

Joint Meeting of the GEWEX Data and Assessments Panel and the GEWEX Hydroclimatology Panel

**Rio de Janeiro, Brazil
2–6 September 2013**

The Joint Meeting of the GEWEX Data and Assessments Panel (GDAP) and the GEWEX Hydroclimatology Panel (GHP) was hosted by the Instituto de Geociências (IGEO), Centro de Ciências Matemáticas e da Natureza, Universidade Federal do Rio de Janeiro (UFRJ). Professor Ana Nunes served as the local host. The meeting began with presentations by scientists from South America and the Caribbean on topics of importance to society and climate services in the area, such as water resources, geomorphology, and risk analysis and environmental disasters. Many of the lectures targeted undergraduate and postgraduate students, as well as professionals working in the areas of risk analysis and prevention of disasters related to extreme events. The event drew over 200 participants from 11 different countries.

GDAP and GHP are organized around addressing the GEWEX Science Questions (GSQs; http://www.gewex.org/pdfs/GEWEX_Science_Questions_final.pdf) which in turn support World Climate Research Programme activities. The South American scientific community is interested in answers to questions that coincide with the GSQs, especially ones that lead to a better understanding of the major causes of regional environmental disasters associated with natural climate variability and/or anthropogenic forcings. In particular, IGEO-UFRJ scientists are interested in how climate change impacts areas of complex topography in South America.

The focus of the GDAP/GHP Meeting was to examine issues related to the roles of both panels in GEWEX, as well as shared interests in data development and validation, and develop strategies to jointly address some of the overarching GEWEX Science Questions in support of WCRP goals. Discussions generally focused on tackling some of the broader issues related to snow and orographic precipitation that are challenging to both panels and where the combined approaches of GDAP and GHP might yield improvements.

GDAP is currently generating an “Integrated GEWEX Product” consisting of data products for radiative energy, turbulent fluxes, and condensation heating. At the same time, core activities of GHP, including new and existing Regional Hydroclimate Projects, crosscutting projects on extremes, high elevations studies, hydrological applications, and global data centers, could potentially yield data and analyses useful for the development and validation of GDAP data products. GHP and GDAP agreed to collaborate on two problems that are of mutual interest and importance to both panels, orographic precipitation and high altitude (snow) precipitation.

GEWEX Data and Assessments Panel (GDAP) Meeting

**Rio de Janeiro, Brazil
3–5 September 2013**

Christian Kummerow
Colorado State University, Fort Collins, CO, USA

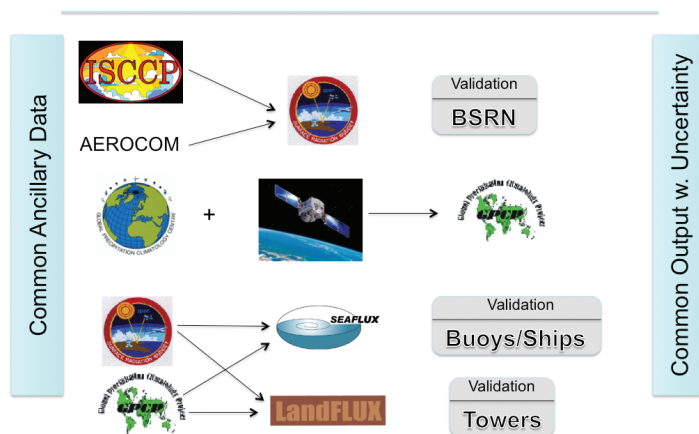
Christian Kummerow, the GDAP Chair, opened the meeting with a summary of recent Panel accomplishments. The assessments of precipitation, clouds, and radiation budget data sets have been completed and published as World Climate Research Programme reports, and the water vapor assessment is well underway. Key results of the Assessment of Global Cloud Data Sets from Satellites were published in the *Bulletin of the American Meteorological Society (BAMS)* in July 2013. The SeaFlux and LandFlux products, and the Integrated Product are being finalized. A new focus on water storage components is being added to GDAP, and two new members, Wouter Dorigo and Felix Landerer have joined the Panel.

With independent products now available for radiative energy, turbulent fluxes and condensation heating, GDAP has focused over the last 2 years on creating a Integrated GEWEX Product that uses a common grid, ancillary data, procedures and assumptions in order to ensure that relationships among water and energy variables are due to the data and products themselves, rather than inconsistencies in the assumptions. A key objective of this meeting was to review the readiness of GEWEX reference products and set deadlines for individual activities that will result in the release of the Integrated Product in June 2014. This release date will precede the 7th International Scientific Conference on the Global Water and Energy Cycle that is being held in The Hague, The Netherlands on 14–17 July 2014. The Conference will provide a venue to advertise the Integrated Product and present initial results.

GDAP will focus on an assessment of the state of the water and energy budgets based upon the new Integrated Product. This assessment is intended to document the state of our observing system, which is to be the first of periodic re-evaluations of the state of the water and energy observing system. It 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.

Wouter Dorigo gave a “new member” presentation on his personal research and interests, and reviewed some of the available soil moisture products and issues. He began by stating that radiation, soil moisture and temperature are the three primary constraints on vegetation growth, making soil moisture central to the GEWEX overarching science questions. After reviewing the basic principles of active and passive microwave sensing of soil moisture, and reviewing some challenges related to stitching together time series with dif-

GEWEX Integrated Products



Interdependency of products forming the GEWEX Integrated Product.

ferent instruments, he reviewed some of the products that are generally available. The Water Cycle Multimission Observation Strategy (WACMOS) Climate Change Initiative is focusing on merging the various products and relies on active sensors in areas with moderate to high vegetation, while using mostly passive means to map soil moisture in arid and semi-arid zones. The International Soil Moisture Network complements the satellite data. Dr. Dorigo and the Technical University of Vienna have played a major role in hosting and disseminating these data, and examples of the user interfaces were shown. Dr. Dorigo presented some of the shortcomings of in situ data, as well as why work with similar climate regimes is necessary when doing validation work so that systematic algorithm errors are not intertwined with random noise from in situ sensors. He ended his talk by stating that he hoped the community could do a better job of working together on the issue of absolute soil moisture versus relative soil moisture.

Jörg Schulz, GDAP Vice-Chair and representative on the WCRP Data Advisory Council (WDAC), reported that the Council is looking to GEWEX, and particularly GDAP, to help provide input on the best practices for assessment activities. The World Meteorological Organization Network for Sustained and Coordinated Processing of Environmental Satellite Data for Climate Monitoring (SCOPE-CM) is of great interest to GDAP because of its goal of producing long-term climate data records. The Network has completed its pilot phase and will begin an expanded Phase 2 in January 2014.

William Rossow began the review of GEWEX standard products with the status of the International Satellite Cloud Climatology Project (ISCCP) products. Testing of the new High-resolution Infrared Radiation Sounder (HIRS) product (nnHIRS) is still ongoing, but is expected to be completed soon. A last re-engineering is underway for the transition to operations at the National Oceanic and Atmospheric Administration's National Climatic Data Center (NCDC).

The new version of ISCCP being prepared for the Integrated Product is well underway and should be finished when nnHIRS is fully tested. Dr. Rossow presented details of nnHIRS temperature and humidity structure that appears quite reasonable and certainly better than the previous version of HIRS.

Robert Adler reported that the transfer of the Global Precipitation Climatology Project (GPCP) algorithm V2 to NCDC is on track. The status of Global Precipitation Climatology Centre (GPCC) data, which is used as input to GPCP products, was provided by Udo Schneider. He described two new GPCC products, a drought monitoring product and a first guess daily product that was requested by GEWEX to better study precipitation extremes. The generation of the daily product began in January 2012. Funding is available for a GPCC project on the validation of medium-range climate prediction focused on 1988–2008.

Stefan Kinne reported on AEROCOM, an international initiative to improve aerosol representation in global models. GDAP has chosen AEROCOM to supply aerosol products for GDAP. This was necessary as the Global Aerosol Climatology Project (GACP) data are currently only available over the ocean. The Max-Planck Institute-Aerosol-Climatology (MAC) consists of a monthly global climatology of aerosol optical properties that imposes local AERONET observations onto a central model background to achieve a global estimate of aerosols and their optical properties. It provides Aerosol Optical Depth (at 550 nm), the single scattering albedo and asymmetry factor. Details of the MAC-v1 are documented in the *Journal of Advances in Modeling Earth Systems* (2013). The next version (MAC-v2) will have a higher spatial resolution (0.5 x 0.5) and is expected to be released in 2014.

Paul Stackhouse presented some of the major accomplishments of the Surface Radiation Budget Project, including the improved accessibility of Version 3 products, the continued validation against the Clouds and the Earth's Radiant Energy System (CERES) data, and the significant progress made towards the finalization of the Release 4 data that will be used in the Integrated Product. While more validation has been done, the main result indicating significantly higher net radiation into the surface (114 Wm^{-2}) remains unchanged.

Joseph Michalsky reported that there are 58 Baseline Surface Radiation Network (BSRN) stations. Nine stations began producing data in 1992 and 19 stations submitted data in 2013, with 13 stations keeping data current. The South Pole and Neumayer stations have the longest records. As an example of how much the data are used, in April 2013, 1059 files were transferred per day with 66 systems requesting data during the month via ftp.

Although Carol Anne Clayson could not attend the meeting, she provided a summary of SeaFlux activities. Version 2 is well underway with common grids and assumptions. The main issues are the sea surface temperature and the near-surface temperature and humidity that are currently computed from passive microwave brightness temperatures using a neural net-

work instead of the nnHIRS product. Sensitivities related to the calculations need to be more thoroughly understood before a decision can be made about using these as common input products for the Integrated Product.

Eric Wood presented the progress made in developing the LandFlux product for latent and sensible heat fluxes over land surfaces. He divided the presentation into two components. The first dealt specifically with the issue of land surface temperature while the second focused more on the LandFlux product preparation and assessment. The surface temperature presentation was motivated by difficulties that LandFlux encountered when using nnHIRS land surface temperatures. More specifically, the problem was not with the observed land surface temperatures but rather the interpolated temperatures to 3-hour grids in both clear and cloudy conditions. To ameliorate this problem, the Princeton group developed a global land surface model using the NCEP Climate Forecast System Reanalysis (CFSR) forcing data, to produce a continuous, high-resolution surface temperature data set consistent with the HIRS clear-sky land surface temperature. Dr. Wood showed a number of examples to illustrate the performance of this product which appears to be good by all accounts. There was some recognition in the ensuing group discussion that the goal of complete consistency among the products should be scaled back some to allow individual products to use non-standard input—as long as a parallel product, using standard input was generated simultaneously for diagnostic purposes.

Four products, a Penman-Monteith scheme, a Priestly-Taylor approach, a surface energy balance approach, and the Global Land-surface Evaporation Amsterdam Methodology (GLEAM) are being evaluated with different forcing data and validation criteria for the LandFlux product. While no decision has been made as to which of the four products will be considered the standard GEWEX product, it is clear that all four schemes will be used at a minimum to gain insight into their differences and the overall uncertainty.

After much discussion by the GDAP members and product leads about the Integrated Product and its timeline, it was concluded that the individual products should not be made demonstrably worse by using common input. If, however, a decision was made to continue with the individual input parameters, then a parallel product, using the common input, should be created for inspection by the community. An example is the humidity difference in the lowest 10 m used by SeaFlux. If the nnHIRS product is not as good as what can be retrieved from passive microwave sensors, then SeaFlux should continue to use its own humidity difference but produce a parallel product with the nnHIRS humidity difference for diagnostic purposes. The Panel believes that in time these discrepancies can be eliminated.

The Water Vapor Assessment (G-VAP) completed its third year and Marc Schroeder reported on its progress. The activity is designed to provide an overview of available data records and provide users with enough information to decide if a data

record fits their purpose. Simultaneously, this assessment activity seeks to generate the necessary information for GEWEX to create a new standard water vapor product. To do this, the assessment has been broken into three categories of water vapor products: Integrated Water Vapor, Water Vapor Profiles, and Upper Tropospheric Humidity. Initial comparisons have been made but it is too early to draw summary conclusions.

James Mather began the update on the Department of Energy Atmospheric Radiation Measurement (ARM) Climate Research facilities by reviewing the status and instrumentation of the ARM fixed and mobile facilities, and their deployment schedule. The current array of sensors is highly relevant to GDAP and greater use of these data needs to be encouraged. To that end, Dr. Mather proposed extracting subsets from GEWEX products over ARM sites and making them available through the ARM archive as an external data product. This was welcomed by the GDAP members.

While the Cloud Assessment activity has concluded and been published as a WCRP report and accompanying BAMS paper, Claudia Stubenrauch reported that the website hosting the GEWEX Cloud Assessment database has had considerable traffic (approximately 4000 web hits per month and up to 2 million files downloaded), especially since the announcement in the *GEWEX Newsletter* of February 2013. This site will therefore be maintained and be complemented with revised versions in order to allow existing and new investigators to use the extensive database for comparisons of their own products in the future.

The Aerosol Assessment activity is being led by Sundar Christopher and Jeff Reid. The seven most common global aerosol optical depth products, the Advanced Very High Resolution Radiometer (AVHRR; GACP and NOAA); the Multi-angle Imaging SpectroRadiometer (MISR); the Moderate Resolution Imaging Spectroradiometer (MODIS; Standard and Deep Blue); the Ozone Monitoring Instrument (OMI); and the Polarization and Directionality of the Earth's Reflectances (POLDER), will be examined to evaluate their state-of-the-art science within the GEWEX framework. Phase 1 of the project should be completed within a year.

The Panel discussed current and future assessments, particularly how to deal with the length of time these usually take (an average of 7–8 years). There was consensus that even though it is difficult and time consuming, creating and maintaining databases and procedures of what has been done previously is a worthwhile endeavor as it allows new products to have a ready assessment standard. Once these databases are created, new assessments should not take nearly as long. It was also suggested that assessments could be organized around literature reviews. Such assessments would not perform the direct intercomparisons that are currently being done and could therefore be carried out more quickly. The next GDAP assessment will likely be a new precipitation assessment after the Global Precipitation Mission is launched and providing stable products.