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NEWS

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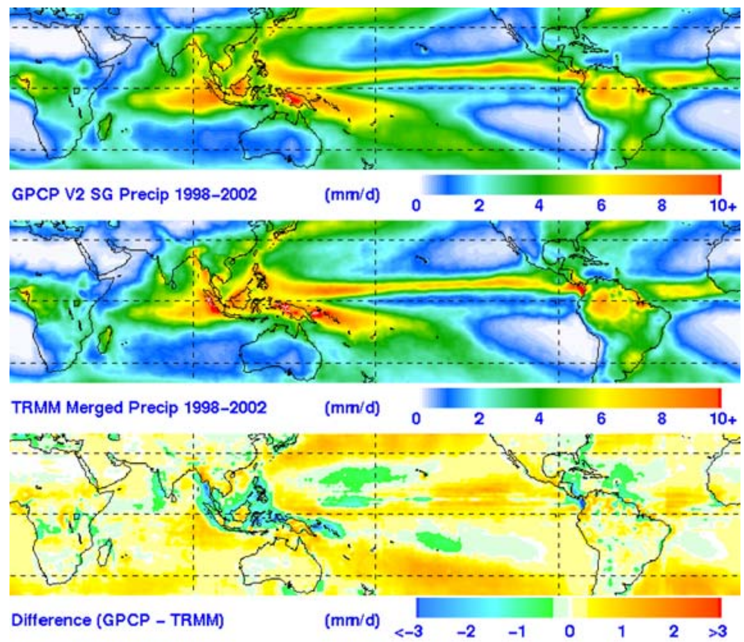
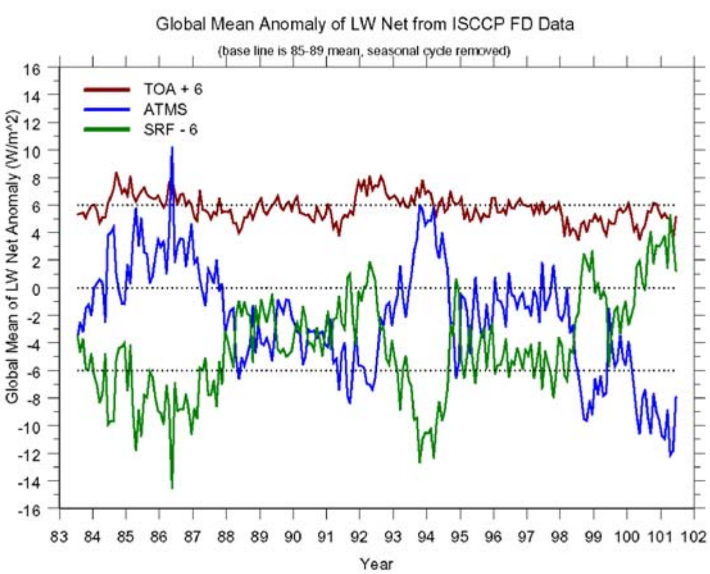
World Climate Research Programme–WCRP

CROSS-COMPARISON OF GEWEX 20+ YEAR GLOBAL DATA SETS WITH NEW EOS DATA IS BEGINNING WITH TRMM AND GPCP



Comparison provides a basis for improving GEWEX data sets and a 20-year context for new Earth Observing System (EOS) data. Mean rainfall in mm/day. GPCP (top panel), TRMM (middle panel) and GPCP-TRMM difference (bottom panel). See article on page 5.



NEW 18-YEAR ISCCP PRODUCT SHOWS WIDE SWINGS IN SURFACE AND ATMOSPHERIC FLUXES, BUT LITTLE CHANGE IN TOP-OF-ATMOSPHERE

(see article on page 7)

What's New

- **Up to 6-month daily GCM rainfall predictions show success in streamflow forecasting in Brazil.**
- **Bob Schiffer begins serving as IGPO Director.**
- **Piers Sellers soars into space on Atlantis.**
- **CEOP focusing on EOP-1 (seasonal data set) for early dissemination.**

COMMENTARY

ROBERT A. SCHIFFER TO SERVE AS DIRECTOR OF IGPO

Soroosh Sorooshian, Chairman
GEWEX Scientific Steering Group

Join me in welcoming Dr. Robert A. Schiffer as the interim Director of the International GEWEX Project Office (IGPO) for the next year while the process to select a permanent director is underway. Dr. Paul D. Try, founder of the IGPO and its Director for the past 12 years, is stepping down but will continue to support IGPO activities in a part-time capacity for the next year. The international visibility and success of the GEWEX Program is due to the tireless efforts of Paul Try. The community is grateful to Paul for his vision and leadership of IGPO.

Dr. Schiffer is currently the Chief Scientist of the Goddard Earth Sciences and Technology Center (GEST) at the University of Maryland, Baltimore County. He retired from the National Aeronautics and Space Administration (NASA) in early 2002, and has over 39 years of experience in planning and managing national and international atmospheric and climate research programs, including 11 years at the Jet Propulsion Laboratory as a research engineer/scientist involved in the NASA Planetary Exploration Program, and 28 years at NASA Headquarters, planning and managing Earth science research and applications programs. These included interagency and international coordination, and scientific oversight of experimental global observing systems, numerical modeling and data assimilation systems, physical process studies involving field and airborne campaigns, and data management systems.

While at NASA, Dr. Schiffer was awarded the Distinguished Service Medal and two Medals for Outstanding Leadership for his contributions to interagency and international climate research and global environmental observations. He earned his MS and Ph.D. degrees (in atmospheric sciences) from the University of California at Los Angeles, and BAE and MAE degrees (in Aeronautical Engineering) from the Polytechnic Institute in New York.

Over the past 18 years, Dr. Schiffer was seconded part-time to the World Meteorological Organization as Director of the World Climate Research Programme (WCRP) Radiation Projects Office. Dr. Schiffer's past assignments to the WCRP Joint Planning Staff and NASA's Office of Earth Science Enterprise provide a nearly unmatched combination of international and interagency experience to couple with his direct and long association with GEWEX and its remote sensing components to ensure continuing and strong leadership for the IGPO. Bob's space systems and radiative transfer background blends especially well with my hydrology expertise as we attempt to implement and address the critical science questions for Phase II in GEWEX.

Contents

IAA ELECTS SOROOSH SOROOSHIAN AS MEMBER

Dr. Soroosh Sorooshian, chairman of the GEWEX Scientific Steering Group, was elected as a Corresponding Member of the International Academy of Astronautics (IAA) at the World Space Congress, held on October 13, 2002 in Houston, Texas. Election to the Academy is in recognition of an individual's record of service and achievement and leadership in space-related activities.

UP TO 6-MONTH DAILY GCM RAINFALL PREDICTIONS SHOW SUCCESS IN STREAMFLOW FORECASTING IN BRAZIL

C.E.M. Tucci[1], R.T. Clarke[1], W. Collischonn[1], P.L. da Silva Dias[2], and G. Sampaio[3]

[1]IPH-UFRGS, Porto Alegre, [2]USP, São Paulo, [3]CPTEC-INPE, São José dos Campos, Brazil

Collaborative research in Brazil has now shown that it is possible to use up to 6-month daily rainfall predictions from an atmospheric general circulation model (AGCM), together with a model of river basin response, to yield useful estimates of future river flow several months in advance, when applied to a portion (75,000 km^2) of the Uruguay River drainage basin lying in southern Brazil.

With over 90 percent of the energy consumed by Brazil's population coming from hydropower, efficient exploitation of Brazil's water resources is critically important and planning future energy production would be more efficient if the inflow to reservoirs used for hydropower generation could be predicted. Where hydropower is generated, the benefits of prior knowledge of reservoir inflows, even when knowledge is incomplete, are that (1) spillage is minimized; (2) reservoirs can operate with greater head of water for longer periods; and (3) more energy can be generated at times when energy prices are higher. Since, in mixed generating systems, the operational costs of hydropower production are lower than for thermo-electric and other generating systems, there is a strong economic motive for maximizing the proportion of energy generated from hydropower. One way of contributing to this maximization is to make use of hydrologic forecasts when decisions are to be made concerning power production, particularly where there is a mixture of generating systems.

It is relatively easy in large rivers to predict flows several days or even several weeks ahead, but to be useful for planning purposes, predictions of flow are needed several months in advance, and this in turn needs predictions of future rainfall. While numerical models for weather prediction give estimates of future rainfall for several days, and climate prediction models yield rainfall sequences extending up to several months, rainfall prediction remains one of the most difficult variables to forecast in quantitative terms, although important advances in this difficult field have been reported recently.

Collaborative research between the Instituto de Pesquisas Hidráulicas of the Federal University of Rio Grande do Sul (IPH-UFRGS), the Institute for Atmospheric and Geophysical Research of the University of São Paulo (IAG-USP), and the Center for Weather Forecasting and Climate Research of the Brazilian Agency for Space Research (CPTEC-INPE) is producing new capabilities. Output from the CPTEC's AGCM included sequences of future daily rainfall for periods extending up to 6 months ahead, and these were used as input to a rainfall-runoff model for large basins, developed by IPH-UFRGS, to give estimates of future flow in the Uruguay River. The period 1995–2001 was used to fit and test the modeling procedure. The usefulness of predicted flows was assessed by calculating the root-mean-square error (RMSE) between the predicted flows, and the flows observed in the Uruguay River. This RMSE was compared with the RMSE obtained when the mean flows recorded over the period of past record were used as predictions of flow in future periods. The extent to which the first RMSE was smaller than the second is a measure of how well the modeled flows outperformed forecasts based on the historic mean flows.

The highly nonlinear nature of meteorological processes causes uncertainty wherever hydrologic forecasts are derived from rainfall sequences derived from predictive models of weather or climate. Because of the nonlinearities, predicted rainfall sequences are strongly dependent on initial conditions. To evaluate the uncertainty, predictions were repeated with initial conditions taken from five different days, resulting in an ensemble of predictions consisting of five individual members. Each member of the ensemble was used to generate a flow sequence, and variability amongst the set of predicted flows thus generated gave a measure of their uncertainty. Before using the forecasts of future rainfall given by the CPTEC AGCM, however, it was first necessary to correct them, because the CPTEC AGCM underestimated rainfall over almost all the basin, particularly in winter, although it reproduced inter-annual variability in regional rainfall relatively well (Cavalcanti et al., 2002). A statistical procedure was used to correct for the underestimation of rainfall, which consisted of the following: At each grid-point of the CPTEC AGCM for which daily rainfall was predicted, the probability distribution function (pdf) of the predicted daily rainfalls, in all members of the ensemble, was calculated month by month. The pdf was also calculated, at each of these grid-points, for the daily rainfalls interpolated from the 78 rain gauges distributed over the drainage basin; each daily rainfall predicted by the CPTEC model was then simply transformed into the value corresponding to it in the pdf of interpolated rainfalls.

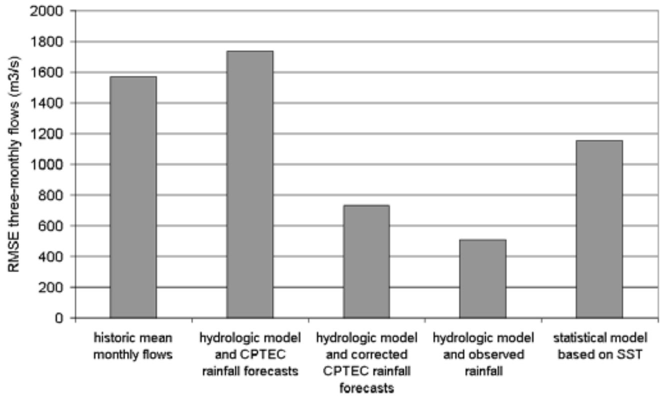


Figure 1. For the period 1995–98, the first of the five columns shows the RMSE obtained when the historic mean flows are used as forecasts of future flow.

Figures 1 and 2 summarize the value of flow predictions given by the combined AGCM and rainfall-runoff modeling components. Both figures refer to one flow-gauging station (Iraí) on the Uruguay River, and refer to mean flows calculated over 3-month periods.

In the case of Figure 1, which refers to the period 1995–98, the first of the five columns shows the RMSE obtained when the historic mean flows are used as forecasts of future flow; this error is clearly large, almost 1600 m^3s^{-1}. The second column shows the RMSE when the rainfall sequences predicted by the CPTEC model are used, without the statistical correction referred to above, as input to the rainfall-runoff model; here the RMSE is even larger than in the case of the historic means. The third column shows the RMSE when the rainfall sequences predicted by the CPTEC model are corrected statistically, as described above. The RMSE is greatly reduced relative to the RMSEs in the first and second columns. The fourth column of Figure 1 shows the RMSE that would have been obtained if future rainfall had been known exactly; this column measures errors of interpolating rainfall between rain-gauge sites (needed to run the hydrologic model) and imperfections in the model representation of physical hydrologic processes. The fifth column of Figure 1 shows the RMSE obtained when 3-month river flows are related, by means of a multiple regression scheme, to the principal components of sea-surface temperatures (SSTs) in the Pacific and Atlantic Oceans. For the period in question 1995–1998, this gave a RMSE smaller than that given by using historic mean flows to predict future flows, but larger than the RMSE obtained by using statistically corrected rainfall predictions as input to the IPH rainfall-runoff model.

Thus, column 4 of Figure 1 gives the RMSE assuming perfect knowledge of future rainfall. The RMSE obtained by using predictions of future rainfall, after statistical correction, is greater (column 3), but is very much less than that obtained by using the historic means to estimate future flows (column 1). Time-series models of ARMA type were also explored, with results not shown in Figure 1, however the Uruguay River basin responds very rapidly to rainfall, and ARMA forecasts only 1 month ahead were very close to the historic means.

Figure 2 gives an even better demonstration of the value of 3-month-ahead streamflow predictions for the Uruguay River. The figure refers to the period 1999–2001, for which no rain-gauge observations were available. As in Figure 1, the first column of Figure 2 gives the RMSE obtained when past mean flows are used to predict future flows, and the second column gives the RMSE when the statistically uncorrected rainfalls predicted by the CPTEC model were used as input to the hydrologic model; here the RMSE is again larger than that given by using the historic means. The third column of Figure 2, however, shows the RMSE obtained when statistically corrected rainfall predictions were used by the hydrologic model to predict streamflow; and the important point here is that the probability density functions used to make the corrections were derived from rainfall recorded prior to the period of test 1999–2001. While the RMSE is still high, slightly more than 600 m^3s^{-1}, it is substantially less than 900 m^3s^{-1} obtained by using past flow records to predict future flow. As in Figure 1, the fourth column shows the RMSE obtained by using an empirical regression relationship between mean 3-monthly flow SST principal components; the resulting RMSE is smaller than that where statistically uncorrected rainfall records were used (second column of the figure), but is larger than the RMSE obtained by using historic mean flows to predict future mean flows.

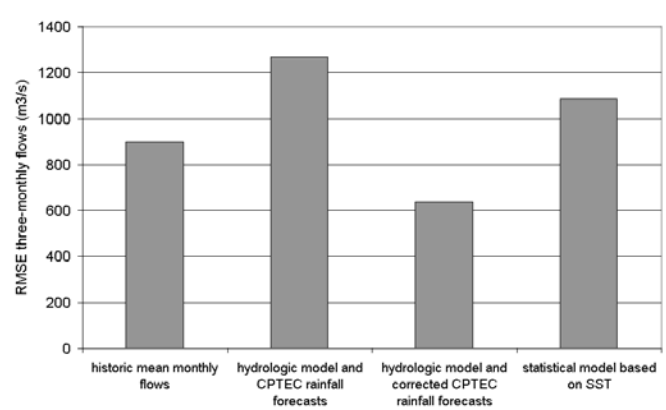


Figure 2. The period of 1999–2001.

It can, therefore, be concluded that the use of daily rainfall sequences predicted by the CPTEC AGCM, after they were statistically corrected for bias, as input to the rainfall-runoff model, gave better estimates of future flow at Iraí on the Uruguay River, than where historic mean flows were used as estimates of future flow, even though the errors of estimate remain large. The error reduction in streamflow prediction is also related to the ability of the AGCM to predict seasonal rainfall with higher skill for some areas on Earth in comparison to others. This is true for Southeastern South America, where the Uruguay River basin is located, as shown by Cavalcanti et al. (2002), but cannot be generalized for all drainage basins. That is, the ability of the statistical correction of model-calculated rainfall bias for any particular basin will be limited if the AGCM has poorer skill in predicting seasonal variability of rainfall for that basin. (*This research, was funded by the Brazilian Agency for Electrical Energy – ANEEL.)*

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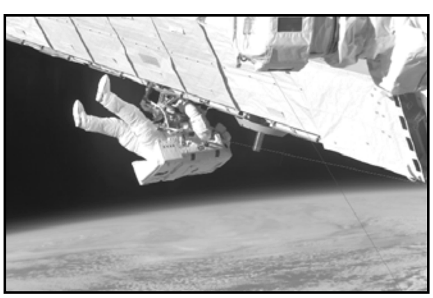
FORMER GEWEX SCIENTIST WALKS IN SPACE

Dr. Piers Sellers, who stepped down as chair of the International Satellite Land-Surface Climatology Project in 1996 to begin training as an astronaut mission specialist in Houston, was finally launched into space on October 6th aboard the space shuttle Atlantis (STS-112). Piers was part of a six-member crew whose main task was the installation and hookup of a 15-ton, 45-foot long truss containing the new external cooling system for the space station. During the 11-day mission, Sellers and his colleague made three spacewalks to install and activate the truss.



TRMM AND GPCP INITIAL CROSS-COMPARISON

Robert F. Adler[1], George Huffman[2], and David Bolvin[2]

[1]NASA/Goddard Space Flight Center
[2]Science Systems and Applications, Inc.

The Tropical Rainfall Measuring Mission (TRMM) has been orbiting the Earth for almost 5 years. The joint U.S.-Japan mission was launched in late November 1997 and produced its first full month of data in January 1998 (Kummerow et al., 2000). **Now with nearly 5 years of data this comparison of the TRMM estimates with those of the community analysis produced routinely by the GEWEX Global Precipitation Climatology Project (GPCP) (which currently does not use TRMM data) is becoming the baseline for both incorporating TRMM data into the GPCP product and extending the understanding provided by TRMM back for 20 plus years.**

TRMM standard products include estimates from single instruments on TRMM (radar and passive microwave), from a combination of those two instruments, and from a multisatellite product that combines information from TRMM and geosynchronous infrared (IR) satellites. In the current Version 5 of the TRMM standard products these various estimates produce a spread of mean rainfall in the tropics with a range of about 20 percent over the ocean (Adler et al., 2003a). Although this range is somewhat smaller than a pre-TRMM analysis of the Special Sensor Microwave/Imager (SSM/I)-based rainfall estimates, it should be reduced as differences between the passive microwave and radar algorithms are resolved. A major step in that direction will occur in the Spring of 2003 when the entire TRMM data set will be reprocessed with the improved Version 6 of the TRMM algorithms.

For this comparison the TRMM Version 5 multisatellite product was chosen because it is based on the radar/passive microwave combination calibrating or adjusting the geosynchronous IR data to increase sampling. The mean value of the radar/passive microwave combination falls in the middle of the range of the TRMM estimates. This TRMM product (TRMM product identifier 3B-43) also utilizes rain gauge information over land, as does the GPCP product. The GPCP satellite analysis also uses a multisatellite approach with passive microwave information (from low-orbit SSM/I instruments) calibrating the IR information (Huffman et al; 1997; Adler et al; 2003b).

The mean daily rainfall from January 1, 1998 to July 31, 2002 is shown in the figure at the top of page 1 for TRMM and GPCP. Both analyses have very similar patterns, as expected, with maxima in the Intertropical Convergence Zone (ITCZ) of the Pacific and Atlantic Oceans, in the eastern Indian Ocean and over land areas in Brazil, Africa and Indonesia. The difference map in this figure (bottom panel) indicates a pattern of both positives and negatives in the deep tropics over the ocean and generally positive values (GPCP larger) in midlatitudes. In the light rain areas in the western part of the sub-tropical oceans the TRMM estimates tend to be larger, while in the very dry eastern parts of the oceans GPCP shows a slightly larger amount. The two analyses produce nearly equal mean rainfall over the oceans between 20°N and 20°S, but with GPCP being higher in the midlatitudes, especially in the Southern Hemisphere.

Even within the 20°N–20°S region over oceans there are variations in relative rainfall amount between the two estimates. In the heavier rain areas of the western Pacific Ocean, both above and below the Equator, the TRMM-based estimate is higher, whereas over the areas of somewhat less rain east of the Philippine Islands and southeast of the South Pacific Convergence Zone (SPCZ) maximum, the difference is reversed. This relation between the two products may result from the GPCP estimate saturating in very high rain areas. Other smaller, but interesting, areas where TRMM is larger are found along coasts in the eastern Arabian Sea adjacent to India, in the eastern part of the Bay of Bengal along Indochina and in the Gulf of Panama. The difference here may be related to the ability of the TRMM radar to delineate areas of shallow convection, especially in the monsoon regions of the Indian Ocean.

Comparisons between TRMM and GPCP will continue as algorithms and analysis procedures are refined. **The authors and others are working on a method to incorporate the 5 years of TRMM data into GPCP.** This will likely be tied to a parallel effort to produce GPCP global analyses at a 3-hr time resolution for recent years using the TRMM-based 3-hr multisatellite research analysis, which will be available in Version 6 in 2003. A real-time version of the 3-hr multisatellite analysis (images and data) is currently available via the TRMM web site (http://trmm.gsfc.nasa.gov). The real-time analysis uses TRMM to calibrate or adjust both the polar-orbit microwave and geosynchronous IR rain estimates and merges the information using as much microwave data as possible and filling in the remaining gaps with the lower quality IR-based estimates. Additional microwave data will be added as available. It is expected that over the next few years GEWEX's GPCP data products will be enhanced through the use of TRMM data. These efforts in precipitation analysis fit very well with the development of the Global Precipitation Measurement mission to be launched in about 2008.

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MOUSTAFA CHAHINE AWARDED WILLIAM NORDBERG MEDAL

Dr. Moustafa Chahine, former chairman of the GEWEX Scientific Steering Group (1989–1999) and now senior research scientist at NASA's Jet Propulsion Laboratory and Science Team Leader for NASA's Atmospheric Infrared Sounder (AIRS), was awarded the William Nordberg Medal in space science from the Committee on Space Research (COSPAR) of the International Council for Science. This medal commemorates the work of the late William Nordberg and is awarded each year to a scientist who has made a distinguished contribution to the application of space science in a field covered by COSPAR.

NEW ISCCP GLOBAL RADIATIVE FLUX DATA PRODUCTS

Yuanchong Zhang[1] and William B. Rossow[2]

Department of Applied Physics and Applied Mathematics, Columbia University[1]
NASA Goddard Institute for Space Studies (GISS)[2]

The International Satellite Cloud Climatology Project (ISCCP) has produced a new 18-year (1983–2000) global radiative flux data product called ISCCP FD. The figures on the cover and back page illustrate a unique aspect of this product, which provides physically consistent surface and top-of-atmosphere (TOA) radiative fluxes by showing the global monthly mean net shortwave (SW) and net longwave (LW) anomalies at the surface, in the atmosphere and at the TOA over the whole time period. Notable features are: (1) a decrease of the net SW at the surface and TOA, as well as in the atmosphere produced by the Mt. Pinatubo volcanic aerosols in 1991–92; (2) an overall increase of the net SW at TOA and the surface, but not in the atmosphere, from the 1980s to 1990s associated with a decrease in low-latitude cloud cover; (3) three (possibly four) decreases in net LW at the surface and increases in the atmosphere, but not at TOA; and (4) a small decrease of net LW at TOA and in the atmosphere and a larger increase of net LW at the surface occurring in the late 1990s. Another unique feature of the flux profile product is that it provides, for the first time, a comprehensive determination of the synoptic scale variations of the vertical profiles of radiative diabatic heating, albeit with crude vertical resolution, but sufficient to represent radiative heating in the lower, middle or upper troposphere and the stratosphere.

The product was created by employing the NASA GISS climate Global Circulation Model (GCM) radiative transfer code and a collection of global data sets describing the properties of the clouds and the surface every 3 hours (ISCCP); daily atmospheric profiles of temperature and humidity (National Oceanic and Atmospheric Administration Television InfraRed Observation Satellites (TIROS) Operational Vertical Sounder); daily ozone abundances (Total Ozone Mapping Spectrometer); a climatology of cloud vertical layer distributions from rawinsonde humidity profiles (Wang et al., 2000); a climatology of cloud particle sizes (Han et al., 1994, 1999); a climatology of stratospheric aerosol and water vapor (Stratospheric Aerosol and Gas Experiment-II); a climatology of the diurnal variations of near-surface air temperature (surface weather observations and National Centers for Environmental Protection [NCEP-1] re-analysis); a climatology of tropospheric aerosols (NASA GISS climate model); and the spectral dependence of land surface albedo and emissivity by land-cover type (NASA GISS climate model). The results include the all-sky and clear-sky, upwelling and downwelling, total shortwave (SW = 0.4 – 5 µm wavelength) and total longwave (LW = 5 – 200 µm wavelength) radiative fluxes at five levels: surface, 680 mb, 440 mb, 100 mb and top-of-atmosphere. All of these results are reported with a resolution of 3 hours and 280 km (equal-area map equivalent to 2.5° latitude-longitude at the equator) in four data products: (1) TOA RadFlux, (2) Surface Radiative Fluxes (SRF RadFlux), (3) Radiative flux profiles including TOA and SRF fluxes (RadFlux Profiles), and (4) the complete input data collection (RadFlux Inputs). The first three products include a summary of the most relevant input physical parameters, whereas the fourth product contains the exact inputs used to calculate all the fluxes.

Several papers are being prepared to describe the features of the radiative transfer model and the input data sets and to provide results of comparisons with other more direct determinations of the surface and top-of-atmosphere radiative fluxes (Zhang et al., 2003). More information can be found at

http://isccp.giss.nasa.gov/projects/flux.html

or by contacting the authors (yzhang@giss.nasa.gov or wrossow@giss.nasa.gov). These data products are available from the authors in a preliminary format.

Note: In December 2002, the GEWEX Surface Radiation Budget (SRB) Project will release a 1x1 degree, 3-hourly, SW and LW surface radiative flux data set covering the period 1983–1995. These fluxes are also based on the ISCCP cloud products, but use different sources of information about the atmosphere and surface. These data will be available through the Atmospheric Sciences Data Center at NASA Langley Research Center at http://eosweb.larc.nasa.gov/PRODOCS/srb/table_srb.html.

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WORKSHOP/MEETING SUMMARIES

GEWEX RADIATION PANEL MEETING

31 July – 2 August 2002
Zurich, Switzerland

William B. Rossow
NASA Goddard Institute for Space Studies

The 13th meeting of the GEWEX Radiation Panel (GRP) was hosted by the Institute for Atmospheric and Climate Science ETH. An important focus of this meeting was to review the status of the Baseline Surface Radiation Network (BSRN) and the Surface Radiation Budget (SRB) Project, as well as the general activities of the other GRP projects.

The BSRN and SRB reviews indicated that both projects are now well underway and did not raise any substantive issues. Both projects are rapidly eliminating data processing backlogs and releasing their data sets. **There are over 35 active stations participating in BSRN and the archives (located at ETH) have all irradiances available for over 1,800 data-months, equivalent to an average of 4 years of data for each site.** Some sites have more than a decade of data available. All the related ancillary data sets have also been collected and are being placed on the BSRN archives web site for ftp access. The SRB shortwave products are available for almost 10 years; longwave products will follow more slowly, but should be available early next year. Current plans are to process surface radiative fluxes for the period July 1983 through December 1995; however, the GRP recommended that SRB continue processing the remaining years (1996–2001) by switching to another source of atmospheric data.

The review of the other radiation projects highlighted several important activities that are underway. **Recent analyses of the 20+ year record of top-of-atmosphere radiative fluxes from Nimbus-7, the Earth Radiation Budget Experiment (ERBE), the Scanner for Radiation Budget (ScaRaB) and the Clouds and Earth's Radiant Energy System (CERES) show not only features associated with ENSO events and the El Chichon and Mt. Pinatubo eruptions, but also inter-decadal changes that appear to be associated with changes in clouds found in the International Satellite Cloud Climatology Project (ISCCP) data set and upper atmosphere water vapor found in the analysis of High resolution Infrared Radiation Sounder (HIRS) data by John Bates [National Oceanic and Atmospheric Administration (NOAA)].** The report of the Intercomparison of 3D Radiation Codes (I3RC) Project (http://climate.gsfc.nasa.gov/I3RC/index.html) contained several notable items: (1) the first two phases of the project to compare 3-dimensional (3-D) radiative transfer codes are now complete and papers are being submitted for publication of the results and conclusions; (2) a model test kit is now on-line to allow other investigators to test their 3-D radiative transfer (RT) codes; and (3) efforts are now being made to link with cloud-large-eddy-simulation and land-surface-vegetation modelers to examine the role of 3-D radiative effects in planetary boundary layers and in land-atmosphere exchanges. The preliminary results of a survey of recent changes to global circulation model RT codes showed that there has been rapid progress lately to improve the physical detail of these codes. GRP plans to complete and publish this survey and to foster some renewed attention to testing these codes more thoroughly. The following issues regarding radiative transfer modeling were discussed: (1) the notable lack of quantitative data about the properties of cirrus cloud particles, especially those smaller than about 50–100 μm [some better data may come from the recent Cirrus Regional Study of Tropical Anvils and Cirrus Layers–Florida Area Cirrus Experiment (CRYSTAL-FACE)]; (2) the lack of a general radiative transfer theory to handle scattering by such small, nonspherical particles (also relevant for aerosols); and (3) no agreement on a practical way to represent the wide variety of shapes/sizes of particles encountered in cirrus.

The *water* projects, especially the Global Precipitation Climatology Project (GPCP) and Tropical Rainfall Measuring Mission (TRMM) were reviewed and recent activities highlighted three points, leading to some recommendations: **(1) the GRP endorsed GPCP plans to produce Version 3 products, which will be anchored on TRMM results, but noted that the passive microwave analysis should be made consistent with microwave-based water vapor and cloud water results; (2) actions to obtain better snowfall data are still not adequate, so the GRP recommended exploring a tighter collaboration with the Climate and Cryosphere (CLiC) Study to improve this aspect of global precipitation; and (3) a possible gap in the tropical precipitation record may occur between TRMM and the planned Global Precipitation Mission (GPM).** A special presentation by Toshio Iguchi (Communications Research Laboratory) and the subsequent discussion highlighted the fact that validation of satellite precipitation measurements is not yet successful and that more needs to be done to understand the radiative transfer physics of this remote sensing problem. Finally, at the request of the GEWEX Scientific Steering Group (SSG), the GRP discussed its possible contributions to a GEWEX-wide precipitation initiative based on the global satellite data sets.

The review of ISCCP and the Global Aerosol Climatology Project (GACP) indicated that both of these projects had recently completed production of their data products through September 2001, at which time the reference polar orbiter was changed from NOAA-14 to NOAA-16, necessitating a transfer of the calibration standard. Two issues were discussed: (1) GACP (also ISCCP) should now make connections with the International Global Atmospheric Chemistry (IGAC) Project, the Global Atmosphere Watch (GAW) Programme, the Stratospheric Processes and their Role in Climate (SPARC) Programme, and the BSRN/Aerosol Robotic Network (AERONET) to exploit the different sources of information that these groups have that is related to clouds and aerosols; and (2) both projects need to formulate plans for exploiting the new satellite instruments making advanced measurements of clouds and aerosols.

The final discussion encompassed a number of possible actions being considered by the GRP to foster more integrative analyses of the global data sets. A significant action to facilitate better connections among the GRP satellite projects and with other data analysis activities within GEWEX was the decision to organize all of the GRP data activities into a single Working Group on Data Management and Analysis (WGDMA). **The first tasks of WGDMA would be to undertake some common statistical analysis tasks, possibly including the creation of a merged collection of data, for all of the GRP global satellite projects (ISCCP, GACP, GPCP, SRB, SeaFlux) and to make plans for the exploitation of new satellite observations.** This new group would also liaise with the GEWEX Cloud System Study (GCSS)/Data Intergration for Model Evaluation (DIME), the Global Land Atmosphere System (GLASS)/Assistance for Land-Surface Modelling Activities (ALMA), the International Satellite Land-Surface Climatology Project (ISLSCP), as well as the GRP Data Management Working Group. The first meeting of this group is planned for April–May 2003 in Asheville, North Carolina, hosted by NOAA's National Climatic Data Center.

Also discussed was what could be done to fill in the missing global land surface data sets needed to complete a description of the global energy and water cycles (referred to as LandFlux). The GRP chairman reported that the GEWEX SSG had given the lead of this activity back to GRP, and as a result, he would be attending forthcoming meetings of the GEWEX Hydrometeorology Panel (including the Water and Energy Balance Study and ISLSCP) to discuss how to proceed.

Two workshops are being organized by GRP to foster development of integrative data analysis methods: (1) the Workshop on Climate Feedbacks (jointly with WGCM) to be held 18–20 November 2002 in Atlanta, Georgia, USA; and (2) the Workshop on Objective Analysis Techniques being organized by GPCP to be held 11–13 March 2003 at the European Centre for Medium-Range Weather Forecasts, UK.

GEWEX HYDROMETEOROLOGY PANEL MEETING

10–12 September 2002
Palisades, New York

Ronald E. Stewart
McGill University, Canada

The Eighth Meeting of the GEWEX Hydrometeorology Panel (GHP) was hosted by the International Research Institute (IRI) for Climate Research at the Lamont-Doherty Earth Observatory in Palisades, New York. Focused workshops on the Water Resources Application Project (WRAP) and the Water and Energy Balance Study (WEBS) were held the day before the GHP meeting, and a Coordinated Enhanced Observing Period (CEOP) meeting was held the day afterwards.

A review of contributions to GHP/GEWEX by various national and international projects and organizations including those within and outside the GEWEX framework was given by representatives of such activities as IRI, the International Association of Hydrological Sciences (IAHS); the limited international regional study, the African Monsoon Multidisciplinary Analyses (AMMA) in West Africa; the PLATIN study (La Plata River Basin) in South America, the Isotope Hydrology Section of the International Atomic Energy Agency; and the Data Assimilation Office of NASA Goddard Space Flight Center; and others. The work of the GHP Working Group on Data Management was also reviewed. Topics discussed at the GHP meeting include the following.

Four-dimensional data assimilation (4DDA) of atmospheric fields was conducted over monsoonal Asia, and Version 1.5 of the GEWEX Asian Monsoon Experiment (GAME) reanalysis has been released and is available as a CD-ROM set (6-hour interval data, gridded at 2.5 degrees; see page 14). GAME has obtained new scientific results on the hydrometeorological processes in the Asian monsoon region from the Tropics to the Siberian Arctic region. The land-atmosphere interaction processes in typical climate and vegetation in monsoonal Asia appear in diurnal through seasonal time scales. GAME is also showing that the water fed rice paddy fields, which are a typical land-surface condition in monsoonal Asia, play an important role in developing and modifying precipitation systems.

The GEWEX Americas Prediction Project (GAPP) studies of monsoonal processes are being studied in conjunction with the Climate Variability and Predictability (CLIVAR)/Pan-American Climate Study (PACS) in support of the North American Monsoon Experiment (NAME). GAPP is currently supporting several studies to assess the relative role of land surface conditions and sea-surface temperatures in affecting the intensities and centers of atmospheric anomalies. Initial studies of the Southwest monsoon indicate that the strength of the Low Level Jet in California is inversely correlated with the strength of the Gulf of Mexico Low Level Jet.

Currently, there are 102 ongoing field projects in the Large-scale Biosphere-atmosphere project in Amazonia (LBA). During the rest of 2002, the LBA-WET to DRY field campaign will study the atmospheric forcing linked to the dry season and the onset of the rainy season in the southern Amazon, including the role of aerosols from biomass burning, and the South American Low Level Jet field that will take place during January–February 2003. This field experiment will allow for a better knowledge of the moisture transport between Amazonia and the La Plata River Basin.

The Mackenzie GEWEX Study (MAGS) research in this past year had been focused on the development of intermediate level coupled models (e.g., coupled atmosphere-surface and coupled surface-hydrologic models), which have been completed, and preliminary results from these models (e.g., Canadian GEWEX Enhanced Study water year simulations) are very encouraging. The development of a fully coupled atmosphere-surface hydrologic model is actively underway right now.

Based on updated data, the Global Runoff Data Centre (GRDC) is currently revising estimates of mean annual freshwater surface water fluxes into the world oceans. Based on a new geographic information system based methodology involving a digital elevation model, it will be possible to estimate freshwater fluxes from arbitrary reaches of the coastline. Depending on data availability, GRDC aims to extend this analysis to estimates of individual years later on.

The Global Precipitation Climatology Centre (GPCC) reanalysis based upon the Full Data Product has been carried out for the period January 1986 up to December 1995 (ca. 28,000 to 40,000 stations). The results have been calculated on a 0.5°-grid (and 1°-grid) and have been provided to NASA/GSFC for publication on the International Satellite Land-Surface Climatology Project (ISLSCP) Initiative II (see page 15) CD-ROM.

The International Association of Hydrological Sciences (IAHS) Decade on Prediction in Ungauged Basins (PUB) is an international research initiative to promote the development of science and technology to provide the hydrological data where the ground observations are needed but are missing. The Kickoff Meeting of PUB will be held in Brazilia on 20–22 November 2002.

Using representative models, available observations and various reanalyses, the GEWEX Continental-scale International Project (GCIP) WEBS has produced a CD-ROM, with a synthesis of the water and energy budget for GCIP. MAGS WEBS has started budget studies over the Mackenzie Basin using numerical weather prediction, as well as regional climate models. These show general agreement with available measurements for some parameters but problems with others (such as orographic precipitation). LBA WEBS is using a combination of station rainfall and the National Centers for Environmental Prediction (NCEP) reanalysis to characterize the annual cycle of critical water budget parameters and their variations for the northern and southern sections of the Amazon River Basin. GAME WEBS is developing a comprehensive data set through a special reanalysis effort by the Japan Meteorological Agency (JMA) and the bringing together of many observational measurements taken over many of the GAME regions of Asia. Model studies are using a hierarchy from high-resolution reanalyses from JMA and standard reanalysis products from NCEP. AMMA is using reanalysis to identify the sources of moisture for the Sahelian rainfall. It has also been shown that GCMs do not reproduce correctly the monsoon onset. The influence of rain variability on the computation of catchment water budgets is also explored. The Global Land Data Assimilation System Project is using a combination of numerical weather prediction modeled and observation-derived data to force and constrain (via data assimilation) multiple, sophisticated land surface models at 1/4 degree spatial resolution, 60S – 90N, on a 15 minute timestep.

All the Continental Scale Experiments are focusing on their contributions to CEOP.

GSWP-2 KICKOFF WORKSHOP

30 September – 1 October 2002
Calverton, Maryland, USA

Paul Dirmeyer[1], Taikan Oki[2], and Xiang Gao[1]

[1]Center for Ocean-Land-Atmosphere Studies, Calverton, Maryland, USA
[2]University of Tokyo, Kyoto, Japan

The Center for Ocean-Land-Atmosphere Studies (COLA), with support from the National Aeronautics and Space Administration (NASA) Program on Terrestrial Hydrology hosted the kickoff workshop of the Second Global Soil Wetness Project (GSWP-2). The project is the principal element of the large-scale uncoupled land surface modeling action in the Global Land-Atmosphere System Study (GLASS; Polcher et al., 2000) and a major element of the International Satellite Land-Surface Climatology Project (ISLSCP), both contributing projects of GEWEX. The overarching goal of the GSWP is to produce as a community effort the best model estimates of the global land-surface water and energy cycles (Dirmeyer et al., 1999). This will entail an evaluation of the uncertainties linked to the land surface schemes (LSS), their parameters and the forcing variables that drive them.

GSWP-2 will take advantage of the 10-year (1986–1995) ISLSCP Initiative II data set (http://islscp2.sesda.com) and LSS simulations will be conducted at a spatial resolution of 1-degree, sans Antarctica. The project will also adhere to the Assistance for Land-Surface Modeling Activities (ALMA) data standards developed in GLASS.

The main goal of the kickoff workshop was to discuss details of the project planning with members of the scientific community who would be participating in GSWP-2, address unresolved issues and complete the draft Science and Implementation Plan for the project. Specifically, the workshop provided a forum to resolve uncertainties and requirements for input data to the various LSSs; address more general modeling group issues; introduce the GSWP-2 Inter-Comparison Center (ICC), housed at the University of Tokyo, and the data submission process; solidify the new remote sensing element of GSWP-2; outline the validation program; narrow options for model sensitivity studies; and discuss other science that can leverage off of GSWP-2. The workshop also established participants and leadership for elements of the project, and demonstrated the data server and software tools that should make model participation and data access much easier than for past experiments.

Execution of GSWP-2 will follow in three streams—data, modeling and evaluation—given in the figure on page 16. COLA is processing the 3-hourly meteorological forcing and complete boundary condition data for GSWP-2, including an extension of the data back in time to 1982. LSS integrations will begin at July 1982, and loop through the first 12 months of forcing data until the modeler is satisfied that soil moisture has spun up and sufficiently equilibrated. A lesson from the GSWP pilot project was that this spin-up process overly amplifies the impact of climate anomalies from that year on the land surface state variables. Therefore, the models will then proceed with their integrations forward from June 1983 – December 1985 so as to converge to a realistic "land climate" at the start of the evaluation period. The 10-year baseline integration, which will be evaluated within the group of GSWP participants and later released to the community at large, covers the period from January 1986 to December 1995. Daily global output will be reported from all models during this period. In addition, for the last year (1995) there will be an "intensive model output period" where model results will be reported at a 3-hour interval, but likely with a reduced set of variables. These data will be especially useful for validation and remote sensing applications. We may also specify a subset of points for full 10-year histories at 3-hour output. The data server system will make such limited re-integrations simple for the models to perform.

A major product of GSWP-2 will be a multi-model land surface analysis for the 1986–1995 period. This will be a land surface analog to the atmospheric reanalyses. There will be a climatological annual cycle data set, and a larger data set for the entire series. Compiling the results of multiple LSSs to produce a single analysis will provide a model-independent result. Of particular value, uncertainty estimates can be put on all of the fields, based on inter-model spread. Additional uncertainties regarding forcing data can be quantified, based on the results of the sensitivity studies. The act of constructing an ideal multi-model analysis is a research topic in itself, and much can be learned from the experience of multi-model ensembling in the atmospheric and oceanic modeling communities. There will be three main modes of *in situ* validation of participating LSSs:

Field campaigns. The GSWP-2 period overlaps a number of relevant field campaigns, including older GEWEX experiments, which can provide validation

Participants attending the GSWP-2 workshop.

data. Comparison of measured meteorological variables from these campaigns with the reanalysis-based forcing data will also provide an evaluation of those products.

Observational networks and long-term monitoring. There are also long-term monitoring networks of soil moisture, carbon, radiative and turbulent fluxes that can provide local or regional validation for LSSs. These will be predominantly available for the latter years of the period.

Streamflow. Runoff fluxes from all participating LSSs will be routed with common river routing schemes to compare with streamflow measurements across a large portion of the globe, as an assessment of the simulation of annual, seasonal, and interannual variations in surface hydrology. Similarly, large basin comparison of model water storage change with observed atmospheric moisture flux convergence minus discharge may also uncover problems in the forcing data and models at basin scales.

It is recognized that discrepancies exist between the observed meteorology and land surface conditions at the validation sites, and the 1-degree gridded data that drive the models, and that those differences can contribute to errors at least as much as the shortcomings in the various models. Representativeness of gridded data at the plot scale can also be evaluated in these locations. PILPS, in its Phase 2, has conducted and continues to craft local land surface modeling experiments built around nearly complete sets of forcing and validation data at a single location (Henderson-Sellers et al., 2002). It is not the intent of this *in situ* validation program to duplicate that effort. Rather, using the global forcing data sets, local validation may be performed when and where such data are available.

One of the new thrusts for GSWP-2 is a stronger connection to applications in remote sensing. The principal goal of the effort in remote sensing applications is to expand validation beyond those few areas where *in situ* data on land surface state variables are readily available. In addition to the classical attempts to validate the typical land-surface state variables using satellite retrievals, GSWP-2 also intends to expand the capabilities of current LSSs. This is to be done by the application of algorithms by which LSSs can directly report brightness temperatures, like those sensed by instruments in orbit. These may be applied as forward algorithms for infrared/skin temperature and microwave/soil wetness (and vegetation index for LSSs that predict vegetation phenology).

Modeling sensitivity studies will involve re-integrating the LSSs over part or all of the global 10-year domain to test the response of the models to changes in forcing data and surface parameters. Each participant will be encouraged to take part in some or all of the proposed studies. The sensitivity studies are still being defined, but will likely include sensitivity to choices in meteorological forcing data, such as choice of near-surface reanalysis product (NCEP/DOE Reanalysis versus ECMWF ERA-40), impact of hybrid forcing data (combining observed and reanalysis products for precipitation and air temperature), and an assessment of the impact of rain gauge under-catch. There are also multiple land surface parameter data sets available in ISLSCP Initiative II, such as three choices of global vegetation maps. GSWP-2 will also investigate sensitivity to basic choices of surface vegetation data, as well as the impact of inclusion/exclusion of sub-grid information (for LSSs that include surface tile schemes).

Forcing data and model results will be made available to participants as data sets accessible from three Distributed Oceanographic Data System (DODS) servers (http://www.unidata.ucar.edu/packages/dods/; http://grads.iges.org/grads/gds/) in the United States, Europe, and Japan. Using the ALMA data exchange standards (http://www.lmd.jussieu.fr/ALMA/), and DODS data subsetting capabilities, individual LSSs will be able to run globally each time step, each grid point from start to finish, or in any other sequence of integration, accessing the data directly over the Internet without the need to download or otherwise a priori process the complete data set on their local system. Software tools and source code to aid in access and production of ALMA-standard data, DODS client software libraries, PILPS consistency checks of model results, and interpolation of 3-hourly forcing data to shorter time intervals will also be provided to the community. Additionally, standard and customizable browse images will be made available to the public via the web.

Release of all forcing and boundary condition data to the modeling groups is scheduled for February 2003, with baseline simulations due to the GSWP Inter-Comparison Center (ICC) in August 2003 (see figure on page 16). Complete descriptions and current information concerning this evolving project are available at: http://www.iges.org/gswp/ and anyone interested in participating in land surface modeling, validation or other scientific participation should contact the project at gswp@cola.iges.org.

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CEOP STATUS SESSION AT GHP-8

Palisades, New York
13 September 2002

Sam Benedict
CEOP International Coordinator

A Coordinated Enhanced Observing Period (CEOP) status session was held in conjunction with the Eighth Meeting of the GEWEX Hydrometeorology Panel (GHP). Dr. Toshio Koike, lead scientist for CEOP, confirmed that the build-up phase of CEOP is on schedule and that CEOP is focusing on the development of an initial enhanced observing period (EOP-1) data set, which covers the period July through September 2001. The implementation of two other enhanced observing periods covering annual cycles will be undertaken using data collected from October 2002 to December 2004. In response to a key action item for the CEOP Data Management Working Group, a File Transfer Protocol (FTP) for delivery of data from the CEOP Reference Sites to the CEOP Central Archive has been established.

A number of reports were given at the meeting from representatives of the GEWEX Continental Scale Experiments (CSE) that highlighted the existence of multinational commitments that have been coordinated and maintained in handling interactions among the operators of the CEOP reference sites. Channels of communication between the reference site operators and the CEOP data managers have been established to ensure that data will be provided for the purpose of improving the collective contribution of the CSEs to the global requirements of CEOP. As a result of these reports and the discussions at the meeting, a large amount of information about the characteristics of the CEOP reference sites has been provided by the CSEs and placed in the CEOP Reference Site Table at: http://www.joss.ucar.edu/ghp/ceopdm/rsite.html. The CEOP Central Archive at the University Corporation for Atmospheric Research continues to receive data for the EOP-1 from the CSEs.

As a result of an action to standardize the CEOP Model Output requirements, a document has been produced that provides guidance for CEOP model output generation at numerical weather prediction centers, meteorological agencies and data assimilation centers. Commitments have been obtained for the provision of CEOP model products from major national and multinational centers including the Japan Meteorological Agency, National Oceanic and Atmospheric Administration, National Centers for Environmental Prediction, National Aeronautics and Space Administration/Goddard Space Flight Center Data Assimilation Office, the European Centre for Medium-Range Weather Forecasting, the United Kingdom Met Office, the Center for Weather Forecasting and Climate Research of the Brazilian Agency for Space Research and the Australian Bureau of Meteorology Research Center. It was announced at the meeting that the Max Planck Institute for Meteorology (MPIM) at Hamburg, Germany would contribute support to CEOP by assisting with the centralized handling and retention of the CEOP model output data being generated by the various contributing centers. Work is underway to integrate CEOP data into a World Data Center on Climate database scheme at MPIM. The most efficient input, storage and access structure is currently being defined. Mirror sites for some or all of the CEOP model output data products may be established in Asia and the USA.

Presentations by the CEOP Water and Energy Simulations and Prediction (WESP) Working Group clarified the methodology that CEOP will use in applying enhanced observations to better document and simulate water and energy fluxes and reservoirs over land on diurnal to annual temporal scales and to better predict these on temporal scales up to seasonal for water resource applications. The CEOP WESP Working Group strategy, as accepted at the meeting, is to build on work by the GHP related to closing simplified vertically integrated water and energy budgets with observations and analyses, and beginning efforts to simulate these budgets regionally. WESP plans to transfer this knowledge to global scales; include more land, water and energy cycle processes, and begin to examine the vertical structure in the atmosphere.

The CEOP Monsoon Systems Working Group, held its first implementation planning workshop, in parallel with the GHP meeting from 10 to 11 September 2002. Results of the workshop were reported during the CEOP status session and it was reconfirmed that this working group will address the implementation of one of the main CEOP aims associated with the documenting of the seasonal march of the monsoon systems, assessing the monsoon systems driving mechanisms, and investigating the possible physical connections between such systems. It was recommended that the Working Group proceed with a CEOP Inter-monsoon Model Study (CIMS) as developed during the Workshop. CIMS will be an international research project to validate and assess the capabilities of climate models in simulating physical processes in monsoon regions around the world. For CIMS, a major effort will be devoted to defining the data requirements, and modeling strategy for validating model physics.

Validation data will be derived from CEOP reference sites, which include the GEWEX CSEs and planned Climate Variability and Predictability (CLIVAR) field campaign sites. Numerical experiments will be designed to target the simulation of fundamental physical processes that are likely to uncover limitations in model physics. A draft report of the workshop findings with the versions of the presentations made at the meeting have since been put on the internet at: http://monsoon.t.u-tokyo.ac.jp/ceop/meeting/CEOP-MSS/index.html.

The CEOP Satellite Data Integration Working Group reported that a data integration, storage and access scheme under development by the National Space Development Agency of Japan (NASDA) and the University of Tokyo (UT) has been demonstrated as an integral part of the satellite integration process in CEOP. It was reconfirmed that this 500 tera-byte data integration and archival system at UT will be available for the CEOP satellite data products work. The scheme that utilizes the NASDA/UT capability for production and archiving of satellite data products for CEOP reference sites has been presented as a three-phased process. The new schedule shows that the first phase (June 2002 to November 2002) will focus on data received from NASDA and the University of Tokyo related to all of the CEOP Reference Sites. Specifically this will be for the DMSP Special Sensor Microwave/Imager and Tropical Rainfall Measuring Mission Microwave Imager and Precipitation Radar data. It was announced that NASDA and the UT would host a CEOP Satellite Data Integration Issues Workshop from 9 to 10 October 2002 in Tokyo, Japan. The proposed agenda included a discussion of details associated with a NASDA proposal for a CEOP Committee on Earth Observation Satellites Working Group on Information Systems and Services Test Facility (CEOP-WTF) that would be developed to assist with the derivation of CEOP special products from each satellite sensor. The CEOP WTF proposal, which now includes a Satellite Data Integration Center in Japan and, possibly, one in the USA, has already been accepted for further implementation with the support of the Integrated Global Observing Strategy Partnership (IGOS-P), including Space Agencies.

The CEOP Science Steering Committee reported that a number of important issues related to the efficient organization and management of CEOP to achieve the main science objectives have been addressed by the Committee. These actions have included finalizing the CEOP Data Policy statement; setting minimum standards for temporal sampling of CEOP Reference Site parameters, maximizing the science and technology benefits from CEOP, especially associated with setting a goal for delivery of a CEOP seasonal data product (EOP-1); and providing inputs on CEOP publications including the CEOP Brochure (see the CEOP web site at http://www.ceop.net). It was also confirmed that the CEOP Advisory and Oversight Committee would be activated by the end of 2002 under the co-chairmanship of Drs. A. Sumi (NASDA) and J. Kaye (NASA).

CEOP held its initial implementation planning meeting at the Earth Observation Research Center of NASDA in Tokyo, Japan, from 6–8 March 2002. More specifics about CEOP and the Kick-off Meeting can be found at: http://monsoon.t.u-tokyo.ac.jp/ceop/. All of the main actions and recommendations in CEOP are being undertaken in reference to the goals and objectives contained in the CEOP Implementation Plan. The Plan, which was finalized following recommendations formulated at a CEOP Implementation Workshop held at the GSFC in March 2001, was published in May 2001 and can be found at: http://www.gewex.com/ceop/ceop_ip.pdf.

CEOP has gained the interest of other international organizations outside of the WCRP community, as evidenced by the proposal for an Integrated Global Water Cycle Observations (IGWCO) theme within the framework of the IGOS-P, which has reaffirmed CEOP as "the first element of the IGWCO." The next implementation planning meeting will be held in Berlin, Germany from 2–4 April, 2003. Presentations associated with preliminary results from the application of the available site data in the EOP-1 data set will be part of the agenda.

GAME RESULTS AVAILABLE ON CD-ROM

Version 1.5 of the GEWEX Asian Monsoon Experiment (GAME) Intensive Observation Period (IOP) reanalysis for the period of April – October 1998 has been released and is available as a CD-ROM set (6-hour interval data, gridded at 2.5 degrees).

GAME-IOP data for the 1998 summer is also available in a CD-ROM set containing the following:

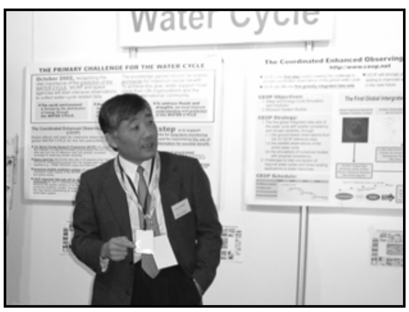
Vol. 1: JMA routine observation
Vol. 2: GAME-Tropics, GAME-Tibet, India (sonde)
Vol. 3: GAME-HUBEX, GAME satellite
Vol. 4: GAME AAN, GAME radiation
Vol. 5: India surface observations (for the use of the Asian scientific community)

To obtain copies, contact Mr. Kiyotoshi Takahashi at info-gain@mri-jma.go.jp. For more information about GAME data sets, see the GAME Archive and Information Network (GAIN) web site at http://gain-hub.mri-jma.go.jp/

CEOP PLANS PRESENTED AT INTERNATIONAL FORUMS

Toshie Koike, lead scientist for the Coordinated Enhanced Observing Period (CEOP) and Professor at the University of Tokyo, outlined the need for better observations of precipitation patterns caused by changes in the global water cycle at the **Eighth Session of the Conference of the Parties of the United Nations Framework Convention on Climate Change held in New Delhi, India**, on 23 October – 1 November 2002. Prof. Koike described how CEOP will gather, assimilate, and archive data pertaining to the water cycle through the use of satellites to create coordinated observations of the global water cycle. He emphasized that CEOP is the first step in meeting the challenge of providing coordinated observations of the water cycle in a globally integrated system.

At the **World Summit on Sustainable Development (WSSD), held in Johannesburg, South Africa**, 16 August – 4 September 2002, the IGOS Water Cycle Theme and its first element, CEOP, were included in the NASDA exhibit on cooperative satellite and *in situ* observations of the global and regional water cycles and their scientific contributions to water resource management in the Waterdome Pavilion. At a side event at the WSSD organized by NASDA and the IGOS Water Cycle Theme Team, Prof. Hartmut Grassl, chair of the GEWEX Continental Scale Experiment BALTEX Science Steering Group, gave the keynote presentation on the "observation of the intensified global water cycle" and Dr. Koike presented "CEOP as the first element of the IGOS water cycle theme."



Prof. Koike at the WSSD CEOP exhibit.

NEW WEB LOCATION FOR ISLSCP INITIATIVE II DATA

http://islscp2.sesda.com/

Due to security problems, the original web site for International Satellite Land-Surface Climatology Project (ISLSCP) Initiative II has been closed. Data sets from the ISLSCP Initiative II data collection are available now at islscp2.sesda.com.

The Initiative II global data sets are mapped at consistent spatial and temporal resolutions and are compiled in four key areas: land cover, hydrometeorology, radiation, and soils. They span the 10-year period, 1986–1995, and are mapped to consistent grids (0.5 x 0.5 degree for topography and land cover, 1 x 1 degree for meteorological parameters). The temporal resolution for most data sets is monthly; however, a few are at a finer resolution (e.g., 3-hourly). Currently, 35 of the 47 data sets are available for distribution. The complete collection will be delivered to the GSFC DAAC in January 2003.

The final data set will consist of approximately 230 parameters organized under the following broad categories:

- Carbon (15)
- Vegetation (29)
- Hydrology, Topography and Soils (39)
- Snow and Sea Ice (4)
- Oceans (1)
- Radiation and Clouds (45)

GEWEX/WCRP MEETINGS CALENDAR

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

18–20 November 2002—GRP/WGCM WORKSHOP ON CLIMATE FEEDBACKS, Atlanta, Georgia, USA.

18–22 November 2002—WGNE/GMPP MEETING, Météo-France, Toulouse, France.

21–23 November 2002—12TH LBA SCIENCE STEERING MEETING, Manaus – AU, Brazil.

6–10 December 2002—AGU FALL MEETING, San Francisco, California, USA. Special theme session on research in climate and hydrology in the Southern Hemisphere.

15–17 January 2003—US-JAPAN WORKSHOP ON CLIMATE CHANGE, Irvine, California, USA.

20–24 January 2003—15TH SESSION OF THE GEWEX SCIENTIFIC STEERING GROUP, Bangkok, Thailand.

9–13 February 2003 — 83RD AMERICAN METEOROLOGICAL SOCIETY ANNUAL MEETING, Long Beach, California, USA.

11–13 March 2003—GEWEX WORKSHOP ON OBJECTIVE ANALYSIS OF PRECIPITATION, Reading, UK

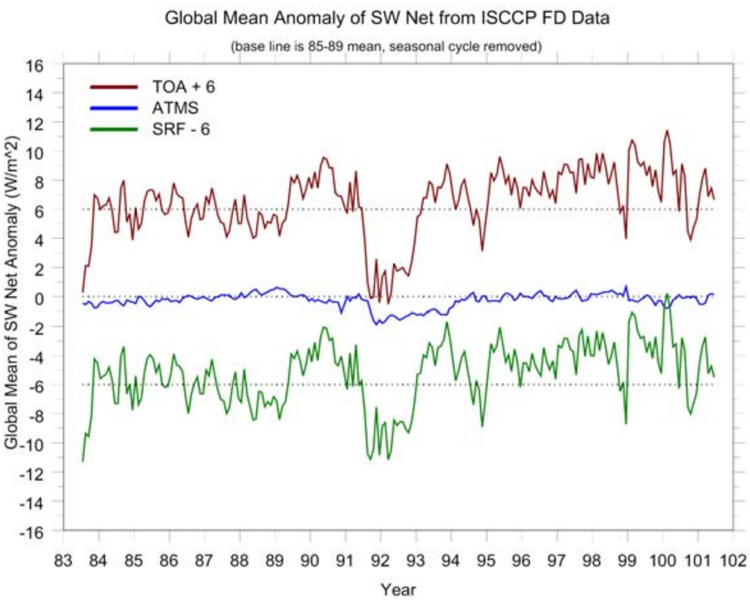
17–21 March 2003—WCRP JOINT SCIENTIFIC COMMITTEE MEETING, Reading, UK.

2–4 April 2003—CEOP SECOND FORMAL INTERNATIONAL IMPLEMENTATION PLANNING MEETING, Berlin, Germany.

3–6 November 2003—14TH SESSION OF THE GEWEX RADIATION PANEL, Toronto, Canada.

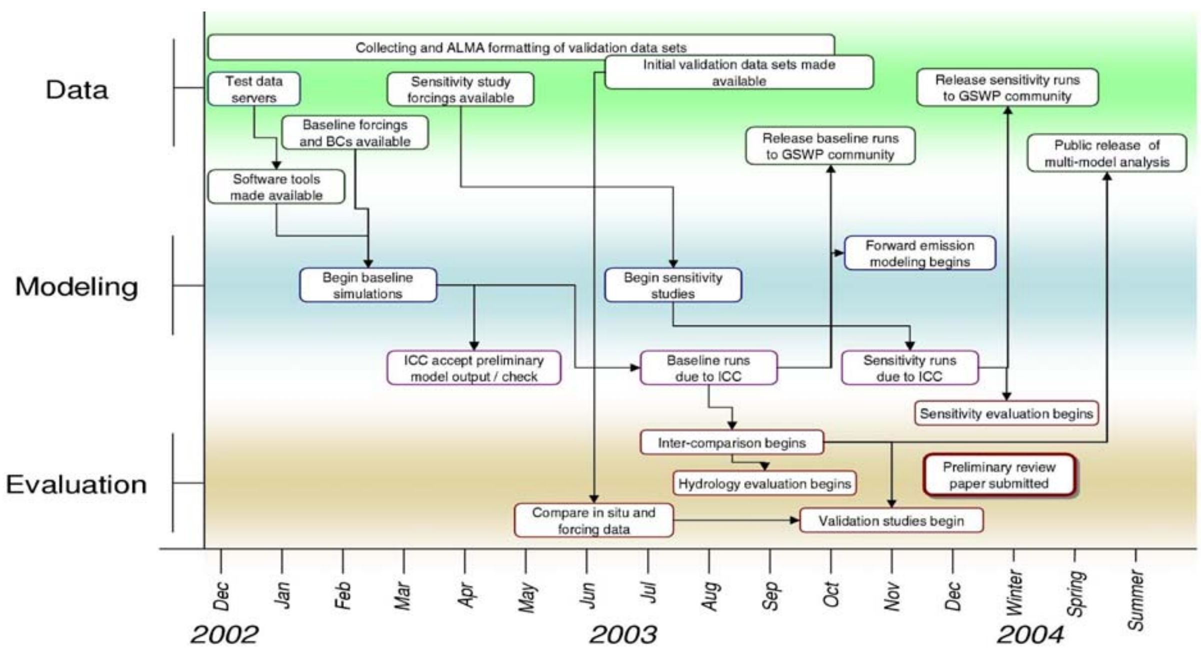
OVERALL INCREASE IN NET SHORTWAVE RADIATION AT TOA AND AT THE SURFACE, BUT NOT IN THE ATMOSPHERE

(*New 18-Year ISCCP Data Set*)



The figure illustrates the new ISCCP FD data product providing physically consistent global monthly mean net SW and net LW anomalies at the surface, in the atmosphere and at the top-of-atmosphere over the whole time period. ***See article on page 7.***

FOLLOW-ON GLOBAL SOIL WETNESS PROJECT (GSWP-2) TIMELINE



See article on page 11.

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Dr. Robert A. Schiffer, Director

Editor: Dawn P. Erlich
Mail: International GEWEX Project Office
1010 Wayne Avenue, Suite 450
Silver Spring, MD 20910, USA

Layout: Erin McNamara
Tel: (301) 565-8345
Fax: (301) 565-8279
E-mail: gewex@gewex.org

WWW Site: http://www.gewex.org