Meeting/Workshop Reports

2024 GDAP Annual Meeting

Sapporo, Japan
6 July 2024

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The 2024 GEWEX Data and Analysis Panel (GDAP) Meeting took place at Hokkaido University in Sapporo, Japan on 6 July 2024, the day before the 9th GEWEX Open Science Conference (OSC) began just a few blocks away. Sapporo is the capital city of Hokkaido, the northernmost island of Japan, known as a sanctuary from the notoriously hot, humid summer prevailing in the rest of the country.

GDAP's primary roles are (1) identifying the needs for global observations crucial for understanding the processes underlying Earth's water and energy cycles and (2) coordinating activities to assess and analyze the observation data to achieve the GEWEX Science Goals (*https://www.gewex.org/about/science/gewex-science-goals/*). Such GDAP activities are led either by Panel members directly or by external experts working together with the Panel. Historically, GDAP has worked in close collaboration with the International Satellite Cloud Climatology Project (ISCCP) and the Global Precipitation Climatology Project (GPCP) in the years since GDAP was called the GEWEX Radiation Panel (GRP). Recently, these products were integrated with other GDAP-initiated flux products—SeaFlux, LandFlux, and the Surface Radiation Budget (SRB)—to construct the GEWEX Integrated Product (IP), a comprehensive data set covering different elements of the water and energy cycles.

The Panel regularly reevaluates its portfolio to align its activities, questions, and foci to match emerging needs in a timely manner. GDAP's projects currently emphasize understanding Earth's Energy Imbalance (EEI) and coordinating the ISCCP Second Generation (ISCCP-SG) product while continuing existing cooperation with the Baseline Surface Radiation Network (BSRN) and Global Precipitation Climatology Centre (GPCC). The 2024 GDAP Panel Meeting centered on preparing to initiate new activities for the coming several years.

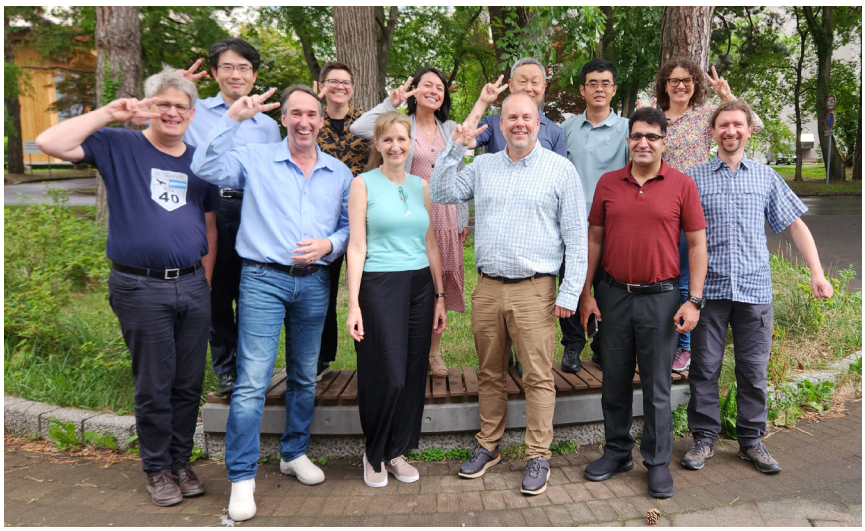
The 2024 GDAP Panel Meeting opened with two talks by new Panel members Xuelong Chen and Hanii Takahashi. Xuelong summarized his research covering broad areas of land-atmosphere interactions. Hanii outlined her work on satellite observations of shallow and deep convection with a focus on underlying physical processes. The Panel welcomed the two outstanding scientists with the anticipation that their contributions will spawn new GDAP activities.

One emerging direction in the GDAP portfolio is convective tracking. Hanii Takahashi presented outcomes from the GEWEX-Atmosphere Observing System (AOS)-Investigation of Convective Updrafts (INCUS) convective tracking workshop held at the National Aeronautics and Space Administration (NASA) Goddard Institute for Space Studies (GISS) from 17–21 April 2024. Methodologies have existed for decades to track the evolution of convective cloud systems in space and time using satellite data, but they are now increasingly gaining renewed interest. A few reasons are behind this. The capability to observe changes over the convective lifecycle in aspects of cloud systems (anvil cloud thickness, for instance) has been improved by the latest generation of geostationary meteorological satellites, which have enhanced spatial and temporal resolution with additional channels that were unavailable in previous generations. High-resolution (half-hourly, 0.1°-gridded) global precipitation data sets such as Global Satellite Mapping of Precipitation (GSMaP) and Integrated Multi-satellite Retrievals for Global Precipitation Measurement Mission (IMERG) opened a pathway to precipitation-based convective tracking in addition to the traditional infrared-based tracking. Convective tracking dovetails with the ISCCP-NG activity as a potential science application of the Level 1 Gridded (L1G) radiances. It will also feature in future directions within the Upper Tropospheric Clouds and Convection (UTCC) Process Evaluation Study (PROES) project, led within the Global Atmospheric System Studies (GASS) Panel. A third promising area of application is to use convective tracking as a tool for evaluating global km-scale model simulations, also in coordination with GASS.

Markus Ziese, who leads GPCC at Deutscher Wetterdienst (DWD), reported the status of database statistics and data processing for GPCC. GPCC provides a long-term record of quality-controlled monthly and daily global precipitation over land by integrating gauge-measured surface precipitation from different sources across the world. GPCC's continuing contribution to GEWEX via the GEWEX Hydroclimatology Panel (GHP) and GDAP is highly appreciated by the Panels.

The first session after lunch began with two briefing talks by the Panel co-chairs, followed by group discussion. Tristan L'Ecuyer first gave an introductory summary of GDAP's roles, and Hiro Masunaga outlined the feedback from the 36th GEWEX Scientific Steering Group (SSG) meeting in Budapest, Hungary, from 22–26 April 2024. Recommendations discussed in the SSG meeting span diverse topics, but they almost unanimously encourage GDAP to strengthen ties with other entities, especially with the other three GEWEX Panels. Field campaigns coordinated under the leadership of GHP and the Global Land-Atmosphere System Studies (GLASS) Panel, for instance, offer high-quality measurements of variables (e.g., precipitation, radiation, land-surface temperature) that would serve as a valuable reference for global-scale satellite-based data sets as part of GDAP-led assessments. Operational surface-measurement networks continue to be important partners for GDAP. While BSRN and GPCC annually report to GEWEX, the Panel currently lacks an official communication channel with the ground-radar network community. GDAP is seeking

to expand membership with a ground-based weather radar expert, ideally with experience in intercalibrating and blending retrieved hydrologic parameters from multi-national, multi-radar networks.



Participants of the 2024 GDAP Meeting in Sapporo, Japan

As part of the group discussion in exploration of new GDAP initiatives, Xubin Zeng, GEWEX SSG co-chair, introduced the Global Precipitation Experiment (GPEX). GPEX is a new World Climate Research Programme (WCRP) Lighthouse Activity aimed at filling in the gaps among the process-level understanding, observations, and modeling of precipitation with the ultimate goal of improving precipitation prediction skill for the benefit of society. GDAP has the potential to contribute to GPEX in multiple ways. A next round of the GEWEX precipitation assessment, as a follow-on to the previous assessment conducted in collaboration with the Coordination Group for Meteorological Satellites (CGMS) International Precipitation Working Group (IPWG), would be among the promising possibilities of future GPEX-GDAP synergies.

In the second session of the afternoon, presentations on activity updates resumed with the EEI assessment. EEI, or the radiative energy imbalance at the top of the atmosphere (TOA) resulting in a secular increase of ocean heat content (OHC), is potentially a critical element for the predictability and stability of Earth's climate system. Benoit Meyssignac, attending remotely, reported the status and recent trend of EEI as revealed by a variety of observations ranging from temporal changes in the in-situ OHC estimates to the satellite-retrieved TOA radiation. The latest findings from these observations were reported and discussed at the EEI Assessment Workshop held in Frascati, Italy, from 15–17 May 2024. GDAP has been and will be making a leading contribution in this area of research through the assessment of diverse EEI measurements evaluated with robust and reliable uncertainty estimation.

Jan Polcher, GEWEX SSG co-chair, gave a quick introduction to a joint effort by WCRP and the Global Climate Observing System (GCOS) to quantify the quality of essential climate variables (ECVs) in terms of global integrals. The overall idea is that the volume-integrated conservation laws with respect to global water, energy, and carbon cycles are exploited as a constraint to the ECVs relevant to each continuity/budget equation. Some of the current and future GDAP activities, particularly those involved in data assessment, are expected to benefit from insights to be gained under the global integral initiative.

BSRN updates were presented by Laura Riihimaki. Laura will become the new BSRN project manager in the fall of 2024, taking over from Christian Lanconelli, who steps down after four years of dedicated leadership to BSRN. The BSRN team has been committed to collecting broadband shortwave and longwave measurements from ground stations for decades across the globe. The 18th BSRN Workshop took place in Tokyo during the week (1–5 July) just before the GDAP meeting, reviewing the status of operational and pending stations and the strategies for instrument calibration and data quality processing. The continuing effort by BSRN to maintain surface radiation measurements worldwide offers a valuable contribution to GDAP and broader climate-science communities.

To further address the need for more extensive coordination of new activities across the GEWEX Panels, GDAP co-chair Hiro Masunaga led an evening breakout session with co-chairs and interested members of all four GEWEX Panels on the evening of July 9th at the OSC venue. The GEWEX OSC provided a perfect opportunity for all GEWEX Panels to meet and discuss subjects of mutual interest. All the Panel and SSG members, along with anyone interested, were invited to this brainstorming session with no planned agenda. More than 20 participants joined the meeting starting at 7 pm despite the risk of missing dinner after a long day trapped in the conference room. Diverse topics were discussed, including the strategies to link km-scale model simulations with observations. Satellite remote sensing with various instruments, a dense network of simple measurements, and sophisticated observations from field campaigns each have complementary strengths and limitations that must be considered when analyzed together with model simulations. This topic aligns well with GDAP's core mission to coordinate and curate global data sets to address energy and water cycle science, and the Panel anticipates playing a central role in developing this potential pan-GEWEX project. In preparation of the protocol for a joint model-observation project, baseline location and period need to be carefully chosen bearing in mind the availability of existing observation data and numerical experiments. Conversations will continue in future occasions when different Panels meet again.

The next GDAP meeting will take place in Paris in May 2025, in conjunction with other workshops linked to relevant activities, including UTCC PROES.