

aerosols on DCC and lightning (Pan et al., 2021). Studies demonstrated that the deep layer of marine ice nucleating particles (INPs) associated with atmospheric rivers can play a significant role in affecting orographic mixed-phase clouds and precipitation in the western U.S. (Lin et al., 2022).

To explore how local aerosol effects interact with the large-scale circulation, a numerical set-up that resolves clouds in high resolution while accounting for large-scale circulation and thermodynamic feedbacks was presented (G. Dagan). This work emphasized the importance of examining aerosol effects on DCC life cycle, particularly anvil clouds, which have long-lasting radiative impacts.

The DCC sessions wrapped up with a discussion of potential future research directions, including the impact of different aerosol size distributions, composition, and type. Further, a focus on ice microphysics, anvil radiation impacts, and the effects of urbanization and climate warming were defined as topics of interest.

During the ACPC scientific steering committee (SSC) meeting, Daniel Rosenfeld, a founding member of ACPC, stepped down from his role as co-chair, and Michael Jensen was selected to serve as a new co-chair. In addition, four new SSC members were elected: Guy Dagan, Jiwen Fan, Andre Gettleman, and Franziska Glassmeier. The next ACPC meeting is planned for April 2023, and a hybrid meeting format is proposed, including both a physical meeting and a virtual component. All colleagues interested in ACPC topics are cordially invited to join the initiative.

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Global Water Futures Meets Online for 2022 Annual Open Science Meeting– Knowledge to Action

Virtual Meeting
16–18 May 2022

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Global Water Futures (GWF), a GEWEX North American Regional Hydroclimate Project (RHP), held its fifth Annual Open Science Meeting online over three days (16–18 May 2022), with a central theme of “Knowledge to Action”. The meeting had 490 registrants and was well-attended throughout. There were multiple plenary sessions with keynote speakers, high-level panels, Indigenous-led sessions, parallel scientific sessions with oral presentations and lightning talks, poster presentations, and virtual social events. Parallel scientific sessions included 59 oral presentations and 71 posters. All the sessions are available for viewing on the meeting page at <https://www.gwf2022.com/>.

Throughout the three-day meeting, the theme of Knowledge to Action was integral in the presentations, discussions, and outcomes. Plenary keynote talks featured diverse perspectives on each day’s theme: Towards Managing and Governing Water Futures, Water-related Risk Reduction, and Harnessing Data and Knowledge to Improve Water Practice. These set the context for the high-level panels to explore issues in detail, focusing on some specific questions. High-level panels addressed topics including i) Water Governance in a Changing Future; ii) the Canada Water Agency–Towards Innovative Water Management; iii) Extreme Events and Impacts in 2021; iv) Risk Reduction including Human, Ecological, and Economic Elements; v) Advancing Water Management with Science and Models; and vi) Using New Sensors and Datasets to Improve Water Management. The first day of the meeting featured a plenary session called “Our Waters”, led and organized by Indigenous partners, which included a set of videos and panel discussions to share and learn about several water bodies in Canada (Redberry Lake, Grand River, and the Saskatchewan River Delta), the communities around them, and the issues they face through the eyes of Indigenous youth, Elders, and community members. Scientific presentations and posters addressed how research is being applied in practice or for potential practical applications.

Of specific relevance to GEWEX, GWF has made substantial advances in continental-scale modeling through the work of our Core Modeling and Forecasting team. These were summarized on the third day of the meeting in the plenary session, Harnessing Data and Knowledge to Improve Water Practice. GWF

has moved towards a model-agnostic framework where model components can be interchanged and run at a continental scale.

GWF has also been leading a focal examination of the 2021 extreme heat, drought, wildfires, storms, and flooding across Canada that broke numerous records and caused extensive damage and societal impacts. A panel was convened at the meeting on day two to discuss progress in understanding and diagnosing these events, and how to better manage and adapt to future extremes. Carrying out these types of focused examinations of single or multiple extreme events through interdisciplinary collaboration was an approach started in the earlier Changing Cold Regions Network RHP for western Canada, and is encouraged for all RHPs to better understand, predict, and manage the increasing occurrence of such events around the world.

GWF2022 Conclusions

Global Water Futures has amassed a large amount of knowledge through research and is working with many collaborators, including Indigenous partners, to better work across knowledge systems and within the uncertainty of our water futures in Canada.

Over the past five years of the program, we have completed laboratory, theoretical, fieldwork, and community research activities as well as modeling, visualization, sensor, and tool development. We have helped develop the first national water prediction models for Canada. We continue to synthesize research findings through workshops, sectoral meetings, model applications, and publications. We need to continue these synthesis activities in collaboration with our research partners while continuing our communication and outreach through regional and sectoral science discussions and custom knowledge translation applications. This is timely, given the extreme water–energy events experienced across Canada in 2021. The record-breaking heat, drought, rainfall, melt, and wildfires experienced were not only of immense magnitude, but also remarkable persistence and national impact.

Several key messages emerged over the course of the meeting:

- The importance of **collaborative and reciprocal partnerships**. Partnerships between disciplinary experts, partnerships with Indigenous and other communities, governments, organizations, and businesses to **reduce the disconnects** between disciplines, sectors, urban/rural and upstream/downstream contexts, knowledge systems, languages, and scientific information versus public information needs
- The importance of **open minds and active listening** as part of knowledge mobilization. Engagement starts at the conceptualization of research and needs to be continued throughout, listening to concerns and ideas and working collaboratively to generate solutions.
- The importance of **working across knowledge systems**, harnessing **process knowledge and quantitative and qualitative data**, developing **holistic and community-**

informed models, and **reconnecting and reconciling** with each other, and with the environment

- The importance of **co-developing water governance systems** in Canada using multiple knowledge systems and braiding Indigenous and current colonial mechanisms
- The importance of better and more extensive **measurement and prediction systems**
- The recognition that we are **not ready** for the water-related climate change impacts that we will continue to experience and that we need a different way to **proactively manage water-related disasters and reduce risk**
- The recognition that in mitigating water-related risks, we need **solutions that account for biophysical, social, cultural, political, and economic contexts** while **ensuring that risk is not displaced** to other types, groups, places, ecosystems, or times
- The recognition that **vulnerability to water-related risks is interwoven with issues of social and environmental justice**
- The recognition that the **Canada Water Agency** can be a critical catalyst towards achieving our sustainable and equitable water future, as long as it is given the requisite agency and mandate to act effectively and does so within a collaborative governance structure
- The recognition that there are many **opportunities to learn** from success stories, both within Canada (e.g., Manitoba's Collaborative Leadership Initiative) and internationally (Aotearoa's water future)
- The recognition that the **tremendous knowledge, data, and tools** developed in Global Water Futures need to be **preserved and made accessible for current and future generations** as they seek solutions for a more sustainable and equitable water future for Canada.

Ultimately, the climate crisis is the water crisis and we need partnerships to create innovative, equitable, and sustainable solutions. All voices need to be at the table and we need creativity, imagination, intentionality, and transformative thinking to lead us towards more sustainable water futures.

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