then took place. The discussion further mentioned the addition of a dedicated chapter in the Precipitation Assessment about the consistency between global precipitation and global radiation that eventually links to the EEI. Jim Mather gave a short presentation about the Atmospheric Radiation Measurement (ARM) facility activities that triggered a discussion about planning a smaller, more focused workshop, prior to the delayed IP workshop, jointly held with the BSRN team. It would concentrate on strengthening the link between the existing facilities, the satellite activities in GDAP, and the scientific questions of GEWEX. Organizers are aiming to hold this ground-based, data-centric event as soon as sanitary conditions permit.

The Wednesday session focused on the ISCCP-NG initiative. It was also a year since the first ISCCP-NG workshop took place at the European Organisation for the Exploitation of Meteorological Satellites (EUMETSAT) headquarters in Darmstadt, and we reviewed progress made since then. An overview was first provided by Andy Heidinger, which gave both the programmatic context and some updates on the working group dedicated to the L1G product. The link with the International Cloud Working Group (ICWG) is very strong and has enabled sustained discussions since the workshop. This L1G "georing" product is based on advanced geostationary platforms and would form the basis for the ISCCP-NG product suite developments. Andy reported significant progress in building a prototype or a demonstration product and created some excitement among participants by showing a movie of estimated outgoing longwave radiation (using 11- and 6.3-microns observations) at ~5km sub-hourly to hourly resolution. The governance, science-wise, was discussed and Graeme Stephens recalled the role of GEWEX as a steward of international data efforts. It is anticipated that the ISCCP-NG would report to GEWEX [GDAP or the Scientific Steering Group (SSG)]. The exchange further suggested that the project should begin to communicate with the broader cloud science community to advertise the activity and its anticipated outcomes. In particular, the next GEWEX SSG meeting might provide a good forum to present the progress in order to bridge out to the "Digital Twin" Earth modeling effort, for which such a data set is highly relevant. Andy also presented slides from Joerg Schultz that summarized the effort to inform the Coordination Group for Meteorological Satellites (CGMS) council about the activity. The project and its ambition were very well received and are now being inserted into the complex multi-agency program where EUMETSAT will keep a leading role. Finally, the science applications of a new ISCCP-NG data set were discussed. Brian Kahn synthetized the various types of anticipated outreach spanning from cloud processes to aerosols and lightning. Graeme Stephens emphasized the strong connection with the scientific objectives of the National Aeronautics and Space Administration (NASA)-led Aerosol and Cloud, Convection and Precipitation (ACCP) international cooperation effort. Graeme suggested that Andy give a seminar in the framework of the ACCP science seminar series. The discussion about the next steps for the project focused first on a hands-on virtual workshop to showcase what can be derived from the prototype L1G. This should happen in the spring of 2021 after the prototype is accessible. Later, a more conventional workshop is envisioned, but its realization depends on the trajectory of the pandemic.

2020 GEWEX Hydroclimatology Panel (GHP) Meeting

Virtual Meeting
26–27 November 2020

Ali Nazemi, Francina Dominguez (GHP Co-Chairs) and Joan Cuxart (Past GHP Co-Chair)

The 2020 GHP Meeting occurred during the COVID-19 pandemic and marked the first fully virtual GHP meeting. Held through the GoToMeeting™ online platform, the 2020 GHP meeting provided an opportunity for Panel members and project leaders from across the globe to share and review the status of current and future GHP projects. To accommodate diversity in time zones, the Co-Chairs decided to schedule 3-hour sessions each day to outline and discuss each project in short 10- to 15-minute time slots. To make this possible, each project submitted its presentation(s) and report(s) in advance, so Panel members could review each activity prior to the meeting. Although the spirit and socializing opportunities of previous in-person GHP meetings was missing, this iteration clearly showed that there are also benefits in virtual meetings. One lesson learned was that if the presentations are uploaded ahead of time, then the meeting itself will be dedicated only to targeted discussion, which makes it easier to maintain the focus and effectiveness of the discussion. We believe meetings with such a format can enrich the experience of the attendees and can potentially be a complement for some in-person events in post-pandemic situations.

GHP is comprised of four different types of activities: (1) Regional Hydroclimate Projects (RHPs), aiming at understanding and predicting hydroclimatology in a specific region; (2) Cross-cutting Projects (CCs), encouraging knowledge mobilization and global synthesis around a specific problem; (3) Global Data Centers, collecting and distributing hydrologically-relevant data; and (4) Networks, maintaining collaboration and building capacity for activities relevant to GEWEX science. During the GHP meeting, the group reviewed and discussed the progress of ongoing and prospective projects in these three categories.

Ongoing and Prospective Regional Hydroclimate Projects (RHPs) and Networks

RHPs are generally large, multidisciplinary projects, developed to improve our understanding of the physical processes that affect water and energy exchanges within a region. There are currently three ongoing RHPs, including Global Water Futures (GWF), Baltic Earth, and The Hydrological cycle in the Mediterranean eXperiment (HyMeX). These are mature RHPs with a large group of active researchers and established ties with local communities. GWF and Baltic Earth are progressing continuously and at a good pace. While HyMeX is now officially over, there is a strong willingness to continue this RHP. A new group of young researchers, who were present at the meeting, will take the lead on the next phase of HyMeX. The Land Surface Atmosphere Interactions over the Iberian Semi-Arid Environment campaign (LIAISE) may serve as an effective link between the old and the new HyMeX initiatives.

Participants of the 2020 GHP Meeting, courtesy of Vidya Samadi

We also took the opportunity to exchange ideas about lessons learned from the three successful RHPs and how these lessons can apply to prospective RHPs. There are currently six prospective RHPs, four of which are quite advanced and almost ready to launch. These RHPs include the Asian Precipitation Experiments (AsiaPEX), the Third Pole Environment-Water Sustainability (TPE-WS) project, the Regional Hydrology Program for the Andes (ANDEX), as well as the United States-RHP (US-RHP). We expect AsiaPEX, US-RHP, and ANDEX to submit their integrated science and implementation plans in 2021. PannEx, an initiating RHP to provide a better understanding of Earth system processes over the Pannonian Basin, has decided to become at this point a GHP Network. Networks provide a more flexible way to continue the interactions of an RHP. For PannEx, this will allow developing a more widely-involved community, delaying its application to become a full, active RHP to a later stage. We also expect another group to join our Networks this year, namely the Australian Energy and Water Exchanges research initiative (OzEWEX), which will operate as a "space" for researchers and users from various organizations to engage with topics relevant to the GEWEX science. There are also two preliminary RHPs, including an activity in Eastern Africa along with a developing joint global change SysTem for Analysis Research and Training (START)/National Aeronautics and Space Administration (NASA) initiative in Central Asia. These projects are at very early stages and are expected to flourish some years from now.

Ongoing and Prospective Crosscutting (CC) Activities

CCs are integral activities within the GHP structure, aimed at addressing GEWEX Science Questions, creating collaborations between RHPs, other GEWEX Panels and WCRP activities. The 2020 GHP meeting marked an end to two successful CCs, namely the International Network for Alpine Catchment Hydrology (INARCH) and the INTElligent use of climate models for adaptation to non-Stationary hydrological Extremes (INTENSE). During its activities, INARCH produced a number of open data sets and improved science for predictive modeling capability in mountainous regions. INTENSE focused on the collection and analysis of sub-daily extreme precipitation data and model outputs for improved understanding of how extremes of precipitation are responding to global warming. INTENSE will keep the legacy of a well-managed CC with a considerable amount of scientific publications and data products, some already added to the Global Precipitation Climatology Center (GPCC) repository.

There is currently an ongoing CC in GHP, Transport and Exchange Processes in the Atmosphere over Mountains Experiment (TEAMx), aimed at improving the current understanding of exchange processes in the atmosphere over mountains and how these processes are parameterized in climate models. TEAMx activities are progressing very well. Despite the fact that the activities are mostly centered in the Alps region, the main focus of TEAMx is on processes and therefore has global relevance. Both TEAMx leaders and GHP members noted the tremendous opportunity for knowledge sharing between TEAMx and relevant ongoing and prospective RHPs (i.e., ANDEX, TPE-TS, GWF) as well as past CCs (e.g., INARCH). There were discussions around TEAMx tentatively forming a Process Evaluation Study (PROES) and collaborating with the GASS and GLASS Panels. GHP also includes a prospective CC, i.e., Determining Evapotranspiration (ET), focused on advancing the understanding and determination of evapotranspiration across scales. The 2nd ET workshop was held online in February 2021 with the goal of defining its governance structure, scope, and main objectives, and applying for CC status within GHP. Possibilities for considering this CC as a PROES within the broader GEWEX context, e.g., GLASS, were discussed.

Data Centers

The Global Precipitation Climatology Centre (GPCC) is well-connected to the other GHP and GEWEX activities. Steady and significant progress was reported related to precipitation data. The Global Runoff Data Centre (GRDC) focuses on acquisition, harmonization, and storage of global historical river discharge data. The center is progressing very well and new data are continuously added into the system. Although its pace is relatively measured, the International Data Centre on Hydrology of Lakes and Reservoirs (HYDROLARE) continues gathering information on the water level of lakes and reservoirs worldwide. The possibility for collaboration between HYDROLARE and similar initiatives outside GHP was discussed.

Other Business

Potential links between GHP and GLASS were examined, through linkage between some CCs and RHPs with the GEWEX Land-Atmosphere Feedback Observatory (GLAFO), a network of measurement sites sampling the atmospheric boundary layer and upper surface around the globe. Possible interactions between RHPs and CC with broader WCRP activities were also discussed through WCRP Light House Activities (LHAs), in particular "My Climate Risks", a new initiative for assessing and explaining regional climate risk. GHP co-chair Ali Nazemi is currently part of the science program in this LHA.

The 2020 GHP Meeting was concluded by welcoming new members and thanking those rotating off the GHP Panel. After seven years in the GHP Panel and four years of excellent leadership, Joan Cuxart stepped down as Co-Chair and Ali Nazemi was appointed as the new Co-Chair of GHP. Also, after six years of dedicated service to GHP, Craig Ferguson stepped down as GLASS-GHP liaison and was replaced by Josh Roundy.