

Report of Actions and Recommendations

World Climate Research Programme (WCRP) Global Energy and Water Exchanges (GEWEX) Project Hydroclimatology Panel (GHP)

Business Meeting

2-6 September 2013

Held Jointly with the GEWEX Data and Assessments (GDAP) Panel

This document provides the first draft of the notes, actions and recommendations from a Joint Meeting of the World Climate Research Programme (WCRP) Global Energy and Water Exchanges (GEWEX) Project Hydroclimatology (GHP) and Data and Assessments (GDAP) Panels held in Rio de Janeiro from 2-6 September 2013. The meeting took place at the Instituto de Geociências (IGEO), Centro de Ciências Matemáticas e da Natureza (CCMN), Universidade Federal do Rio de Janeiro (UFRJ), Cidade Universitária, Ilha do Fundão, Rio de Janeiro, Brazil. It was hosted/sponsored by the Fundação Carlos Chagas Filho de Amparo à Pesquisa do Estado do Rio de Janeiro (FAPERJ), the Universidade Federal do Rio de Janeiro (UFRJ) and the World Climate Research Programme (WCRP) with GEWEX. The material related to this report, including the presentations, are available at the meeting Web Page: <http://gewex.org/ghp-gdap/home>.

-NOTE- TIMING OF THE NEXT GHP MEETING: The decision was made to have a full GHP Business meeting Hosted By Dr. Graeme Stephens at a JPL/CALTECH facility in Pasadena, CA, USA. The dates have tentatively been set for 8-11 December 2014.

I. Purpose of the Meeting

GEWEX is based on integrated research projects, observations and scientific activities that aim to improve the knowledge about global climate change and its impacts on a regional scale. GEWEX integrates scientific research, production and collection of information in the form of observational data, as well as products derived from applied algorithms and analysis of numerical model solutions, all distributed among different panels. The GEWEX Hydroclimatology Panel (GHP), and the GEWEX Data and Analysis Panel (GDAP) are organized to address the GEWEX Science Questions (GSQs) http://www.gewex.org/pdfs/GEWEX_Science_Questions_final.pdf in support of the WCRP activities.

South American scientific community is also interested in answers for questions that coincide with the GSQs, and lead to a better understanding of the major causes of 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. Thus, in order to enhance and exchange knowledge, the IGEO-UFRJ through its Graduate, and Extension and Outreach Programs proposed that the Joint Meeting of GHP and GDAP be held in the City of Rio de Janeiro, together with presentations by invited researchers from South America and the Caribbean, dedicated to studies on climate, water resources, geomorphology, and risk analysis and environmental disasters.

Besides the scientific meeting of the two panels, which assessed international projects that receive support from WCRP, lectures by researchers associated with the WCRP/GEWEX, as

well as invited talks from local researchers were also presented. The lectures targeted undergraduate and postgraduate students, professionals working in the areas of risk analysis and prevention of disasters related to extreme events, and members of the local scientific community. The entire event drew over 200 participants from 11 different countries.

The agenda outlining the overall structure of the meeting is provided in Appendix 1, and since this report is an effort to document the main issues, actions and recommendations that came out of the GHP specific Panel Business meeting and the joint GHP/GDAP sessions as reflected in the Agenda provided in Appendix 2. The presentations related to the agenda items are linked to their topic descriptions as noted. For completeness the GDAP specific meeting agenda is included in Appendix 3.

2. Objectives and Goals

Initially, a number of lectures/presentations were made by both Regional participants, including, UFRJ President's Office Representatives, the Dean of the CCMN, the IGEO's Director, and Drs Gerson Cardoso da Silva Júnior (Dept. of Geology, IGEO, UFRJ); Germán Poveda (Universidad Nacional de Colombia); Tercio Ambrizzi, (USP); and José Marengo, (INPE); as well as key GEWEX Representatives.

These talks set the stage for productive discussions and interactions between the interdisciplinary and international individuals and groups that participated in the meeting. These presentations also established the basis for the primary topics related to the work that the GHP and the GDAP are responsible for carrying forward in support of WCRP and GEWEX.

Drs K. Trenberth, G. Stephens, Chair and Chair-elect, respectively, of the GEWEX Scientific Steering Group (SSG); P. van Oevelen, Director of the International GEWEX Project Office (IGPO); C. Kummerow, GDAP, Chair; and J. Polcher and J. Evans, GHP Co-Chairs, provided material at the opening of the meeting and at the start of the Joint and GHP-specific sessions that outlined the goals and objectives of the meeting that were most relevant to GHP.

3. Summary:

In keeping with the recent strategic planning process in WCRP and GEWEX, the meeting was organized partly as an effort to further sharpen the development and implementation of the WCRP Grand Challenges <http://www.wcrp-climate.org/grandcha.shtml>. Specifically, the WCRP Grand Challenge related to changes in water availability is led by GEWEX and is designed to respond to issues associated with how to better understand and predict precipitation variability and changes, and how changes in land surface and hydrology influence past and future changes in water availability and security.

For GHP, this approach is especially related to the challenge of developing a water strategy that addresses the issue of past and future changes in Water in general, and the GEWEX science question on global water resource systems in particular.

In this context, the meeting provided material that can be used to expand the current outline, define desired activities (meetings, workshops, conference sessions, Panel meetings, etc.) and timelines, and assess needed resources (organizational, financial, and human resources) that will allow progress to be made in this arena.

The perspective within which the GEWEX Science Questions (GSQs) were framed was provided by Dr Trenberth in the form of Table 1:

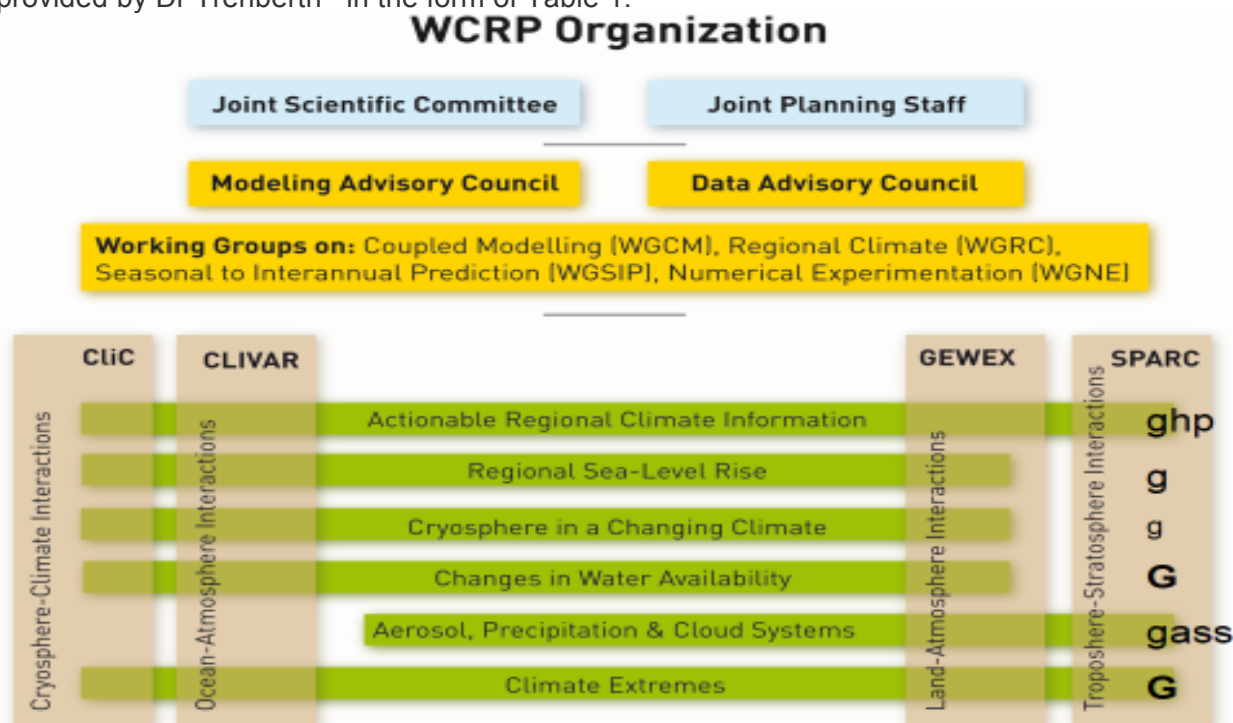


Table 1: GEWEX Contributions to WCRP Grand Challenges

In terms of the GEWEX Science Questions, the matter of “Water availability” will be addressed in all 4 GSQs, especially the first 2, namely:

- Observations and Predictions of Precipitation
- Global Water Resource Systems
- Changes in Extremes
- Water and energy cycles and processes

The comprehensive conclusion was that the implementation of the WCRP Grand Challenges and science questions depended upon the GEWEX Imperatives: observations and data sets, their analyses, process studies, model development and exploitation, applications, technology transfer to operational results, and research capacity development and training of the next generation of scientists. In addition, they involve all of the GEWEX Panels and will benefit greatly from strong interactions with other WCRP projects such as CLIVAR, SPARC, and CliC and other related global environmental change (GEC) research programs, such as IGBP, International Human Dimensions Programme (IHDP), and DIVERSITAS, or the new initiative called Future Earth.

Additionally, the Panel was advised to review its contribution to the GEWEX Science Conference that will take place at the World Forum, The Hague, The Netherlands, from 14-17 July 2014 <http://gewex.org/2014conf/home.html>. The Conference will celebrate 25 years of GEWEX research and set the stage for the next phase of research addressing the WCRP

Grand Challenges on water resources, extremes and climate sensitivity through observations and data sets, their analyses, process studies, model development and exploitation, applications, technology transfer to operational results, and research capacity development and training for the next generation of scientists.

4. GHP Role in GEWEX

The strategy of using its Panels and their broader research communities to articulate the GEWEX contribution to the WCRP Grand Challenges resulted in the form and content of this meeting. As the speakers articulated in their charge to the participants, it is necessary that the outcomes include individuals and groups that will focus on the key issues and that will ensure that the expected results are accomplished within specific timelines to achieve progress and reach milestones that meet specified metrics.

The leadership role of GHP in the hydrologic sciences and modeling activities within WCRP has been established as has the progress of the GEWEX Regional Hydroclimate Projects (RHPs) in seasonal forecasting, the detection and attribution of change, and the development and analysis of climate projections.

Figure 1 shows the role GHP plays in the overall GEWEX framework.

GEWEX: Major Components

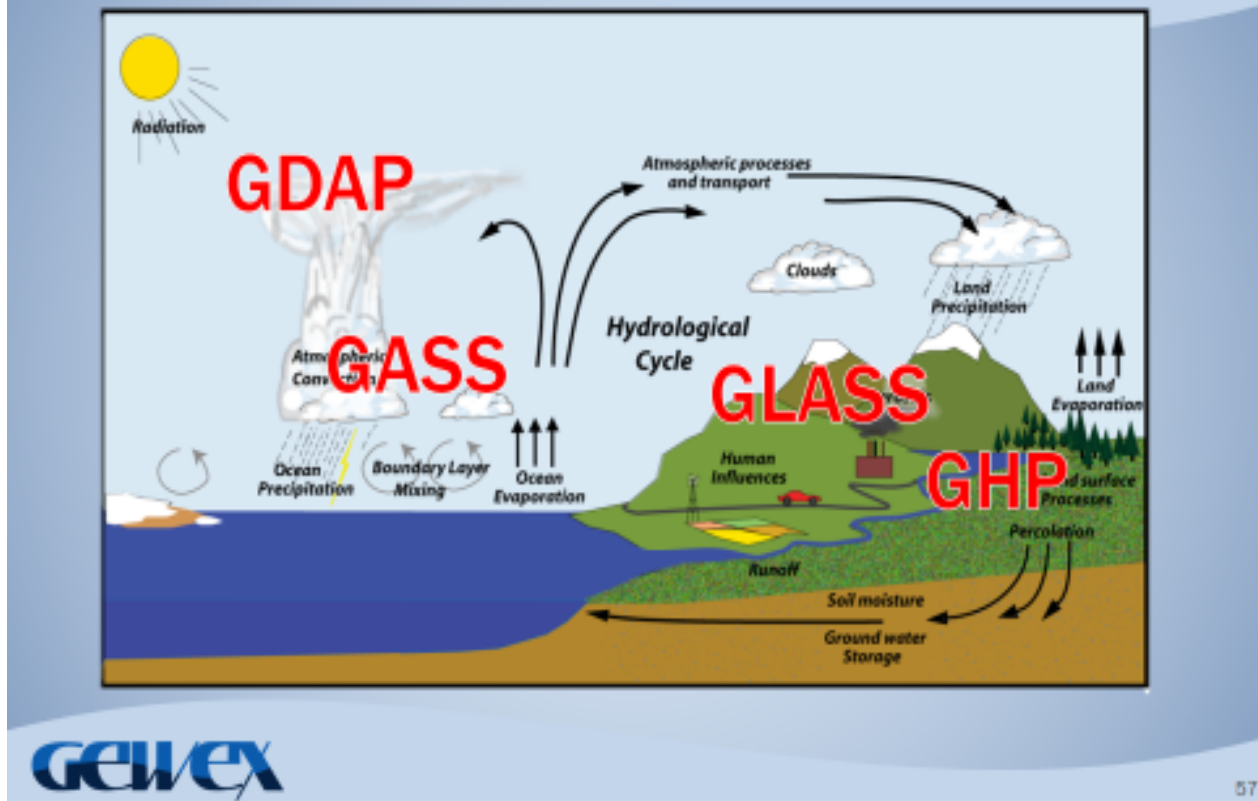


Figure 1: GEWEX Functional Elements

4.1 RHP Related Issues, Actions and Recommendations

In keeping with the need to be responsive to the WCRP/GEWEX main challenges and scientific questions GHP has organized itself to address the GEWEX science questions from a regional and integrated perspective. Only at the regional scale can the water cycle be addressed from its physical to human and socioeconomic aspects.

The RHPs are an essential tool in this endeavor as they bring together various disciplines on the water issues. The Cross-Cut projects allow GHP to propagate knowledge from one region to the other and synthesis results at the global scale. They also allow development and testing of applications developed with the new understanding (science with applicable outcomes). Figure 2 provides a summary of the main aspects of GHP.

GEWEX Hydroclimatology Panel

- Regional hydroclimate projects
- Globally distributed extensive **regional data sets** : water and energy cycle observations (in situ and space borne and modeling data)
- **Global Data Centers**; data management system / GEO Prototype for Water Cycle Observations
- **Regional climate and hydrological modeling and process Descriptions**
- **Hydrological Applications and Forecasting** (Drought monitoring, Hydrological Ensemble Predictions...)
- <http://www.gewex.org/projects-ghp.html>

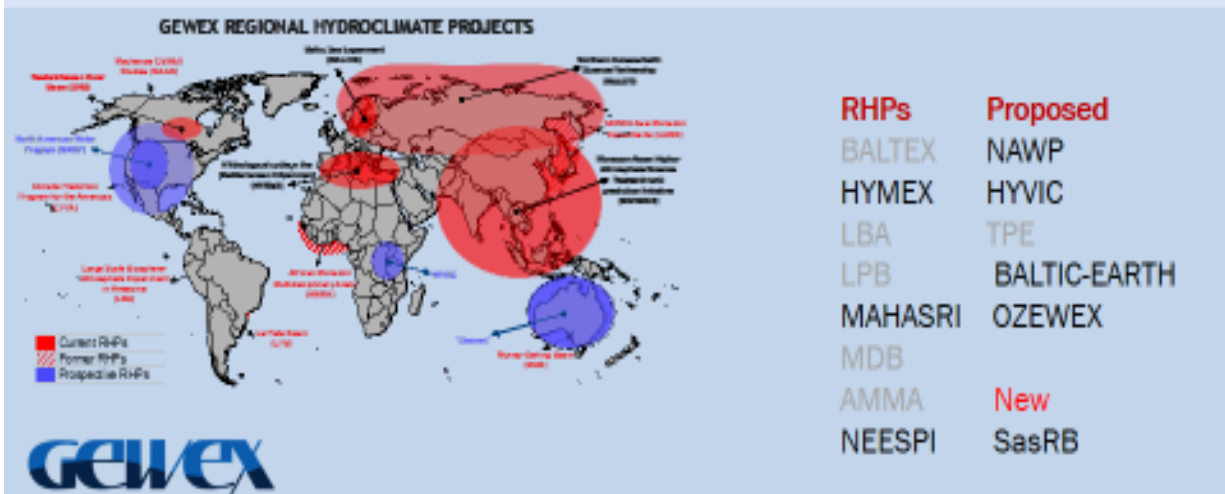


Figure 2: Summary of GHP Regional Hydroclimatology Projects (RHP) and related Features

By applying new criteria, approved earlier by the GEWEX Scientific Steering Group (SSG), in evaluating the RHPs and their contributions to GEWEX, the Panel was able to assign the designations (Former, Current, Prospective) noted in the Figure. Application of the new criteria also allowed the Panel to validate the continuation of four studies and confirm their end dates, for future planning purposes (BALTEX-2013, NEESPI-2014/15, MAHASRI-2015 and HyMeX-2016).

The Panel had earlier accepted the SSG's request to develop a strategy for addressing the GSQs within the context of its core activities. For the RHPs it was noted that the GSQs pose issues that are central to each of the regional activities of GHP and that being responsive to the these topics had been made part of the new criteria for reaching full RHP status.

Action (A1) RHP representatives should provide synopses of work in context of GSQs. Each RHP representative, of record, should provide a brief report of what part(s) of their past efforts, current work and planned efforts were/are relevant to each GSQ. **Reports are due by 1 June 2014** and should include information associated with each GSQ, including for example, (i) coordination with stakeholders to jointly produce tools and applied datasets; (ii) interactions with modeling groups showing improvements in model developments, validation with datasets, and

application by services; and (iii) Involvement of early career scientists, and related outreach initiatives.

Action (A1a) - IGPO agreed to assist with this action by **drafting a letter**, on behalf of the GHP Co-Chairs that advises the RHP representatives of record that they should prepare a GSQ-relevant report of their work that can be posted on the GEWEX/GHP Web Page. **The letter will be ready by 15 October 2013.**

Action (A1b): IGPO to set up an RHP-Specific Web Page Reporting Scheme. The International GEWEX Project Office (IGPO) agreed to **set-up, through the main GEWEX Web Page, a means for the RHPs to report their progress, in the context of the GSQs each science question (e.g. a short text on what aspects of their work were/are GSQ-relevant and specific key results).** The Panel agreed that the action to set-up a Web Page “reporting” scheme/template for the RHPs would extend to former as well as current studies. **The template should be available in time for initial application by the time of the GEWEX Science Conference (July 2014).**

4.1a **MAHASRI – Reported by Dr J. Matsumoto**

As reported the sunset date for MAHASRI is the end of 2015. Matsumoto agreed to:

Action (A2): Prepare a synthesis report that specifies the GSQ-relevant work MAHASRI has undertaken as noted in Action A1 above.

Action (A2a): Keep the Panel informed of plans for a **MAHASRI Wrap-up Conference.**

Action A2b): To formally inform the Panel of **MAHASRI interactions with the Monsoon Panel.**

4.1b **NEESPI Reported on by Dr. E. Wood for Dr. P. Grosiman**

As reported the sunset date for NEESPI is the end 2014 early 2015. Actions agreed to included:

Action (A3-i, ii, iii): IGPO to contact P. Groisman to ask him to (i) **Prepare a synthesis report** that specifies the GSQ-relevant work NEESPI has undertaken as noted in Action A1 above; (ii) **Formally inform the Panel in a timely manner** plans for a **NEESPI Wrap-up Conference.**

The concern by the Panel is that although NEESPI has a Science and Implementation Plan and a Science Team, it is a very broad initiative covering a vast region and is it possible for them to specify their exact contribution to the GSQs in a unified manner re: the precipitation, hydrology, etc., of the entire region including availability of a regional observational database?

4.1c **HyMeX Reported by Dr P. Drobinski**

As reported the sunset date for HyMeX is the end of 2016. Drobinski agreed to:

Action (A4): Prepare a synthesis report that specifies the GSQ-relevant work HyMeX has undertaken as noted in Action A1 above.

The Panel agreed that, since HyMeX has just finished an intense observational period related primarily to basic science and research, and that it would be some time before specific “applied”

science results might come available, the HyMeX GSQ-relevant report could include expected results and plans for GSQ-specific initiatives.

Recommendation (R1) - The Panel also agreed to endorse the enthusiastic efforts by HyMeX to engage the countries at the southern boundary of the Mediterranean Sea and asked to be kept informed of progress in that aspect of their future plans. They also noted interest in interdisciplinary initiatives that might build on the fact that HyMeX could be considered the first GEWEX RHP to directly engage oceanographers in GEWEX, due to the unique interaction between discharge and evaporation in the Mediterranean.

Recommendation (R2) - The connection of HyMeX and the RHP's in general to CORDEX was discussed at this point and it was agreed that no specific action would be taken at this time, which related to whether or not any RHP should have an active CORDEX initiative in place. This matter will be revisited following a review of the GSQ-specific reports to be provided by each RHP.

4.1d SaskRB Reported by Dr H. Wheeler

SaskRB remains an initiating RHP and a great deal of the background of the study is available in the report <http://gewex.org/ghp-gdap/docs/GSQ2MtgRept.pdf> from the Workshop: Water Strategy for the World Climate Research Programme (WCRP), which addressed the WCRP Global Grand Challenge on Past and Future Changes in Water and the GEWEX Science Question on Global Water Resource Systems (GSQ-2). The workshop took place from 5-7 June 2013, at Saskatoon, Canada.

The Panel was informed of a new project that has been initiated enlarging the scope of SaskRB, namely the Changing Cold Regions Network (CCRN), 2013-2018. This Network aims to understand, diagnose and predict interactions amongst the cryospheric, ecological, hydrological and climatic components of the changing Earth system at multiple scales with a geographical focus on Western Canada's rapidly changing cold interior. The geographic center of CCRN is the Mackenzie River Basin, where earlier RHP-type infrastructure had been built up during the Mackenzie GEWEX Study ([MAGS](#)).

Recommendation (R3) – The Panel endorsed CCRN as an effort that adds value to SaskRB, especially by strengthening its atmospheric component. On that basis, the Panel recommended that their endorsement be noted by the SaskRB leadership and that it be added as part of the continuing aspects of SaskRB as a GEWEX/GHP “Initiating” RHP.

4.2 Proposed RHP Related Issues, Actions and Recommendations

4.2a HyVic by Dr J. Polcher for Dr F. Semazzi

The Panel was informed of further progress on the proposed study over the Lake Victoria Basin (LVB) that is evolving as a potential RHP designated as a study of the hydrology of the Victoria Basin (HyVic). Figure 3 shows the various components of HyVic as they were discussed at a HyVic Planning Meeting, held at the University of Reading, UK, from 18-19 July, 2013. As a way of carrying the HyVic plans forward in an orderly manner, it was agreed at the Reading

Meeting to form an International Planning Committee (IPC). The report of the Reading Meeting is on the meeting Web Page: <http://gewex.org/ghp-gdap/home>.

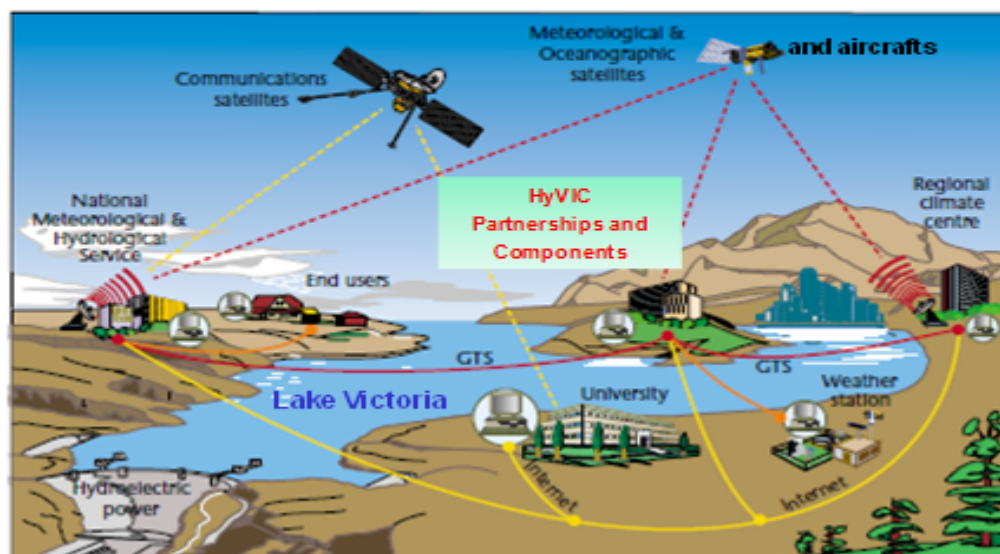


Figure 3 – Elements of HyVic

Recommendation (R4): The Panel endorsed the establishment of the IPC as the body which will work on finalizing HyVic's science plan and aid in identifying and securing funding for the program as well as other activities. The Chair of the IPC, Dr F. Semazzi has the responsibility to keep the GHP informed of the IPC actions and HyVic progress in general.

The first meeting of the IPC will be held in Arusha, Tanzania, at the 2013 [Africa Climate Conference](#), where several side meetings will be held on the topic of HyVic.

Recommendation (R5): With the caveat that a member of the East African University community be added to the IPC, the Panel agreed that the slate of candidates submitted earlier should be endorsed, and that their term of responsibility should run for three years or until HyVic is approved as an RHP, whichever event occurs first.

Action (A5): IPC invitation letter. IGPO agreed to draft and distribute a letter of invitation to the list of IPC candidates and to register the responses on behalf of the GHP Co-Chairs. The letter has been sent and responses are being tracked.

Action (A5a): HyVic adherence to RHP Approval/Assessment Criteria. The Panel specified that the IPC review and consider all the elements of the Criteria for development and implementation of the GHP, RHPs. The IGPO will inform the Chairman of the IPC of the need to ensure that the HyVic implementation adhere to the Criteria <http://www.gewex.org/RHP-TOR.pdf>.

4.2b

OzEWEX by Dr J. Evans

The Panel again voiced its point of view that OzEWEX, while making progress on a number of issues of importance to GEWEX including those that relate to the GSQs, it continues to operate more as a set of separate initiatives/activities that have not settled on a unifying theme that might make the whole greater than the sum of the independent sub-projects. The discussion partially resolved this matter by providing additional information on the continuing development of the OzEWEX Science and Implementation plan, which is evolving toward a set of amalgamating themes that will meet the criteria of an Initiating RHP.

Action (A6): Advancement toward an OzEWEX unifying set of themes. The Panel asked the IGPO to advise the OzEWEX Representative, of record, of the concerns voiced at the meeting and of the need for the Project to provide updated documentation that would show progress toward a functional approach to the science foci under way or planned that would fit the form of a RHP.

4.2c BALTEX-BALTIC EARTH by Drs. H. Berbery and J. Polcher; for Dr. M. Reckermann

The Panel was informed that the wrap-up/synthesis meeting for BALTEX Phase II, was designated as the 7th Study Conference on BALTEX and was held on the Island of Öland, Sweden from 10-14 June 2013. BALTEX Phase II (2003-2012) had extended the scope of research to regional climate change, water management and biogeochemical cycles and transport processes in the regional Earth system of the Baltic Sea and its hydrological drainage basin, which constitutes a unique European water basin, creating specific demands on models and scientific concepts.

Baltic Earth is the name of the program which is to succeed BALTEX. The continuity in basic research fields, structure (secretariat, conferences, publications) and the network (people and institutions) is symbolized by the clearly recognizable logo, being very similar to the BALTEX logo, but still distinctly different. Baltic Earth stands for the vision to achieve an improved Earth system understanding of the Baltic Sea region. This means that the research disciplines of BALTEX continue to be relevant, but a more holistic view of the Earth system encompassing processes in the atmosphere, on land and in the sea as well as in the anthroposphere shall gain in importance in Baltic Earth relative to BALTEX. Specific grand research challenges have been suggested to be:

- GC1: Salinity dynamics in the Baltic Sea
- GC2: Land-Sea biogeochemical feedbacks in the Baltic Sea region
- GC3: Natural hazards and extreme events in the Baltic Sea region
- GC4: Understanding sea level dynamics using new technologies (remote sensing)
- GC5: Understanding regional variability of water and energy exchanges
- The human impact will be assessed at all levels, wherever possible and sensible

More information is available at: <http://www.baltic-earth.eu/balticearth/index.html>.

The Panel was encouraged that BALTIC-Earth seems to be aligning well with WCRP/GEWEX challenges and science questions, noting that all of the BALTIC-Earth GCs, except for GC2, are

associated with topics of direct interest to GEWEX at both the regional and global scales. None-the-less IGPO accepted the **Action (A7)** to contact BALTIC-Earth representatives of record to ensure that they are aware of the GSQs and that they factor those into their implementation processes.

4.3 Cross-cut presentations Actions

The concept of the Cross-cut (CC) Projects, as the second core element of GHP, with the RHPs, has been retained as a means of generating interactions between RHPs, maintaining links with completed RHPs, advancing the GHP contributions to the WCRP Grand Challenges and the GEWEX Science Questions, addressing issues of common concern with the other GEWEX Panels and WCRP projects and engaging the broader Community in GEWEX/GHP work.

The CCs have been constrained to be projects to be carried out for 2-3 years but, which can be renewed. The currently active CCs (see list below) have been addressed in short proposals that followed a prescribed template with specifics related to the science objectives, the relationship to the RHP's and the GEWEX Science Questions, and their implementation process. Others that are listed as "Potentially" active have reached a level of maturity as to be endorsed by the Panel but have not been formally submitted in the standardized CC format, as yet. Those identified as "Proposed" have had an initial discussion, but require additional dialog between the Panel and those promoting the topic for CC status.

GHP Cross-Cut Projects List

Currently active

- Drought (Ron Stewart)
- Sub-daily precipitation (Hayley Fowler)
- LSM validation & Benchmarking (Mike Ek, GLASS)

Potentially active

- Cold Regions precipitation, especially that which undergoes a phase transition (Ron Stewart, Pasha Groisman)
- Seasonal hydrologic prediction (Andy Wood)
- GDAP integrated product regional evaluation (TBD)

Proposed

- High-elevation precipitation
- Climate change and water resources
- Regional climate model evaluation (CORDEX)

4.3a Drought by Dr. R. Stewart

The basis for this CC was a WCRP Global Drought Information System (GDIS) workshop in Frascati, Italy, in April 2012. The workshop was sponsored by the WCRP Drought Interest Group (DIG), together with CLIVAR, GEWEX, GEO, the European Space Agency (ESA), NASA, NSF, and NIDIS. The workshop focused on determining the needs and the steps necessary for the development of a GDIS. The key recommendation of the workshop was that the community should move forward with the development of the basic elements of the GDIS consisting of: 1)

an experimental real-time global monitoring and prediction system; 2) a drought catalogue summarizing our understanding of drought world-wide, and 3) a research component centered on internationally coordinated cases studies of recent high profile droughts, with strong ties to users. The recommendations include specific steps on how to move forward on each component including the critical role of pilot studies that target existing national and other regional drought information systems in the validation and evaluation of the global products.

As a result, Dr Stewart on behalf of GHP undertook to map the issues that occur at the regional (RHP) scales and to produce a summary/synthesis article that considers the regional questions and brings together the many related facets for a global view. The list of topics for consideration at the regional level include:

- occurrence and known severe droughts
- ability of simple metrics to capture droughts (and limitations)
- types and features and locally appropriate metrics
- trend -- known, suspected, or needs work
- key circulations (low-level jets, storm tracks, anticyclones)
- key processes (soil moisture feedback, snowmelt, etc.)
- predictability
- impacts
- gaps in the aspects above

To put the matter in the GHP/RHP context the following Table (2) was presented, by Dr Stewart.

RHPs and Extremes-Related Phenomena

Draft summary (needs updating)

	Heavy Precipitation	Floods	Winter Storms	Drought	Heat Waves	Fires
AMMA	•			•		
BALTEX	•	•	•	•		
CPPA	•	•		•	•	
HyMeX	•	•	•	•	•	
LBA	•	•		•		
LBP	•	•		•		
MAHASRI	•	•		•		
MDB	•	•		•	•	•
NEESPI	•	•	•	•		•
SRB	•	•	•	•	•	•

Table 2 – Drought and other extreme events exhibited in the GHP RHPs

- The Panel was encouraged to hear that at the time of the meeting all of the Individual articles for the synthesis article had been submitted and asked **Dr Stewart (Action–A8)** to keep them informed of progress on the next milestones such as submittal of the article to the Journal of Climate and plans for a follow-on workshop in 2014.

4.3b Sub-Daily Rainfall by Dr. S. Westra for/with Dr H. Fowler

The Panel had earlier agreed that this CC was relevant to GHP interests including that:

- Many high-risk flood events (such flash floods) occur at sub-daily timescales.
- Sub-daily rainfall intensity is also important for understanding sediment transport, landslides, water quality, environmental flows, stormwater and sewerage system design,...
- Evidence is increasingly showing that the distribution of rainfall within a day is changing:
 - Rainfall is becoming more intense, and potentially interspersed with longer dry periods
- Still many unknowns about the nature and causes of these changes!

There was agreement that the research foci of the study were relevant to the efforts by GHP, through its RHPs, to contribute to the GSQs. To keep with the need for the CCs to be focused efforts, the Panel asked **Dr Westra (Action – A9)** to bring forward **plans for a Sub-Daily Precipitation Workshop that would occur at the time of the GEWEX July 2014 Science Conference and Pan-GEWEX Meeting** and, which, in part, would include outreach/communication with the GHP/RHP representatives of record for their involvement/contribution to the principal research questions associated with the CC, including:

- What is the spatial distribution of observed precipitation extremes, and their trends, globally at daily time-scales?
- What is the spatial distribution of observed precipitation extremes, and their trends, globally at sub-daily time-scales?
- What is the relationship between daily and sub-daily extremes, their trends and global warming and natural variability?
- Are global and/or regional climate models able to simulate precipitation extremes at daily and sub-daily times-scales?
- What are the projected future changes in daily and sub-daily precipitation extremes due to global warming?
-

In this context, **Dr Westra** was specifically asked (**Action – A9a**) to provide background on this CC to Dr P. Drobinski, so that the concept could be taken up at the 7th HyMeX Workshop that will take place from 7 to 10 October 2013 in Cassis, France.

4.3c LSM validation & Benchmarking by Dr. M. Ek (Written Input)

This CC has been undertaken by Dr Ek, on behalf of GHP, through the GEWEX Global Land/Atmosphere System Study (GLASS) Panel land model benchmarking project: led by Martin Best (UKMO, former GLASS co-chair), Gab Abramowitz (UNSW, PALS), and other GLASS members (including Dr Ek). The primary tool for the benchmarking of land models in the framework of this CC is the Protocol for the Analysis of Land Surface models (PALS).

The Panel was informed that the initial project had morphed into the PALS Land sUrface Model Evaluation Benchmarking pRoject (PLUMBER), which is now a “community” experiment that aims to introduce the concept of land model benchmarking in land modelling development and validation processes taking place within the broader community.

The Panel asked **Dr Ek, to (Action A -10)** provide them with specific examples of how the process whereby the archived data sets (at NCAR) are being queried for use in PALS (a current activity at NOAA/NCEP) - data.eol.ucar.edu/master_list/?project=CEOP/EOP-3/4 –, is proceeding. Such examples are necessary to show that this CC is achieving success by

leveraging off of the historic datasets associated with the GHP/RHP efforts to provide the community with high quality (QC'd) datasets.

4.3d Cold-Shoulder Season Precipitation by Dr R. Stewart (with Pasha Groisman)

The Panel agreed that there is interest in this topic because precipitation occurring when the temperature is below and especially near zero degrees centigrade is very often linked with natural hazards. The focus of the CC will, therefore, be associated with the issue of how the occurrence of cold/shoulder season precipitation, in particular precipitation that undergoes a phase transition, and the hazards that they are correlated with might be affected by warming temperatures, circulation changes, etc.

The Panel supported the idea that there is value in pursuing this CC and that it is especially relevant to conditions that have been or are under observation and analysis in a number of RHP's.

Dr Stewart was asked to submit a CC Proposal on this topic (or enlist a project lead who could do so) and to undertake (Action A-11) the writing of an Article on the subject for publication in the GEWEX Newsletter, by the end of 2013.

It was noted that this CC will have the interest of the CCRN community and is expected to have support within other RHP research groups.

In this context, and because GHP may be activating a number of "cold regions" cross-cut science initiatives (see items 4.3f and g below) it was recommended (R6) that GHP foster closer collaboration with the WCRP core project Climate and the Cryosphere (CliC). IGPO took agreed to (Action A-11a) contact the CliC Leads and propose a presentation of GHP at the next CliC SSG and to invite CliC representatives to the next GHP meeting in December 2014.

4.3e Seasonal hydrologic prediction by Dr A. Wood

If this initiative became a CC of GHP it would be associated with the Hydrological Ensemble Prediction Experiment (HEPEX). The HEPEX has been framed to demonstrate the added value of hydrological ensemble predictions (HEPS) for emergency management and water resources sectors to make decisions benefitting the economy, public health and safety. Key questions of HEPEX include:

- What adaptations are required for meteorological ensemble systems to be coupled with hydrological ensemble systems?
- How should the existing hydrological ensemble prediction systems evolve to account for all sources of uncertainty within a forecast?, and
- What is the best way for the user community to take advantage of ensemble forecasts and to make better decisions based on them?

The Panel agreed that seasonal forecasting could be an important research focus at which GHP and HEPEX could have a mutually beneficial connection. GHP has strength, through its RHPs, in seasonal forecasting/predictability and HEPEX has some smaller funded activities that could use WCRP/GEWEX national/international associations for support to coalesce into a larger coordinated experiment that could lead GHP closer to the service/user communities where HEPEX now has active ties.

Dr A. Wood was asked to (Action A-12) submit a CC proposal on the agreed to template (see Appendix 4) that would especially provide for a survey of the level of activity associated with HEPEX that is/has taken place in the RHPs.

4.3f GDAP integrated product regional evaluation (Open discussion)

The GDAP presentation informed the Panel that there were a number of products including Energy/Water, TOA and Surface Fluxes, Land Fluxes, Sea Fluxes, Clouds and Aerosols. These will all be integrated by 15 November 2013 and by 30 March 2014 would be available for one full year (2007). From that point on the effort will start back at 1998 and move forward to the current time.

Dr C. Kummerow, GDAP Co-Chair noted that as soon as the integrated product is done they would be ready to begin looking at subsets of the data that correspond to the RHPs and begin an effort to interact on issues related to water budget closure over those regions. The GHP reaction was that while this was of some interest the matter of closure of the water budgets over the RHP's was not the highest priority matter facing GHP in its effort to contribute to the GSQs and that other issues should be given more immediate consideration.

GHP proposed interacting with GDAP on higher priority science issues such as validation of the precipitation product over mountainous areas as an adjunct to the broader matter of the hydrology of mountain basins. Connections should also be made with respect to phases of precipitation: rain, mixed and snow and what is occurring in the transitional zones that may be identifiable in the GDAP product(s) and relatable to the appropriate RHPs. It was felt that this could be difficult since the GDAP snow products are derived from temperature/humidity information. Despite these short-comings it was agreed that an effort should be undertaken between GHP and GDAP that might have the possibility of contributing to better understanding of the hydrology over orographic terrain (i.e. high mountain precipitation).

These discussions led to a proposal by Dr R. Harding to look at water budgets with the gross runoff over the world's largest basins. The effort would look at twenty major basins, where runoff is available, to determine if the water budget is closed in the products. As a corollary, a check of potential evaporation (if/where it exists) would enable a conclusion to be made about whether or not evaporation is the reason the budget is not balanced.

Drs Polcher and Harding agreed to (Action a-13) write a proposal to engage GDAP in an effort to examine a number of large river basins (up to 20) using observed runoff to determine the extent to which their water budgets can or cannot be closed. GHP, through its RHPs would contribute to this effort by providing data (including masks) relevant to the exercise, from their regions (SaskRB/CCRN, MAHASRI, HyMeX, BALTEX, etc.). The first results from the analysis of the basin study, should be available at the GEWEX Science Conference and pan GEWEX meeting (July 2014).

4.3g High Elevation Precipitation by Dr V. Levizzani (written report)

Dr V. Levizzani, informed the Panel, through a written report, about a new project designated as the NextSnow pilot project, which he proposes to submit, in due course, as a GHP CC. This effort, is part of the larger Italian effort NextData (<http://www.nextdatapoint.it/>) launched by the Italian National Council of Research to collect, catalog and provide access to environmental and

climate data with special emphasis on mountain and sea areas. NextSnow aims at setting the ground for a snow cover and snowfall measurement and modeling strategy in Italian mountain regions using ground measurements, remote sensing observations and numerical models.

The Panel asked **IGPO to (Action A-14)** connect with Dr Levizzani assist him in formulating this CC in a timely manner and to further assist him in linking with individuals and groups with knowledge of data and networks in mountain regions, including Dr J. Pomeroy at Environment Canada, Dr J. Renwick, climate system expert at the Victoria University of Wellington, New Zealand and Drs Germán Poveda & Juan F. Salazar & D. López at the Universidad Nacional de Colombia, Medellín, Colombia. Dr Poveda had presented information about a regional network of over 60 stations that who's data could be of value in the suggested CC (see Figure 4).

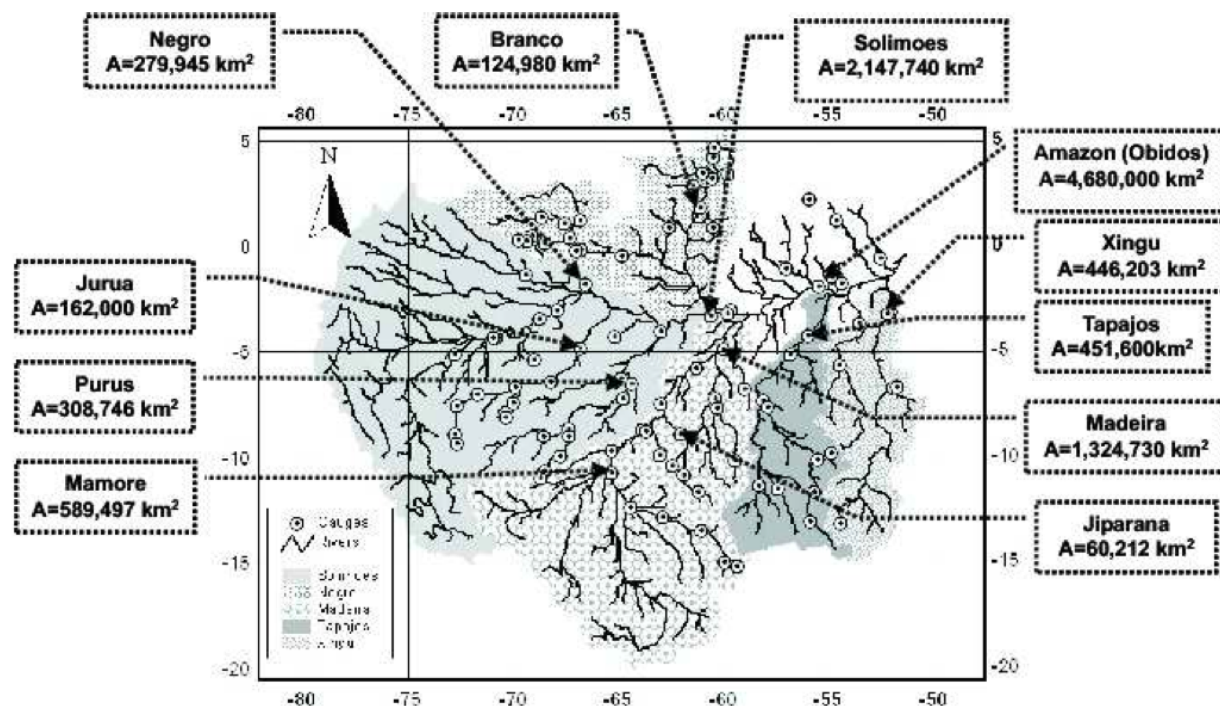


Figure 4 – Gauged basins in University of Colombia River flow study

This action should also ensure that this proposed CC be associated with the GHP/GDAP joint regional evaluation CC noted above.

4.3h Climate Change and Water Resources by Dr R. Harding

This proposed CC is directly associated with the GSQ-2 issue that deals with climate change and water resources. **Dr Harding agreed to (Action A-15)** to formulate this CC as a means of sharpening the WCRP Grand Challenge related to the development of a water strategy that addresses the issue of past and future changes in Water in general, and the GEWEX science question on global water resource systems in particular. The action to move this ahead as a GHP contribution to the GSQs will be coordinated with **Dr Harding's agreement** to distill questions on this topic and provide it as a talk at the GEWEX Science Conference (July 2014). Following the Conference the CC will be formally submitted to the Panel.

4.3i Regional Climate Model Evaluation (CORDEX) by J. Evans/H. Berbery

This CC was proposed to better understand the value of the CORDEX approach and the significance of its results to GHP. The Panel did not feel that there was sufficient understanding of the need/value of applying the CORDEX regional model evaluation approach to the RHP regions. Before, advancing this as a CC the Panel will want to hear back on the outcome of the WCRP VAMOS/CORDEX Workshop on Latin-America and Caribbean CORDEX LAC: Phase I - South America, a partnership between CLIVAR/VAMOS and CORDEX that took place from 11-13 September 2013, Lima, Perú and the 1st CORDEX Workshop on Statistical Downscaling, 26-27 September 2013, Trieste Italy, and the CORDEX conference, 4-7 November, Brussels, Belgium, where GHP representatives were/will be participating. Following feedback on these meetings, **Drs J. Evans and H. Berbery agreed to (Action A-16)** provide the Panel with more background on how GHP might link with CORDEX in a mutually beneficial manner, including a possible CC that might include CORDEX runs over GHP RHPs and a comparison of the results to GCM runs over the same regions.

4.3j Cross-cut Science/RHP Contribution to GEWEX Science Questions Summary

The progress toward the implementation of the existing GHP Cross-cutting Science initiatives and expansion of the number of proposed topics as discussed at the meeting led to the agreement that further advancement of the cross-cut proposals and their implementation across the RHPs was the main tool by which GHP would be a major contributor to advancing understanding of the main science issues facing GEWEX as reflected in the GEWEX Science Questions. As a way of summarizing this concept a matrix was developed that maps the GHP CCs into the GSQs. The matrix is presented in Figure 5 below.

GHP activities in relation to GSQs

GEWEX Science Questions		Regional Hydroclimate Projects					Cross-cut activities
		BALTEX-II	MAHASRI	NEESPI	HyMex	SaskRB	
Observations and Predictions of Precipitation	How well can precipitation be described?	y	y	y	y	y	Sub-daily precipitation
	How do changes in climate affect the characteristics?	y	y	y	y	y	High elevation precipitation
	How much confidence do we have in predictions?	y	y		y		Phase transition precipitation
Global Water Resource Systems	How do changes in the land surface and hydrology influence water resources?	y	y	y	y	y	Climate change and water resources
	How does climate change impact water resource systems?	y	y	y	y	y	
	How can new observations lead to improved management?		y			y	
Changes in extremes	Observing system requirements		y	y	y	y	Drought
	Modelling capabilities				y	y	Seasonal Hydrologic prediction
	Modelling processes involved in extremes				y	y	Regional climate model evaluation
	Improved early warning systems		y			y	LSM validation and benchmarking
Water and energy cycles	Can we balance the budget at TOA?						GDAP integrated product evaluation
	Can we balance the budgets at the surface?				y		
	Can we track the changes over time?				y		
	Can we relate changes and processes?						
	Cloud-aerosol-precipitation feedbacks						

Figure 5 - Cross-cut Science/RHP Contribution to GEWEX Science Questions Summary Matrix

4.4 Global Data Centers

The Global Data Centers for precipitation, river runoff and lakes/reservoirs (GRDC, GPCC and Hydrolare, respectively) are affiliated activities under GHP auspices for GEWEX.

4.4a Global Precipitation Climatology Center (GPCC)- by Dr U. Schneider

The main objective of the GPCC is monitoring and assessment of global precipitation on the Earth's land surface based on rain gauge-measurements, thereby contributing to GEWEX (GHP and GDAP) and to GCOS. The Panel asked Dr Schneider to (Action A-17) respond to the request for GPCC to subset high elevation stations as a global provider and to interact with research groups looking for precipitation data at high elevations and especially to link with the GHP efforts to improve knowledge of the hydrology of high elevations (Dr V. Levizzani) and to distinguish rain, mixed, and solid phases of precipitation (see items 4.3d, f, and g, and coordinate with the appropriate GHP leads on each those related cross-cut science efforts). The Panel also asked Dr Schneider to (Action A-17a) connect with RHP representatives who are knowledgeable of data recovery efforts taking place in their regions so that the most accurate data can be reflected in the GPCC database (e.g. Dr Matsumoto/MAHASRI, Dr T. Lebel/AMMA, and others). The Panel would like reports of progress on these actions by the time of the GEWEX Conference and Pan-GEWEX Meeting (July 2014).

4.4b Global Runoff Data Center (GRDC)- by Dr U. Looser

The main objective of the GRDC is the world-wide acquisition, storage and dissemination of historical river discharge data in support of the predominantly water and climate related programmes and projects of the United Nations (UN), their specialized agencies and the scientific research community. The Panel encouraged the GRDC to (Action A-18) consider producing research ready subset products from their database that could advance knowledge of hydrological issues of importance to the GHP efforts to contribute to the GSQs (water budgets, high elevations, precipitation phases, etc.). It was also mentioned that IGPO, on behalf of the Panel, would be willing to send a letter, on GEWEX letterhead, to the Center Management, emphasizing the need for such products and supporting the addition/redirection of resources, to develop/produce such products. The panel also agreed to identify RHP representatives/points-of-contact who are interested in the production and application of such specialized runoff products.

4.4c International Data Centre on Hydrology of Lakes and Reservoirs (HYDROLARE) by Dr U. Looser for Prof. V. Vuglinsky (written input)

In 2013 the Centre has been operating in accordance with work plan adopted by Roshydromet and following the recommendations of the third Steering Committee meeting (5 – 7 July 2011, SHI, Saint-Petersburg). The Panel was informed that HYDROLARE is continuing to work on collection and analysis of data on hydrology of lakes and reservoirs obtained from the WMO members, as well as on the conversion of data to the adopted format. The database has been updated by the level data averaged for lake area and has consequently been restructured. The Panel has asked IGPO (Action A-19) to contact Dr Vuglinsky to encourage him to interact with RHP representatives/points-of-contact who are interested in the production and application of specialized lake Hydrology products that could advance knowledge of hydrological issues of importance to the GHP efforts to contribute to the GSQs (water budgets, high elevations, precipitation phases, etc.) and to report on progress toward the development of such products by the time of the GEWEX Conference and Pan-GEWEX Meeting (July, 2014).

Recommendation R-6: Add Lake Hydrology to the GHP framework. In the context of the Hydrolare discussion, Dr R. Stewart put forward the idea of a possible GHP CC related to improving the understanding of the modeling and hydrology of lakes. The Panel endorsed the idea and asked Dr. Stewart to look into such an effort as part of CCRN and report on the feasibility of making it a GHP CC.

4.5 Other Topics and Overarching Issues, Actions and Recommendations

A series of other topics were discussed at the meeting that included (i) development of a GHP “review” style article; (ii) GHP actions associated with finalizing GHP related sessions at the GEWEX Science Conference; (iii) concepts to be considered for possible eventual GHP endorsement as GHP CCs or new RHPs.

4.5a GHP “review” Article (open discussion)

Action (A-20) – IGPO, with support of the GHP Co-Chairs, outline and draft a GHP review/survey synthesis in the form of an article in an appropriate Publication (e.g. BAMS, EOS, etc.). The basis for this action was the recognition that it was important to better understand the

background associated with the continued restructuring of GEWEX science elements and the consequential re-organization and establishment of new plans/vision for GHP's contribution (through its Regional Studies and Cross-cutting science projects) to the climate research challenges and questions now being posed by WCRP/GEWEX.

4.5b GHP contribution to the GEWEX Science Conference (open discussion)

Action (A-21) –The Panel agreed to take the following, with respect to the GHP relevant sessions at the Conference <http://gewex.org/2014conf/home.html>. In specific it is critical that the GHP associated Conveners/Co-Conveners develop the three line description that summaries the main points of session for review by the Panel by 27 September 2013.

(A-21a) Advancing Climate systems knowledge through new observations and field Exp (GHP RHP focus): Jeff Walker and Philippe Drobinski agreed to chair Session. Panel asked that this session have both an Oral and a Poster component.

(A-21b) Use of climate information and predictions in hydrology and water resources management (GHP/RHP Focus) HEPEX should be on board so it was decided to replace Jan Polcher with Jan Verkade to entrain him into this Session. Jan will write to Eric Wood as a Co-Convenor of this session and ask him if he has come up with the three line description. The GHP Co-chairs are to communicate with Toshio Koike to invite him to be involved. The Panel asked that this session have both an Oral and a Poster component.

(A-21c) Modeling anthropogenic impacts of land-water-management in land surface models. It was agreed that Richard Harding will Lead this session and that he will do the description. He will also get in touch with Taiken Oki, Justin Sheffied and the others listed in the V6 version of the Conference Plan.

(A-21d) Hydrology of high elevation areas: We want John Pomeroy to lead with Essery and Jaoming Ma to Co-convene. J. Evans agreed that, on behalf of the GHP Co-Chairs, he would write a message inviting John Pomeroy, Essery and Jaoming Ma to co-convene this session on behalf of GHP. Jason and Jan will suggest points to be included in the Session description.

(A-21e) Land precipitation and drought observations, modeling, errors and uncertainty GDAP lead GHP just review/comment on the three line description. Dr Levinzzani is the GHP representative.

Consequently, these actions were undertaken and GHP has met its immediate responsibilities associated the GHP related Sessions at the Conference.

4.5c New Studies for Consideration for GHP CC and RHP Initiation by Drs L. A. T. Machado (RELAMPAGO) and A. Nunes (SAnDRA)

4.5c.1 RELAMPAGO - Dr. L. A. T. Machado provided the Panel with details of an effort designated as RELAMPAGO (working acronym) - Remote sensing of Electrification, Lightning, And Meso-scale/micro-scale Processes with Adaptive Ground Observations, which is envisioned to be an international multi-agency field program to study multi-scale

aspects of intense, organized convective systems that produce severe weather in subtropical south America. Satellite evidence, including from TRMM, indicates that the convection in this region is unique in its intense vertical structure, broad horizontal organization, and lightning production. In this data sparse region, we do not know much about aspects of these systems including what governs their structure, life cycle, similarities and differences with severe weather-producing systems observed in the US and elsewhere, and their predictability on weather to climate timescales.

The Panel agreed that RELAMPAGO had merit and suggested that if more specific research related to hydrology at the surface were included there would be an interest from GHP to endorse such an effort as a proposed RHP in the 2016-17 time period. The Panel asked **IGPO to (Action A-22)** write a letter to Dr Machado noting the Panels comment that this effort seems to very nearly meet the conditions for becoming an RHP, but outlining the note that there is need to add a strong hydrological component at the surface and advising him of the Criteria that need to be met if a study is to be endorsed as an RHP, including especially the consequential need to be more multidisciplinary. **The letter should ask for a response to these suggestions by the time of the GEWEX Conference and Pan-GEWEX Meeting (July 2014) and should encourage further updates on the evolution of the RELAMPAGO Implementation plans and funding be provided in the interim.**

4.5c.2 System for Analysis of Environmental Disasters and Risk Assessment (SAnDRA)

Dr A. Nunes informed the Panel that the “mission” of SAnDRA is the development of an integrated modeling approach that aims to assist with decision-making regarding environmental disasters caused by extreme events via coordinated projects, research and activities of the Departments of Geography, Geology and Meteorology from IGEO-UFRJ. The modeling component will include landslide modeling that will apply physically based numerical models that include advanced hydrology and slope stability, among other combinations. Predictions of areas susceptible to mass movements will be made through the combination of prediction models of mass movements (e.g., SHALSTAB and TRIGRS models for shallow landslides) with a propagation model for debris flow (model FLO-2D).

In concluding her presentation Dr Nunes noted that all proposed modeling experiments, as well as essential datasets, would be used in the refinement of the modeling systems, providing better predictions and projections to model areas susceptible to landslides and that this combined modeling effort will also contribute to the understanding of regional climate variability and change; and will support better mitigation and adaptation decisions at local scales.

The Panel felt this effort had value in the framework of the issues, which GHP must undertake to contribute to the GSQs. In that context, they asked **Dr Nunes to (Action A-23) consider presenting this concept in an appropriate GHP specific session at the GEWEX Conference (July 2014) and to keep the Panel informed in the interim period of further progress on the development of SAnDRA in anticipation of it also being formulated into a GHP CC, in due course, following the GEWEX Science Conference.**

4.5d WCRP Conference for Latin America and the Caribbean: Developing, linking and applying climate knowledge by Dr H. Berbery

Dr Berbery informed the Panel that part of the motivation for a WCRP Conference for Latin America and the Caribbean (LAC) came during the Sixth International Scientific Conference on the Global Energy and Water Cycle held in Melbourne, Australia on 24-28 August 2009. It was acknowledged at that meeting that the climate research community is facing a complex challenge that involves:

- Improving our knowledge on the climate system, the interactions among its components and the limits of predictability, but also
- Enhancing our ability to interact with other disciplines, particularly decision makers and social scientists in order to translate basic climate knowledge into actionable science.

In this context, the WCRP Joint Scientific Committee (JSC) asked the Variability of the American Monsoon Systems (VAMOS) Panel of CLIVAR initiate actions towards organizing a Latin American and Caribbean Conference on Climate and Society with the objective of identifying new priorities for a new regional group within the WCRP structure.

The kick off meeting for the Conference, which will take place in Montevideo, Uruguay, March 17-21, 2014, identified four thematic areas prioritized by the Global Framework for Climate Services: water, disaster risk reduction, food security/agriculture and health. More information on the Conference can be found at: <http://www.cima.fcen.uba.ar/WCRP/>

The Panel endorsed the LAC and asked IGPO to (Action A-24) distribute to the broader GHP community, the two charts from Dr Berbery's presentation that show the Climate Research Specific Objectives/Expected Outcomes that the Conference will be considering.

4.5e Data Management Advisory Council (Open Discussion)

The Panel discussed the need to undertake a survey of past and present RHPs with the intent of performing an assessment of their databases in accordance with specific standards that GHP should inaugurate under the auspices of a proposed Data Management Advisory Council (DMAC). The DMAC would set the data standards, set up a GHP CC that would use the standards to assess the databases of the past RHPs and begin to monitor the four active RHP data collection, processing and distribution schemes and products in the context of their potential application to the advancement of the GSQs. The goal is to ensure the RHP datasets are consistent and "verified". The Panel asked IGPO (Action A-25) to take the lead in establishing the framework/TORs for a DMAC with support from other members of the Panel and GHP community, including Drs Walker, Matsumoto, Ek, Li, Harding and Berbery. IGPO agreed to (Action A-25a) open the matter at the GEWEX SSG meeting 28-31 October 2013, at Boulder, Colorado, USA.

APPENDIX 1. Overall Agenda of Meeting

Joint Meeting of the World Climate Research Programme (WCRP) Global Energy and Water Exchanges (GEWEX) Project Hydroclimatology (GHP) and Data and Assessments (GDAP) Panels

(Draft Agenda, Rev 6, 29 August 2013)

Instituto de Geociências (IGEO), Centro de Ciências Matemáticas e da Natureza (CCMN),
Universidade Federal do Rio de Janeiro (UFRJ), Cidade Universitária, Ilha do Fundão, Rio de
Janeiro, Brazil

2 – 6 September 2013

Sponsored by the

Fundação Carlos Chagas Filho de Amparo à Pesquisa do Estado do Rio de Janeiro (FAPERJ),
Universidade Federal do Rio de Janeiro and the WCRP with GEWEX

Purpose of the Meeting

The Global Energy and Water Exchanges (GEWEX) is based on integrated research projects, observations and scientific activities that aim to improve the knowledge about global climate change and its impacts on a regional scale. GEWEX integrates scientific research, production and collection of information in the form of observational data, as well as products derived from applied algorithms and analysis of numerical model solutions, all distributed among different panels. The GEWEX Hydroclimatology Panel (GHP), and the GEWEX Data and Analysis Panel (GDAP) are organized in order to address most of GEWEX Science Questions (GSQs) in support to the World Climate Research Programme (WCRP) activities.

South American scientific community is also interested in answers for questions that coincide with GSQs, and lead to better understanding of the major causes of 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. Thus, in order to enhance and exchange knowledge, the IGEO-UFRJ through its Graduate, and Extension and Outreach Programs proposed that the Joint Meeting of GHP and GDAP was held in the City of Rio de Janeiro, together with presentations by invited researchers from South America and the Caribbean, dedicated to studies on climate, water resources, geomorphology, and risk analysis and environmental disasters. Besides the scientific meeting of the two panels, which assess international projects that receive support from WCRP, lectures by researchers associated with the WCRP/GEWEX, as well as invited talks from local researchers are scheduled. The lectures target undergraduate and postgraduate students, professionals working in the areas of risk analysis and prevention of disasters related to extreme events, and members of the local scientific community.

Opening Meeting sessions with translation (Monday and AM Tuesday).

Monday September 2, 2013

09:00 – 10:00 REGISTRATION

Convened at Auditorium Roxinho (400-seat room), CCMN, UFRJ.

10:00 – 10:45 Opening ceremony with participation of the UFRJ President's Office Representatives, the Dean of the CCMN, the IGEO's Director, and the WCRP/GEWEX Representatives and Panel Chairs.

10:45 – 11:15 WCRP/GEWEX Presentation (**Peter van Oevelen**, Director of the International GEWEX Project Office)

11:15 – 12:00 **Session 1**: "Climate change and environmental disasters". (**Chairs: Ana Nunes/Peter van Oevelen**)

11:15 – 12:00 "How human-induced climate change affects weather extremes." (**Kevin Trenberth**, Chairman of the GEWEX Scientific Steering Group, National Center for Atmospheric Research).

12:00 – 14:00 Lunch break.

14:00 – 16:30 **Session 1 continued**.

14:00 – 14:30 "Drought and heavy precipitation over Canada with implications for other regions." (**Ronald Stewart**, University of Manitoba).

14:30 – 15:00 "Real-time global flood estimation using satellite rainfall information." (**Robert Adler**, ESSIC/University of Maryland).

15:00 – 15:30 "On the role of atmospheric rivers and low-level jets in South American precipitation patterns." (**Germán Poveda**, Universidad Nacional de Colombia).

15:30 – 16:00 "A new system for environmental disaster and risk assessment" (**Ana Nunes, Nelson Fernandes and Maria Naise O. Peixoto**, Depts. Of Meteorology and Geography IGEO, UFRJ).

16:00 Adjourn session.

17:00 – 19:00 **Reception for GEWEX members and guests**.
Main Hall of CCMN, UFRJ.

Tuesday September 3, 2013

09:00 – 12:00 **Session 2**: "Hydrological Cycle and Energy Balance on a Planet in Transformation" (**Chair: Howard Wheater**)

Convened at Auditorium Roxinho (400-seat room), CCMN, UFRJ.

09:00 – 09:30 "Groundwater and wetlands in South America." (**Gerson Cardoso da Silva Júnior**, Dept. of Geology, IGEO, UFRJ).

09:30 – 10:15 "Can we observe and assess whether the global hydrological cycle is intensifying?" (**Eric Wood**, Princeton University).

10:15 – 11:00 "Observations of the Earth's water cycle: progress and challenges." (Graeme Stephens, Jet Propulsion Laboratory, NASA).

11:00 – 11:30 "Brazilian Panel of Climate Change (PMBC) and the First National Assessment Report: Scientific Basis." (Tercio Ambrizzi, USP)

11:30 – 12:00 "Causes and impacts of Amazonian droughts." (José Marengo, Centro de Ciência do Sistema Terrestre, INPE).

12:00 – 13:30 Lunch break

GHP/GDAP Panel Sessions begin (no translation service available)

Convene: Conference Room, Deans's Office (capacity 90), CCMN, UFRJ.

13:30 – 14:10 **Opening of the Panel Sessions: Joint Overview** of GDAP and GHP projects and future plans; (GDAP, and GHP Chairs)

14:10 – 16:00 Presentations from Invited Regional Project Scientists
South American/Caribbean Projects Joint Session (Chairs Ana Nunes, Hugo Berbery) 4-6 presentations of 15-20 minutes, Regional Energy and Water Exchanges Project initiatives/proposals and cross-cutting Science topics.

14:10 – 14:30 Dr Rosmeri Rocha – South American CORDEX

14:30 – 14:50 Dr Maria Assuncao – GOAmazon* (modeling component)

14:50 – 15:10 Dr Germán Poveda – "Scaling of maximum annual river flows in the Amazon River Basin"

15:10 – 15:30 Dr E. Hugo Berbery - "A status report on the organization of the WCRP Latin American and Caribbean Conference (LACC)"

15:30 – 16:00 Coffee Break

16:00 – 17:00 **Parallel** GHP and GDAP Sessions Begin: (Agendas provided by Panel Chairs): (Sessions are opened to Regional Scientists) Suggested rooms: Conference Rm, Dean Office (capacity 90), CCMN, UFRJ (GDAP Mtg); Rm 5, Dean Office (capacity 20), CCMN, UFRJ (GHP Mtg).

17:00 Adjourn

*****Wednesday

September 4, 2013

09:00 – 12:00 **Parallel** GHP and GDAP Sessions (Continued)
(Agendas provided by Panel Chairs): (Sessions are opened to Regional Scientists)

12:00 – 13:30 Lunch break

* Green Ocean Amazon (GOAmazon) field campaign taking place from 2014-2015 in the State of Amazonas, Brazil.

Parallel GHP and GDAP Sessions (Continued)

13:30 – 17:00 **Parallel** Panel Sessions Continued
(Coffee and snacks served outside the room).

17:00 Adjourn

Thursday September 5, 2013

09:00 – 12:00 **Parallel** Panel Sessions Continued

12:00 – 13:30 Lunch Break.

13:30 – 16:00 **Joint** GHP/GDAP Session (Agenda is TBD by Panel Chairs)
(Convene in Conference Room, Dean's Office, CCMN, UFRJ)

16:00 – 16:30 Coffee Break.

16:30 – 18:00 **Joint** GHP/GDAP Session Continued with emphasis on **Evaluation of international
“projects”/cross-cuts submitted to the panels**

18:00: Adjourn

Friday, September 6, 2013

09:00 – 11:00 Roundtable Discussion with Panel Members, Collaborators and Local Scientists.
(Convene in Conference Room, Dean's Office, CCMN, UFRJ).

11:00 – 12:00 Lunch break (served on site).

12:00 – 13:45 Discussion on integration of activities within GEWEX, with recommendations for
the report to be presented to WCRP.

13:45 - 14:15 Closing session by the Panel Chairs with an evaluation draft.

14:15 Meeting ends

APPENDIX 2. GHP Specific Business Meeting Agenda

Draft Agenda GEWEX Hydroclimatology Panel (GHP) annual International Science Progress and Planning Meeting in Rio de Janeiro, Brazil from 2-6 September 2013 (Draft Rev 5, 30 August, 2013)

Tuesday September 3, 2013

13:30 – 16:00 Joint GDAP/GHP Session

New Winds Conference Room (70-seat room), Bl. H, 2nd floor, IGEO, UFRJ.

13:30 – 13:50 GDAP overview w. focus on potential joint GDAP/GHP activities – C. Kummerow

13:50-14:10 GHP overview w. focus on potential joint GDAP/GHP activities – J. Evans

14:10 – 16:00 Presentations from Invited Regional Project Scientists (Chairs Ana Nunes, Hugo Berbery) *4 presentations of 20 minutes, Regional Energy and Water Exchanges Project initiatives/proposals and cross-cutting Science topics.*

16:00 – 17:00 **GHP Session.**

Conference Rm, Dean Office

16:00 – 16:20 Panel objectives and meeting goals – J. Polcher

16:20 – 16:40 IGPO Update, JSC Report & GEWEX 2014 conference – P.J. van Oevelen

16:40 – 17:00 GEWEX Priorities/Outlook – G. Stephens

17:00 Adjourn

Wednesday September 4, 2013 – GHP Session

09:00 – 09:10 Agenda Overview and Charge to Participants – Evans/Polcher

GHP Element Reports (max 15 min presentation). Each project should plan to discuss:

- Status of the project
- Contribution to GEWEX Science Questions & WCRP Grand Challenges
- Interactions with other GEWEX Panels or parts of WCRP
- Plans for next 1-3 years.

RHP session

9:10 – 9:30 MAHASRI – J. Matsumoto

9:30 – 9:50 HyMeX – P. Drobinski

9:50 – 10:10 SRB – H. Wheeler

10:10 – 10:30 HyVic – J. Polcher

10:30 – 11:00 Break

11:00 – 11:20 OzEWEX – J. Evans

11:20 – 11:40 BALTEX-Earth – E. H. Berbery/J. Polcher

11:40 – 12:00 J. Polcher – Discussion RHP Status/Plans

12:00 – 13:30 Lunch break

Cross-cut Projects

13:30 – 13:50 Droughts – R. Stewart
13:50 – 14:10 Sub-daily precipitation – S. Westra
14:10 – 14:30 Cold season precipitation extremes – R. Stewart
14:30 – 14:50 Seasonal streamflow prediction – E. Woods
14:50 – 15:10 GHP/HEPEX Cross-cut Proposal - A. Wood

15:10 – 15:40 Break

Wednesday September 4, 2013 – (GHP Session CONTINUED)

15:40 – 16:30 J. Evans. *Discussion – RHP & cross-cut project interaction, potential new cross-cut projects (and leads) to address GSQs & WCRP Grand Challenges.*

16:30 – 17:00 Wrap-up Discussion - All

17:00 **Adjourn**

Thursday September 5, 2013

9:00 – 12:00 GHP Session continued

Global Data Centres

9:00 – 9:20 GPCC – U. Schneider
9:20 – 9:40 GRDC – U. Looser
9:40 – 10:00 HYDROLARE – U. Looser (not confirmed)
10:00 – 10:20 GEO/GEOSS – WCRP/GEWEX Linkage P. van Oeleven

10:30 – 10:50 Break

10:50 – 12:00 Panel meets for discussion of meeting outcome.

12:00 – 13:30 Lunch Break.

13:30 – 18:00 Joint GDAP/GHP Session
Convene in Conference Room, Dean's Office, CCMN, UFRJ

13:30 – 16:00 Discussion: GDAP to lay out specific plans for water and Energy budget products and closure. Discuss with GHP about specific joint effort.

16:00 – 16:30 Coffee Break.

16:30 – 18:00 Joint GHP/GDAP Session Continued with emphasis on Evaluation of international "projects"/cross-cuts submitted to the panels

18:00: Adjourn

APPENDIX 3: GDAP Specific Agenda

Tuesday September 3, 2013

13:30 – 16:00 Joint GDAP/GHP Session

New Winds Conference Room (70-seat room), Bl. H, 2nd floor, IGEO, UFRJ.

13:30 – 13:50 GDAP overview w. focus on potential joint GDAP/GHP activities – C. Kummerow

13:50-14:10 GHP overview w. focus on potential joint GDAP/GHP activities – J. Evans

14:10 – 16:00 Presentations from Invited Regional Project Scientists (Chairs Ana Nunes, Hugo Berbery) *4-6 presentations of 15-20 minutes, Regional Energy and Water Exchanges Project initiatives/proposals and cross-cutting Science topics.*

16:00 – 17:00 GDAP Session.

Rm 5, Dean Office

16:00 – 16:20 Panel objectives and meeting goals – C. Kummerow

16:20 – 17:00 New member presentation – W. Dorigo

17:00 Adjourn

*****Wednesday

September 4, 2013 – GDAP Session

09:00 – 09:20 IGPO Update and JSC Reprot – P.J. van Oevelen

09:20 – 09:30 WDAP Report – J. Schulz

09:30 – 09:40 Update on SCOPE-CM – J. Schulz

09:40 – 10:20 New Member Presentation – Felix Landerer

10:20 – 10:40 Break

The GEWEX Products. Each project should plan to discuss:

- Status of the current products & Ancillary data
- Status of the “Integrated Product”
- Complete list of ancillary products & their testing for “Integrated Product”
- Output variables that are to form part of the “Integrated Product”
- Timetable

10:40 – 11:25 ISCCP & Ancillary Products – W. Rossow

11:25 – 12:00 GPCP – R. Adler

12:00 – 13:30 Lunch break

13:30 – 13:50 GPCC – U. Schneider

13:50 – 14:20 Aerocom - S. Kinne

14:20 – 15:10 SRB/BSRN - P. Stackhouse/Michalski

15:10 – 15:30 Break

15:30 – 16:20 SeaFlux - C. A. Clayson

16:20 – 17:10 LandFlux – M. McCabe/E. Wood

17:10 **Adjourn**

Thursday September 6, 2013

- 9:00 – 12:00 GDAP Session continued
- 9:00 – 10:00 C. Kummerow. *Joint product discussions and plans. Will discuss finalization of Tier 1 products as well as incorporation of next generations products. Dorigo and Landerer to overview status of Soil Moisture and Mass Balance products.*
- 10:00 – 10:30 Water Vapor Assessment – M. Schroeder
- 10:30 – 10:50 Break
- 10:50 – 11:10 Collaboration w. ARM. – J. Mather
- 11:10 – 11:30 Ongoing Cloud Validation Efforts C. Stubenrauch
- 11:30 – 12:00 C. Kummerow. *Discussions – Should we consider assessments based upon literature only? i.e. 1-2 year efforts that publish basic product strength and weaknesses based upon published literature) versus active assessments. Do we restart precipitation or wait for GPM?*
- 12:00 – 13:30 Lunch Break.
- 13:30 – 18:00 Joint GDAP/GHP Session
Convene in Conference Room, Dean's Office, CCMN, UFRJ
- 13:30 – 16:00 Discussion: GDAP to lay out specific plans for water and Energy budget products and closure. Discuss with GHP about specific joint effort.
- 16:00 – 16:30 Coffee Break.
- 16:30 – 18:00 Joint GHP/GDAP Session Continued with emphasis on Evaluation of international "projects"/cross-cuts submitted to the panels
- 18:00: Adjourn**

APPENDIX 4:

GHP cross-cutting project proposal

- **Title for project**

- **Proposers/Contacts**

Who is proposing this project and will act as a contacts/coordinators for others interested in collaborating on the project?

- **Motivation**

This section should provide the scientific rationale/motivation for the project, along with relevant institutional context. It should answer questions like: Why is this project important scientifically and to GHP? How does this project build on past studies/knowledge and take advantage of expertise and observations supported by GEWEX/GHP? What will this project contribute to the field and the GHP community if successful? How will this project contribute to the GEWEX imperatives?

- **Principal research questions to be addressed**

This section should contain the principle research questions that embody the aims/objectives of this project. It should distill the science focus in a clear and concise fashion.

- **Data requirements**

What observational or model data will be required to address the research questions? What data will be needed and how will they be obtained (open repositories, direct contact ...) ? Of these data, which are available through accessible data repositories (e.g. satellite data, CORDEX)? And which need to be sourced through local or regional institutions/contacts? How will the RHPs contribute?

- **Project methodology**

This section should present the proposed experiment design and analysis techniques. It could include information on data quality control, required model simulations, and data analysis to be performed. The experiment and data analysis should be connected to the research questions above. Enough detail should be included to foster discussion of the most appropriate techniques or potentially the requirement for development of new techniques.

- **Collaboration Mechanisms**

How will scientists collaborate in this project and interact with other GHP groups? Is there a need of collaboration with other GEWEX panels or WCRP groups? If so, what mechanisms are foreseen? Will there be a website? Email list? Workshops? Is there a plan for an initial workshop? When? Where?