Highlights of the 25th Session of the GEWEX Scientific Steering Group

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The 25th Session of the GEWEX Scientific Steering Group (SSG) was hosted by Dr. Jason Evans of the Climate Change Research Centre and Dr. Matthew McCabe of the Water Research Centre at the University of New South Wales (UNSW) in Sydney, Australia on 15–18 October 2012. The meeting was generously sponsored by the Australian Research Council (ARC) Centre of Excellence for Climate System Science and the University of New South Wales School of Civil and Environmental Engineering.

During the meeting, Prof. Andrew Pitman, the Director of the ARC Centre of Excellence for Climate System Science, gave a special in-depth presentation on UNSW research related to GEWEX activities. Dr. Kevin Trenberth, the SSG Chair, was invited by UNSW to give a public lecture on Climate Extremes and Climate Change, which was well attended.

During the agency presentations, Dr. Michael Rast introduced European Space Agency (ESA) programs of relevance to GEWEX research interests, as well as examples of collaborative activities sponsored by ESA, including joint conferences, special publications, and dedicated projects, such as the Water Cycle Multimission Observation Strategy (WACMOS) and GlobVapour. WACMOS II is contributing to the GEWEX LandFlux Project. ESA is also planning a Water Cycle Feasibility Project to explore the potential of Earth observations in addressing key questions about the water cycle at both global and basin scales.

In her presentation on the Japan Aerospace Exploration Agency (JAXA), Dr. Riko Oki noted that the Global Change Observation Mission on Water (GCOM-W1), which launched in May 2012, carries an Advanced Microwave Scanning Radiometer (AMSR2) for observations of water vapor, precipitation, soil moisture, sea-surface temperature, and wind speed. GCOM-C (climate observation) is planned for launch in 2015. GCOM data products are available at: *https://gcom-w1.jaxa.jp*.

Via Skype, Dr. Jared Entin of the National Aeronautics and Space Administration (NASA) reviewed the NASA Earth Science focus areas related to GEWEX activities. Special attention was given to the Modern Era Retrospective-Analysis for Research and Applications (MERRA), highlighting the use of NASA's global data assimilation system to produce a long-term (1979-present) synthesis for state-of-the-art global analyses, with emphasis on improved estimates of the hydrological cycle on a broad range of weather and climate time scales. NASA is also generating groundwater and soil moisture drought indicators each week based on terrestrial water storage observations derived from Gravity Recovery and Climate Experiment (GRACE) satellite data.

Dr. Michael Ek provided an overview of the National Oceanic and Atmospheric Administration (NOAA) Modeling, Analysis, Predictions, and Projections (MAPP) Drought Task Force, a two-year, multi-institutional, interagency-funded activity to improve methodologies for drought monitoring and prediction. Research results from the project will be documented in a special collection of papers on "Advances in Drought Monitoring and Prediction" in the *Journal of Hydrometeorology*.

Planning for 2013 and Beyond

Over the past year, the SSG and the GEWEX science community refined the GEWEX Imperatives and developed four GEWEX Science Questions (GSQs), which are comprised of research efforts that are likely to demonstrate significant progress in the next 5–10 years. These GSQs are complementary to the WCRP Grand Challenges introduced at the last Joint Scientific Committee (JSC) meeting (see the Commentary in the August 2012 issue of *GEWEX News*). The primary objective of one session of the SSG was to review the activities of the GEWEX Panels and their plans for contributing to the GEWEX GSQs, which are stated below.

1. **How can we better understand and predict precipitation variability and changes?**
2. **How do changes in the land-surface and hydrology influence past and future changes in water availability and security?**
3. **How does a warming world affect climate extremes, especially droughts, floods, and heat waves, and how do land area processes contribute in particular?**
4. **How can understanding of the effects and uncertainties of water and energy exchanges in the current and changing climate be improved and conveyed?**

At the recent 33rd JSC meeting, which was held in Beijing, China, GEWEX and the other WCRP Projects were asked to take a fresh look at their regional activities in Africa, as well as in Latin America and the Caribbean. Starting with stakeholder needs in the region, the projects will develop research priorities that are in line with the new research priorities. In particular, the Climate Variability and Predictability Project (CLIVAR) and GEWEX are to take the lead in forming organizing committees for conferences or workshops that will identify future directions for WCRP in these regions. CLIVAR and GEWEX will also coordinate pan-WCRP monsoon activities, with the CLIVAR Asian-Australian Monsoon Panel (AAMP) taking the lead on global monsoons with activities on Africa, Asia, and the Americas.

Activities related to extremes will be guided by the new WCRP Grand Challenge on extremes, and this would necessarily involve a great expansion over what currently exists in the Commission for Climatology (CCI)/CLIVAR/Joint Technical Commission for Oceanography and Marine Meteorology (JCOMM) Expert Team (ET) on Climate Change Detection and Indices (ETCCDI). The extremes activity could be centered anywhere, but seems to be a logical fit with land (GEWEX) since it includes drought, ETCCDI, and activities in the GEWEX Regional Hydroclimate Projects (RHPs).

GEWEX Data and Assessments Panel (GDAP)

The SSG reviewed the current and planned activities of the GEWEX Panels, starting with GDAP, which is chaired by Prof. Christian Kummerow and vice-chair Dr. Joerg Schultz. The Panel is divided into three focus areas: (1) Data Products, (2) Product Assessments, and (3) Radiative Transfer Code Assessments. The individual data products for clouds (the International Satellite Cloud Climatology Project, ISCCP), aerosols (the Global Aerosol Climatology Project, GACP), radiation (the Surface Radiation Budget Project, SRB), turbulent fluxes (SeaFlux and LandFlux), and precipitation (the Global Precipitation Climatology Project, GPCP) continue with reasonable support except for GACP, which is currently unfunded. Each of these projects is preparing for a data reprocessing cycle that will result in common ancillary data, assumptions, and space and time grids that will be merged into a single product called the GEWEX Integrated Water and Energy Product. The first year of the integrated product is scheduled for delivery in 2013.

Based upon GDAP data products, the downward shortwave and longwave radiative fluxes at the Earth's surface were calculated to be 166 Wm^{-2} and 344 Wm^{-2} respectively, which is about a 16 Wm^{-2} increase compared to the previous estimation of Trenberth et al. (2009). This makes for a much larger and untenable discrepancy between radiative fluxes and estimated latent and sensible heat fluxes at the surface. The recent publication by Stephens et al. (2012) was discussed and it was noted that the latent heat estimate of 88 Wm^{-2} is well outside the bounds estimated by GPCP (76 Wm^{-2} with a bias error of less than eight percent), highlighting the issue of closure. The integrated GDAP product will further quantify the flux estimates and their uncertainties, and bring closure issues to a head. It was noted that the Global Precipitation Measurement (GPM) mission to be launched in 2014 will resolve most, if not all of the issues related to mean precipitation at the global scale.

The SeaFlux product, a high-resolution satellite-based data set of turbulent surface fluxes over the global oceans, is being developed with input from the CLIVAR ocean flux community. Both SeaFlux and LandFlux data sets will be released in mid-2013 with relatively better quality than reanalysis. Both products have improved agreement with in situ measurements than current reanalyses.

GDAP recently completed assessments of cloud and radiation data products. Journal versions have been submitted in order to make them available to the Intergovernmental Panel on Climate Change (IPCC) assessments. The Radiation Assessment shows some differences between ISCCP, SRB, and the Clouds and the Earth's Radiant Energy System (CERES) products. These differences, however, are often much smaller than among climate models. The cloud assessment focuses significant attention on the question of cloud amount, which

is often used as a metric in climate studies. Although cloud amount is quite inconsistent among data sets, owing to different sensitivity of sensors, the effective cloud amount, which includes the influence of optical depth, is in much better agreement. In addition to these activities, GDAP has initiated two new assessments: a new water vapor assessment that includes new sounders, reference radiosondes, and Global Positioning System (GPS)-based methods, and an assessment of satellite simulators. The latter is intended to document the assumptions made within the simulators that are often not recognized, and it is hoped that this will foster interaction with the modeling community.

Global Atmospheric System Studies (GASS) Panel

GASS, which is co-chaired by Drs. Stephen Klein and Jon Petch, supports the community that carries out and uses observations, process studies, and model experiments with a focused goal of developing and improving the representation of the atmosphere in weather and climate models. Close to 220 scientists attended the 1st Pan-GASS Science Conference held in September 2012 (see the meeting report on page 10). GASS has eleven current and planned projects. Newer projects of note include: (i) a joint GASS/Global Land/Atmosphere System Study (GLASS) Panel study on land-atmosphere interactions; (ii) a joint effort with the Working Group on Coupled Modelling (WGCM) and European Union Cloud Intercomparison, Process Study and Evaluation Project (EUCLIPSE) to examine the interactions of moist process parameterizations with large-scale circulation under the weak-temperature gradient approximation; and (iii) the Grey-Zone Intercomparison Project to examine how models parameterize convective processes when the model horizontal resolution only partially permits convective clouds to be simulated (2–10 km range).

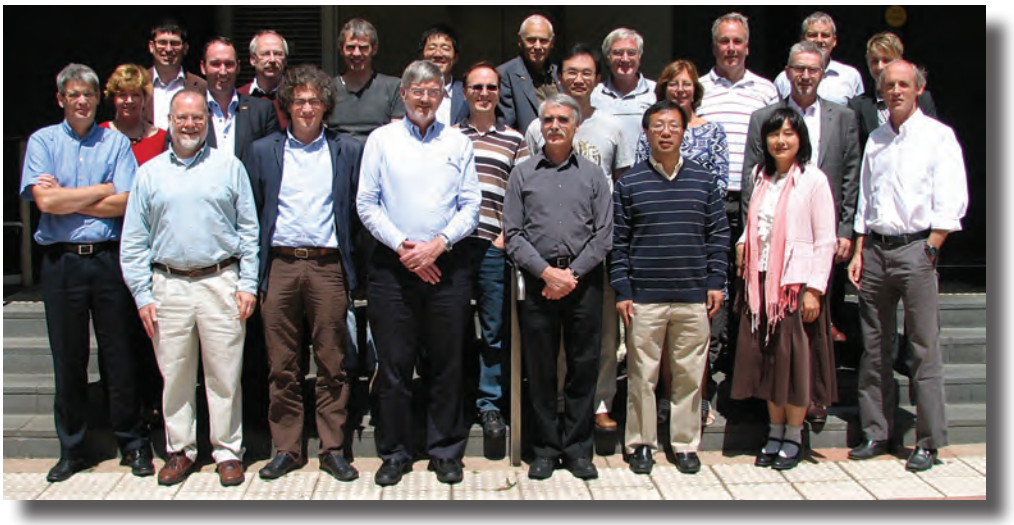
GASS has collaborative activities with many projects. A study on the vertical structure and diabatic heating of the Madden Julian Oscillation (MJO) is a joint project of GASS and the WCRP-World Weather Research Programme (WWRP) MJO Task Force. The GASS Low-Cloud Feedbacks Project is conducted jointly with the Cloud Feedback Model Intercomparison Project of the WGCM. Also, Dr. Gunilla Svensson represents GASS in planning meetings of the new polar project initiatives of WWRP and WCRP, and Dr. Steve Woolnough represents GASS on the joint WWRP/WCRP Subseasonal to Seasonal Prediction Project.

Global Land/Atmosphere System Study (GLASS) Panel

GLASS, which is co-chaired by Drs. Joe Santanello and Martin Best, supports the improvement of estimates and representation of land-surface states and fluxes, the interaction with the overlying atmosphere, and maximizing the fraction of inherent predictability in models. An important achievement of GLASS has been the development of easy-to-use, comprehensive evaluation methods for surface models using single site data, based on the Protocol for the Analysis of Land Surface models system (PALS). The PALS capability has been extended beyond traditional validation methods to include a priori benchmarking with the aim of defining the added value that a land-surface model can deliver in comparison with alternative methods (e.g., empirical models). A catalogue of reference sites' flux tower sites has been developed, and progress made in a synthesis of longwave and net radiation methods.

The focus of the GLASS Project for the Intercomparison of Land Data Assimilation Systems' first experiment (PILDAS-1) is on operational weather and seasonal forecasting, soil moisture retrieval, and development of a framework for comparisons. Early experiments have been completed and target dates for full experiments and analyses are August and October 2013 respectively.

The kick-off meeting for the GLASS Global Soil Wetness Project-3 (GSWP-3) is planned for early 2013. The goal of the Project is to develop a comprehensive set of land state data to investigate coupled energy-water-carbon cycles for a long-term period covering the entire 20th and 21st centuries. GSWP-3 activities will include: (1) the comparison of coupled energy-water-carbon cycle models with different configurations of model components (i.e., without a dynamic ecosystem component, with a static carbon cycle component, and with a dynamic carbon cycle component); (2) the comparison of model simulations with time-varying land cover maps and different soil maps (e.g., Harmonized World Soil Map); (3) the validation of models using observations collected from in situ ob-



Participants at the GEWEX SSG-25 Meeting.

servations from all over the world; and (4) development of a data portal. As GSWP-3 plans include a global river model, there is considerable potential for collaborative activities with the GEWEX Hydroclimatology Panel (GHP) RHPs. See the GLASS meeting report on page 12.

GEWEX Hydroclimatology Panel (GHP)

GHP, which is co-chaired by Drs. Jan Polcher and Jason Evans, has been reorganized around the RHPs and crosscutting projects. Several RHPs have ended and potential new projects have been identified in the U.S., Canada, Australia, and Africa. The Saskatchewan River Basin in Canada received confirmation as an Initiating RHP. A community benchmarking project (PALS) is underway with GLASS, where reference site and model output data sets gathered previously for different regions, seasons, and variables are being used in the validation of land-surface models. GHP is also focused on the SSG challenge to foster collaborations with other groups having common interests in land-surface processes, including the Coordinated Regional climate Downscaling Experiment (CORDEX), GDAP, GLASS, and CLIVAR, to deal with a number of important issues that range from monsoons to extremes and how to help coordinate the multitude of national initiatives in those areas.

Dr. Eric Wood stepped down as the chair for the Hydrologic Applications Project (HAP) and a clear path to maintain this type of activity is needed. HAP members successfully implemented, under the auspices of the United Nations Educational, Scientific, and Cultural Organization (UNESCO), an Experimental African Drought System. This was undertaken and training was conducted at the Centre Regional de Formation et d'Application en Agrométéorologie et Hydrologie Opérationnelle (AGRHYMET) in Niamey, Niger and the IGAD Climate Prediction and Applications Centre (ICPAC) in Nairobi, Kenya. The HAP Seasonal Forecasting Working Group under the leadership of Dr. Albert van Dijk has been very active, with an emphasis on dynamic seasonal forecasts derived from climate models and their propagation through hydrological models.

Joint GHP/GDAP annual meetings that include time for participation by local researchers in related fields are tentatively planned in Rio de Janeiro, Brazil in early September 2013. A CORDEX meeting may also be held during the same period. See the full GHP meeting report on page 18.

It has been a busy year for the International GEWEX Project Office and GEWEX Panels, and that will not change in 2013, judging by the number of meetings already scheduled, including kick-off workshops addressing activities related to the GEWEX Science Questions.

References

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