

Executive Summary
**of the Report of Actions/Recommendations the World Climate
Research Programme (WCRP) Global Energy and Water Exchanges
(GEWEX) Project Hydroclimatology Panel (GHP) Business Meeting
10-13 December 2014**
**Including a Joint Session with Representatives of the Global Drought
Information System (GDIS) on 10 December**
(Final Draft Rev1: 22 January 2015)

Reference sections in Full Report:

4.1 **RHP Related Issues, Actions and Recommendations**

Action (A1) RHP representatives, when reporting progress and plans, should always provide synopses of work in context of GSQs.

Action (A1a): The action for IGPO to set up an RHP-Specific Web Page Reporting scheme by July 2015.

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

With the new sunset date established and acknowledged the Panel, Matsumoto agreed:

Action (A2): To **Organize sessions**, which highlight the GSQ-relevant work MAHASRI has undertaken (as noted in Action A1 above), **at the March 3-4, 2015-“Japanese Domestic Workshop on MAHASRI and Beyond”**.

Action (A2a): as a corollary to action (A2), to begin to write summary papers in BAMS and JMSJ in early 2015, which also emphasize the contributions MAHASRI has made to the GSQs

Action (A2b): To keep the Panel informed of plans for a **March 2-4, 2016: International Science Conference on MAHASRI that would mark the end of the Project**.

Action (A2c): To keep the Panel informed of plans for a follow-on Regional Study partially oriented around GSQs. **Specifically report on this matter at the 2015 GHP meeting.**

4.1b **NEESPI Reported on by Dr. P. Grosiman**

The sunset date for NEESPI was specified to take place at a **“Synthesis NEESPI Workshop” (Prague, Czech Republic; April 9-12, 2015)**. Actions agreed to included:

Action (A3, i, ii, iii, iv): **P. Grosiman to ensure (i) that the NEESPI End of Project Plan include an overview of contributions NEESPI has made to the GSQs over the 10 year period the Study has been functioning; (ii) that the Panel is formally informed in a timely manner of the plans for the NEESPI Wrap-up Conference in Prague, (iii) that the Panel is kept informed of the process for the transition from Northern Eurasia Earth Science Partnership Initiative (NEESPI) to “Northern Eurasia’s Future” Initiative (NEFI). Specifically to provide a report on the matter at the 2015**

GHP meeting, and (iv) that any formal document/book summarizing NEESPI results contain reference to GEWEX as specified in the GHP/RHP criteria.

4.1c HyMeX Reported by Dr P. Drobinski

Drobinski agreed that:

HyMeX will perform a mid-term review of the project in 2016, after 5 years of implementation. At the 2015 GHP meeting HyMex will (Action A4) present the prescribed mid-term report of the work accomplished that is relevant for the GSQs (see Action A1 above).

4.1d SaskRB Reported by Dr H. Wheeler/R. Stewart

The Panel was advised that the Changing Cold Regions Network (CCRN), 2013-2018, Project which they were informed of at the GHP September 2013 meeting and which enlarged the scope of SaskRB, was being formally proposed as a new GHP RHP that would have as its domain both the Saskatchewan River Basin (SaskRB) and the Mackenzie River Basin.

The Panel made the following Recommendation (R-1) to be carried forward to the SSG for endorsement: The Panel approved CCRN as a new/Initiating RHP replacing SaskRB.

4.2 Proposed RHP Related Issues, Actions and Recommendations

4.2a HyVic by Dr F. Semazzi

Since the meeting at The Hague, Drs Polcher and Evans had worked with Dr Semazzi to upgrade the documentation and provide guidance necessary for HyVic to meet the GHP RHP criteria for Initiating status.

The outcome was:

Recommendation (R-2) to be carried forward to the SSG for endorsement: The Panel approved HyVic as a new/Initiating RHP with the stipulation that IGPO assist HyVic to establish a Web Page and that Semazzi advance the case for a local drought monitoring system and additional capacity building within the HyVic Framework.

4.2b OzEWEX by Dr Albert van Dijk

The Panel heard that the outcome of the OzEWEX 1st Annual OzEWEX Workshop 28–29 October 2014 Canberra, Australia (Reference Summary in GEWEX Newsletter, Vol. 24 No. 4, November 2014), as reported by Dr Albert van Dijk included agreements on a set of amalgamating themes that were oriented toward meeting the criteria of an Initiating RHP.

The Panel concluded that these outcomes had strengthened the OzEWEX concept and that there is a sufficient number of investigations into a broad range of issues that need to be worked on and that relate directly to the WCRP GCs and GEWEX GSQs to warrant:

Recommendation (R-3) to be carried forward to the SSG for endorsement: Approval of Initiating RHP status for OzEWEX

4.2c BALTEX-BALTIC EARTH by Dr. M. Reckermann

...the Panel voiced its concern that BALTIC Earth is lacking a specific hydrological component and is missing connections to weather services and deficient in plans for field campaigns organized around a definite land component that would generate data of value and interest to the broader GEWEX community.

...the Panel asked Dr Polcher to undertake Action (A5) to act as the GHP Panel advocate for promoting a broader Land/Hydrological component in BALTIC Earth and to specifically contact/meet with BALTIC-Earth representatives of record, especially the BESSG, to ensure that the Science Plan evolves in a more synergistic way with the GSQs. In the interim the Panel tabled a decision to approve BALTIC-EARTH as an initiating GHP RHP.

4.2d RELAMPAGO - Remote sensing of Electrification, Lightning, And Meso-scale/micro-scale Processes with Adaptive Ground Observations by Drs A. Nunes and J. Polcher on behalf of Dr. L. A. T. Machado (including input from Dr F. Dominguez)

The overarching science goals are still not clearly defined. The Panel also, continued to express its interest in seeing more specific examples of a more balanced focus between Meteorological aspects and the Hydrological issues/community of the region.

Action (A6): Polcher to continue to assist the RELAMPAGO Community through direct contact with the lead Scientists and Investigators, with further development, in 2015, of near term plans to reach out to other scientists with observational and modeling interests and the crafting of a white paper that can become the basis for a more formal request for Initiating RHP status for RELAMPAGO.

4.2e Pannonian Basin by Dr J. Cuxart

The presentation by Dr Cuxart was compelling on several levels for this region to become a GHP RHP. The Panel asked Dr Cuxart to (Action A7a) further develop and distribute a brief whitepaper summarizing what the basis and characteristics for a Pannonian basin water and energy cycles Experiment (PannEx) in the context of a GHP RHP, with the stipulation that consideration is given to the possibility of broadening the effort to include the larger Danube basin.

IGPO was asked (Action A7b) to assist in promoting/adding GEWEX aspects and features to the planning of a 2-day PannEx workshop, hosted by the Meteorological and Hydrological Service of Croatia, in the area of the city of Osijek, in fall 2015.

It was concluded that the proposed timeline for defining PannEx (2015/17), proposing it as an RHP (end of 2017) and gaining RHP Initiating status (2018/19), was acceptable for future planning.

4.2f USA Water and Energy Exchanges (UWEX) Experiment/RHP by Various Contributors

The Panel was asked by the GEWEX SSG Co-Chairs (Stephens/Seneviratne) to (Action A8a) help with a scoping exercise by developing a proposal that meets the criteria of a GEWEX–style regional effort positioned in USA.

To begin this exercise the Panel took a number of Actions.

Action (A-8b): Appointed a **planning committee** made up of the following members: F. Dominguez (U. Arizona), R. Rasmussen (NCAR), A. Barros (Duke Uni.), Tom Painter (JPL) and Levi Brekke (Bureau of Reclamation) to **immediately begin** the task of preparing a draft **whitepaper** that specifies the main science issues to be addressed by such a study along with the region(s) of interest, the tools and funding sources/opportunities, the main stakeholders/applications, social issues to be considered, links with other groups/studies (both national and International), outreach opportunities, etc.

(Action A-8c): To formalize the committee and the scope of their work the Panel asked Dr Seneviratne with support of the IGPO to draft a **letter of nomination** and **Terms of Reference (TOR)** for the committee.

Action (A-8d): On the longer term the group is to reflect on the structure and organization of such an experiment in the specific framework of a GEWEX RHP mainly addressing the contribution such an RHP would make to the GSQs.

The panel made a number of suggestions to help start the work of the planning Committee on a USA RHP, namely that:

- Time scales should go from weather to climate
- The project should be centered on application driven researchers
- The region of choice should be the Colorado basin within the Wester US Climatic region.
- The whitepaper, once completed, should be publicized in an article in the GEWEX Newsletter.

4.3 Cross-cut presentations Actions

GHP Cross-Cut Projects List

Currently active

- INTENSE (Sub-daily precipitation) (H. Fowler)
- LSM validation & Benchmarking (M. Ek) – has become a more general attempt to encourage
- GLASS-GHP collaboration

Proposed

- Cold/Shoulder Season Precipitation Near 0°C, (R. Stewart/P. Groisman)
- MOUNTerrain (Mountainous Terrain rainfall) (J. Renwick)
- Including water management in large scale models (R. Harding/A. Nazemi)
- INARCH (Mountain Hydrology) (J. Pomeroy)

Potential

- Seasonal hydrologic prediction (A. Wood/HEPEX)
- GDAP integrated product regional evaluation

4.3a Sub-Daily Rainfall (INTENSE) by Dr. Jason Evans for Hayley Fowler

The INTENSE project officially started in Feb 2014 and is gradually gaining momentum (and will gain further impetus with additional staff recruitment in Jan 2015) and since July 2014 has been merged with the GHP cross-cut on sub-daily precipitation to provide the core effort in this area.

The action (Action A-9) is for Fowler to contact Looser at GRDC and Schneider at GPCC to establish if those Centers could be a resource for datasets relevant to INTENSE. In addition RHP Representatives and other CC Leads need to be contacted for specific discussions related to provision of relevant datasets.

Comments at the meeting suggested that contributions could be available from HyMeX (Drobinski), CCRN (Wheater/Stewart), OzEWEX (van Dijk), MAHASRI (Matsumoto), BalticEarth (Reckermann) and Renwick and Pomeroy who are looking into Mountainous Terrain rainfall and Mountain Hydrology respectively.

In a more general sense, Polcher/Evans and IGPO agreed to assist Fowler and other Panel Project Leads with Action A-9a, namely, the tactical steps necessary, to expedite/facilitate/encourage these intra-Panel communications/linkages, including, letters, emails, side meetings, web-site presence, etc.

4.3b LSM validation & Benchmarking by Dr. M. Ek

The Panel noted that this CC has devolved into a more general attempt to encourage Inter-Panel linkages, the collaboration has been undertaken by Dr Ek, on behalf of GHP, through the GEWEX Global Land/Atmosphere System Study (GLASS) Panel. The Panel asked Dr Ek to (Action A -10), as the newly appointed GLASS Co-Chair, continue to provide a GLASS/GHP liaison.

Having identified this effort as an inter-Panel coordination function it will not be carried forward as a GHP CC but will remain an important part of GHP. Another matter that was mentioned at the meeting was the value of MOLTS data as a contribution from the RHPs to the model benchmarking process(es). Decisions on these matters remained TBD.

4.3c Cold/Shoulder Season Precipitation by Drs Groisman/Stewart

The Panel acknowledged that this phenomenon was of interest/importance to the GHP/GEWEX climate research agenda and that the objective of this proposed GHP CC was articulated clearly

Asked Drs Stewart and Groisman to (Action A-11) follow through on the plan to prepare a review article for BAMS that would articulate more clearly what is needed and what will be accomplished within the framework of a GHP CC, especially what the results (deliverables) will be in the next 2-3 year period and how they will advance progress on addressing the GSQs.

The Panel reiterated the need for RHP Representatives and other CC Leads, in regions most affected by this phenomenon (e.g. Arctic and Antarctic-CliC, high seas and corresponding coastal areas, mountainous regions exposed to oceanic water vapor transport, regions exposed to water vapor transport from large lakes and interior seas-CCRN, etc.) to be contacted for specific discussions related to provision of relevant datasets/models (see Actions A-9 and A-9a above, as an example for what is needed in this context). In particular the Panel asked the Co-

Chairs to be the primary points of contact between **CLiC** and the work/plans associated with this CC.

Recommendation (R-4) to be carried forward to the GEWEX SSG for endorsement: **That the Cold/Shoulder Season Precipitation Near 0°C effort be accepted as a formal GHP CC.**

4.3d MOUNTerrain (Mountainous Terrain rainfall) by Dr J. Renwick (Skyped)

The Panel felt that the presentation and the Newsletter article, prepared earlier, (Vol. 24 No. 4, November 2014) **did** articulate the science questions of relevance to understanding precipitation processes in mountainous regions and provided a **clear statement of the objective of MOUNTerrain.**

Renwick was asked to take **Action (A-12)** to address the needs for more specific short term deliverables and to make an effort to engage a wider group of experts in the discussion/planning for moving forward with this work. **Van Lipzig** agreed to contact Renwick and to assist with this work and with nominating others with an interest in contributing. In this context, the Panel reiterated that **RHP Representatives, other CC Leads, heads of Data Centers and other Panel Chairs/members (GPCC, GDAP, HyMeX, CCRN, etc.) need to be contacted** for specific discussions related to provision of relevant datasets/models/studies (see **Actions A-9 and A-9a above, as an example of what is needed**).

The Panel's Recommendation (R-5) was to encourage this effort through 2015 and to evaluate its progress toward formal acceptance as a GHP CC at the 2015 meeting.

4.3e Including water management in large scale models by Dr R. Harding/H. Wheeler (with A. Nazemi)

The Panel agreed that this concept had made good progress from being initially proposed at the July 2014 side meeting at The Hague, up to the time of the December meeting. There was a general support for moving forward with the idea and asked Dr Harding with support from Dr A. Nazemi to take **action (A-13)** to promote a conceptual approach as outlined in the presentation.

The Panel's Recommendation (R-6) was to encourage this effort through 2015 and to evaluate its progress toward formal acceptance as a GHP CC at the 2015 meeting.

4.3f INARCH (Mountain Hydrology) by Dr. J. Pomeroy

The Panel acknowledge the extent of the maturity of the International Network for Alpine Research Catchment Hydrology (INARCH) (Crosscut) Study specifically the level of International involvement in the list of Co-proposers. The clear delineation of the urgency and significance of the issue and particularly that the evaluation of different downscaling schemes from meteorological to hydrological models in mountains might fit in well as a subset of the GHP/GEWEX High Resolution modeling initiative, resonated with the Panel.

On this basis and the fact that funding has been sought and is being committed to some aspects of the work the Panel agreed to: **Recommendation R-7 to accept INARCH as a formal GHP CC.**

Dr Pomeroy was asked to take action (A-14) to write a GEWEX Newsletter article on this topic and to link with RHP Representatives, other CC Leads, heads of Data Centers and other Panel Chairs/members (GLASS, SnowMIP, etc.) for specific discussions related to provision of relevant datasets/models/studies (see Actions A-9 and A-9a above, as an example of what is needed).

4.3g Seasonal hydrologic prediction by Dr A. Wood

The Panel had agreed earlier that seasonal forecasting could be an important research focus at which GHP and the Hydrological Ensemble Prediction Experiment (HEPEX) could have a mutually beneficial connection. Dr A. Wood was asked to (Action A-15) submit a formal CC proposal on the agreed to template for evaluation by the Panel before its third quarter 2015 meeting. The aspects that need highlighted are the forming of an international seasonal prediction working group and connections to the specific GHP RHPs that have active groups working on this topic (OzEWEX, CCRN, etc.).

4.3h GDAP integrated product regional evaluation

Action (A-16) was for Polcher/Evans to contact the new Chair of GDAP, Dr Joerg Schulz to gauge further interest in the two Panels working together on science research topics that can advance progress on the GSQs by applying GHP CCs and RHP resources that can benefit from linking with GDAP datasets and related assets.

4.3i Crosscut Science/RHP Contribution to GEWEX Science Questions

(Insert the New/Updated Matrix from Jan's presentation on 10 December, 2014.)

Figure 1 - Cross-cut Science/RHP Contribution to GEWEX Science Questions Summary Matrix

4.4 Global Data Centers

The Global Data Centers (GDCs) for precipitation, river runoff and lakes/reservoirs (GPCC, GRDC GPCC and Hydrolare, respectively) are affiliated activities under GHP auspices for GEWEX. The Panel was encouraged by the continued integration/alignment of activities at the GDCs with those developing within the GHP CCs and RHPs (with the possible exception of Hydrolare). In this context, the Panel established an on-going action (A17) based on an earlier item (see actions A9 and A9a), but generalized to be:

That, Polcher/Evans and IGPO assist the Panel Project Leads and the Heads of the RHPs with, the tactical steps necessary including, letters, emails, side meetings, web-site presence, International workshops, meeting sessions, posters etc. that could be used to expedite/facilitate/encourage the communications/linkages between the researchers (GHP CC Leads) that need data and products that may reside or be developed through the Global Data Centers (GPCC, GRDC and HYDROLARE) and additionally with those in the field (RHP-Leads) who can also be providers (i.e. regional data recovery efforts)/appliers (services, model groups) of the data/products at the Global Centers. This was specified earlier in Action A-9, whereby, the INTENSE CC was asked to be involved in the exchanges with GPCC.

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) concepts to be considered for possible eventual GHP endorsement as GHP CCs or new RHPs.

4.5a GHP “review” Article (open discussion)

Action (A-18) – The GHP Co-Chairs (Polcher/Evans), to 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. Polcher agreed to draft the initial abstract for this article/paper noting that the RHPs have changed from what they had been in the past and that it is important to recognize those changes and to consider how they will evolve in the future as a result and what the impact of those changes may have on future plans for GEWEX/GHP. IGPO will assist with this action.

4.5b GHP/Working Group on Regional Climate Interaction by Dr B. Hewitson

On the basis of the discussion on this topic (see item 4.5b in the full report) the Panel asked Dr Polcher (a current member of WGRC) to (action A19) continue to act a liaison between GEWEX/GHP and WGRC/CORDEX.

4.5c Other presentations

4.5c.1 GEWEX Process Evaluation Studies (PROES) by Dr. G. Tselioudis

The Panel encouraged the continuation of the work by (i) taking action (A20) to port the existing algorithm/toolkit to the web where it can be accessed and demonstrated to have value using different data and applied to different regions (enhancing data mining and compositing techniques) and (ii) constructing a scheme(s) that apply to a number of phenomena/processes especially those that might optimize the use of high resolution satellite observations with and GEWEX (GHP/RHP) datasets.

4.5c.2 GPS and GPS occultation experiments by Dr Yuning Fu

The Panel felt this work was a particularly unique approach to using available observational data to advance and improve knowledge, which is directly associated with furthering the contribution GHP can make toward both the WCRP Grand Challenges (Water Availability and Extremes) and the relevant GSQs. Dr Yuning was asked (action A21) to keep the Panel informed of further development of this work and to consider exploring the interest of a broader International community to engage in applying this scheme to other regions (RHPs). This could include a GEWEX Newsletter article on the topic and a report on progress at the 2015 GHP meeting.

4.5c.3 Impact of the water resources management on projected future change of drought and; Current status of water isotope studies by Dr K. Yoshimura

The Panel asked Dr Yoshimura, as a Panel member, to (action A22) consider how both the drought and Isotope initiatives could be broadened beyond his own area of influence to include a wider group of researchers with funding who could coalesce around the framework of a GHP CC and engage the RHPs in a manner that would synergistic with the existing GHP CCs.

4.5c.4 Remote sensing of snow by Dr. Tom Painter

The Panel agreed that this work demonstrates the impact of dust on snow melt and emphasizes the importance of capturing this effect in order to model the evolution of snow derived water resource and asked Dr Painter to elaborate more on the underlying interest of the international community and to take action (A23) to keep the Panel informed of the next steps that may be taken to formulate this work into a GHP CC, by for instance filling out a CC template by the time of the 2015 GHP meeting for further consideration by the Panel to accept this as a formal GHP CC.

4.5c.5 International GEWEX Project Office (IGPO) Status by Dr. van Oevelen

The action items related to the Joint Scientific Committee (JSC) 2014 (JSC-35) were reviewed and the IGPO took the action (A23) to summarize the results of the discussion on behalf of the SSG Co-Chairs as part of their preparations for the GEWEX presentation at the 2015 JSC meeting (JSC-36).