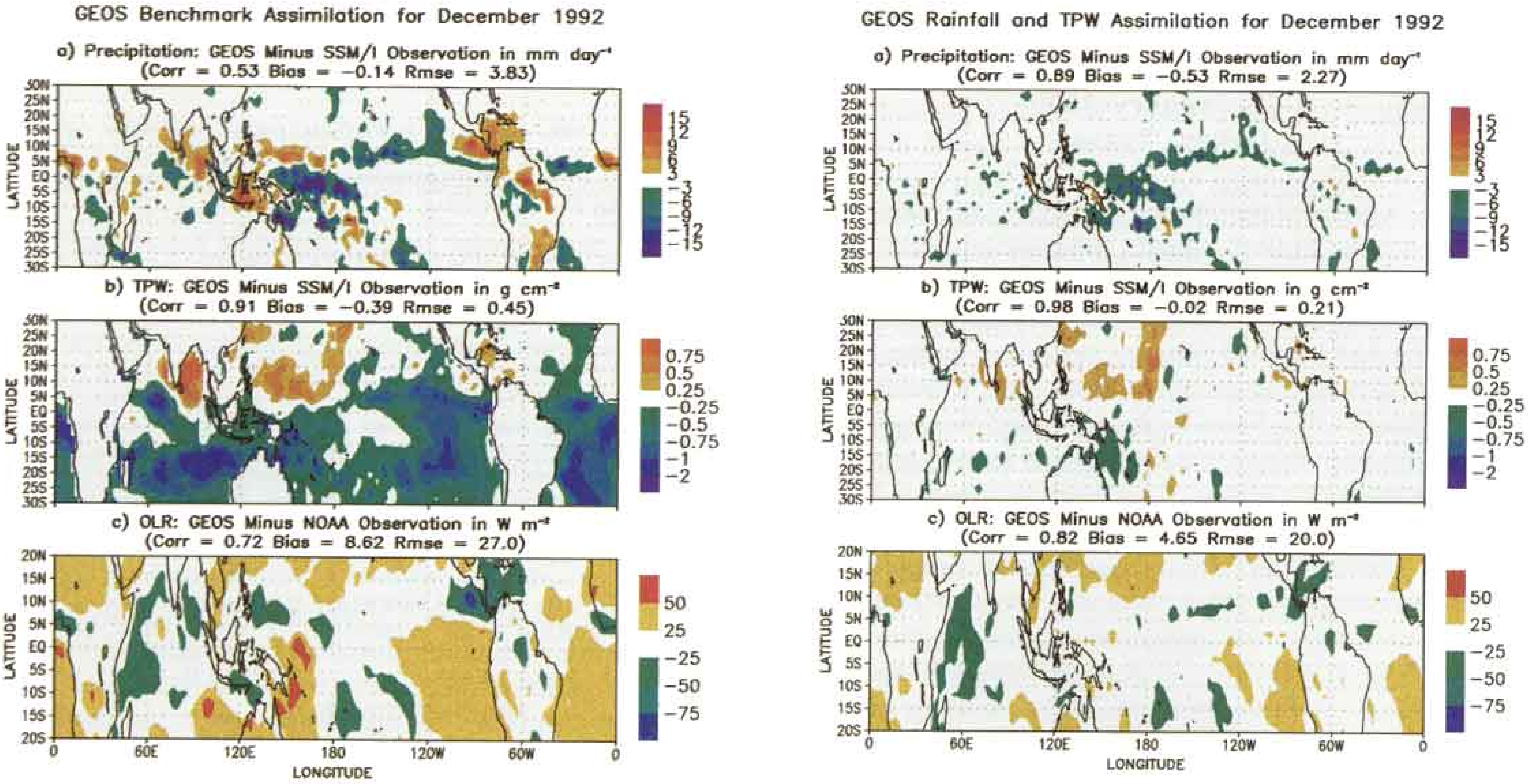
GEWEX News is published quarterly (February, May, August and November). Articles should be received by the International GEWEX Project Office at least six weeks prior to publication. Contributions are welcome in the following categories:

- New research results from GEWEX projects
- Summaries of GEWEX meetings and workshops
- News items about GEWEX projects and people

Please try to limit the size of contributions to 800-1600 words. Authors should balance text and figures to convey the desired message to the reader. The editors of *GEWEX News* reserve the right to edit articles to fit the available space.

Please send text via e-mail in text-only format (ascii) and figures as tiff files to gewex@cais.com. Paper copies of text and figures may also be requested.

Assimilated Data Sets Improved Using SSM/I-Derived Precipitation and Moisture



NASA Goddard Earth Observing System (GEOS) assimilation results with and without SSM/I-derived data compared with observations. The panel on the right shows that assimilation of SSM/I rain rates and TPW yields a 46% reduction in the bias and a 26% reduction in the rms error in the OLR over the tropics. Overall, assimilating SSM/I rain rates improves cloud distributions and the cloudy-sky radiation, while assimilating TPW data reduces a lower-tropospheric moisture bias to improve the clear-sky radiation. *(See page 4).*

PILPS PROGRESS IN SPECIAL JOURNAL ISSUE

Progress on the Project for Intercomparison of Land-surface Parameterization Schemes (PILPS) is reported in Volume 19, December 1998 issue of *Global and Planetary Change*. This special issue includes a set of papers about PILPS Phase 2 off-line intercomparisons using observed forcing and validation data. In addition, this 282-page Special Issue contains papers reporting on the 1997 PILPS Workshop held in Melborne, Australia. These workshop papers include descriptions and results on PILPS Phase 3 coupled components and PILPS Phase 4 on coupled intercomparisons work.

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