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AGU HYDROLOGY SECTION

Newsletter

APRIL 2025

Bridges to the Future Program



BY PAST PRESIDENT JOHN SELKER

BACKGROUND

Celebrating the past and future of hydrology, the AGU Hydrology Bridges to the Future Program is intergenerational. Bridges connects foundational work in our field with the expanding range and diversity of students interested in water, and honors those who've made an impact in our field.

GOAL AND SCOPE

The program has two key missions:

1. To present personal memories of individuals who advanced hydrological sciences and its community; and
2. To support students facing financial or other barriers in pursuing their interests in the Hydrologic Sciences.

THE STUDENT SIDE

Endowment and Frequency

Grants are awarded annually. Every $50,000 in the endowed funds a $2,000 student grant annually, in perpetuity. The program currently holds an endowment of $178,050 and will be awarding five grants in 2025.

Students can apply for funding to supplement academic experiences like attending meetings, visiting research teams, or pursuing career development activities.

Applications are due by May 31, with awards announced July 1.

All Students Welcome

Funding is open to undergraduate (including two-year colleges), master's, and doctoral students with demonstrated interest in hydrological sciences and financial constraints limiting their ability to engage in the field.

Candidates must be enrolled full- or part-time as an undergraduate (including two-year institutions), master's, or doctoral student. Preference is given to undergraduates, but students at any stage or discipline may apply.

Applications must include a (1) CV, (2) two-page essay on their hydrology interests and proposed activity, (3) budget showing the activity is only be feasible with the grant, and (4) one-page reference letters confirming the student can complete the activity and serve as a good ambassador for the Hydrological Sciences community.

Packages should be submitted to the Hydrology Section president. Selection is based on academic achievement, commitment to Hydrological Sciences, strong recommendations, and demonstrated financial need.

THE HONOREE SIDE

Naming and Recognition

All AGU Hydrology Section members may propose an honoree (deceased) by submitting a cover letter, two-page biography, academic CV, and one or more photographs.

At least three co-nominators must sign the submission. Honorees are selected by the AGU Hydrology Section leadership based on their exemplary contributions to research and education. No minimum funding is required for recognition, but every $50,000 raised in an honoree's name funds a student grant in their honor.

Contacts: Venkataraman Lakshmi, President, AGU Hydrology Section (vlakshmi@virginia.edu);
Tracy LaMondue (tlamondue@agu.org), AGU vice President for Development

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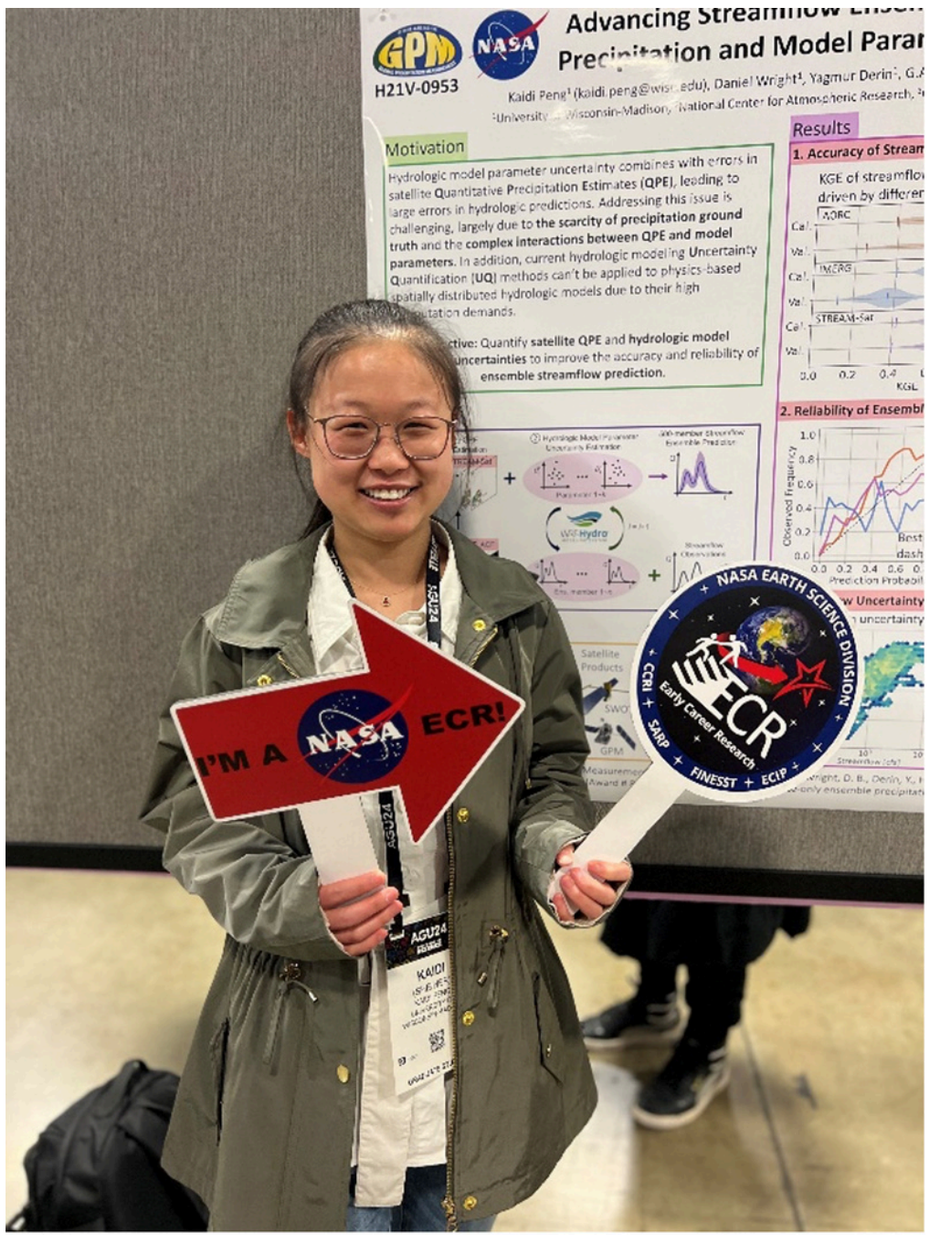
On the cover:

This month's cover features the iconic Navajo Bridge over Marble Canyon of the Colorado River—a symbol of the connections between people and water in the arid West. It reflects the spirit of this issue, "building bridges", through efforts that support students in honor of those who shaped our field, broaden access to data and tools, cultivate global collaboration, or link remote sensing with modeling to navigate uncertainty.



Kaidi at AGU24 celebrating her NASA FINESST Award.

AWARDEE SPEAKS

Horton Research Grant

Kaidi Peng

UNIVERSITY OF WISCONSIN – MADISON

I am honored to have been selected for the Horton Research Grant this year in support of my doctoral research at the University of Wisconsin–Madison. My passion for hydrology began with my undergraduate capstone project on satellite-based bathymetry inversion. I was attracted by how powerful the satellites are in observing water dynamics at a global scale. However, I quickly recognized the inevitable uncertainties in remote sensing data, leading me to pursue my Ph.D. research on global, multi-scale satellite-based precipitation uncertainty and its associated effects on flood prediction.

Improving the accuracy of hydrologic modeling is crucial for enhancing communities' preparedness for floods, particularly in data-sparse and weakly-characterized regions. Although satellite-based measurements of precipitation, e.g., NASA's Integrated Multi-satellitE Retrievals for GPM (IMERG), and streamflow, e.g., Surface Water and Ocean Topography (SWOT) are increasingly available for use in ungauged regions, they often introduce large biases due to retrieval algorithm deficiencies, sensor heterogeneity, and infrequent sampling. When used in hydrologic prediction, satellite-based precipitation uncertainty and calibration target uncertainty are further blended with model parameter uncertainty, leading to significant streamflow prediction bias.

"My dissertation proposes a satellite-aided ensemble flood prediction framework by leveraging satellite data uncertainty quantification, statistical modeling, and the distributed physics-based hydrologic model."

The identification and decoupling of these uncertainties can enhance our understanding of their respective impacts, thereby improving hydrologic prediction. Addressing this issue worldwide is challenging, however, largely due to the scarcity of precipitation and streamflow ground truth and complex uncertainty interactions. Current global flood models lack a feasible way to simultaneously account for uncertainties in satellite-based precipitation, model parameters, and calibration targets. Therefore, my dissertation proposes a satellite-aided ensemble flood prediction framework by leveraging satellite data uncertainty quantification, statistical modeling, and the distributed physics-based hydrologic model.

I sincerely appreciate my advisors Prof. Daniel Wright and Dr. Yagmur Derin, who always support me and give me the freedom to explore my research interests. I would like to thank my collaborators and lab mates for fostering great discussions that have inspired me to develop interesting research ideas.

TECHNICAL COMMITTEE

Remote Sensing

Easing the Learning Curve with a New Cheat Sheet for Remote Sensing of the Hydrological Cycle

Gigi Pavur (US Army Corps of Engineers), Deep Shah (Texas A&M Univ.), Laura Almendra (Univ. of Florida), Leah Kocian (Texas A&M Univ.), Debasish Mishra (Texas A&M Univ.), Vinit Sehgal (Louisiana State Univ.), Huilin Gao (Texas A&M Univ.), Kristen Whitney (NASA GFSC; Univ. of Maryland), Hatim Geli (New Mexico State Univ.), Andrew Feldman (NASA GSFC; Univ. of Maryland)

Over the past few decades, Earth observations using satellite remote sensing have proven to be integral to scientific research and applications. This is especially true for hydrological systems, where nearly all components of the hydrological cycle are observable from space using freely accessible and globally available remote sensing products. The advancements in hydrology remote sensing contribute valuable data to support hydrological modeling, water resources management, disaster preparedness, and more. With near real-time global coverage and increasingly better temporal and spatial resolutions, remote sensing continues to improve our understanding of hydrological systems, particularly in regions of the world that lack in-situ ground observations.

As the quantity of remote sensing products continually increases, the 'learning curve' for using new datasets becomes steeper. Keeping track of remote sensing products and their characteristics can be complex and time consuming. Many users struggle with navigating extensive user guides, Algorithm Theoretical Basis Documents (ATBDs), multiple product versions, and numerous websites in their search for specific data. Even for well-versed researchers, navigating diverse file formats, repositories, tools, and dataset structures can be cumbersome. For new users, this learning curve can be discouraging and may even deter them from using these datasets at all.

Given the scientific potential of remote sensing for hydrological research and applications, as well as the substantial investment of time and resources to develop these technologies, there is a critical need to increase resources aimed to support new users. As a step towards easing this learning curve, the Remote Sensing Technical Committee (RSTC) has compiled a new (representative) Hydrology Remote Sensing Live Cheat Sheet. We envision this resource to be regularly maintained, updated, and available on the RSTC website. Please note that this directory is not comprehensive and only represents a subset of available datasets. We invite the AGU community to support development of this directory by submitting dataset recommendations to us for review and inclusion through this form. The Live Cheat Sheet will be updated every two months based on responses submitted through the form.

Together, we can lower the learning curve of hydrology remote sensing to continue increasing the scientific potential and reach of hydrology research and applications.

SEE A DIAGRAM OF OUR SAMPLE CHEAT SHEET ON PAGE 04

AGU Remote Sensing Technical Committee

Visit our website HERE. Join our LinkedIn group HERE.

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Remote Sensing Products for Hydrology

Sample cheat sheet. View the full Live Cheat Sheet HERE. Suggest a cheat HERE.

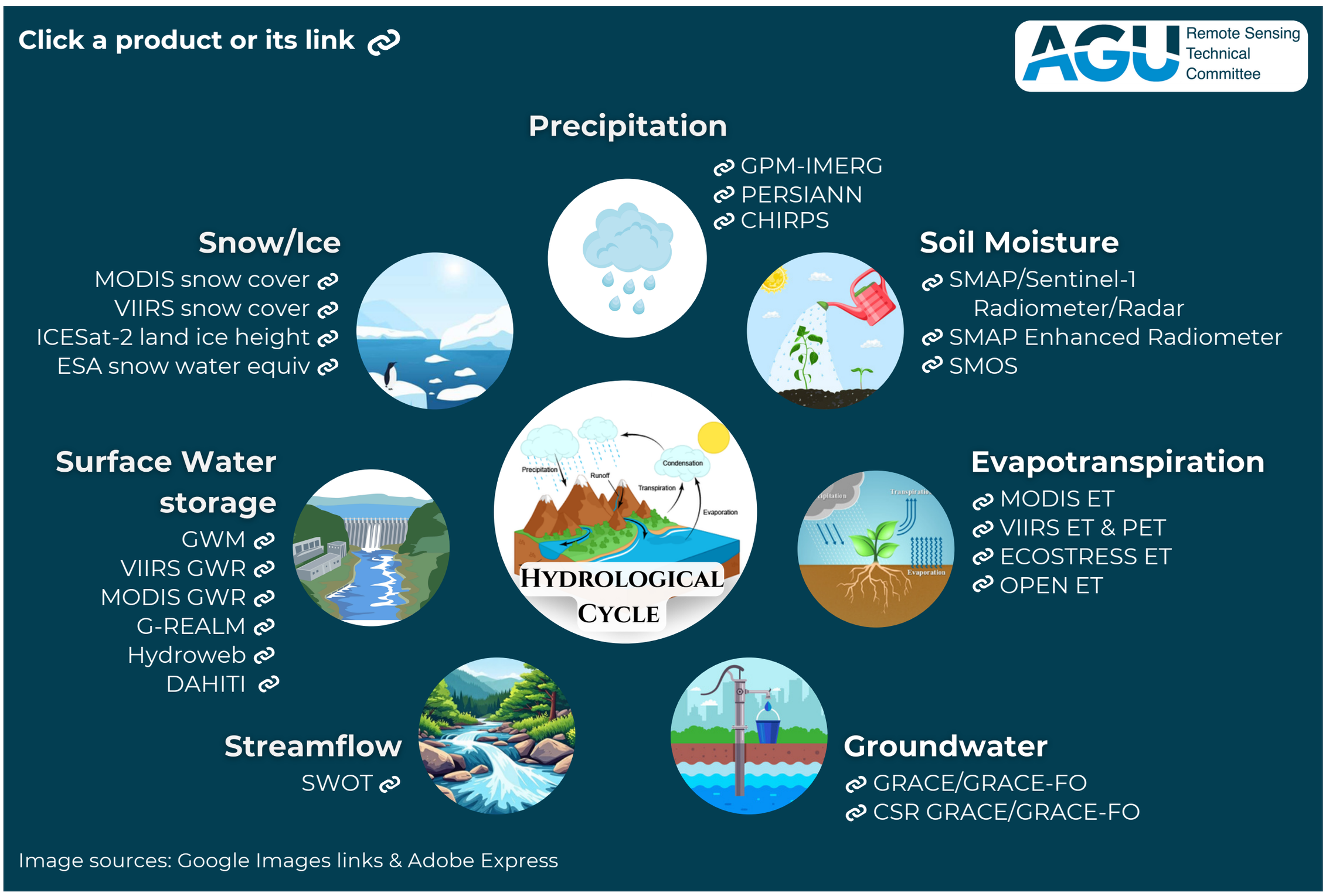

Image sources: Google Images links & Adobe Express

Disclaimer

We do not endorse, promote, or market any specific products from any agency or individual. We strive to include a wide range of datasets, but acknowledge that it may not cover every available product. We encourage users to contribute to the Living Cheat Sheet by submitting additional relevant datasets through the Cheat Suggestion Form. The Living Cheat Sheet will be updated every two months based on responses received through the Cheat Suggestion Form.

AGU Remote Sensing Technical Committee

Visit our website HERE. Join our LinkedIn group HERE.

FELLOW SPEAKS

Christina (Naomi) Tague

UNIVERSITY OF CALIFORNIA,
SANTA BARBARA



The Tague Team Lab in one of our study watersheds:
Rattlesnake Canyon near Santa Barbara, California

I am deeply honored to join the list of AGU Fellows. I am truly grateful to the community both for the recognition and even more so for their support and collaboration. This especially includes the students, mentors, technicians and fellow scientists I've worked with, who enabled me to contribute to hydrologic science and more importantly have made the doing of that fulfilling and fun.

I started my career as a system engineer looking for a way to apply my skills and enjoyment in math and computing. Initially I dabbled a bit in the biomedical field, but was drawn to the environment and to the study of water. Perhaps growing up in the wilds of Newfoundland, Canada had something to do with that! I liked finding a landscape perspective on a system made up of trees, rock and water. Thus, becoming an expert in environmental modeling made sense since I utilized my skills while still maintaining the joy and wonderment in what I was doing. Indeed, I am lucky that I found that. For those early in their career, seek out a way to do what you find fulfilling not just as an ideal, but also in your day to day work-life.

Much of my career has focused on developing and applying eco-hydrologic models. I see models as a way to integrate not just data, but also ideas. But to do that well requires investing in collaboration. In this era, advances in hydrologic science happen along so many dimensions – new observational technologies, sophisticated modeling and data science techniques, new insights not only in hydrology but in related fields like fire science, ecophysiology, geology, atmospheric science, economics and many others. No one person can keep up with all these fields, but at the same time, the most interesting questions (and often the ones that society desperately needs the answer to) require bringing together a myriad of different pieces to shape the puzzle and provide frameworks for answers. Sometimes we do find synthesis in review papers, but integration is also sorely needed in focused work and on specific problems. Making better models, helping others use those models, and finding meaningful applications of models but it also requires listening to and engaging with experts from other fields, and being willing to be wrong and try something new. My most rewarding work has come from hours spent in dialogue with a small group of colleagues with different specialties where we attempt to figure things out together. I have found that investing real time and effort into bringing a myriad of ideas, data, and techniques together is both fulfilling and a seminal way to move forward.

SCIENCE TO SOLUTIONS

NASA's Western Water Applications Office

Leveraging Earth Observation Data for Practical Water Management in the Western US

SEAN W. FLEMING, STEPHANIE L. GRANGER, PERRY C. ODDO, ERIN URQUHART

In 1878, the American soldier, explorer, geologist, and professor John Wesley Powell, marked the 100th meridian as the divide between the eastern and western US. Though approximate, the line is meaningful, denoting a surprisingly sharp transition in the balance between precipitation and potential evapotranspiration, with profound implications for ecosystems and economies. Generally, the West is much drier and has a more mountain snow-dominated hydrologic regime. Agriculture is therefore predominantly irrigated, settlement was guided by water availability (hence Teddy Roosevelt's 1901 remark that in the US West, "whoever controls the stream practically controls the land"), hydropower became dominant, and a vast water management infrastructure emerged—including institutions unique to the West, like the U.S. Bureau of Reclamation—enabling the emergence of glittering megacities in the desert.

Today, the unique water resource management challenges of the western US, amplified by population growth, changing weather patterns, and a rapidly expanding water- and energy-hungry tech sector, continue to drive innovative West-focused solutions, like NASA's Western Water Applications Office (WWAO).

NASA Earth Observation (EO) information may focus on space-based remote sensing—including dozens of missions like MODIS, GRACE, SWOT, SMAP, SRTM, PACE, and OPERA plus future missions like NISAR and SBG, operating multispectral and hyperspectral, radar, and gravity instruments—but also includes significant modeling, airborne remote sensing, data-fusion, and data-pipeline threads. This spatially continuous information at scale, spanning diverse components of the water-cycle including snow, groundwater, soil moisture, river and lake levels, water quality, and land cover change, is an enormous boon to understanding, predicting, and efficiently using water resources and mitigating water-related hazards, like floods and droughts.

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If you're interested in leveraging NASA products and expertise in your applied water resources work in the US West, reach out to the WWAO Program Manager, Stephanie Granger at the Jet Propulsion Laboratory (Stephanie.L.Granger@jpl.nasa.gov).

NASA's Western Water Applications Office

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If you're interested in leveraging NASA products and expertise in your applied water resources work in the US West, reach out to the WWAO Program Manager, Stephanie Granger at the Jet Propulsion Laboratory (Stephanie.L.Granger@jpl.nasa.gov).

WWAO is the Western arm of NASA's Water Resources Program. WWAO works with Western water practitioners and private-sector organizations to co-develop innovative NASA EO-enabled solutions in a needs-driven approach. Transitioning NASA information into practical water management and decision-support tools and services requires recognizing the multiplicity, variety, and interconnectedness of technologies, partners, and water challenges and opportunities (**Figure 1**). Recent examples of WWAO successes in this regard include the Airborne Snow Observatory, the NASA/Navajo Drought Severity Tool, the Snow Today service (**Figure 2**), and NASA EO-improved U.S. Department of Agriculture AI-driven water supply forecasts.

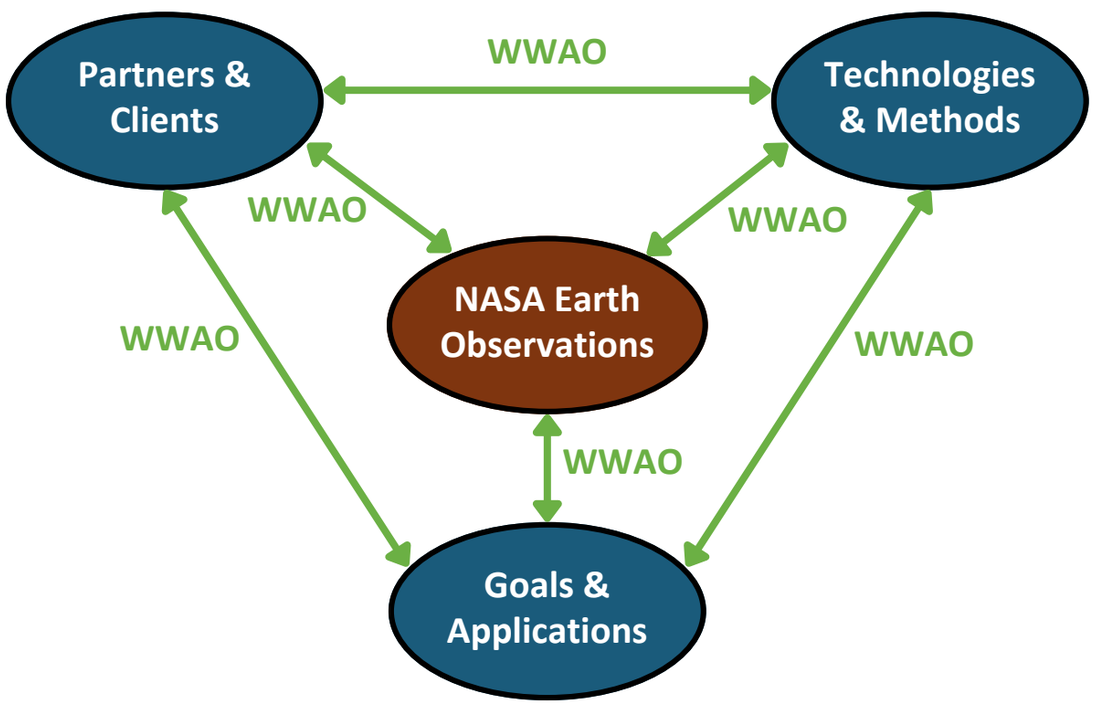


Figure 1. In the mostly arid Western US, water is a key ingredient in everything from agriculture, hydropower, and municipal water supply to golf resorts, lithium mines for electric vehicle batteries, and cloud-computing centers. Optimal management requires knowing where and how much water we have today, next week, and a generation from now. That means new enabling technologies like AI and IoT, plus data—the kind of data NASA has. WWAO links stakeholders, new tech development, and water management tasks to NASA information.

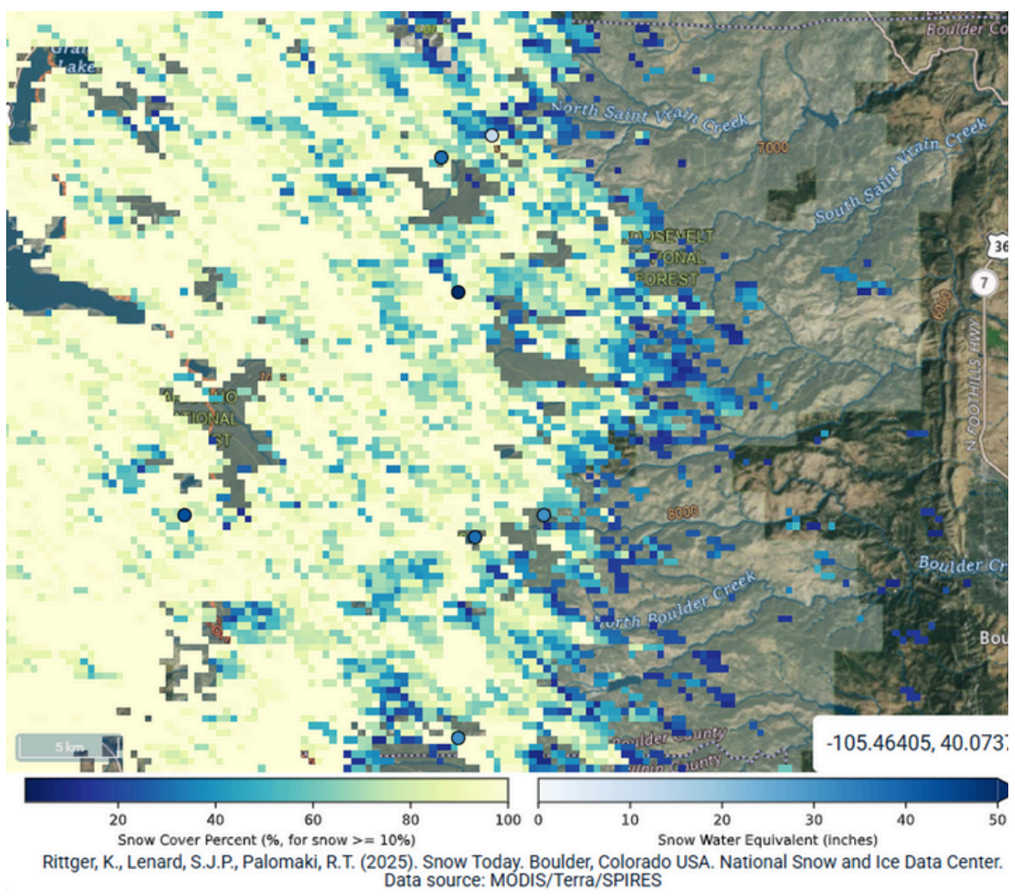


Figure 2. NASA data-driven snow cover map, Front Range of the Colorado Rockies, 6 March 2025. This kind of spatially continuous satellite data can powerfully improve flood, water supply, and hydropower generation forecasts hours, days, and months ahead. Overlain circles show USDA SNOTEL traditional point measurement sites that are an important complementary source of ground validation and additional information. This online Snow Today product, which updates daily, was enabled by WWAO.

SISTER ORGANIZATION

European Geosciences Union

ALBERTO VIGLIONE
HS DIVISION PRESIDENT, & PROGRAMME CHAIR

Dear AGU colleagues,

Hydrologists in Europe and all over the world are currently preparing scientific presentations and, for some of them, their backpacks, to join thousands of colleagues at the next EGU General Assembly. The meeting will take place in a few weeks, from 27 April to 2 May 2025, in Vienna and online. Overall, there will be more than 19,000 presentations (orals, posters, and PICOs—our interactive poster presentations), all to be delivered and viewed both onsite in Vienna (Austria Center Vienna) and virtually (through the platform Gather.Town). In the Hydrological Sciences (HS) programme, we have about 3,500 presentations included in 112 scientific sessions (the full programme can be found here).

This year, particular focus will be given to the topic of "Water and Health", with a special discussion session on water and human health challenges (solicited presentations to be confirmed). As always, we will have outstanding lectures by our awardees: the Arne Richter Award for Outstanding Early Career Scientist lecture by Frederik Kratzert, the Henry Darcy Medal lecture by Jan Seibert, and the John Dalton Medal lecture by Paolo D'Odorico. Something not to miss is our division meeting, where we will present to the community the activities currently underway and plans for the year ahead (on Tuesday, 29 April, 12:45–13:45 CEST).



Picture taken at the John Dalton Medal lecture in 2024.

There will be plenty of HS activities, and you will find much more at EGU: several Union Symposia and Great Debates as well as plenty of short courses, education&outreach sessions, and networking events. If you are far away and cannot travel to Vienna, do not worry—many sessions can be attended online and networking events will also be planned in Gather.Town (including a game session), so just keep an eye on the updates on the conference website.

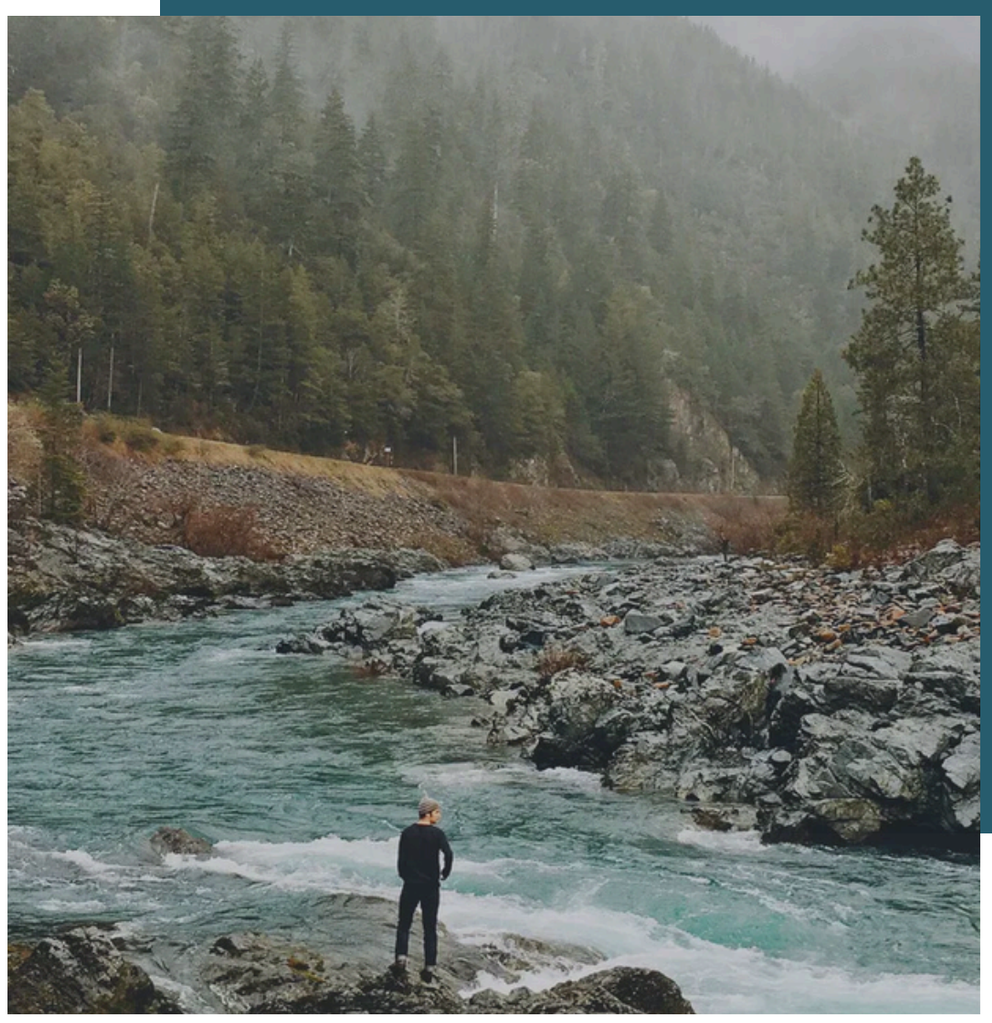
Want to learn more about the HS Division of EGU? Check out our division homepage, subscribe to our newsletter, read our blog, or follow us on LinkedIn, BlueSky, Facebook, and Instagram. Throughout the year, the EGU's HS Division provides networking events and career development opportunities for early career scientists, hosts webinars and the HydroTalk podcast, publishes regular blog posts, and sends out a monthly newsletter to stay connected with members. Contact us! The EGU's HS Division is always thrilled to welcome new members and volunteers and is committed to building an inclusive, diverse, and respectful community

I am looking forward to seeing you in Vienna or online!

Alberto Viglione, HS Division President and HS Division Programme Chair

Open Channel

Email:
agu.hydro.news@gmail.com

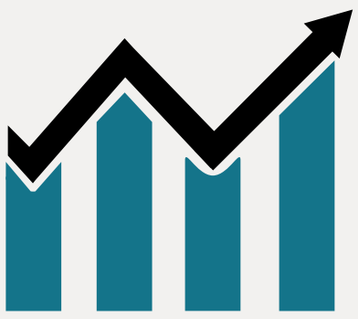


WE'VE HEARD YOU!

The Science to Solutions section (highlighting research with real-world impacts) is now a priority feature. Many also expressed interest in Hydrology Horizons (emerging trends, transformative technologies), so we're curating more content for future issues.

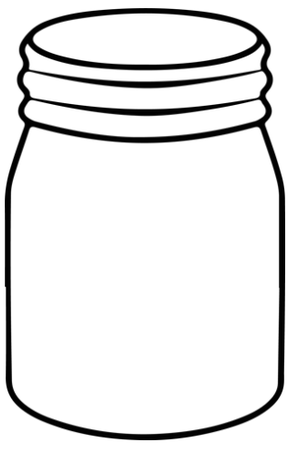
We'd love more feedback and nominations—help shape the newsletter by filling out this brief survey (HERE). All questions are optional, and your input is invaluable. Thank you for your time and insights!

Call for Contributors: Hydrology Horizons



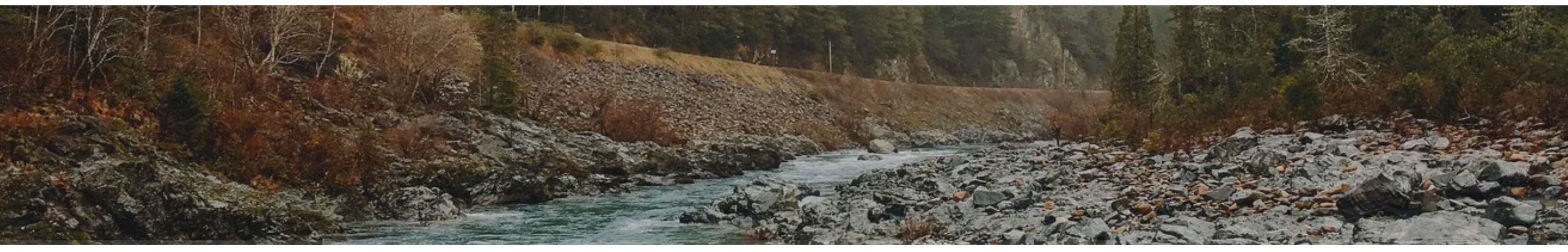
We welcome contributions on emerging research and transformative technologies, including new data, methods, tools, or early insights. Nominate yourself or a colleague at agu.hydro.news@gmail.com.

ANONYMOUS COMMENT JAR



Favorite part of this issue?
Thoughts on future issues?
Nominations for contributions?

Drop your comments in the jar (HERE)—anonymously if you prefer.



Community Links

AGU Hydrology Section

Website: connect.agu.org/hydrology
BlueSky: @hydrology-agu.bsky.social
X: @Hydrology_AGU

Technical Committee Links

HYDROLOGY SECTION JUSTICE, EQUITY, DIVERSITY, AND INCLUSION (JEDI) COMMITTEE

Website: connect.agu.org/hydrology/about/tc-committees/hydrojedi

HYDROLOGY SECTION STUDENT SUBCOMMITTEE (H3S)

Website: agu-h3s.org
X: @AGU_H3S
LinkedIn: @american-geophysical-union-hydrology-section-student-subcommittee-h3s

PRECIPITATION

Website: connect.agu.org/hydrology/about/tc-committees/pretech
Facebook: AGU Precipitation
X: @AGUPrecip
Instagram: @AGU_precipitation
Linkedin: AGU Precipitation

CATCHMENT HYDROLOGY

Website: hydrocatch.weebly.com
X: @AGUCatchHydro

SOIL PROCESSES AND CRITICAL ZONE

Website: connect.agu.org/biogeosciences/tc-committees/soils-spcztc

ECOHYDROLOGY

Website: connect.agu.org/hydrology/about/tc-committees/ecohydrologymain
X: @AGUecohydro

REMOTE SENSING

Website: connect.agu.org/hydrology/about/tc-committees/remote-sensing
LinkedIn: AGU Hydrology Section's Remote Sensing Technical Committee group

GROUNDWATER

Website: connect.agu.org/hydrology/about/tc-committees/groundwater
X: @AGU_GWHydro

UNSATURATED ZONE

Website: connect.agu.org/hydrology/about/tc-committees/unsat
X: @UnsatHydro

HYDROGEOPHYSICS

Website: connect.agu.org/hydrology/about/tc-committees/hydrogeophysics
X: @AGUhydrogeophy
Instagram: @aguhydrogeophysics

WATER AND SOCIETY

Website: connect.agu.org/hydrology/about/tc-committees/water-and-society
X: @AGU_WS
Google: groups.google.com/agu-water-and-society

HYDROLOGIC UNCERTAINTY

Website: hydrouncertainty.org
X: @AGU_HU

WATER QUALITY

Website: aguwaterquality.org/
X: @AGU_WQ