

Highlights of the 24th Session of the GEWEX Scientific Steering Group

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This Session of the GEWEX Scientific Steering Group (SSG) was hosted Dr. Gianni Tartari of the Water Research Institute (ISRA) of the National Research Council of Italy (CNR) in Rome, Italy on 14-18 November 2011. Dr. Enrico Brugnoli, the CNR Director of the Earth and Environment, and Dr. Maurizio Pettine, Director of the CNR Water Institute, provided opening remarks. Special presentations by CNR-IRSA included “Impacts of global changes on water resources: Southern Europe situation” (Michel Vurro); “Stations at High Altitude for Research on the Environment (SHARE) - Water resources: An integrated project for studying the impact of climate change on high mountains” (Franco Salerno); and “Observations and modeling of the hydrological cycle at CNR-ISAC” (Vincenzo Levizzani).

During the agency presentations, Dr. Michael Rast presented some of the European Space Agency (ESA) alliances with major international Earth system science programs. The Water Cycle Multi-mission Observation Strategy (WACMOS), in collaboration with GEWEX, was the first of these initiatives and resulted in a special issue on “Earth Observations for Water Cycle Science” in Hydrology and Earth System Science [a European Geosciences Union journal]. A recent collaboration, the GEWEX/ESA Data User Element GlobVapour Workshop on long term water vapor data sets and their quality assessment, was held on 8–10 March 2011 at ESA’s European Space Research Institute (ESRIN) in Frascati, Italy.

Dr. Keiji Imaoka presented the Japan Aerospace Exploration Agency (JAXA)’s plans for the Global Change Observation Mission on Water (GCOM-W1), which is scheduled for launch in March 2012 and will be a part of the A-Train complement of satellites. GCOM-C (climate observation) is planned for launch in 2014. All GCOM data will be freely available to the science community.

Over the past year the SSG and GEWEX science community have developed a mission statement and Imperatives that outline the strategic future directions of GEWEX as a part of the process for how GEWEX will contribute to the World Climate Research Programme (WCRP) global framework for climate services. During the SSG meeting, a substantial amount of time was spent in defining Grand Science Challenges for GEWEX (see the Commentary on page 2).

During the meeting, the SSG approved a name change for one of its Panels, reviewed the current and planned activities of its reorganized modeling Panels, and was briefed on the progress of the reorganization efforts of its hydroclimatology Panel. Some of the activities of these GEWEX Panels are highlighted in the paragraphs below.

The focus of GEWEX Radiation Panel (GRP) has evolved over time, from developing data sets of global water and energy variables consistent with the GEWEX mission to fostering the creation of global data sets. With independent products available for the radiative and flux terms of the Earth system, GRP is now focused on creating an integrated reference product in which the individual products use a common space and time grid as well as common ancillary data and procedures in order to ensure that geophysical signals are due to the data and products themselves, rather than inconsistencies in the assumptions. Once completed, GRP will undertake an assessment of the state of the water and energy budget based upon the new integrated GEWEX reference product. The assessment will consist of closure tests on the global scale; temporal variability in the fluxes and states; attribution of changes to observed forcings; and a maturity index of various components based upon ongoing assessments of individual components of the budget. In light of the current focus of GRP activities, a name change from GEWEX Radiation Panel (GRP) to GEWEX Data and Assessments Panel (GDAP) was proposed and accepted by the GEWEX SSG.

Key results from GDAP include the following:

All GEWEX reference products are on track for reprocessing beginning in the April 2012 timeframe.

Initial steps have been taken to shift GEWEX products to operational agencies for sustained processing.

The assessment of cloud and radiative flux measurements is scheduled to be published in early 2012.

A writing team will prepare a white paper on lessons learned from the assessments.

The Surface Radiation Budget (SRB) project has computed new surface and top-of-atmosphere fluxes with values that will close the energy budget with latent heat fluxes inferred from precipitation. However, uncertainties remain large (10 W/m^2).

The Global Atmospheric System Studies (GASS) is a new GEWEX Panel that 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. It brings together those involved in the GEWEX Cloud System Study (GCSS), the GEWEX Atmospheric Boundary Layer Study (GABLS), and the development of radiation codes through the Continuous Intercomparison of Radiation Codes (CIRC). The Panel addresses this primarily through the coordination of scientific projects, which brings together experts from around the world to contribute to the development of atmospheric models. Models are compared both to each other and to relevant global and regional observations. A Pan-GASS Meeting is planned for 10-14 September 2012 at the National Center for Atmospheric Research in Boulder, Colorado.

Three new GASS projects are under development.

(1) The Madden-Julian Oscillation (MJO) Diabatic Heating Project, a collaborative project with the WCRP-World Weather Research Programme/The Observing System Research and Predictability Experiment (THORPEX) MJO Task Force, where GASS will investigate the role of diabatic heating and moistening in the simulation of the MJO.

(2) The Grey Zone Project, a collaborative project with the Working Group on Numerical Experimentation (WGNE) to evaluate convection-permitting models [large-eddy simulation models (LES) and high resolution limited-area models (LAMs)] over large domains as a guiding tool for the representation of these processes in global and limited area models with grey-zone resolution.

(3) The Semi-Direct Aerosol Campaign (ISDAC) Mixed-Phase Arctic Clouds Project, a joint US Department of Energy Atmospheric System Research Program model intercomparison project to explore the role of dynamical and microphysical processes in mixed-phase Arctic clouds based on observations collected near Barrow, Alaska in April 2008.

The Global Land/Atmosphere System Study (GLASS) Panel is planning a follow-up project to the Global Soil Wetness Project-2 in collaboration with the terrestrial carbon cycle modeling community. Results from a pilot error propagation analysis have shown that differences in precipitation lead to non-linear differences in evaporation and runoff whose size and sign depends on the climate and vegetation regime. However, the spread between different land models was generally larger than the spread in the precipitation forcings and showed different spatial patterns, pointing at a model-dependent sensitivity of evaporation and runoff. GLASS is also planning two collaborative projects with the GEWEX Hydroclimatology Panel (GHP): (1) a study of the subtle hydrology and vegetation processes that dominate the study area of the 2nd African Monsoon Multidisciplinary Analysis (AMMA) Land Model Intercomparison Project (MIP); and (2) a project to demonstrate benchmarking approaches using the Protocol for the Analysis of Land Surface (PALS).

GHP is in the process of reviewing all of its projects and recommendations regarding the continuation of these will be based upon their level of activity and relevance to the GHP Terms of Reference. Building on its strength in regional studies, and following earlier encouragement by the SSG and WCRP, GHP is addressing the need to better utilize regional climate models as a source of information about ongoing and future land-surface water cycle changes. This includes fostering collaborations with other groups with common interests in land-surface processes, such as the Coordinated Regional Climate Downscaling Experiment (CORDEX).