GEWEX WCRP
World Climate Research Programme
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NEWS

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AMMA FIELD CAMPAIGN RESULTS

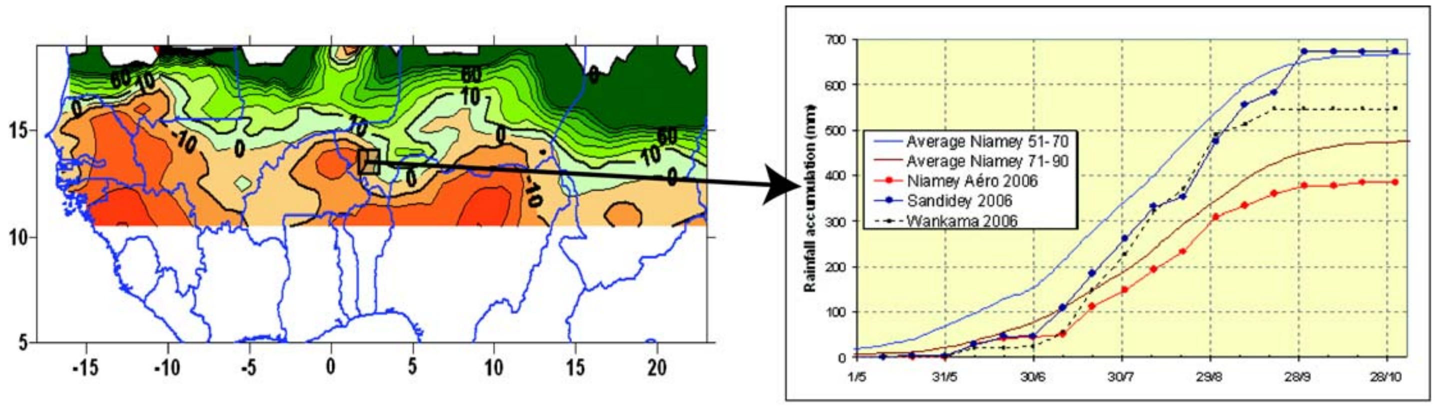
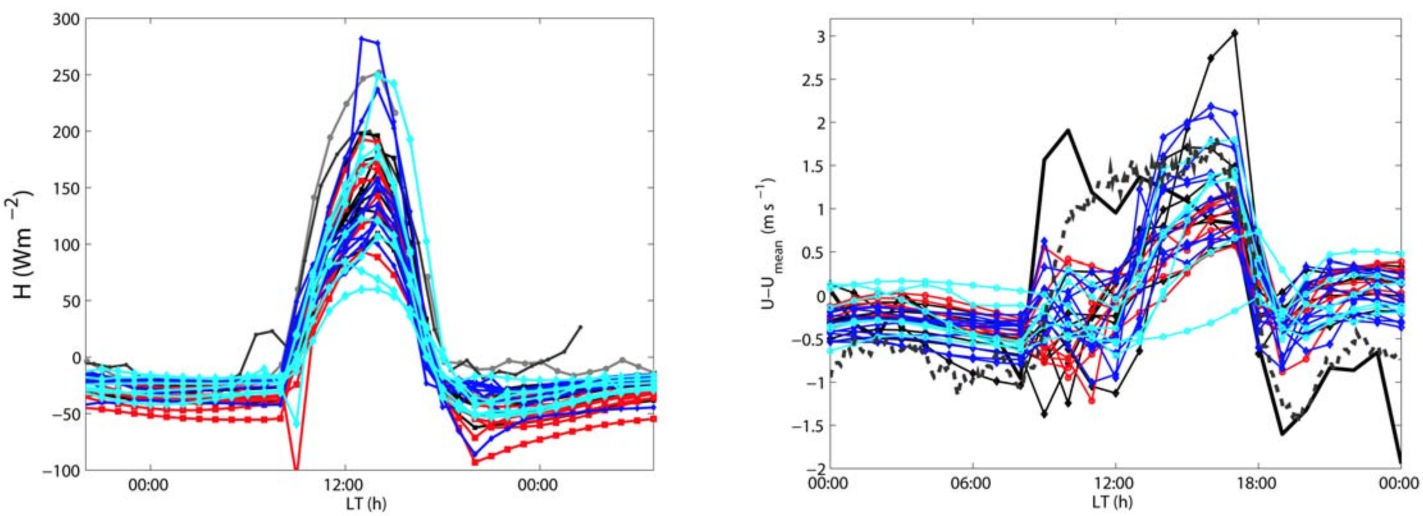


Illustration of the space-time distribution of rainfall over the Sahel and the African Monsoon Multidisciplinary Analysis (AMMA) Project mesosites in 2006, characterized by a very late start of the rainy season over the whole subcontinent. The map on the left shows the seasonal rainfall anomalies computed as a percentage of the mean rainfall over the 1950–2005 period, showing positive anomalies in the north and negative anomalies over the south of the region. These anomalies were caused by suppressed convection conditions during the early stage of the rainy season, followed by an unusually northern location of the primary tracks of the mesoscale convective complexes. The graph on the right illustrates the large differences in precipitation that occur at this scale. See article by T. Lebel, et al. on page 4.

GABLS INTERCOMPARISON SHOWS THAT MODELS DIFFER CONSIDERABLY AND UNDERESTIMATE DIURNAL CYCLE OF WIND SPEED



The GEWEX Atmospheric Boundary Layer Study (GABLS), using observations from CASES-99, shows that models produce very different results in all parameters and that they all differ substantially from observations. The left panel shows sensible heat flux at the surface (Wm^{-2}), and the right panel shows the diurnal amplitude of the 10-m wind speed (ms^{-1}), where the black solid line is the averaged amplitude for the entire month of October and the dashed line is for October 23. Single Column Model results, first order closures (black and red) and turbulence models (blue and cyan). The models with the first calculation level above 5 m are indicated with circles and the ones above with diamonds. See article by G. Svensson and B. Holtslag on page 9.

COMMENTARY

2007 WILL BRING NEW CHALLENGES TO GEWEX

Soroosh Sorooshian, Chairman
GEWEX Scientific Steering Group

Welcome to a new year. I wish all readers of this Newsletter peace and prosperity, and I also wish the same for GEWEX. This year will be an important one for GEWEX and we will need the solidarity of the community to be successful in moving GEWEX forward and realizing the goals that we have outlined in our GEWEX Phase II Roadmap. I would like to give you some reasons why 2007 will be critical for GEWEX.

GEWEX is streamlining its operations. At its recent meeting, the GEWEX Scientific Steering Group (SSG) approved the merger of the GEWEX Hydrometeorology Panel (GHP) and the Coordinated Enhanced Observing Period (CEOP) into a single panel activity—the Coordinated Energy and Water Cycle Observations Project (CEOP). This restructuring will allow the former Continental-Scale Experiments (now Regional Hydroclimate Projects) to more fully exploit the on-going data collection and archival activities of CEOP and will bring more science to the new CEOP and all of the programs with which it interacts. Since these two activities have accounted for more than half of the scientists involved in GEWEX, I think it is incumbent on all of us to do all that we can to make this merger a success.

Research in the Earth sciences is at a critical crossroads. Over the past 2 years we have seen a refocusing of priorities within the National Aeronautics and Space Administration (NASA). The Decadal Survey recently issued by the National Academy of Sciences outlines a path whereby NASA and the space community can move forward to ensure that the Earth observation program remains strong. There are legitimate concerns that if Earth science in NASA falters, then it may falter in other space agencies, and the focus on Earth observations that seemed so promising only a few short years ago will be lost. Since GEWEX relies on space agency support, data, and inspiration, any loss of focus on the Earth sciences can only hurt our program. In the meantime, the good news is that support for GEWEX and its scientific agenda remains at an all time high by almost all agencies at an international level. The important scientific contributions that GEWEX and its panels are making are well recognized by our supporters.

As most of you have heard the World Climate Research Programme (WCRP) is also at a crossroads. It is launching some ambitious new crosscuts under its strategic framework. These include monsoons, extremes, the International Polar Year, anthropogenic climate change, seasonal prediction and atmospheric chemistry and climate. GEWEX has a vested interest in each of these topics, however, we must remain diligent to ensure that it is a viable contributor in these activities. These ambitious new activities are coming at a time when WCRP seems to have reached a budget crisis and the level of future support to its projects has become uncertain. Furthermore, WCRP is facing a review by the International Council for Science (ICSU) in the next year which may have implications for its relationship with WCRP and the International Geosphere-Biosphere Programme (IGBP). GEWEX must help WCRP chart a path through these waters to ensure that both GEWEX and WCRP remain viable and independent of the winds that may seek to blow them off course.

During my 6 years as the GEWEX SSG Chair I have faced many challenges, but I feel that this year will be the most challenging. In previous years it has been the good will, common sense and support of the community that have carried the day. There is no reason to expect it to be otherwise this year. I look forward to your support and collaboration in addressing these challenges.

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WCRP DIRECTOR ATTENDS MEETINGS IN WASHINGTON, DC

On 30 November – 1 December 2006 the Director of the World Climate Research Programme (WCRP), Dr. Ann Henderson-Sellers attended a WCRP Roundtable at a meeting of the Board on Atmospheric Sciences and Climate of the National Academies Climate Research Committee. A workshop was also held with government representatives on the plans of results of the WCRP stakeholders survey.

While in Washington, DC, she met with Gen. Jack Kelly, National Oceanic and Atmospheric Administration (NOAA) Assistant Administrator for Weather, Dr. Chet Koblinsky, Director, NOAA Climate Office, and Dr. Peter Schultz, Deputy Director, U.S. Climate Change Science Program. She also met with Dr. Mary Cleave, Associate Administrator, National Aeronautics and Space Administration (NASA) Science Directorate and other NASA senior staff, including Dr. Michael Freilich, Director of the Earth Science Division. Dr. Henderson-Sellers expressed her appreciation for NASA's long-term support for WCRP programs, especially for GEWEX, for which NASA serves as the major international sponsor. Dr. Cleave emphasized the important role of GEWEX in NASA's research on Earth system science issues, in particular, water and energy processes associated with global climate variability and change.

CAPACITY BUILDING WORKSHOP HELD IN BUENOS AIRES

On 16–17 November 2006, Argentina's Comisión Nacional de Actividades Espaciales (CONAE) hosted the Group on Earth Observations (GEO)/Integrated Global Water Cycle Observations (IGWCO) Theme capacity building workshop in Buenos Aires. Representatives from a number of space agencies as well as other programs such as the International Research Institute (IRI) participated in the workshop. The concept for a capacity building program that emerged from these discussions foresees space agencies and other data providers, and in some cases researchers, developing techniques for using Earth observations in support of decision making in the water resources sector. The next step in this development is to complete a draft proposal for comment and review by the end of March 2007. Anyone wishing to have more information about the proposal is invited to contact Rick Lawford at *lawford@umbc.edu.*

GEWEX DATA APPLICATIONS FOR SOLAR AND OTHER RENEWABLE ENERGY APPLICATIONS

GEWEX Surface Radiation Budget (SRB) Project and Global Precipitation Climatology Project (GPCP) meteorological data sets have proven to be highly valuable to engineers, architects, and planners in the renewable energy sector. These data sets are made available on the NASA Surface Meteorology and Solar Energy web site (*http://eosweb.larc.nasa.gov/sse/RETScreen/*) using RETScreen software (*http://www.retscreen.net/ang/home.php*), a decision support tool that is available free of charge that can be used worldwide to evaluate the energy production and savings, life-cycle costs, emission reductions, financial viability, and risk for various types of energy efficient and renewable energy technologies (RETs). The software also includes product, cost and climate databases, and a detailed online user manual. Since these data sets became available 7 years ago, there have been over 1 million data document downloads and 100,000 registered users. A new version of the Retscreen software in 21 languages is scheduled to be released soon.

U.S. NATIONAL RESEARCH COUNCIL DECADAL SURVEY REPORT RELEASED

The Space Studies Board report, "Earth Science and Applications from Space: National Imperatives for the Next Decade and Beyond," provides a review of priorities for Earth observations for the next decade. The report can be purchased or viewed at *http://www.nap.edu/catalog/11820.html*.

GEWEX SCIENTISTS HONORED AT THE ANNUAL AMS MEETING

At the 87th Annual Meeting of the American Meteorological Society, **Dr. Ulrike Lohmann** received the Henry G. Houghton Award "for pioneering contributions to the representation and quantification of the effects of cloud-aerosol interactions on climate." **Dr. Anthony D. DelGenio**, National Aeronautics and Space Administration (NASA)/Goddard Institute for Space Studies (GISS), **Dr. Randal D. Koster**, NASA/Goddard Space Flight Center, and **Dr. Michael I. Mischenko**, NASA/GISS, were honored as new AMS Fellows.

AMMA FIELD CAMPAIGNS IN 2005 AND 2006

T. Lebel[1], D. J. Parker[2], B. Bourles[3], A. Diedhiou[1], A. Gaye[4], J. Polcher[5], J.-L. Redelsperger[6], and C. D. Thorncroft[7]

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The African Monsoon Multidisciplinary Analysis (AMMA) field campaign is the largest and most extensive of its kind ever undertaken in Africa. Its first component, the long-term observation period (LOP) is based on operational networks and specific field projects, covering the period 2001–2010. In 2005, AMMA began its Enhanced Observing Period (EOP) which will last 3 years and is characterized by a widespread intensification and coordination of existing networks. The peak of activity occurred in 2006 with four Special Observing Periods (SOPs) based on the deployment of extensive observation platforms, including research aircraft and vessels, balloons, and an array of ground instruments.

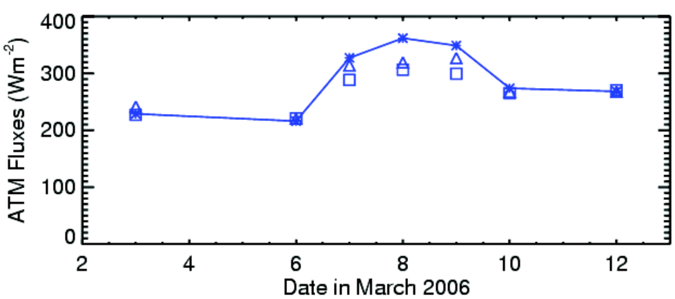
The scientific diversity of the measurements embraces oceanic, hydrological and atmospheric studies, in physical, chemical and socio-economic disciplines. As described by Redelsperger et al. (2006, 2007), the observation strategy includes three spatial scales: regional, meso and local. **Preliminary results indicate that 2006 was characterized by a very late onset of the monsoon over the continent (around 10 July compared to 20–25 June, on average).**

EOP monitoring of the atmosphere at the regional scale and SOP intensification. The main source of *in situ* atmospheric measurements was the existing operational network, which was considerably upgraded using AMMA funding. The infrastructure at 15 synoptic existing stations was extensively refurbished, and four new stations were created, thus providing a basic network of 19 up-to-date stations. The sounding frequency was increased from two to four per day at seven key stations from June to September 2006. For two periods totaling 25 days, a subnetwork of six stations made eight soundings per day. The "fixed" profiling network was also supplemented by soundings from "mobile" platforms. In total, 510 dropsondes were released from research aircraft and 129 from driftsonde gondolas over the continent and the tropical Atlantic. Fifteen boundary layer pressurized balloons launched from Cotonou moved generally north-eastward, sampling the monsoon flow during the onset. In addition, six GPS stations, one VHF profiler and one UHF profiler were used to obtain upper air observations. The outcome of the upper air programme has been the acquisition of a remarkably dense, high-quality upper-air data set for West Africa.

Aerosol campaigns. West Africa is the world's largest source of biomass burning aerosols and mineral dust; satellite sensors consistently indicate that the West Africa aerosol plumes are the most widespread, persistent and dense on Earth. The effect of the dust and carbonaceous aerosols on climate change is one of the greatest uncertainties in the Earth radiative budget. The EOP focuses on studying the mineral dust content and its transport toward the North Atlantic Ocean. This transport can take place at different altitudes within the Saharan Air Layer (SAL), and also within the surface layer. The altitude of the dust transport layer significantly modulates its radiative effect and also induces different deposition patterns, thus impacting the regional dust budget. A Sahelian Dust Transect made of three stations located in M'Bour (Senegal, 16.96°W), Cinzana (Mali, 5.93°W) and Banizoumbou (Niger, 2.66°W) provided precise local scale measurements as well as a regional view of the surface concentration and aerosol optical thickness associated with several huge dust storms that affected all of western Africa in 2005 and 2006. To the extreme north (Tamanrasset, 22°48N), the Transportable Remote Sensing Station was deployed to measure aerosol and cloud radiative properties through a synergy of backscatter lidar, radiometry and *in situ* sampling in the Sahara. In the central Sahel, the Atmospheric Radiation Measurement Program (ARM) Mobile Facility (AMF), equipped with high quality radiation and sounding sensors operated from the Niamey airport, while the Banizoumbou site was equipped with two isokinetic samplers equipped with seven sampling outlets and a similar set-up was deployed in a region of dominant biomass burning aerosols.

The AMF and satellite instruments performed the first simultaneous observations of a major dust storm from space and the ground, allowing researchers to test their understanding of how dust affects the radiant energy budget of the atmospheric column (A. Slingo, et. al., 2006). Researchers used measurements of atmospheric temperature and humidity profiles, and ground-based retrievals of aerosol optical properties—such as aerosol optical thickness and reflectivity—as input to radiation models to assess their ability to simulate the impact of the dust on solar radiation balance. The results indicate major perturbations to the energy balance at both the surface and top of the atmosphere. When compared with the satellite and ground-based observations, the models did a good job of reproducing the radiative energy balance at the surface during the dust storm, but they underestimated the solar absorption within the atmosphere, indicating that scientists need to refine their understanding of the absorbing properties of dust (see figure below).

Continental surfaces and water cycle. The land surface EOP is intended to provide more appropriate data for the study and estimation of water budgets from the local scale to the mesoscale. Surface fluxes (latent and sensible heat, and carbon dioxide) and soil moisture are a major emphasis of the land surface EOP, and will remain so for at least 2008 and 2009. A series of 13 flux stations were deployed from 7°N to 17°N and are documented using two scintillometers (one in Niger, one in Bénin), providing a spatially integrated measurement of the sensible heat flux over areas of a few squared kilometers. Another key EOP instrument is the X-band Doppler and polarized XPORT weather radar installed at Ouémé for fine resolution observations of the rainfields at high time-sampling frequency (typically one volume scanning every 10 minutes) over the Donga catchment. The land surface LOP-EOP program provides a comprehensive set of data, for water cycle studies across scales and for hydrologic model parameterization. The three mesosites also function as "field schools" for training a new generation of young African scientists to use new instruments and methods in hydrometeorology. During the 2006 rainy season, three hydrometeorological radars were deployed along a West to East Sahelian transect. The French Ronsard C-band Doppler and polarized radar was installed at Kopargo to complement the smaller EOP XPORT radar. The figure at the top of page 1 illustrates the space-time distribution



Observations (solid lines and star symbols) and results from two models (squares, triangles) showing the amount of solar energy absorbed in the atmosphere before, during, and after the March 7–9, 2006 dust storm. During the dust storm, observations show a significant increase in atmospheric absorption while the models underestimate the amount of energy absorbed. Before and after the dust storm, the model predictions are consistent with observations.

of rainfall over the region in 2006, characterized by a very late start of the rainy season over the whole subcontinent and overall exceeding rainfall in the North and an overall deficit in the South.

Oceanic campaigns. The respective role of the ocean and of the continental surfaces in shaping the interannual and decadal variabilities of the West African Monsoon is a key question to be addressed by AMMA, leading to a coordinated observation program for the ocean and the continent. The 3-year ocean EOP consists of two annual cruises following the same track lines, one during the establishment of the cold tongue and the monsoon onset (June), and one corresponding to the retreat to the south of the intertropical convergence zone (September). Classical Acoustic Doppler Current Profiles, hydrological measurements, surface drifters and Argo/Coriolis profilers deployment are performed during each cruise. The SOP 2006 onset campaign saw the concomitant deployment of three research vessels (the French *Atalante*, the German *Meteor*, the *U.S. Ronald H. Brown*) centered on the month of June, simultaneously covering the whole tropical Atlantic during the monsoon onset. These vessels documented the air-sea exchanges, through both the ocean and the atmospheric boundary layers. A notable achievement for AMMA was the real time transmission of data to operational centers. In the same way, the radiosoundings from the three ships have been provided in real-time through Argo for assimilation in weather prediction models. The figure at the bottom of page 16 **compares the sea surface salinity and temperature recorded in June 2006 with those recorded in June 2005, showing that in 2006 the upwellings were not yet observed at the period of normal onset of the monsoon, a fact that has probably some bearing on the very unusually late onset of the monsoon in 2006.**

SOP0: the dry phase of the WAM. The SOP0 period (January and February 2006) used the British BAe146 aircraft and a French lidar-equipped microlight aircraft, both operating from Niamey to make *in situ* and remote sensing measurements on smoke from biomass burning and mineral dust aerosols. High quality measurements of the physical and optical properties of mixtures of these aerosols allowed their effect on the radiation budget over the region to be quantified. **Results from 15 aircraft flights suggest that, for Niamey, the monthly-mean surface solar radiation is reduced by more than 50 Wm^{-2} owing to the presence of dust/biomass burning and that distinct, discrete layers of biomass burning aerosol frequently overly layers of mineral dust.**

SOP1 and SOP2: the onset phase and the peak monsoon. SOP1 and SOP2 extended from 1 June to 21 August with four different aircraft operating from Niamey and two from Ouagadougou. An important component of SOP2 was the partnership between AMMA and Stratospheric-Climate Links with Emphasis on the Upper Troposphere and Lower Stratosphere (SCOUT) Program in order to explore the tropical tropopause layer. Ozone and backscatter sondes (with a variety of payloads devoted to water vapor, chemistry, aerosols and cloud measurements) were launched in this framework, helping to show the active transport of these chemicals through the tropopause in West Africa.

SOP3: late monsoon and downstream evolution. SOP3 extended from 15 August to 25 September with one aircraft (the NASA DC-8) operating from Cabo Verde and two from Dakar (the BAe146 and the French Falcon). SOP3 was focused on the observation of the transition of synoptic and convective weather systems as they move from the land out over the Atlantic. Seven African Easterly Waves were sampled by the DC-8, four of which became named storms (Ernesto, Debby, Gordon, Helene), and eight dust aerosol flights were conducted.

Concluding remarks. It is not common for a field programme to embrace such a wide range of spatial and temporal scales, nor to involve such a range of scientific disciplines. The fact that this program has been achieved in an environment that can be very tough on personnel and equipment is a testament to the efforts of many dedicated people, in Africa and overseas.

Acknowledgements: Based on a French initiative, AMMA was built by an international scientific group and is currently funded by a large number of agencies, especially from France, UK, U.S. and Africa and the European Community's Sixth Framework Research Programme. For more information about AMMA, see: *http://www.amma-international.org*.

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LAND-USE AND CLIMATE IDENTIFICATION OF ROBUST IMPACTS (LUCID) PROJECT

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Under the auspicies of the GEWEX Global Land-Atmosphere System Study (GLASS) and the International Geosphere-Biosphere Project (IGBP)-international Land Ecosystem-Atmospheric Processes Study (iLEAPS), the LUCID Project was created to explore, using methodologies that the major climate modelling groups recognize, impacts of land-cover change that are above the noise generated by model variability.

Over the last decade there has been a tremendous increase in the literature describing the impact of land-cover change on climate at the regional and global scale. As with most of the work on the impact of Amazonian deforestation, modelling groups have used different models, land parameterizations, land-cover maps, model configurations and experimental protocols. As a result, the actual impact of large scale land-cover change on the Earth's climate is believed to be one of the following: (a) significant and large; (b) only local to the perturbation; or (3) small enough to be ignored. Some groups find significant teleconnections that other groups dismiss as model variability. Ultimately, much of the land-cover change community at the time of the Third Assessment of the Intergovernmental Panel on Climate Change (IPCC, 2001) believed the case for including land-cover change in climate simulations was "proven." Even if the community was not certain about global-scale teleconnections, confidence that land-cover change drove significant regional impacts was very high and it was assumed that model simulations for the Fourth IPCC Assessment Report (AR4, 2007) would take 20th century land-cover change into account and likely incorporate scenarios for 21st century change.

The AR4 is now basically complete and the coupled climate model simulations did not take into account land-cover change through the 20th Century or into the 21st Century. Clearly, the land cover change community had failed to communicate its belief that land-cover change was a major forcing factor effecting climate (regionally or globally). In discussions within GEWEX-GLASS and IGBP-iLEAPS, there was a sense that the land-cover change community had proven to itself that land-cover change was important, but had not shown to the major modelling groups just how important it was. This led to the decision to launch LUCID, a major experiment to **evaluate the impact of land-use induced land-cover changes on climate.**

The objective of LUCID is to identify and quantify the impacts of land-use induced land-cover changes on the evolution of climate between the pre-industrial epoch and the present day. Multi-model and ensemble simulations will be used to assess the robustness of the identified changes. Impacts of land-cover change will be assessed by examining the mean climate, climate variability and climate extremes. The possible impact of land-cover change on sea-surface temperatures (SSTs) and on ocean circulation will also be assessed. Among the final objectives is determining if a case can be made to ensure land-cover changes are included in any future assessments by the IPCC.

The design includes fixed SSTs and a land cover perturbation reflecting both crops and pasture. To assess the robustness of the results ensemble simulations will be conducted for each natural land-cover and current land-cover (at least six realizations of each cover will be required to sample model variability well). The intent is to identify robust changes via fixed SST experiments, but then move rapidly to coupled model simulations since these are the tools now used for climate projection. Fixed SST experiments will be performed first and these will be used as a baseline for subsequent more extensive simulations. For more information about LUCID or if you are interested in conducting the fixed SST experiment, contact Nathalie de Noblet at *Nathalie.De-Noblet@cea.fr*.

POSITION ANNOUNCEMENT: DIRECTOR OF IGPO

Applications are invited for the position of Director of the International GEWEX Project Office (IGPO). The Director of IGPO leads the development and implementation of the GEWEX Project and its international coordination with all WCRP strategies. The IGPO is the focal point for the planning and implementation of all GEWEX projects and activities. For more information about the position, see *http://www.gewex.org/igpo-director-ad.pdf*.

THE GLOBAL LAND-ATMOSPHERE COUPLING EXPERIMENT – PHASE 2

Randal Koster
NASA Goddard Space Flight Center

The goal of Phase II of the Global Land Atmosphere Coupling Experiment (GLACE-2) is to quantify, across a broad range of forecast models, the subseasonal forecast skill associated with the initialization of land-surface variables. GLACE-1 addressed the following question: to what extent are variations in meteorological variables such as precipitation and air temperature guided by variations in land-surface prognostic states? Because meteorological variables themselves have a strong impact on land-surface state variations, the reverse direction of causality—the impact of land conditions on atmospheric variables—cannot be teased out directly from standard atmospheric general circulation models diagnostics. GLACE-1 defined an experiment that could isolate these land impacts.

The details of the experimental design and an overview of the GLACE-1 results are provided by Koster et al. (2006). The study featured several important findings: (i) within a given model, the locations for which precipitation variations are controlled by variations in soil moisture state show strong geographical variations; (ii) the coupling strength between soil moisture and precipitation varies widely between models; and (iii) to a certain degree, the models behavior in some regions is similar, from which we can deduce multi-model estimates of land-atmosphere coupling "hotspots" (Koster et al., 2004a). These "hotspots," for the most part, are found in the transition zones between humid and dry areas (e.g., central North America and the Sahel)—zones for which evaporation is both large and responsive to variations in soil moisture.

Note that for soil moisture initialization to affect a forecast, two things must happen: (i) the initialized soil moisture anomaly must be remembered into the forecast period, and (ii) the atmosphere must respond in a predictable way to the soil moisture anomaly. GLACE-1 is, in essence, a thorough analysis of the second element and filled a void, since a broad, multi-model analysis of this important aspect of the climate system had never before been performed.

An analysis of the combination of the two elements, however, is arguably far more important. The full initialization question—how would an accurate land surface initialization affect a meteorological forecast?—motivates much of today's research into land-atmosphere interaction. Despite its importance, the question has never been comprehensively and systematically addressed by the community. Indeed, relevant studies with individual modelling systems, in addition to being uncoordinated, are relatively rare. A community-wide multi-model analysis is needed to ascertain the value of land initialization in today's forecast systems.

The community is now poised to embark on GLACE-2, an international model intercomparison experiment that will provide a multi-model, comprehensive view of the impact of land state initialization on forecast skill. Participants in GLACE-2 will learn the quantitative benefits that can stem from the incorporation of a realistic land-surface state initialization into their forecast algorithms. They will be asked to perform two series of forecasts. Each series consists of 100 2-month forecast ensembles (ten members per ensemble) covering ten boreal spring and summer start-dates in each of the years 1986–1995. The total simulation period for the two series together amounts to 333 simulation years.

Series 1 will utilize realistic land-surface state initialization and optimally, these will be established through participation in the Global Soil Wetness Project–Phase 2 (GSWP-2; see Dirmeyer, 2006), an ongoing research activity of the Global Land-Atmosphere System Study (GLASS) of GEWEX. Through GSWP-2, modellers produce global fields of land-surface state variables—and thus initial conditions for forecasts—by driving their models offline with global arrays of observations-based meteorological forcing.

Series 2 is identical to Series 1 except for the fact that it will not benefit from realistic land state initialization. Through the comparison of Series 1 and 2, we will isolate the impact of land initialization on the forecasts. A prototype version of this experiment was successfully performed by Koster et al. (2004b; hereafter K04b). The proposed analyses will start with (but will not be limited to) those outlined in that work. GLACE-2 will first determine the degree to which each model can "predict itself"—the extent to which simulated atmospheric chaos in the model can foil a forecast. The analysis will reveal the geographical and temporal variation of this "potential predictability" at subseasonal timescales as produced by both the ocean boundary and the land initialization.

Next, GLACE-2 will evaluate forecast skill. The observed precipitation or air temperature in a forecast period will be regressed against the forecasted value, and the resulting r^2 value will be taken as the skill level. An example of the type of results that will come out of GLACE-2 is shown in the figure at the top of page 16 which shows the generally positive impact of realistic land initialization on the prediction skill realized for 1-month temperature forecasts, as established by K04b for a specific modelling system. The GLACE-2 analyses will consider separately the four 15-day periods within a forecast, so that the fall-off of skill with lead time can be quantified. Comparing the r^2 values obtained from the Series 1 and Series 2 forecasts will isolate the contribution of land initialization to forecast skill.

K04b suggests that the contribution of land initialization to skill in regions of high potential predictability, although statistically significant, may be modest. Teasing out the skill levels in the presence of large natural chaotic variability may turn out to be a challenge. Thus, GLACE-2 participants are encouraged (but not required) to perform additional forecast simulations that span a much longer period of time. Forcing data will be provided to allow the forecast simulations to cover multiple decades. GLACE-2 participants are also encouraged to repeat the experiments for austral summer.

GLACE-2 will provide the first-ever comprehensive survey of forecast skill levels associated with land state initialization in today's state-of-the-art atmospheric GCMs. In addition to contributing to this survey, participants will achieve the added, and perhaps invaluable, benefit of documenting the value of land initialization within their own modelling systems. **Any modelling group willing to perform the baseline experiments is welcome and encouraged to participate. Interested groups should contact Randal Koster (*randal.d.koster@ nasa.gov*) for further information.** GLACE-2, like GLACE-1 is jointly sponsored by the GLASS panel of the GEWEX and the Working Group on Seasonal-to-Interannual Prediction of the Climate Variability Experiment (CLIVAR).

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THE DIURNAL CYCLE – GABLS SECOND INTERCOMPARISON PROJECT

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The goal of the GEWEX Atmospheric Boundary Layer Study (GABLS) is to improve the representation of the atmospheric boundary layer in weather and climate models, which should also benefit air quality, wind engineering and earth system studies. The first GABLS study was on a weak stably stratified idealized case with a constant surface-cooling rate. The outcome is reported in a special issue in *Boundary Layer Meteorology* (Holtslag, 2006). After this initial exercise, it was decided that the next step was to study the full diurnal cycle of the boundary layer over land. While the first experiment was an idealized study involving single-column models (SCMs) (Cuxart et al., 2006) and Large Eddy Simulation (LES) (Beare et al., 2006), the set up for the second one is based on observations of the Cooperative Atmosphere-Surface Exchange Study–1999 (CASES-99) (Poulos et al., 2002). The main purpose of the second study is to examine the extent to which the diurnal cycle over land is represented by the boundary layer schemes included in today's numerical weather prediction and climate models.

A period from the CASES-99 observations was selected because of the relatively flat location, dry surroundings and clear sky conditions. The case well represents a textbook case of a radiation forced diurnal cycle. In this study, we focus on the intercomparison of various boundary layer schemes and as such we simplify the forcing conditions to facilitate a better intercomparison between models.

The CASES-99 data set was collected during October 1999 in Kansas, United States (37.6N, 96.7W). Here, we focus on two diurnal cycles during the period 23–24 October. When designing the model experiment, our ambition was to keep the set-up of the simulation as simple as possible to make it possible for many groups to participate and to ensure that model specific implementation of more complicated processes would not obscure the results. Thus, all the participating SCMs are driven by a prescribed surface temperature, constant geostrophic wind and a small subsidence rate starting in the afternoon of 23 October 1999.

To find a situation in atmospheric observational data that is horizontal, homogeneous and quasi-stationary on the synoptic scale is extremely difficult. As mentioned above, a constant geostrophic of about 9.5 ms^{-1} wind was used to force the SCMs. To examine the large-scale flow, we diagnosed the geostrophic wind from the pressure field of a three-dimensional simulation using the Coupled Ocean-Atmosphere Prediction System (COAMPS®). The geostrophic wind was approximately constant for the first 12 hours followed by an almost linear decrease for the next 24 hours. By the morning of October 24 the quasi-stationary conditions required for the comparison with observations had ended. As a result the comparison with observations is from 20LT October 22–07LT October 24, (i.e., two full nights and the intermediate day).

More than 20 groups, including numerical weather prediction centers and global climate modellers have submitted model results, some for more than one model configuration adding up to more than 30 simulations. Both models with prognostic turbulent kinetic energy, as well as first orders models are represented. The model results are grouped together by their closure (first order or Turbulent Kinetic Energy schemes) and the height to the first vertical computational level, thus constructing four groups of model results.

Even though the surface temperature is given in the case set up, the SCMs give quite different 2-m temperatures. The intermodel spread, during both day and night, is approximately 2 degrees. The differences manifest themselves in the sensible heat fluxes (see the left panel of the figure at the bottom of page 1), and in very different boundary-layer heights. As in the first GABLS experiment, many models have a too strong surface wind speed during the night (Cuxart et al., 2006). This occurs despite the too weak background forcing during the first night. However, almost all models have a decrease in the wind speed during the morning hours while the observations show a very sudden increase in the wind at the time when the boundary layer becomes convective. The models capture the transition from night time stably stratified conditions to daytime convective boundary layer well, but not the sudden increase in wind speeds and they underestimate day time wind speeds. The right panel of the figure at the bottom of page 1 presents the diurnal amplitude for 10 m winds for all models (i.e., each model's mean wind is subtracted) and observations for October 23 as well as the observed monthly mean. As seen in the figure, October 23 is a representative day for CASES-99. The model mean winds vary between 3.6 and 5.8 ms^{-1} while the mean observed wind for this period is 4.1 ms^{-1}. Note that all models underestimate the diurnal cycle, and most models forecast a too high mean wind speed (not shown).

The first conclusion from the second GABLS experiment is that the models produce very different results in all parameters and that they all differ substantially from the observations. When comparing the models and the observations, the most significant difference is the underestimated diurnal cycle in the 10-m wind speed. The modelled wind speeds are generally too high during the stably stratified night and too low during the unstably stratified daytime conditions. The difference is most striking during the morning hours when most models give a decrease in the wind speed while the observations have a distinct increase in the low-level wind speed as soon as the change to convective conditions occur.

These preliminary results from the intercomparison of column models have inspired other studies using LES and mesoscale model intercomparisons. These and other recent results will be further discussed at a forthcoming workshop to be held at Stockholm University, 19–21 June 2007. If you are interested in participating, please contact the authors as soon as possible or visit: *http://www.misu.su.se/~gunilla/gabls/workshop*.

Acknowledgements: We are indebted to the participating modelling groups for the time they have devoted to making the simulations and to the experimentalists providing the CASES-99 data. Thorsten Mauritsen, Gert-Jan Steeneveld and Michael Tjernström are also acknowledged for their valuable input.

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19TH MEETING OF THE GEWEX SCIENTIFIC STEERING GROUP

Rick Lawford and Dawn Erlich
International GEWEX Project Office

The Nineteenth Session of the GEWEX Scientific Steering Group (SSG) was held at the East-West Center at the University of Hawaii in Honolulu, 22–26 January 2007. The meeting was hosted by Dr. Julian P. McCreary, Jr. of the International Pacific Research Center with excellent support from his assistant, Ms. Jeanie Ho. Approximately 45 experts from 10 countries attended the meeting. The meeting focused on GEWEX activities and on how GEWEX could organize itself to most effectively meet the requirements of the GEWEX Phase II Roadmap, the World Climate Research Programme (WCRP) strategic plan and, more generally, the goals of climate research. As a result of this approach the discussions focused on GEWEX projects and their links with some central projects including the Climate Variability and Predictability (CLIVAR) Project, the Global Water System Project (GWSP), THe Observing System Research and Predictability Experiment (THORPEX), and Global Climate Observing System (GCOS).

In addition a number of scientific talks were given, including:

- Dr. Robert Houze on the Tropical Rainfall Measuring Mission (TRMM) data and latent heating estimates.
- Dr. William Rossow on Cloudsat and its implications for global data sets.
- Dr. Bin Wang on monsoon research needs.
- Dr. Martin Werscheck on EUMETSAT's Satellite Applications Facility

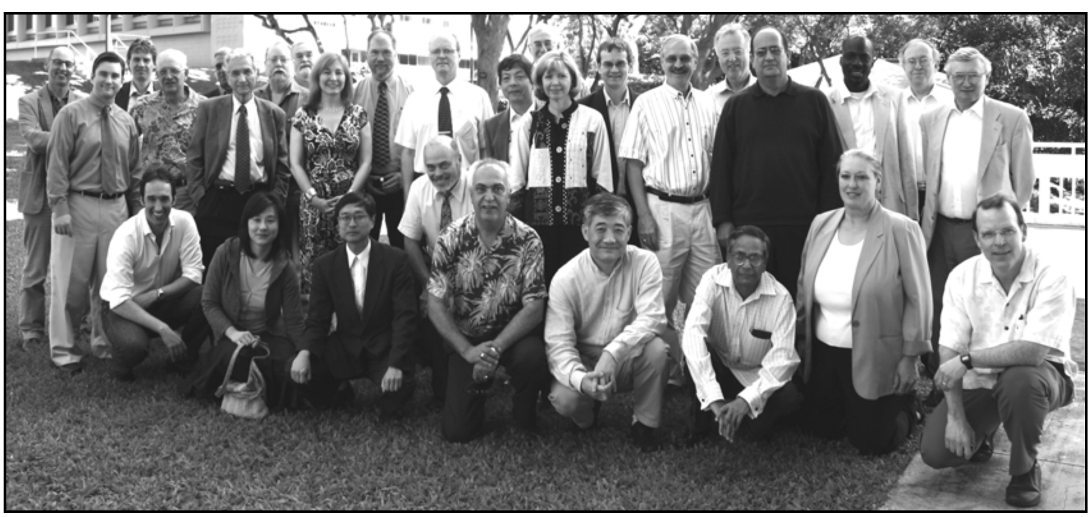
Other presentations were given by Drs Riko Oki, Jared Entin, and Eileen Shea. The following paragraphs summarize some of the main conclusions and actions arising from the programmatic discussions at the meeting.

The most significant and far reaching decision at this meeting was the SSG's approval of a proposal to merge the Coordinated Enhanced Observing Period (CEOP) and the GEWEX Hydrometeorology Panel (GHP) into a single entity known as the Coordinated Energy and Water Cycle Observations Project (CEOP). A background paper describing the rationale for this decision is given at *http://www.gewex.org*. In addition it was agreed that the GEWEX Continental-Scale Experiments (CSEs) will be known as GEWEX Regional Hydro-climate Projects (RHPs) within this new structure. The GEWEX SSG believes that the new panel will provide a global framework for the RHP activities and that the CEOP data services will benefit the full range of science being undertaken in the RHPs. The technical and scientific criteria used as terms of reference for CSEs will be updated for the RHPs to better reflect current WCRP and GEWEX objectives. The restructured CEOP will be meeting in Washington, DC in March to address some of the issues related to the merger and to discuss ways to clarify and strengthen CEOP's contributions to the GEWEX Roadmap.

Assessments of global data products have been carried out under the leadership of GEWEX Radiation Panel (GRP). All four principal sets of data products [International Satellite Cloud Climatology Project (ISCCP), Global Aerosol Climatology Project (GACP), Global Precipitation Climatology Project (GPCP), and the Surface Radiation Budget (SRB) Project] now cover periods longer than 20 years and are increasingly being used in climate studies. The projects continue working towards a coordinated reprocessing activity so that these products can have even broader application. GRP is proposing to make ISCCP an operational product. The precipitation assessment is complete and the report is in review. Other assessment reports are also nearing completion. GPCP is now collaborating with the International Precipitation Working Group concerning improved measurements of snowfall and with a consortium for quantitative precipitation estimation under the WCRP/THORPEX activity.

The GEWEX Modelling and Prediction Panel (GMPP) outlined its new approach to model evaluation and parameterization development. The SSG welcomed this structured approach and supports the ambitious GMPP agenda. GMPP will lead the GEWEX coordination of the Aerosol Cloud Precipitation Climate Initiative with the international Land Ecosystem-Atmospheric Processes Study (iLEAPS) and with the international Global Atmospheric Chemistry Program. GMPP will also investigate collaboration with the Task Force on Seasonal Prediction through the Global Land Atmospheric Coupling Experiment-2 (GLACE-2) and how the effects of snow and vegetation initialization on predictive skill at intraseasonal to seasonal time scales can be assessed. The GEWEX SSG encouraged GMPP to advance a proposal for a joint GEWEX Cloud System Study (GCSS)/WCRP Working Group on a Coupled Modelling collaboration on the Cloud Feedback Model Intercomparison Project (CFMIP) to assess climate change cloud feedbacks and to potentially use the Data Integration for the Model Evaluation (DIME) web site to host model and observational data to facilitate this enterprise. CFMIP will encourage the systematic comparisons of cloud feedbacks among GCMs and comparisons of model clouds with observations.

The SSG approved the Northern Eurasia Earth Science Partnership Initiative (NEESPI) as a Regional Hydroclimate Project. NEESPI seeks to understand how the land ecosystems and continental water dynamics in northern Eurasia interact with and alter the climatic system, biosphere, atmosphere, and hydrosphere of the Earth. In addition, the draft strategic plan of the Hydrology Applications Project (HAP) was reviewed. This project, which succeeds the Water Resources Application Project (WRAP), will be the primary GEWEX link with the Global Water System Project (GWSP). After some modifications to the plan and some broadening of the level of participation GEWEX should be ready to launch this new initiative in the summer of 2007.



Participants at the GEWEX SSG-19 Meeting.

Given the WCRP crosscuts and the responsibility that GEWEX has for leading the monsoon crosscut, the research priorities for this topic received significant attention at the meeting. A key overarching issue for monsoon prediction is the fundamental need for improved representation of tropical convection. The SSG endorsed the concept for the THORPEX/WCRP Year of Tropical Convection (YOTC), a coordinated observing, modelling and forecasting tropical convection activity. YOTC will exploit the vast amounts of existing and emerging observational and computational resources now available in conjunction with the development of new high resolution modelling frameworks to advance the characterization, diagnosis, modelling and prediction of multiscale convective/dynamic interactions and processes, including the two-way interaction between tropical and extra-tropical weather/climate.

The Asian Monsoon Year (AMY) also gained GEWEX support as a joint GEWEX/CLIVAR [plus the Climate and Cryosphere (CliC) Project and Stratospheric Processes And their Role in Climate (SPARC)] activity designed to provide improved observations, analyses, and modelling in the Asian monsoon regions. AMY would focus on the 2008 time period and cover the full annual cycle of boreal summer monsoon thus contributing to the YOTC initiative. AMY would bring together the GEWEX and CLIVAR monsoon efforts in the Asian-Australian region, and in particular, the Monsoon Asian Hydro-Atmosphere Scientific Research and prediction Initiative (MAHASRI). The idea of extending this effort to the global perspective for an International Monsoon Year was discussed.

Concern was expressed about the status of the European GEWEX Coordinator function beyond 2007. The SSG recognized the valuable contribution of the European GEWEX Coordinator (Dr. Peter van Oevelen) in supporting GEWEX activities over the past 2½ years and asked the SSG Chair to request that the European Space Agency (ESA) continue to support this function.

On behalf of GEWEX, the International GEWEX Project Office expresses its appreciation to those agencies (ESA, EUMETSAT, Japan Aerospace Exploration Agency, National Aeronautics and Space Administration, National Oceanic and Atmospheric Administration) that sent representatives to the meeting. Although there were no formal presentations on agency activities these representatives enriched the discussion about GEWEX goals and brought new perspectives to be considered in GEWEX strategies.

WORKSHOP/MEETING SUMMARIES

FIRST GEWEX AEROSOL PRODUCTS ASSESSMENT WORKSHOP

14–15 September 2006
College Park, Maryland, USA

Zhanqing Li
University of Maryland

The GEWEX Aerosol Product Assessment (GAPA) Working Group was established to assess the quality and compatibility of global aerosol products with a focus on the Global Aerosol Climatology Project (GACP) product. GAPA is led by Drs. Z. Li and X. Zhao, University of Maryland, with members representing all major teams producing global aerosol products.

Aerosols are a major atmospheric variable influencing both the transfer of radiative energy, and the conversion of water vapor into cloud droplets and raindrops. Most Global Circulation Models (GCMs) now incorporate aerosol parameters and physical processes linking aerosols with the energy and water cycles so that aerosol direct and indirect effects on climate can be computed. Over the years, many global aerosol products have been generated from historical [e.g., Advanced Very High Resolution Radiometer (AVHRR), POLarization and Directionality of the Earth's Reflectances (POLDER)] and current satellite sensors [e.g., Moderate Resolution Imaging Spectroradiometer (MODIS), Multi-Angle Imaging Spectroradiometer (MISR)], and new products are expected from future sensors [e.g., Visible Infrared Imager/Radiometer Suite (VIRS)]. As the number of aerosol products increases, discrepancies among the products also increase. Data users are confronted with an ever-increasing challenge of deciding which product is the best to use and how much uncertainty exists in the different products.

The objectives of GAPA are: (1) Use current data sets to assess and improve the confidence level in the 30-year satellite aerosol climatology of aerosol optical depth (AOD) and Ångström exponent from AVHRR/Total Ozone Mapping Spectrometer (TOMS); (2) Understand and resolve discrepancies among all major global aerosol products and to document uncertainties; and (3) Produce improved, consistent, unified global aerosol products that link both historical, current, and future satellite observations for long-term trend studies and climate studies.

The workshop objectives were: (1) Review major global aerosol products; (2) Evaluate all key issues in aerosol retrievals such as sensor calibration, cloud screening, algorithm, surface effects, and synergy; (3) Develop a strategy for identifying major sources of discrepancies among the aerosol products; (4) Estimate the range of uncertainties on various time and space scales; and (5) Develop a roadmap for reconciling the differences and for generating unified consistent products.

Aerosol product development teams provided updates on products from satellites [AVHRR-GACP, AVHRR Pathfinder-Atmosphere (PATMOS), AVHRR-National Institute of Environmental Studies, TOMS, Sea-viewing Wide Field-of-view Sensor (SeaWiFS), MODIS, MODIS-Deep Blue, MISR, and Cloud-Aerosol Lidar Infrared Pathfinder Satellite Observation (CALIPSO)] and detailed descriptions of the retrieval procedures. Several comparative studies/analyses were presented that provided some insight into the impact of different assumptions made in the retrieval algorithms (e.g., aerosol size distribution, refractive index, surface spectral albedo ratio) on the differences in the retrieved aerosol quantities. It was noted that the MODIS aerosol product is upgraded in its latest release (Version 5) to correct some errors in the AOD retrieval over land.

Advances in aerosol remote sensing technology were introduced, such as the CALIPSO mission. An upcoming newer version (Version 2) of the widely used ground-based AErosol RObotic NETwork (AERONET) product is expected to produce more realistic aerosol size distributions and single scattering albedos. Issues associated with spatial and temporal matching between satellite and ground aerosol retrievals were reviewed. A new computationally more efficient retrieval approach based on machine-learning techniques appears to offer some guidance for the development of an algorithm that can incorporate all available satellite data. In parallel with satellite remote sensing of aerosols, model simulations of global aerosol distributions have made remarkable progress. Over land, the quality of AODs simulated by some models is as accurate as that of remotely sensed AODs, while the latter is superior over oceans. This indicates that the synergy between model simulations and remote sensing should be exploited. Joint experimental studies are planned to quantify and eventually remove discrepancies between the various aerosol products, which will lead to a coherent aerosol product derived from all available sensors that is compatible with the long-term historical product of the GACP.

For more information about GAPA activities, see: *http://www.atmos.umd.edu/~zli/GAPA/gapa_main.htm.*

GEWEX RADIATION PANEL MEETING

16–20 October 2006
Frascati, Italy

William B. Rossow
City College of New York

As a part of the Pan-GEWEX Meeting to complete the GEWEX Phase II Roadmap, the GEWEX Radiation Panel (GRP) met and reviewed its four active global satellite data projects [the International Satellite Cloud Climatology Project (ISCCP), Global Aerosol Climatology Project (GACP), Global Precipitation Climatology Project (GPCP) and the Surface Radiation Budget (SRB) Project, the latter two supported by surface data projects, Global Precipitation Climatology Centre (GPCC) and Baseline Surface Radiation Network (BSRN), respectively)] and the four associated data product assessment activities. All four data products now cover periods longer than 20 years and the projects continue to work towards a coordinated reprocessing to begin within the next year or two, after completion of the product assessments.

The four product assessment groups are at different stages. The precipitation assessment, in collaboration with International Precipitation Working Group (IPWG) is complete and the report is being reviewed by GRP members. The clouds and radiation assessment groups have completed two workshops and are now drafting reports. The radiation assessment group is planning a third workshop in 2007. The aerosol assessment group held its first workshop in September 2006 (see report on page 12). Of particular note is that GPCP is now collaborating with the IPWG concerning improved measurements of snowfall with a consortium for quantitative precipitation estimation under the WCRP/THe Observing System Research and Predictability Experiment (THORPEX) activity. The SeaFlux Project is moving towards completion of improved analysis methods and global product evaluations and may be ready to produce a new global product (ocean surface turbulent fluxes) by early 2008. The similar LandFlux activity, in collaboration with GEWEX Global Land-Atmosphere System Study/Global Soil Wetness Project, is being organized, starting with an international workshop to be held in Spring 2007, to evaluate the status of available land surface property data products and analysis methods. In summary, the global data projects and associated study activities are about on schedule to produce improved, more homogeneous and more consistent data products within the next few years. Monthly mean maps (common grid) for all of these data products (and some others related to the energy and water cycle) have been posted to the GRP website (*http://grp.giss.nasa.gov/gewexdatasets.html)*.

Invited presentations were made by J. Russell on the Geostationary Earth Radiation Budget mission, N. Loeb (on behalf of B. Wielicki) on Clouds and the Earth's Radiant Energy System, R. Cahalan on the Solar Radiation and Climate Experiment, and Y. Kerr on the Soil Moisture Observing System. Y. Govaerts described a European Organization for the Exploitation of Meteorological Satellites (EUMETSAT) activity to recalibrate the radiances from all first generation Meteosats. J. Bates provided an update on the status of the National Polar-Orbiting Operational Environmental Satellite System; the GRP members indicated that the top priorities for restoration of instruments were the Total Solar Irradiance Sensor and Earth Radiation Budget Sensor. S. Buehler described the potential for remote sensing of cirrus and upper tropospheric humidity using high (>100 GHz) frequency microwave measurements. D. Randall summarized the current state of representing cloud processes in global models and M. Bosilovich described the new global model and assimilation system at the National Aeronautics and Space Administration Goddard Space Flight Center (called the Modern Era Retrospective-analysis for Research and Applications). B. Nelson presented an overview of the NEXRAD precipitation radar network and the potential that such networks have for studying precipitation processes at high space-time resolution. R. Bennartz summarized the results of an international workshop on remote sensing of snowfall and recommended a joint IPWG-GRP working group to develop such techniques further. J. Schulz provided an update on the status of EUMETSAT plans to produce new global water vapor products. J. Bates reviewed the development of principles to guide production of Climate Data Records.

New GRP members presented science talks. J. Schulz expanded on his report on water vapor products to focus on new satellite-based techniques for measuring water vapor profiles using new instruments, especially using the Spinning Enhanced Visible and Infra-Red Imager and the Advanced Microwave Scanning Radiometer. C. Kummerow reviewed the state-of-art of retrieval of rainfall from satellites, especially newer methods exploiting combined passive and active microwave measurements. A key issue is that the available *in situ* measurements are not adequate to evaluate the details of these new approaches. U. Lohmann presented an overview of modelling aerosol-cloud interactions in global models noting that the sophistication of these model representations has far outrun the available observations needed for verification. F. Zhao described Chinese studies of aerosols using a combination of surface and satellite measurements, finding that the more absorbing aerosols over China are concentrated at smaller sizes and lower optical depths.

The other GRP study groups are also making good progress. The Continuous Intercomparison of Radiation Codes Working Group is developing a website that contains synthetic and observation-based test cases for radiation codes, together with state-of-the-art calculations for the former, and measured fluxes for the latter. The 3-D Radiative Transfer Working Group has now combined forces with other working groups to focus attention on the complex problem of 3-D radiation in cloudy atmospheric boundary layers overlying complex vegetation canopies (and other heterogeneous surfaces) to examine how important the non-linear 3-D effects are to exchanges of radiation between the surface and atmosphere. Two other groups continue to work to organize world efforts to produce systematic products from surface lidar-cloud radar sites and from precipitation networks. The purpose of these efforts is, in part, to provide complementary measurements to Cloud-Aerosol Lidar Infrared Pathfinder Satellite Observation (CALIPSO) satellite, CloudSat, and the Tropical Rainfall Measuring Mission. These study efforts provide critical examinations of key problems related to the general goals of the GRP—to complete a quantitative description of the weather-scale variations of the global energy and water cycle over more than one decade. To foster research using such a data collection, GRP will organize a special symposium at the Fall 2007 American Geophysical Union meeting on this topic.

Overall, progress on measuring radiation and clouds continues in a satisfactory way, but completing a comprehensive description of precipitation still requires significant effort. GRP is well along in establishing accurate quantitative descriptions of radiation and clouds, as well as providing a test standard for representations of radiative transfer in global models. In partnership with IPWG, GRP is planning important new initiatives to study key precipitation problems. Progress on improving determinations of surface fluxes is also satisfactory over oceans, but land and ice surface fluxes need substantial new activities, as noted a new initiative on land surface fluxes will begin in 2007.

The next GRP meeting will be held in Brazil in October 2007.

GEWEX/WCRP MEETINGS CALENDAR

For a complete listing of meetings, see the GEWEX web site: http://www.gewex.org

1–2 March 2007—THE SCIENCE OF CLIMATE CHANGE: A ROYAL SOCIETY SHOWCASE OF THE IPCC 4TH ASSESSMENT WG 1 REPORT, London, United Kingdom.

6–9 March 2007—SOLAS OPEN SCIENCE CONFERENCE, Xiamen, China.

12–17 March 2007—JOINT CEOP/IGWCO PLANNING MEETINGS, Washington, DC, USA.

12 March – 4 April 2007—WORKSHOP ON INTERDISCIPLINARY SCIENCE OF CLIMATE CHANGES: BASIC ELEMENTS, Buenos Aires, Argentina.

13–15 March 2007—4TH INTERNATIONAL CLIVAR CLIMATE OF THE 20TH CENTURY WORKSHOP, Exeter, UK.

20–23 March 2007—5TH CLIMATE PREDICTION APPLICATIONS SCIENCE WORKSHOP, Seattle, Washington, USA.

26–30 March 2007—28TH SESSION OF THE WCRP JOINT SCIENTIFIC COMMITTEE, Zanzibar, Tanzania.

15–20 April 2007—EGU GENERAL ASSEMBLY 2007, Vienna, Austria.

21–26 April 2007—13TH BRAZILIAN SYMPOSIUM ON REMOTE SENSING, Florianpolis, Brazil.

23–27 April 2007—ENVISAT SYMPOSIUM 2007, Montreaux, Switzerland.

30 April – 3 May 2007—7TH WORKSHOP ON DECADAL CLIMATE VARIABILITY, Waikoloa Village, Hawaii.

3-4 May 2007—NEESPI SUMMIT, Helsinki, Finland.

7–9 May 2007—EARTHCARE WORKSHOP, Noordwijk, The Netherlands.

20–21 May 2007—GLOBAL DIMMING, BRIGHTENING AND RELATED ISSUES IN CLIMATE CHANGE, Nanjing, China.

22–25 May 2007—AGU JOINT ASSEMBLY, Acapulco, Mexico.

4–8 June 2007—WCRP WORKSHOP ON SEASONAL PREDICTION, Barcelona, Spain.

4–8 June 2007—5TH STUDY CONFERENCE FOR BALTEX, Island of Saaremaa, Estonia.

19–21 June 2007—GABLS WORKSHOP, Stockholm, Sweden.

25–29 June 2007—22ND CONFERENCE ON WEATHER ANALYSIS AND FORECASTING/18TH CONFERENCE ON NUMERICAL WEATHER PREDICTION, Park City, Utah.

27–29 June 2007—3RD HEPEX WORKSHOP, Stresa, Italy.

2–13 July 2007—XXIV IUGG ASSEMBLY, EARTH, OUR CHANGING PLANET, Perugia, Italy.

23–27 July 2007—IGARSS 2007, Barcelona, Spain.

31 July – 3 August 2007—7TH ASIAN LIDAR CONFERENCE, Bangkok, Thailand.

20–24 August 2007—10TH INTERNATIONAL MEETING ON STATISTICAL CLIMATOLOGY, Beijing, China.

26–30 August 2007—EARTH OBSERVING SYSTEMS XII (OP400), San Diego, California.

27–31 August 2007—2ND INTERNATIONAL CONFERENCE ON EARTH SYSTEM MODELLING, Hamburg, Germany.

27–31 August 2007—3RD ALEXANDER VON HUMBOLT INTERNATIONAL CONFERENCE ON THE EAST ASIAN SUMMER MONSOON, PAST, PRESENT AND FUTURE, Beijing, China.

27 August – 1 September 2007—3RD INTERNATIONAL SYMPOSIUM ON RIVERINE LANDSCAPES, Brisbane, Australia.

1–4 September 2007—XIII WORLD WATER CONGRESS, Montpellier, France.

5–7 September 2007—GRP WGDMA MEETING, New York, NY.

9–14 September 2007—EUROPEAN AEROSOL CONFERENCE, Salzburg, Austria.

24–28 September 2007—CHAPMAN CONFERENCE: THE ROLE OF THE STRATOSPHERE IN CLIMATE AND CLIMATE CHANGE, Santorini, Greece.

24–28 September 2007—4TH SEAFLUX WORKSHOP, Amsterdam, Netherlands.

9–12 Oct 2007—GEWEX RADIATION PANEL MEETING, Buzios, Brazil.

22–25 October 2007—A-TRAIN-LILLE SYMPOSIUM, Lille Grand Palais, France.

22–26 October 2007—23RD SESSION OF WGNE, Shanghai, China.

22 October – 3 November 2007—2007 SOLAS INTERNATIONAL SUMMER SCHOOL, Corsica, France.

12–15 November 2007—INTERNATIONAL CONFERENCE ON ADAPTIVE AND INTEGRATED WATER MANAGEMENT (CAIWA 2006), Basel, Switzerland.

26–30 November 2007—2ND INTERNATIONAL AMMA CONFERENCE, Karlsruhe-Leopoldshafen, Germany.

10–14 December 2007—FALL AMERICAN GEOSPHYSICAL UNION MEETING, San Francisco, California.

GEWEX NEWS

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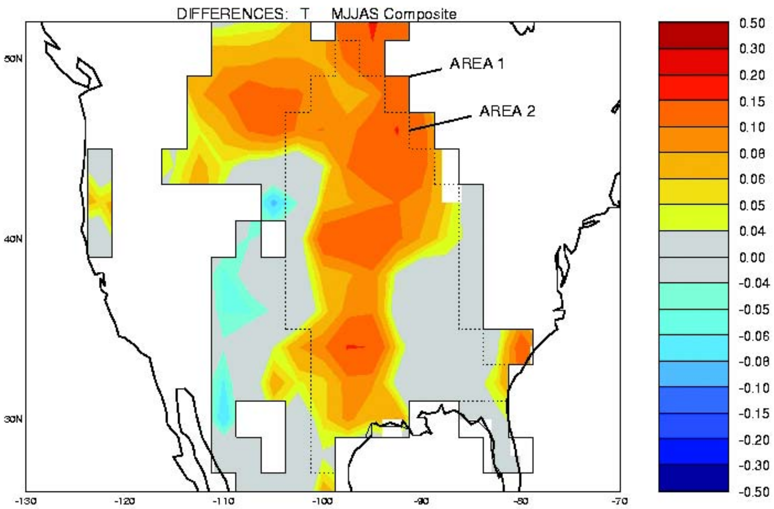
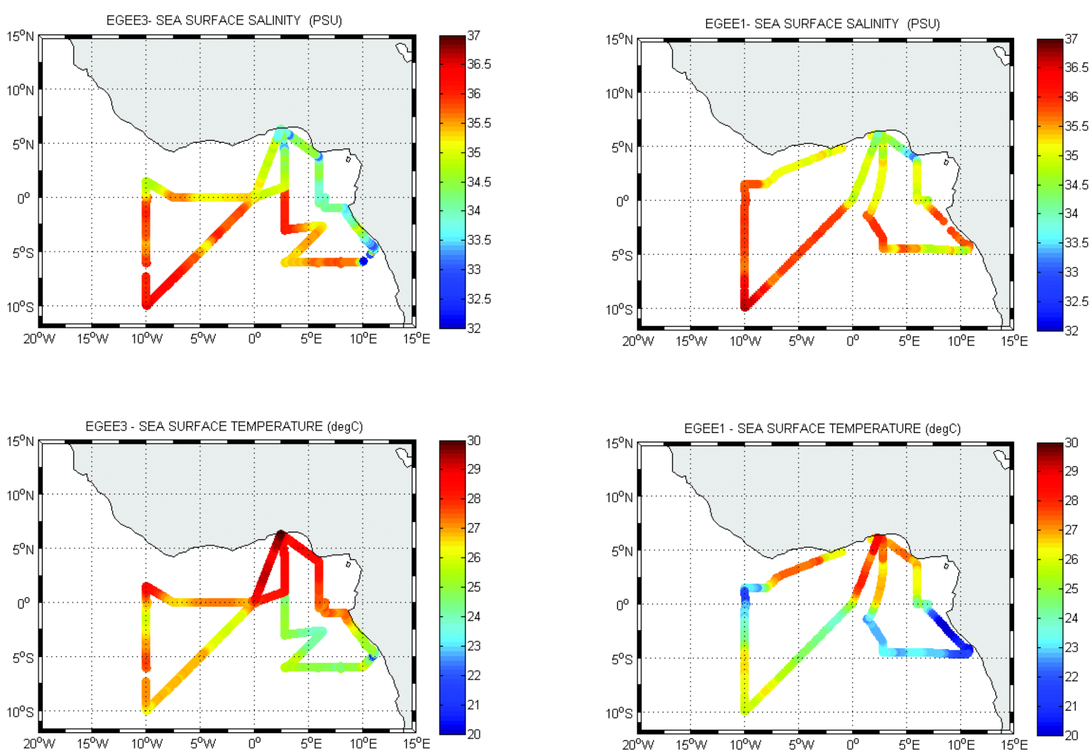
QUANTIFYING MONTHLY FORECAST SKILL ASSOCIATED WITH REALISTIC LAND SURFACE INITIALIZATION



Increased skill for monthly air temperature forecasts (measured as the r^2 between observed and forecasted values) resulting from a realistic land moisture initialization. For clarity, results are shown only where both the potential predictability and the rain gauge density over the forecast suite period is adequate. "Area 1" and "Area 2" refer to potential predictability levels above 0.1 and 0.3, respectively. *See article by R. Koster on page 7.*

WARMER TEMPERATURES IN GULF OF GUINEA EXPLAIN THE LATE ONSET OF WEST AFRICAN MONSOON



Sea-surface salinity and sea-surface temperature along the tracks of the AMMA-EGEE1 (June 2005) and AMMA-EGEE3 (June 2006) oceanic campaigns. The Gulf of Guinea was much warmer in June 2006 than in June 2005, which is probably one factor explaining the very late onset of the monsoon over the continent in 2006. *See article by T. Lebel, et al. on page 4.*