GEWEX WCRP

Global Energy and Water Cycle Experiment

NEWS

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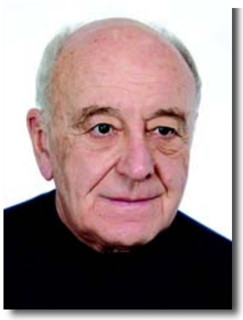
GEWEX is a component of the World Climate Research Programme (WCRP). WCRP is sponsored by the World Meteorological Organization, the International Council for Science and the Intergovernmental Oceanographic Commission of UNESCO.



CAN GEWEX BECOME THE CUTTING EDGE OF WCRP?

Pierre Morel
Professor Emeritus,
University of Paris, France

Prof. Morel was the Director of the World Climate Research Programme (WCRP) from 1982 to 1994.

Looking back over the past 20 years of GEWEX, I thought it might be worthwhile to examine the Project's achievements and outstanding problems, with the primary goal of assessing whether GEWEX is serving the basic WCRP objective, which is to lay the scientific foundation for predicting the response of climate to external forcing. To address this point, it is necessary to first consider the state of climate science in general and identify existing roadblocks.

(Continued on page 7)

LAND-ATMOSPHERE FEEDBACK IN THE WEST AFRICAN MONSOON

Christopher M. Taylor
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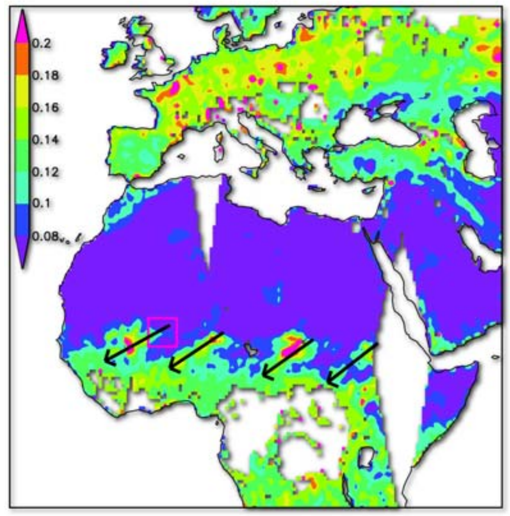


Strong negative correlations between soil moisture and PBL temperature were measured by a research flight within the pink rectangle. Volumetric soil moisture is from 1 August 2006 AMSR-E data. The tracks of four Sahelian mesoscale convective systems are indicated by the arrows.

Interactions between the land surface and the atmosphere are increasingly recognized as playing an important role in shaping our climate and the ways in which it will respond to increases in atmospheric carbon dioxide. The availability of soil moisture influences surface fluxes of sensible and latent heat over land and can thereby feed back on the atmosphere. The Global Land Atmospheric Coupling Experiment (GLACE) (Koster et al., 2004) found a surprisingly large spread of sensitivities in predicted rainfall

(Continued on page 6)

Newsletter Highlights

COMMENTARY

THE INTERNATIONAL GEWEX PROJECT OFFICE: SHIFTING GEARS

Rick Lawford
Director, International GEWEX Project Office

It is with mixed emotions that I write my final commentary as the Director of the International GEWEX Project Office (IGPO). It has been a privilege to be part of GEWEX for more than a decade and a half and Director of the Project Office for the past 4 years. In this latter capacity I have enjoyed working closely with the GEWEX Scientific Steering Group (SSG) Chair, Prof. Soroosh Sorooshian, the GEWEX Panel Chairs, the SSG members and many, many other excellent colleagues in all parts of the globe. During this period, we have recorded many successes, undergone major changes, and faced some significant challenges. Let me comment on some recent programs. Thanks to the efforts of the GEWEX Radiation Panel (GRP), GEWEX is now positioned to make clear statements about how its data sets can be used in future climate change discussions, a result of far-ranging assessments of global data sets for precipitation, clouds, radiation and aerosols. The GEWEX Cloud System Study (GCSS), as part of the GEWEX Modelling and Prediction Panel (GMPP), has made substantial progress in getting its field data sets out to the modelling community through the Data Integration for Model Evaluation (DIME) Project and other innovative web-based information systems. It is clear that GEWEX can set the standard for web portal development and usage by groups such as the Group on Earth Observations.

Exciting developments have also occurred in the Coordinated Energy and Water Cycle Observations Project (CEOP). These successes range from new data systems and field data sets to process understanding from the 2006 African Monsoon Multidisciplinary Analysis (AMMA) Project field campaign in West Central Africa, to new projects in Eurasia in conjunction with the Northern Eurasian Earth Science Partnership Initiative (NEESPI). GEWEX has also branched out and influenced other programs such as the Integrated Global Observing Strategy–Partners (IGOS-P) through the Integrated Global Water Cycle Observation Theme, and the World Climate Research Programme (WCRP) through its contributions to the WCRP cross-cuts, particularly in the areas of monsoons and extremes—two critical issues that will determine much of society's response to climate change. GEWEX linkages with groups like the International Geosphere-Biosphere Programme (IGBP) have also increased with the Integrated Land Ecosystem-Atmospheric Processes Study (iLEAPS) and, more recently, the plans for the Aerosols, Clouds, Precipitation and Climate Initiative. These accomplishments and collaborations prove that GEWEX will only be successful as a team that builds upon the strength of each contributor. In addition to the many scientists whose research adds to these successes, the contributions of the competent IGPO staff, particularly Dawn Erlich and Cathi Kulat, are also greatly appreciated.

One of the accomplishments that has provided more focus for GEWEX has been the development of the GEWEX Roadmap and the discussions that have been promoted through that exercise. This 6-year plan provides a good basis for moving forward, although it will need to be reviewed and updated annually. That said, GEWEX still needs innovative and challenging ideas—ideas like those contained in the article of our esteemed colleague, Prof. Pierre Morel, appearing on page 1 in this Newsletter. As he notes, GEWEX needs to be ready to challenge the conventional wisdom to either support or confront things that are accepted by the community more through hearsay than by serious thought. After 17 years working in GEWEX, I think it is fair to say that we still don't know enough about clouds to effectively represent them in models, nor how to address the three-dimensional movement of moisture in the upper layers of the soil. Our understanding of the role of scale and scale interactions in the real world and in our world of analysis, interpretation and modelling still needs development. Although the community speaks about Earth system modelling, we really are not ready for the challenge of a single-system understanding that can represent all components of the Earth system, let alone introduce human interactions into the system. We need a strong program of research to address the components, both individually and in an integrated way.

These science challenges are imposing enough, but we also must address them at a time when the public is demanding greater local solutions to its problems through the science that it funds. While GEWEX does have solutions for problems at all scales, the budgets for programs like GEWEX are very much dependent on the priorities of national governments—this has not been beneficial to GEWEX (or WCRP) in recent years. The exceptions have been Europe and Japan, where there is real support for the science that supports GEWEX objectives. GEWEX has benefited substantially by having a European GEWEX Coordinator and a Chinese GEWEX Coordinator. In the future, GEWEX will need to help its community to find the support for the science that needs to be done on critical issues, and support its research planning, collaboration and results dissemination. GEWEX investigators need to share their new findings and build them into a continuously updated synthesis of the understanding of the global energy and water cycle. GEWEX also needs to be on the forefront of data sharing to ensure that national and personal factors will not limit the overall effectiveness of the GEWEX enterprise.

It is within the context of needing new energy in addressing these issues that I am pleased to congratulate and welcome Dr. Peter van Oevelen as the new International GEWEX Project Office Director. Peter will bring youthful vigor and some new perspectives to the position; he has already developed good networks in many of the communities that are important to GEWEX and has a thorough understanding of the European system. I hope you will give him the same support that you provided to me in ensuring that GEWEX has the infrastructure and leadership it needs to be successful. Above all, I hope Peter will have the very satisfying experience of personal knowledge growth through the continuous flow of new research findings from GEWEX investigators, the stimulation of new ideas that emerge in GEWEX discussions, and the many benefits of strong professional friendships that develop through GEWEX collaborations.

4TH PAN-GEWEX CLOUD SYSTEM STUDY (GCSS) MEETING

2–6 June 2008
Toulouse, France

The 4th Pan-GCSS Meeting on **"Advances in Modelling and Observing Clouds and Convection"** will review new insights into the physics and dynamics of clouds and convection. Results from new observational space-based platforms (e.g., CloudSat, CALIPSO) and recent field campaigns (i.e., African Monsoon Multidisciplinary Analysis Project–AMMA) will be presented and their impact on our understanding and modelling capabilities of clouds and convection will be discussed. Further key questions that will be discussed are: How well do we understand tropical convection? What can we learn from high resolution modelling on large domains? and Which physical processes determine cloud climate feedbacks and their uncertainties? For more information, see the GCSS homepage: *http://www.gewex.org/gcss.html.*

WHAT'S NEW

BSRN ARCHIVE MOVING TO ALFRED WEGENER INSTITUTE

The Alfred Wegener Institute (AWI) for Polar and Marine Research in Bremerhaven, Germany has generously offered their facilities and resources to host the BSRN data archive. Prof. Peter Lemke, Head, AWI Climate Sciences Division, who recently served as chair of the WCRP Joint Scientific Committee, has been a strong advocate for re-establishing the BSRN archive at AWI. Dr. Gert König-Langlo, a long-time BSRN associate, will oversee the direction of the archive at AWI. Dr. Ohmura Atsumu (retired) and his staff established the original BSRN archive at the Swiss Federal Institute of Technology (ETH) in Zurich, Switzerland and oversaw its operations for over 15 years. The ETH archive staff is supporting the transition activity until mid-2008 when AWI will take over the activity. For more details see: *http://www.gewex.org/bsrn.html.*

GUOXIONG WU ELECTED NEW IAMAS PRESIDENT

GEWEX congratulates Prof. Guoxiong Wu of the Laboratory of Numerical Modelling of Atmospheric Sciences and Geophysical Fluid Dynamics at the Chinese Academy of Sciences, on his election as the President of the International Association of Meteorology and Atmospheric Sciences (IAMAS). Prof. Wu has been an active member of the GEWEX community, serving as a member of the GEWEX Scientific Steering Group from 2001-2005. He is now serving as an officer of the Joint Scientific Committee for the World Climate Research Programme.

SPECIAL GEWEX EDITION OF JOURNAL OF HYDROMETEORLOGY

The *Journal of Hydrometeorology* Special GEWEX issue (August 2007, Vol. 8, No. 4) is now available and features papers from the 5th International Scientific Conference on the Global and Energy Water Cycle.

GEWEX WELCOMES NEW DIRECTOR OF IGPO – PETER J. VAN OEVELEN

The International GEWEX Project Office (IGPO) is pleased to announce Dr. Peter J. van Oevelen as its new Director starting in January 2008. Peter brings strong credentials to the position and has been the part-time European GEWEX Coordinator for the past 3 years, supported by the European Space Agency (ESA). In addition to his GEWEX responsibilities he has worked in support of the Land Unit of the Mission Sciences Division at the ESA Science and Technology Center in the Netherlands. At ESA Peter was involved in science activities related to satellite missions such as the Soil Moisture and Ocean Salinity mission, which will be useful for land surface processes studies.

As the GEWEX European Coordinator, Peter represented GEWEX and reported on program activities at a number of meetings and participated in international coordinated activities. Peter also supported the GEWEX Regional Hydroclimate Projects [particularly the African Monsoon Multidisciplinary Analysis Project] in their quest for data, funding and observational instrumentation, and promoted the Baltic Sea Experiment to the European Union. Through his work with the Coordinated Energy and Water Cycle Observations Project (CEOP) on both scientific and programmatic levels, he has aided in soil and vegetation characterization, facilitated the transfer of ESA data to CEOP archives and assisted with the preparation of a Category-1 proposal for ESA.

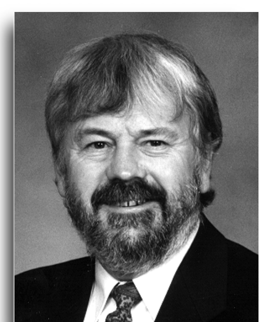
Prior to 2004, Peter worked at Wageningen University as a research associate and lecturer to graduate and undergraduate students. His research activities involved the use of remote sensing in agro-hydrology, meteorology, land degradation and forestry with a special emphasis on microwave remote sensing. He has been co- and principal investigator in numerous experiments and projects [e.g., the Hydrological-Atmospheric Pilot Experiment in the Sahel (HAPEX-Sahel), the Northern Hemisphere Climate-Processes Land-surface Experiment (NOPEX)/Forest-dynamo, Washita-94, and Southern Great Plains-97].

In 1994 Peter received a Fulbright scholarship to work with Prof. M. L. Kavvas at the Department of Civil and Environmental Engineering at the University of California, Davis (USA) on stochastic methods in hydrology and remote sensing. In 2000 Peter co-founded and was technical director of SarVision B.V., a company based in Wageningen, The Netherlands, dealing with monitoring the natural environment using remote sensing. Peter can be reached via e-mail at *gewex@gewex.org*.

GREAT-MAN MADE RIVER INTERNATIONAL WATER PRIZE

S. Sorooshian

The United Nations Educational, Scientific and Cultural Organization (UNESCO) has named the Center for Hydrometeorology and Remote Sensing (CHRS) at the University of California, Irvine and the National Science Foundation Science and Technology Center for Sustainability of Semi-arid Hydrology and Riparian Areas (SAHRA) at the University of Arizona as joint winners of the 2007 Great-Man Made River International Water Prize.



J. Shuttleworth

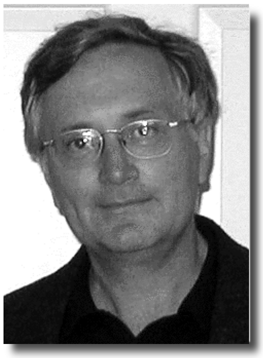
The centers, under the guidance of Prof. Soroosh Sorooshian (CHRS), Chair of the GEWEX Scientific Steering Group and Prof. Jim Shuttleworth (SAHRA), a former theme leader in the GEWEX Americas Prediction Program (GAPP) are rewarded for their outstanding achievements and contributions in advancing the assessment, development, management and use of water resources in arid and semi-arid areas, such as groundwater and surface water availability and usage in areas subject to drought and desertification.

The prize award was presented during the 2007 World Science Day for Peace and Development, held on November 10th at the Hungarian Parliament in Budapest.

CHANGES IN THE GEWEX SCIENTIFIC STEERING GROUP (SSG)

GEWEX welcomes the following new SSG members, whose terms begin 1 January 2008. Dr. Thomas Ackerman, currently an SSG member, replaces Dr. Ulrich Schumann as SSG Vice-Chair. Dr. Schumann's contributions as Vice-Chair and as an SSG member are greatly appreciated.

Prof. Ronald Stewart



Professor,
Department of Atmospheric and Oceanic Sciences,
McGill University,
Montreal, Quebec, Canada

Areas of Interest: Water cycle, extreme events, regional climate, precipitation, and clouds.

Dr. Kevin E. Trenberth

Head,
Climate Analysis Section,
National Center for Atmospheric Research
Boulder, Colorado, USA

Areas of Interest: Global energy and water cycle, climate variability and climate change.

Dr. Olga Zolina

Staff Associate,
Meteorological Institute,
University of Bonn,
Bonn, Germany

Staff Member,
P.P.Shirshov Institute of
Moscow, Russia

Areas of Interest: Atmospheric extratropical cyclone dynamics and their interaction with the ocean; estimation of extreme precipitation and analysis of its variability from NWP products and station data.

IN MEMORIAM

GEWEX AND CLIMATE RESEARCH LOSE A GOOD FRIEND AND KEY SUPPORTER

Dr. Anthony (Tony) Hollingsworth, a giant in the fields of numerical weather prediction and the exploitation of satellite observations, passed away on 29 July 2007, while on holiday in his native Ireland.

Tony was a personal friend to many of us and recognized as a successful "mover and shaker" by everyone in the weather and climate research field. As a realist and a visionary, he was able to make advances in weather/climate prediction that led the field and kept challenging us all to do better. He was always pushing to attempt operational implementation of the latest global satellite sensor data, even while others were analyzing the early data streams. Of course he was right to emphasize that only with the immediate operational evaluation of the data could we determine much of the true value of the data, as well as evaluate data accuracy and correct the initial errors.

Tony was a true believer in the GEWEX concept of using process studies to develop new parameterizations in models as the path to improving their prediction capability. His impatience with our progress provided a great incentive for us to do more, faster—even if this strained resources. A great partner in many endeavors, Tony was never reticent to explain how the effort should be done, but in the most congenial way within our GEWEX partnership. He was always looking for new ways to apply the latest data and research results from all of our GEWEX projects.

Tony will be greatly missed within the GEWEX community. He leaves us with a legacy of converting research results into operational implementation that we must continue to pursue.

Paul Try
International GEWEX Project Office

LAND-ATMOSPHERE FEEDBACK IN THE WEST AFRICAN MONSOON

(Continued from page 1)

from an ensemble of 12 climate models to prescribed soil moisture, implying that basic processes involved in the coupling between land and atmosphere are not well represented in our current models. They also identified the West African Monsoon (WAM) region as one particularly strong land-atmosphere "hotspot."

The African Monsoon Multidisciplinary Analyses (AMMA) Project is a major international project aimed at improving the understanding and prediction of WAM and its socio-economic impact within the region. One focus of AMMA is land-atmosphere interaction, including the integration of knowledge of land and atmospheric processes to gain a more complete picture of the coupled system. The AMMA Project—funded by a large number of agencies, including France, Africa, the United Kingdom, the United States, and the European Union—is centered on an ambitious measurement campaign conducted in the summer of 2006 that has provided invaluable *in situ* observations in a generally data-sparse region. Coupled with sophisticated models and a new generation of satellite products, these data are generating new insight into processes which control feedbacks.

The spatial and temporal distribution of surface fluxes in the Sahel region of Africa is closely tied to antecedent rainfall. In this sparsely vegetated zone where annual rainfall typically ranges from 200 to 800 mm, the monsoon brings a sequence of intense convective storms that leave well-defined swaths of soil moisture in their wake (see figure on page 1). Evaporation rates are high and sensible heating is weak for a day or two after the rain, contributing to a cool, moist and shallow planetary boundary layer (PBL). Because the storms are intermittent in time and space, they generate strong spatial variability in PBL properties that can feed back upon subsequent storms in the region (Taylor and Ellis, 2006).

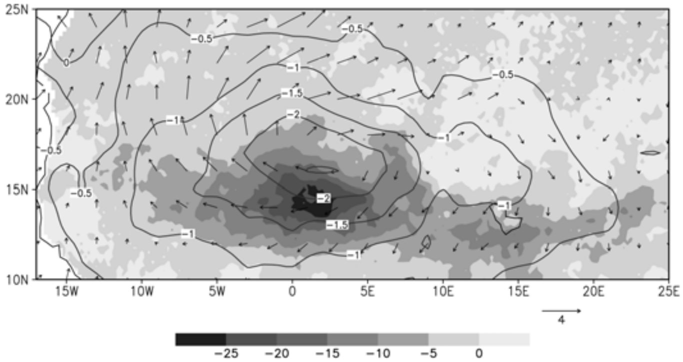
During the AMMA measurement campaign, the research aircraft of the UK National Centre for Atmospheric Science targeted zones of wet soil within generally drier regions. Data from these flights are providing clues as to how the PBL and convection respond to changes in surface fluxes under similar large-scale atmospheric conditions. Land surface temperature data from the Meteorological Satellite of the European Operational System (METEOSAT) were used to accurately locate wet soils from the morning following a storm and to guide afternoon aircraft missions. The resulting data show strong negative correlations between soil moisture and PBL temperature, which were coherent even over surface patches of less than 10 km. These changes were accompanied by strong contrasts in PBL depth and specific humidity; the analysis of wind data recorded by the aircraft also identified clear evidence that surface heterogeneity had induced mesoscale perturbations in the low level flow, analogous to sea breezes (see figure on next page, Taylor et al., 2007). This phenomenon has been seen many times in models but had not been well observed. Work is now focusing on how well numerical and theoretical models capture this behaviour and whether, as predicted by models, these circulations can preferentially trigger deep convection. The response of mature mesoscale convective systems (MCS) to surface-induced PBL variability is also being studied within AMMA. The research will benefit from a concerted effort to generate accurate maps of land surface properties and fluxes (*GEWEX News*, February 2006).

Surface properties can also potentially influence changes in the larger scale circulation in which storms are embedded. AMMA has focused on intraseasonal fluctuations in rainfall, including the monsoon onset, when the latitude of the Inter-Tropical Convergence Zone shifts abruptly northward over West Africa (Sultan and Janicot, 2000). To better capture this key mode of variability in predictive models, it is important to understand the features which control it, such as the nearby ocean, tropical waves, and the land surface. Data from the Tropical Rainfall Measuring Mission have been used to identify the temporal and spatial scales of soil moisture variability. The 15-day time scale in Sahelian rainfall produces significant fluctuations in soil moisture that propagates westwards across the region. When the satellite data were used to scale up surface fluxes from typical wet and dry soils, the resulting variations in sensible heat were found to be large enough to generate a low-level anticyclonic vortex (a "cool high") above the wet soil (Taylor, 2007). The vortex (see figure on next page) modulates the monsoon dynamics, enhancing a moist, southerly flow to the west and dry northerlies to the east. This surface feedback on the monsoon dynamic favors further westward propagation of the rain and soil moisture.

Additional analysis of AMMA data are expected to provide a better understanding of the generic land

NASA GLDAS DATA SETS ARE NOW AVAILABLE VIA DISC

Global Land Data Assimilation System (GLDAS) data sets are now available via the National Aeronautics and Space Administration's Data and Information Services Center located at the Goddard Space Flight Center. The data can be downloaded at: *http://disc.gsfc.nasa.gov/hydrology/hydro_get_ data.shtml.*



Difference between wet and dry spells in sensible heat flux (shaded; Wm^{-2}) estimated with passive microwave data from satellite and corresponding ECMWF temperature (contours; K) and wind (vectors; ms^{-1}) data at 925 hPa.

processes that will lead to improved climate model parameterizations. This knowledge may improve the prediction of climate change in many tropical and semi-arid regions. There is a strong need for such improvements in West Africa, an area where there is little agreement between models, and an area where the vulnerability of the population to fluctuations in climate is extreme.

References

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Taylor, C. M., and R. J. Ellis, 2006. Satellite detection of soil moisture impacts on convection at the mesoscale, *Geophys. Res. Lett.*, *33*, L03404.

Taylor, C. M., D. J. Parker, and P. P. Harris, 2007. An observational case study of mesoscale atmospheric circulations induced by soil moisture, *Geophys. Res. Lett.*, *34*, L15801.

GPCP DOCUMENTATION UPGRADED

Technical documentation for the Global Precipitation Climatology Project (GPCP) monthly and daily products has been updated and converted into Adobe PDF files that are available at:

V.2 SG–monthly:
ftp://precip.gsfc.nasa.gov/pub gpcp-v2/doc/V2_doc.pdf

1DD–daily:
ftp://precip.gsfc.nasa.gov/pub/1dd1DD_ doc.pdf

Each provides background on the input data sets, algorithms, and data set characteristics and attributes, together with references and contact information.

CAN GEWEX BECOME THE CUTTING EDGE OF WCRP?

(Continued from page 1)

Global Warming Prediction and Reality

To most people, climate prediction is synonymous with projecting the expected changes in global mean surface temperature—known as global warming—and identifying the natural or human causes of such warming. Let us adopt this layman perspective and consider the progress made over the last 27 years. During the summer of 1979, the late Dr. Jule Charney convened a group of leading American scientists to prepare a report for the U.S. National Academy of Sciences (NAS) on the projected climatic effects of rising concentrations of carbon dioxide and other greenhouse gases (Kerr, 2004). Only two participants of this workshop had actually developed climate models: Dr. Syukuro Manabe of the National Oceanic and Atmospheric Administration (NOAA) Geophysical Fluids Dynamics Laboratory (GFDL) and Dr. James Hansen of the National Aeronautics and Space Administration (NASA) Goddard Institute for Space Studies (GISS). Dr. Manabe reported that his numerical simulation of the Earth climate under a doubled carbon dioxide concentration predicted a global-mean warming of 2°C. Under the same assumed steady conditions, Dr. Hansen reported a warming of 4°C. After considering the scientific bases for both simulations, Dr. Charney saw no reason for choosing one projection over the other. However, judging that 0.5°C was not an unreasonable margin of uncertainty for either model assessment, he simply added this margin to the range between the two available predictions. Thus came into being the 1.5–4.5°C estimate of the likely climate response to a steady doubling of atmospheric carbon dioxide, henceforth enshrined in the NAS workshop report and any number of subsequent model sensitivity assessments.

Nearly three decades later, the Intergovernmental Panel on Climate Change (IPCC) published the Technical Summary of its Fourth Assessment Report (Climate Change, 2007). The report states that: "Analysis of model [results] together with constraints from observation suggest that the equilibrium climate sensitivity is *likely* to be in the range 2°C to 4.5°C with a best estimate value of about 3°C. It is *very unlikely* to be less than 1.5°C." One might say this latest pronouncement does not show much progress beyond the original pronouncement by Dr. Charney; however, it is too easy to make fun of IPCC efforts and the treasures of diplomacy that undoubtedly were spent over the wording of their latest finding.

A more profound question is how early climate models from the 1970s could have come so close to what is now considered to be the most likely answer. Indeed this appears just short of miraculous, considering the poor spatial resolution of the models of that time, as well as their highly schematic depiction of Earth orography and drastically over-simplified representation of physical processes. The reason for this convergence is that *all climate models are fundamentally the same* as regards to their treatment of the planetary radiation balance and global warming. They are complex mathematical algorithms with a lot of free parameters that may be adjusted to match known climatology.

Deriving Climate Sensitivity from the Seasonal Cycle

There is a general perception that climate hindcasts and forecasts are desperately difficult endeavors to compute subtle long-term trends in global-mean quantities such as surface temperature or tropospheric moisture, trends that are hard to quantify even with the benefit of modern observations. This could not be more misleading. The best known and most accurately documented component of climate variability is simply the seasonal cycle, something no more arcane than the fact that summertime is warmer than winter. Indeed, the *meteorological processes* that account for tropospheric adjustments to seasonal cycling in solar irradiance are precisely the same as those underpinning the long-term response to radiative forcing (i.e., changes in net radiation flux at tropopause level). Even more pertinent is the fact that seasonal cycling (~10°C or more) occurs every year in addition to some global warming (~0.01°C per year). Guess which of the two phenomena is the principal driver of tropospheric adjustments.

Weather-related processes are *fast*, with characteristic time-scales of approximately 1–10 days, which is much shorter than the duration of a season. Furthermore, these processes have relatively small spatial scales (from ~10 km for single storm cells to ~1,000 km for weather systems) that are significantly smaller than the planetary scale. For these reasons, weather-related radiative and hydrologic processes can be meaningfully averaged over less than the global domain (e.g., one hemisphere only) and over relatively short time spans. When dealing with fast tropospheric processes alone, there is no need to restrict ourselves to long-term “climatological averages” in which most of the significant signal has been averaged out. It is legitimate to investigate seasonal adjustments as relevant climate processes.

Likewise, taking one hemisphere as a proxy for the global climate system is not totally unreasonable, since the Northern and Southern atmosphere dynamics are not so different. Both show similar climate zones from the tropics to the poles and similar general circulation around the Earth. Additionally, they are both subject to similar weather disturbances and hold the same types of clouds. Obviously seasonal cycling of "hemispheric climate" is not a perfect analog for the long-term climate response to global forcing, but what would be a perfect analog? *Climate sensitivity*, as defined in early climate change simulations, is simply the ratio between mean surface warming (ΔT°C) and the corresponding increment (ΔF Watt/m^2) in outgoing long-wave radiation at the tropopause level (as needed to compensate for increased infrared absorption in the stratosphere above). To first order, this simple one-dimensional picture holds over domains smaller than the whole planet because climate is overwhelmingly governed by vertical fluxes of radiant energy and heat rather than lateral flux divergence.

Now let us see how the numbers work. The NASA Langley Research Center provided hemispheric statistics of monthly changes in outgoing long-wave radiation at the top of the atmosphere (which is not much different from changes at tropopause level, since stratospheric absorption is only a small percentage). Climatologist Dr. Abraham Oort at the Geophysical Fluid Dynamics Laboratory provided matching surface temperature statistics. The differences between meteorological winter and summer months (December, January, February or June, July, August, depending upon the hemisphere) came out as shown in the table below.

Oddly enough, the half-global sensitivity factors are nearly the same, despite a factor 2 difference in seasonal temperature ranges. This suggests a quasi-linear dependence between outgoing longwave radiation and surface temperature, at least within

	Northern Hemisphere	Southern Hemisphere
ΔF (seasonal)	21 W/m^2	9 W/m^2
ΔT (seasonal)	11.7 K	5.1 K
$\lambda = \Delta T/\Delta F$ (sensitivity)	0.56 K/W.m^{-2}	0.57 K/W.m^{-2}

the 12°C range of hemispheric-mean seasonal warming. There is no obvious reason why the response to the much smaller global-mean greenhouse forcing should depart widely from this linear dependence. As a matter of fact, the sensitivity of early atmosphere-only climate models was close to $l = 0.5$ K/Wm^{-2} (Manabe, 1967).

Modern climate simulations are not so easy to compare with observations because they incorporate many more components of the climate system, which respond to environmental changes on much longer time-scales than the atmosphere alone. These extra components add their own feedbacks to the overall global warming response, hence raising the aggregate sensitivity beyond that which is due to fast atmospheric adjustments only. The mean sensitivity factor of 15 climate simulations analyzed in the 2001 IPCC assessment was just short of 1K/W.m^{-2} which is not inconsistent with a 0.5K/W.m^{-2} response for the atmosphere alone. This is reason enough to somehow trust past and current global warming projections, even though individual climate model algorithms are not realistic representations of the actual physical processes.

On the other hand this does not tell us anything about the validity of climate simulations as regards to hydrologic parameters because current models did not benefit from the equally meaningful (observation-based) tuning of moist process parameterizations. As any long-term climate prediction on our water-rich planet requires reliable projections of the global water cycle, there is a clear and present need for demonstrably accurate simulations of moist processes in climate models. It is essential to draw the climate modeling community away from its comfortable “international consensus” on global warming and convince it to accept *the challenge of predicting the water cycle.*

Experimental Climate Scientists Versus Climate Modellers

It is easy to get the feeling that climate modelers have a definite inclination to reject or discount observational findings that do not conform with the standard format of “model data” (i.e., a complete and homogeneous long-term series of global values). In fairness, one should recognize that climate models are not equipped with the data assimilation tools for extracting information from observed weather-related events. How can we expect our “process studies” and “field experiments” or our less-than-perfect global environmental statistics to help WCRP achieve its global climate prediction objective?

The sad fact is that few climate modelers devote much time to overcoming the very real difficulty of combining “model data” with real-world observations. The poor academic rewards given to model validation—to say nothing of the lack of interest from science funding agencies—do not help, especially when cranking one more climate model run leads to the gratifying publication of “new results.” Spending months or years of dedicated effort to quantify model errors on the basis of less-than-perfect observations is neither easy nor rewarding. How could this be changed? The GEWEX community must accept the fact that no quantitative understanding, let alone science-based predictions of climate change, can be achieved without verifiable global climate models. GEWEX must make it its business to invent effective scientific strategies for translating observations into better model formulations of atmospheric and hydrologic processes. The grand challenge is to reconcile *the virtual world of climate modelling with the real world of climate physics* through more demanding model validation at the process level.

The Role of GEWEX

Can an international consultative entity like GEWEX (or WCRP for that matter) help at this juncture, when neither body has responsibility for the funding and management of actual research projects anywhere in the world? Indeed, the only effective role of an international consultative body is just that: to consult and help the actual players who must operate with the support of their own funding agencies. There is no purpose, however, in international coordination unless diverse components end up contributing to an overall science goal that transcends individual endeavors. It is the task of GEWEX to define and promote inspiring yet achievable long-term research objectives that could guide the individual efforts of practicing scientists worldwide and produce advances toward meeting its grand challenge.

A GEWEX Global Climate Science Strategy?

Encouraging and facilitating the development of more realistic climate models, especially in respect of cloud, precipitation and land surface processes, is or should be a core objective of climate research. To this end, the overarching concern of GEWEX should be developing any promising means to *expand the exposure of climate modellers to real-world observations*, be it in the form of climatological statistics, detailed process-resolving studies, or the reality of day-to-day confrontation with real weather as done by operational forecasters. Three generic approaches suggest themselves for breaking into the world of climate modelling.

1. Global Climatological Data Sets.

The near-impossibility of explicitly resolving moist atmospheric processes in climate models implies that *process paramerization* with adjustable coefficients will remain standard modeling practice in the foreseeable future. There will be continuing need for tuning these parameterizations to match relevant climate statistics. It is largely up to GEWEX to provide additional or better global climatological data sets to enable the incorporation of crucial moist process information in such model tuning. The first and foremost requirement is for complete and homogeneous global cloud and precipitation data sets based on ongoing measurements.

The two main GEWEX activities, the International Satellite Cloud Climatology Project (ISCCP) and the Global Precipitation Climatology Project (GPCP), are very much products of 1980 technologies. Both were originally subject to severe data storage and data processing constraints that limit their scientific significance. After some 20 years of practice, it is about time to revisit these projects and come up with a more advanced and, hopefully, much more powerful scheme for systematic production of global cloud and precipitation statistics from satellite and other available observations. The ISCCP was originally a data rescue operation; at that time, the only alternative to drastic undersampling and an overly simple cloud classification scheme was losing the geostationary satellite data altogether (data that were routinely deleted by satellite operators after a few days of temporary storage). ISCCP exploits one out of every 50 subsamples of the full-disc images and uses at best two independent radiometric measurements per pixel (mainly thermal infrared). Following an altogether different data processing path, GPCP conducts an even more drastic reduction of the original satellite data, boiled down to statistics of cold pixels that are associated with thunderheads and heavy precipitation. There is no provision for extracting cloud pattern information that historically was the basis for cloud classification.

It is time to call upon the international community of atmospheric and hydrologic scientists, meteorological satellite operators and weather forecasters to exploit their collective knowledge of the retrieval of cloud and precipitation information from satellite data to lay out the conceptual basis of a *new integrated satellite data processing system* that would fulfill the objectives of both climate science and operational meteorology. This could be the first major new initiative of the GEWEX program.

2. Bridging the Gap between Process Scales and Climate Modelling.

It has long been recognized that "clouds are complicated" (a remark that applies to other moist processes as well). There is no prospect in the foreseeable future for climate models to resolve atmospheric transport, surface topography or land cover at the scale of individual storm cells, nor *a fortiori* internal cloud processes or atmospheric turbulence. Because of the unpredictable nature of these phenomena, there is no prospect either for direct comparison of predicted cloud or precipitation data from a climate model run with observations in the field. On the other hand, stand-alone Cloud-Resolving Models (CRMs) encompassing a single storm cell or a representative chunk of the cloud field may be run time and again to build a library of simulated realizations of a generic process, which could be matched to one-time field observations or the occasional aircraft/satellite transects. Stand-alone cloud-resolving models also can generate consistent statistics of the multiple parameters or fields required for quantitative comparison with climate model simulations. This approach has been explored already by the GEWEX Cloud System Study (GCSS) and need not be described in further detail (Randall, 2003).

A forceful drive to develop and validate similar stand-alone process-resolving models for a wide range of generic or even site-specific phenomena in the atmosphere, the boundary layer and the ground could be a productive endeavor in the foreseeable future. Undoubtedly a strong advocacy effort would be needed to get the attention of climate science funding agencies and gain access to the substantial computing capabilities required for such an effort. This could be the second major new initiative of the GEWEX program.

3. Climate Simulation Statistics Versus Deterministic Weather Forecasts.

The chaotic nature of atmospheric dynamics is such that no climate model run, even driven by observed surface boundary conditions, can be expected to reproduce the unique historical sequence of events we observe in the real world. The standard way around this fundamental difficulty is to produce statistics from an ensemble of parallel prediction runs, averaged over large spatial domains and time spans. Spatial and temporal averaging does reduce discrepancies but only at the cost of smoothing out transient variability, which contains most of the interesting information. Indeed the unique real-world time sequence that we have is likely to differ from any independent model simulation by as much as two randomly selected members of an ensemble of simulations. This sets a fundamental limit—a large residual noise level—to any attempt to validate or adjust the parameters of a model "physics package" against real-world statistics. This is why even strenuous model validation efforts fail to identify specific weaknesses in the representation of transient phenomena (a category that includes all moist processes). This is a fundamental difficulty met by climate modellers in trying to produce demonstrably valid simulations of the global water cycle.

An alternative approach would be to test parametric algorithms intended for climate modelling in a deterministic prediction mode by incorporating these algorithms in the atmospheric GCM used operationally by a cooperating weather forecasting group. The benefit would be the ability to test a range of parametric algorithms or physical process formulations through their impact on real-time predictions of specific weather phenomena that could be compared with direct observations. The cost is equally obvious in terms of a sizable commitment of resources by cooperating operational agencies. Through their connection to both operational meteorology and scientific research, WCRP and GEWEX are in an ideal position to promote such cooperative endeavors. This could be the third major initiative of the GEWEX program.

Success with any or all of these approaches would be reward enough for the historical promoters of GEWEX: Professor Vern Suomi, Dr. Lennard Bengtsson, Dr. Moustafa Chahine, and myself.

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IPY STUDY: IMPACT OF AEROSOLS ON THE HYDROLOGICAL CYCLE IN THE ARCTIC

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The Hydrologic Impacts of Arctic Aerosols (HIAA), an international, multidisciplinary project endorsed by the International Council for Science/ World Meteorological Organization Joint Committee for the International Polar Year (IPY) and GEWEX, promotes and coordinates atmospheric aerosol science associated with clouds, radiation, surface hydrology and cryospheric research efforts. The main focus of HIAA is to investigate the interactions among aerosols, clouds and precipitation in the Arctic and the impact of variations and changes in aerosol characteristics on precipitation, surface energy balance and surface temperature, as well as land surface hydrology and sea ice characteristics.

Observations of increasing precipitation, rising river flow, declining snow cover and thawing permafrost indicate substantial changes to the Arctic hydrological cycle and these are likely occurring from a complex interplay between natural internal modes of climate variability and of anthropogenic activity. Variations in atmospheric aerosol characteristics have the potential to modulate the Arctic hydrological cycle through their impact on clouds and precipitation, radiation fluxes and surface albedo, while atmospheric aerosols influence the nucleation of cloud particles, affecting directly the cloud cover and precipitation processes. Aerosols (particularly carbonaceous and dust) can directly influence the surface albedo of snow and ice, and can also affect the surface radiative fluxes through direct and indirect radiative forcing.

To better understand these processes, the following research activities are planned: (1) application of a mesoscale model with sophisticated cloud microphysical processes and new aerosol parameterizations to investigate the sensitivity of precipitation amounts and phase-to-aerosol physical and chemical characteristics in order to simulate the impact of biomass burning, pollution aerosol and desert dust; (2) integrated analysis of satellite, *in situ* and ground-based observations; and (3) synthesis and comparative analysis of disparate, historical data from different parts of the Arctic region.

HIAA research is supported by a National Aeronautics and Space Administration/IPY project that seeks to analyze the A-Train multi-satellite data products associated with aerosols, clouds, precipitation and surface energy balance in conjunction with ground-based aircraft and unmanned aerospace vehicles measurements near Barrow and Prudhoe Bay, Alaska, and other sites in Canada, Europe and Russia. The focus of this effort is to evaluate the vertical distribution of clouds, aerosols and precipitation during the Aqua/CloudSat/Cloud-Aerosol Lidar and Infrared Pathfinder Satellite Observations (CALIPSO) overpasses and the horizontal coverage of aerosols and clouds reconstructed from other high-resolution satellites. A mesoscale model with sophisticated cloud and aerosol microphysical processes is being used to aid in the interpretation of data and to investigate the sensitivity of precipitation and energy balance to aerosols.

HIAA-related research is also being conducted as part of the Northern Eurasia Earth Science Partnership Initiative (NEESPI). The integration and synthesis of interdisplinary, historical data conducted by NEESPI provides the opportunity to establish empirical evidence of the impact Arctic aerosols and their variations have upon the precipitation and energy balance changes in the Arctic. The observational findings will be placed in a broader context through the synthesis of data and models. A Northern High Latitudes Model Intercomparison Project is being planned to evaluate and improve the modeling capability of the Arctic systems, including linkages between aerosols, precipitation and hydrology. Overall, the HIAA-related activities will provide new insight into aerosol-cloud-hydrological cycle interactions in the Arctic region, as well as lead to the development of a methodological framework needed for integrative studies of aerosol and precipitation in the context of regional and global climate change.

CLIMATE CHANGE STUDIES IN EASTERN EUROPE

The recently-launched **Climate Change and Variability: Impact on Central and Eastern Europe (CLAVIER)** Project is addressing the impacts of climate change in eastern Europe, with a special focus on Hungary, Romania and Bulgaria. It will undertake regional modelling issues and process the analysis of connections between weather, extremes, aerosols and water resources through modelling studies, case studies and workshops. CLAVIER is interested in exchanging information with GEWEX and other projects that are focused on climate related issues. For further information, visit *http://www.clavier-eu.org* or contact Dr. Daniela Jacob at *daniela.jacob@zmaw.de*.

WORKSHOP/MEETING SUMMARIES

FIRST LANDFLUX WORKSHOP

Toulouse, France
28–31 May 2007

William B. Rossow
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In collaboration with the GEWEX Global Land Atmosphere System Study (GLASS), GRP launched LandFlux, an activity designed to produce a global, multi-decadal surface turbulent flux data product. The First LandFlux Workshop was hosted by Le Centre d'Etudes Spatiales de la Biosphère (CESBIO) and reviewed the status of land-surface data products, potential methodologies for deriving turbulent fluxes, and how the combination of surface energy and water fluxes obtained from new satellite measurements of water could be used to obtain detailed land-water budgets.

A review of current land surface fluxes and continental energy and water budgets from the main global reanalysis products was given, as well as a report on the forthcoming European Space Agency Soil Moisture and Ocean Salinity Mission (SMOS) that will include a soil moisture-mapping capability. Progress on understanding the land-surface processes made by past programs was reviewed, including the GEWEX International Satellite Land-Surface Climatology Project (ISLSCP) and Global Soil Wetness Project (GSWP). In addition, a presentation was given on the activities planned by the International Geosphere-Biosphere Programme's Integrated Land Ecosystem-Atmosphere Process Study (iLEAPS).

Several "data-centric" approaches to estimating land-surface fluxes were discussed, including using one of the classic (bulk) formulae with observational inputs and a more elaborate model solving the instantaneous surface energy balance with observational inputs (forcing approach). The use of models that emphasize the atmospheric boundary layer processes or land-surface processes and assimilation techniques was also proposed. Possible sources of *in situ* data that could be used for the verification of remote-sensing-based flux estimates included recent results from the African Monsoon Multidisciplinary Analysis (AMMA) Project and the growing collection of data sets from the GEWEX Coordinated Energy and Water Cycle Observations Project (CEOP) and the flux tower data sets being produced by FLUXNET.

A number of model comparison and evaluation studies were presented that provide estimates of surface fluxes from different kinds of model-based systems, including: (1) atmospheric reanalyses like the European Centre for Medium-Range Weather Forecasts ERA-40 that assimilate primarily atmospheric measurements; (2) land process models forced by the atmospheric reanalyses like the GSWP activity; (3) land process models used to assimilate measurements of land properties like the Global Land Data Assimilation System (GLDAS); and (4) coupled land-atmosphere models that assimilate both atmospheric and land measurements, such as the National Aeronautics and Space Administration's (NASA) Modern Era Retrospective-analysis for Research and Applications (MERRA). One study illustrated how changing mean temperature can alter the strength of land-atmosphere coupling, leading to very different styles of temperature variability, while another highlighted the strong constraints possible from a combination of atmospheric forcing and surface "water availability" measurements, as well as the diurnal variation of surface temperature. Several studies showed significant improvements in representing the behavior of the land-surface obtained by assimilating a wider range of quantities, such as soil moisture, snow water equivalent, vegetation leaf area index and surface skin temperature by using land process models or by assimilating these and other atmospheric quantities using a coupled land-atmosphere model. These analyses could be used to estimate soil moisture or could be used to assimilate this information. The latter approach, combined with analysis from the NASA Gravity Recovery and Climate Experiment (GRACE) observations, might allow for a physically consistent partitioning of total land water into its constituent parts (ground water, soil moisture, surface flooding, snow, river discharge, evapotranspiration), making possible quantitative hydrological studies.

An evaluation of satellite-based estimates of land-surface inundation showed: (1) excellent correspondence between the annual variations of flood extent and precipitation in the tropics and snowmelt at higher latitudes; (2) satellite-based estimates of the annual variations of total water and river discharge; and (3) satellite-based determinations of the surface longwave radiative fluxes and their sensitivity to errors in surface skin and air temperature differences. The last study highlighted the need for better all-sky land-surface skin temperature data sets that resolve the diurnal variations.

Past attempts to determine soil moisture from satellites were described, including use of historical and modern passive microwave instruments. To construct a long record from these disparate sources will require careful cross-calibration of all the microwave instruments. Planned missions, SMOS and a possible NASA Hydrosphere State Mission (HYDROS) will provide purpose-designed measurements for the first time. However, given the complexity of the microwave signal dependence on soil moisture, vegetation, surface roughness and topography, analysis of these data will still be challenging. Although multi-sensor analysis approaches using advanced mathematical tools provide more complete analysis results, they are still limited by the lack of general radiative transfer models of the land surface, especially for the vegetation canopy.

Estimates of land-surface albedos were discussed. These have generally lacked information about the spectral and angular dependence of surface reflectivity and have treated them with simple approximations. The sensitivity of the absorbed solar radiation at the surface of these factors was shown to be the main limiting factor for the shortwave portion of the surface radiation budget. The current combinations of instruments provide adequate instantaneous coverage of angle dependence but without complete spectral coverage (the Multi-angle Imaging SpectroRadiometer, the Polarization and Directionality of the Earth's Reflectances–POLDER), or they provide nearly complete spectral coverage without instantaneous angle coverage (e.g., Moderate Resolution Imaging Spectroradiometer–MODIS, Medium-Resolution Imaging Spectrometer, Spinning Enhanced Visible and InfraRed Imager). Analysis of these measurements has provided the best determination of land-surface albedo. A comparison of the MODIS and POLDER results, as well as other validation studies, has provided conclusive verification of the spectral and angular dependencies employed in the current analyses. The most complete albedo product is now produced from MODIS but only covers a time period of about 7 years. Systematic efforts are now underway to connect the MODIS record to the longer Advanced Very High Resolution Radiometer (AVHRR)-based albedo records. Although determinations of the total absorbed solar radiation by land surfaces seems in hand, the partitioning of this energy between ground and vegetation remains a challenge.

A presentation on determining land-surface properties from satellites indicated that albedo data are in good shape. Several research products for land-surface temperature exist, however most are limited to clear-sky conditions and none cover the complete diurnal cycle for both cloudy and clear conditions. Near-surface atmospheric conditions, such as winds, temperature, and humidity are available from either the extensive network of surface weather stations with 3-hourly time sampling (with significant coverage gaps) or from operational weather analyses (with significant diurnal cycle errors). Two systematic surface radiative flux products (and one Fractional of Absorbed Photosynthetically Active Radiation product) are available with useful accuracy, and the general compilations of information about the properties of the land surface and its vegetation are available but of varying quality.

Several approaches to estimating land-surface turbulent fluxes were discussed and include: (1) eddy correlation measurements from flux towers (FLUXNET and CEOP); (2) bulk formula approaches where the input quantities are measured *in situ* or inferred from satellite data; (3) fluxes determined from land-surface process models "forced" by meteorology and downwelling radiative fluxes as done by GSWP; (4) fluxes from numerical weather model-based assimilations of atmospheric observations; and (5) fluxes determined from land-surface models constrained by many observations of the state of the atmosphere and land surface. None of these methods is yet mature enough to satisfactorily address GEWEX science questions.

Actions identified at the meeting include: (1) recalibrate long-term satellite radiance data sets, especially AVHRR and Scanning Multichannel Microwave Radiometer, Special Sensor Microwave Imager–Advanced Microwave Scanning Radiometer; (2) complete the ongoing evaluation and comparison/revision of the newer albedo products and connect these to an AVHRR-based record; and (3) finish a prototype global surface skin temperature product that resolves diurnal variations for clear and cloudy conditions. In addition, it was recommended that: (1) FLUXNET and iLEAPS provide an international coordination of "landflux" sites using the GEWEX Baseline Surface Radiation Network (BSRN) as a model; (2) GLASS and CEOP focus more attention on improving the large-scale hydrological parameters used in models; and (3) GRP focus more attention on the development of methods for determination of large-scale hydrological parameters from satellites.

The participants endorsed the Committee on Earth Observation Satellites plans for having an albedo workshop in 2008 to provide a final evaluation of current-day products and to set the stage for connecting these to the longer AVHRR record. To stimulate further development of turbulent flux estimates over land, GRP (jointly with GLASS, CEOP and ILEAPS) will plan another LANDFLUX workshop in about 18 months to compare global land flux products for a common time period using common diagnostics and verification data sets.

MONSOON MEETINGS IN BALI SET A FRAMEWORK FOR COLLABORATIVE EFFORTS

Bali, Indonesia
3–6 September 2007

[1]Rick Lawford, [2]Jun Matsumoto, and [3]Tetsurzo Yasunari

[1]International GEWEX Project Office, [2]University of Tokyo, [3]Nagoya University

Intensive meetings focusing on monsoons and the water cycle were held with the first two days devoted to discussions of the **Asian Monsoon Year (AMY'08)** and the emerging **International Monsoon Study (IMS)** on the third day. These meetings were followed by a 3-day planning meeting on the Coordinated Energy and Water Cycle Observations Project (CEOP) and the Asian Water Cycle Initiative. The meetings were sponsored by the Japan Aerospace Exploration Agency, the University of Tokyo, the World Climate Research Programme (WCRP) and GEWEX. The AMY and IMS meetings are summarized below; the CEOP meeting report will appear in the next GEWEX Newsletter.

AMY is a new joint GEWEX/Climate Variability and Predictability Project (CLIVAR) venture that will bring together the Monsoon Asian Hydro-Atmospheric Science Research and Prediction Initiative (MAHASRI) with a large number of other international and national projects and programs in Asia. AMY has already had extensive coordination in Asia and is tentatively scheduled to be launched in 2008. The workshop built upon the First International AMY Workshop held earlier this year in Beijing, China. The workshop was organized by Drs. Jun Matsumoto and Bin Wang, who respectively lead monsoon activities on behalf of GEWEX and CLIVAR. The major objectives of this workshop were to discuss and finalize the AMY08 science and implementation plans.

The goals of AMY are threefold: (1) to significantly advance our understanding of the physical processes determining Asian monsoon variability and predictability; (2) to improve Asian monsoon predictions on intraseasonal and seasonal time scales for societal and scientific benefits; and (3) to promote applications as a means to support strategies for sustainable development. Success in meeting these overarching goals are critical to WCRP's new strategic framework. When fully implemented, AMY will be a coordinated observation and modelling effort with a focus on understanding the interaction of the aerosol-cloud-radiation-hydrology cycle interactions and ocean-land-atmosphere interactions of the Asian monsoon system, as well as on improving monsoon prediction overall.

The workshop began with presentations about the overall goals of AMY and the principal science issues the project will address. Aerosols are expected to be one science focus because they may be a significant factor in rainfall variability over monsoon land regions. In terms of climate variability, AMY will focus on the diurnal cycle, interseasonal variability and the annual cycle. The modelling of monsoons using both regional and global models will be required to support efforts to improve seasonal prediction of summer continental precipitation and to assess the impact of land surface initialization on the seasonal prediction of the Asian Monsoon System.

After the central themes were described, the meeting received briefings from representatives of the many projects that will be contributing to AMY, including: the Asian-Pacific Economic Cooperation Climate Center; the Monsoon Asia Integrated Regional Study; the World Weather Research Program-Tropical Meteorology Research; THe Observing System Research and Predictability Experiment (THORPEX)-Pacific Asian Regional Campaign (TPARC); the Asia and Indian-Pacific Ocean Program; North Pacific Ocean Circulation and Its Impacts on the Dynamic Environment of the Marginal Seas (NPOIMS); Progressive Research on Atmosphere-Biosphere-Hydrosphere and their Interaction in Semi-Arid Northeast Asia (PRAISE); the Atmospheric Radiation and Cloud Station (ARCS); Hydrometeorological Array for ISV-Monsoon Automonitoring (HARIMAU); Tibetan Observation and Research Platform (TORP); the East-Asian Monsoon Experiment (EAMEX); the Semi-Arid Climate and Environment Observatory of Lanzhou University (SACOL); the Southwesterly Monsoon Flow Experiment (SoWMEX); the South China Heavy Rainfall Experiment (SCHeREX); CEOP; MAHASRI; and CLIVAR panels. These presentations were followed by national presentations in which countries in the region outlined what they could contribute to AMY and specified what they would like to receive from AMY. Countries that made presentations included Thailand, Malaysia, Vietnam, Indonesia, the Phillippines, Bangladesh, Nepal and Mongolia.

The **IMS Workshop** addressed the request by the Joint Scientific Committee (JSC) that the WCRP monsoon community develop a plan for an Asian Monsoon Year and that the Year of Tropical Convection (YOTC) be considered as a component of the IMS, which would include issues related to capacity building, the application of observations, and predictions in monsoon regions for societal benefit.

The science issues from the 2005 Pan-WCRP Monsoon Workshop were reviewed as a starting point for the discussions. Priority research needs are related to simulation of the diurnal cycle of precipitation and convection, the representation of the seasonal cycle of monsoons in GCMs, modelling intraseasonal variations in monsoons, process studies for the Maritime continent, and the Indian Ocean, and understanding of atmospheric moisture transport.

The presentations during the meeting included overviews of the GEWEX/CEOP Regional Hydroclimate Projects that deal with monsoon areas (MAHASRI, African Monsoon Multidisciplinary Analysis Project, La Plata Basin Project) and the CLIVAR Ocean Basin Panels (Atlantic, Pacific and Indian oceans) that will be incorporated into the IMS. Based on the current state of preparation, IMS is expected to be extended from 2008 to 2012.

Discussions at the workshop led to the affirmation and development of the following goals: (1) Improve forecasts from intra-seasonal to inter-annual time-scales in monsoon regions; (2) Improve our understanding of the relative role of land and oceans on diurnal to interannual time scales; (3) Improve our understanding of the effects of climate change (natural and anthropogenic) on monsoons; (4) Enhance observational networks and data utilization; (5) Enhance the collaboration among regional monsoon research communities; and (6) Facilitate the use of climate knowledge in societal impact studies.

Currently GEWEX monsoon activities are being coordinated within the framework of CEOP. Representatives from this group will be involved in helping to scope out the IMS along with CLIVAR experts and members of the JSC oversight committee on monsoons. The GEWEX and CLIVAR project offices will also be involved in coordinating the implementation of IMS. Prof. Yasunari organized this workshop and is planning a second Pan-GEWEX workshop to advance the planning and implementation of IMS. Readers are invited to e-mail their comments on IMS to Rick Lawford at *gewex@gewex.org*.

GEWEX NEWS

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GEWEX/WCRP MEETINGS CALENDAR

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

9–11 January 2008—CATCHMENT-SCALE HYDROLOGIC PREDICTION: MODELLING, OBSERVATION AND DATA ASSIMILATION INTERNATIONAL WORKSHOP, Melbourne, Australia.

20–24 January 2008—20TH CONFERENCE ON CLIMATE VARIABIITY AND CHANGE, New Orleans, Louisiana, USA.

21 January 2008—FIRST AMS CONFERENCE ON INTERNATIONAL COOPERATION IN THE EARTH SCIENCES, New Orleans, Louisiana, USA.

28 January–1 February 2008—THIRD WCRP INTERNATIONAL CONFERENCE ON REANALYSIS, Tokyo, Japan.

4–8 February 2008—GEWEX SCIENTIFIC STEERING GROUP MEETING, Buenos Aires, Argentina.

4–8 February 2008—3RD INTERNATIONAL TRMM SCIENCE CONFERENCE, Las Vegas, Nevada.

10–14 February 2008—INTERNATIONAL WORKSHOP ON GLOBAL DIMMING AND BRIGHTENING, Ein Gedi, Israel.

25–28 February 2008—INTERNATIONAL SYMPOSIUM ON ADVANCED ENVIRONMENTAL MONITORING, Honolulu, Hawaii, USA.

26–28 February 2008—FIRST U.S. – CHINA SYMPOSIUM ON METEOROLOGY, Norman, Oklahoma, USA.

10–14 March 2008—ADVANCES IN ATMOSPHERIC AEROSOL SCIENCE, New Orleans, Louisiana, USA.

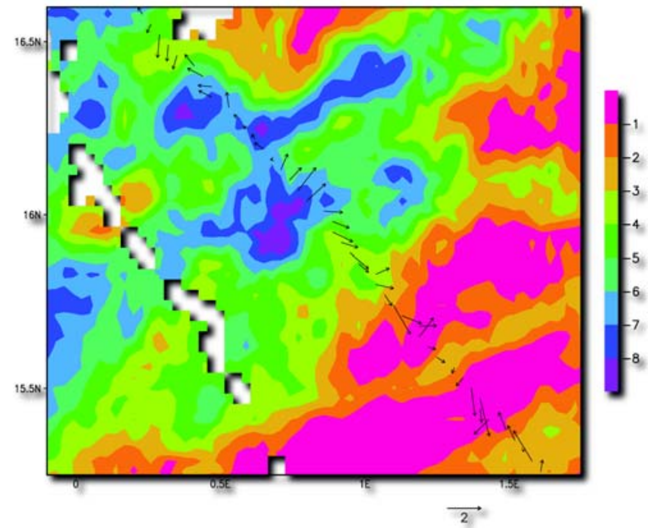
31 March–4 April 2008—29TH SESSION OF THE WCRP JOINT SCIENTIFIC COMMITTEE, Bordeaux, France.

13–18 April 2008—EUROPEAN GEOPHYSICAL UNION GENERAL ASSEMBLY, Vienna, Austria.

5–9 May 2008—4TH INTERNATIONAL GEOSPHERE-BIOSPHERE CONGRESS, Cape Town, South Africa.

2–6 June 2008—4TH PAN-GCSS MEETING: ADVANCES ON MODELLING AND OBSERVING CLOUDS AND CONVECTION, Toulouse, France.

SOIL MOISTURE INFLUENCES ON LOW LEVEL WINDS



Aircraft observations of low-level wind perturbations (vectors; m/s) during the AMMA campaign. The shading indicates satellite-derived daytime land surface temperatures expressed as anomalies from the mean diurnal cycle (K; data from the LandSAF). Mesoscale perturbations to the flow tend to be directed from above wet, cool soils towards drier, warmer regions. See article by C. M. Taylor on page 1.

9–13 July 2008—15TH INTERNATIONAL CONFERENCE ON CLOUDS AND PRECIPITATION, Cancun, Mexico.

7–11 July 2008—IGARSS 2008, Boston, Massachusetts.

23–25 July 2008—ISCCP 25th ANNIVERSARY SYMPOSIUM, NASA GISS, New York, NY, USA.

31 August–5 September 2008—SPARC 4TH GENERAL ASSEMBLY, Bologna, Italy.

22–24 September 2008—GRP WORKING GROUP ON DATA MANAGEMENT AND ANALYSIS MEETING, Hong Kong, China.

14–17 October 2008—GEWEX RADIATION PANEL MEETING, South Korea.

Participants of the Asian Monsoon Year 2008 Meeting held in Bali, Indonesia. See report on page 14.