GENERATIONS OF WATER

AGU HYDROLOGY SECTION NEWSLETTER

OCTOBER 2025

About the cover:
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APPLY NOW

Bridges to the Future Student Grants Program

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. The program program provides $2,000 grants to support undergraduate, master's, and doctoral students facing financial barriers in pursuing careers in hydrology. Funding can be used for activities like attending scientific meetings, visiting research groups, or engaging in career development.

Who Can Apply

Students enrolled full- or part-time at two-year colleges, four-year universities, or graduate programs, with a demonstrated interest in hydrological sciences. Preference is given to undergraduate students, but all career stages are eligible.

Application Materials Include

A current CV, two-page essay describing your hydrology interests and proposed activity, budget explaining how the grant makes the activity feasible, and one letter of reference confirming your qualifications and potential impact

How to Apply

Submit your application to Venkataraman Lakshmi, Hydrology Section President: vlakshmi@virginia.edu.

Deadline Approaching

Applications are due by October 31. Award announcements will be made in November. For more information, contact Tracy LaMondue, AGU Vice President for Development: tlamondue@agu.org.

This issue:

About the cover

This month's cover shows the Yuanyang Rice Terraces shaped by water & time, which reflects this issue's theme, "Generations of Water." From scientists at all career stages (including high school!) to a global program coordinating science–policy efforts for 50 years, this issue highlights how hydrologic knowledge flows across people, places, & decades.

AWARDEE SPEAKS

Anna Boser

Science For Solutions Award

University of California, Santa Barbara

When I began my PhD five years ago, I believed there was a formula for impactful research: identify the biggest knowledge gap, find the lowest-hanging technical fruit, and solve it with skill. Having grown up in California, one of the most agriculturally productive yet water-stressed regions in the world, and having spent time in Niger where erratic rainfall dictates food security, I was driven to use remote sensing and machine learning to improve agricultural water management.

It didn't take long to realize that science rarely works that way. Choosing questions that truly matter—and ensuring the answers reach the people who need them—requires more than technical ability. It demands sustained attention to context, relationships, and ethics.

My first major project used new satellite data and machine learning to estimate agricultural water use in California. I was proud when it culminated in a Nature Communications paper and wide media coverage, yet I struggled to see how the findings would influence decisions on the ground. The science was strong, but the path to real-world impact remained uncertain, and I felt unfulfilled.

Anna Boser with Jackson Coldiron (left) and Eugene Kaango (center) at the School of Agricultural Sciences at the University of Zambia in Lusaka, Zambia, 2025.

> "Choosing questions that truly matter—and ensuring the answers reach the people who need them—requires more than technical ability."

For my next project—investigating the extent and growth of smallholder irrigation in Sub-Saharan Africa—I approached things differently. Although the analysis could have been completed entirely from my desk, I spent six months in Zambia to understand how the work could benefit the people whose livelihoods depend on these systems. Through conversations with farmers, government researchers, and private partners, I learned that limited knowledge about both the extent of small-scale irrigation and the factors that encourage its growth has left policymakers and managers without the information they need to understand its climate adaptation potential or design strategies to support it. now have a clear plan for sharing my results with government, NGO, and private partners in a way I feel confident will lead to practical plans for guiding investment and policy without putting vulnerable farmers at risk.

Today, I view impact not as an afterthought but as a design principle. Technical innovation opens the door, but deliberate, on-the-ground engagement turns scientific discovery into lasting benefit for the communities our work aims to support.

> "Technical innovation opens the door, but deliberate, on-the-ground engagement turns scientific discovery into lasting benefit for the communities our work aims to support. "

AWARDEE SPEAKS

Megan Konar

Macalwane Medal

University of Illinois at Urbana-Champaign

Konar research group in Spring 2025.

I'm deeply honored to be named an AGU Fellow and to receive the James B. Macelwane Medal. This recognition holds special significance for me because my PhD advisor, Ignacio Rodriguez-Iturbe, was awarded the same medal back in 1977. Ignacio was an extraordinary mentor, and I feel incredibly fortunate to have been his student. Throughout my journey, I've been equally lucky to work with so many brilliant colleagues, collaborators, and students. At the end of the day, it's all about the people.

From an early age, I was captivated by the beauty of the natural world—and I still feel immense gratitude that I get to study it as a career. What unites us as AGU researchers is a shared curiosity and drive to better understand the natural world around us. We're all chasing questions sparked by the mysterious, complex, and beautiful world in which we live.

People outside of science are often surprised when I tell them how much creativity and imagination matter in research, not just technical skills. But it's true—scientists, philosophers, and artists are all, in their own way, seekers of truth and beauty. Remembering that broader purpose can help us stay inspired—and help us inspire the next generation.

"What unites us as AGU researchers is a shared curiosity and drive to better understand the natural world around us. We're all chasing questions sparked by the mysterious, complex, and beautiful world in which we live."

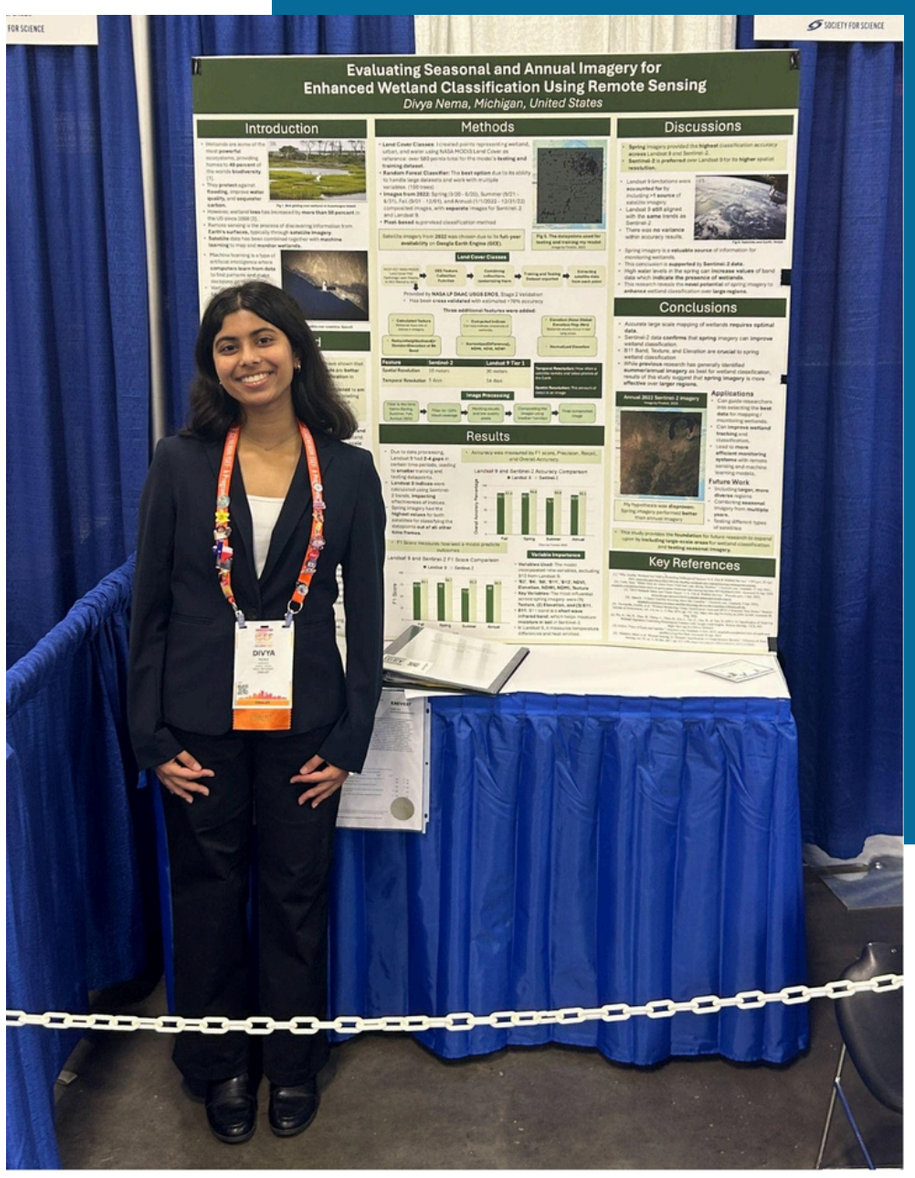
Of course, people aren't separate from nature—we are a part of it. Historically, though, human society has often existed outside the focus of the natural sciences. I'm grateful that AGU has created space for research that weaves societal dimensions into fields like hydrology, which is the focus of my research. As a community, I hope we continue to explore and highlight the more beautiful aspects of humanity—its resilience, ingenuity, and adaptability—in our work. Rather than focusing only on human impacts as threats to the environment, let's also incorporate these positive dimensions. By better understanding the full relationship between water and society, we can uncover insights that support both the natural world and human flourishing.

STUDENT SPOTLIGHT

Exploring How Seasonality Affects Wetland Classification

Divya Nema

Novi High School, Michigan



Sharing my research at the International Science and Engineering Fair.

Wetlands are vital ecosystems that support both planetary and human health, but wetland loss in the U.S has increased by more than fifty percent since 2009 [1]. Remote sensing and machine learning have been combined to monitor and map wetlands throughout the years to encourage conservation. However, wetlands change throughout the year due to their unique hydrological and vegetation cycles, causing seasonal variations in their data. This, combined with the diversity of wetland types, can make their classification challenging. Understanding how seasonal remote sensing data influences wetland classification is crucial to building accurate models, but has only been assessed over small-scale field studies [2] [3] [4].

My research compared how seasonal Sentinel-2 and Landsat 9 data affect wetland classification across Michigan, USA. Using supervised classification, I built a model incorporating variables commonly used for classifying wetlands, such as indices. I created a dataset of urban, wetland, and water areas in Google Earth Engine using NASA's MODIS Land Cover Map and evaluated how training and testing the model on single time-frame data (spring, summer, fall, annual) affected the classification accuracy using F1 scores.

The results showed that spring Sentinel-2 and summer Landsat 9 data provided higher accuracy than other time periods, revealing the potential of seasonal data for wetland classification in Michigan. For the best-performing time-frames, the most important variables for classifying wetlands were computed texture from the NIR band and the SWIR band. By examining seasonality and key variables, these conclusions offer insights into improving wetland classification and can support large-scale wetland mapping and monitoring for regions with similar climates, with the ultimate goal of choosing optimal data for accurate classification.

My home state Michigan inspired this project. Michigan has many diverse wetland types, yet they have declined over the past few decades due to factors such as urbanization. To gain feedback on my research project, I competed at the International Science and Engineering Fair in May 2025, an experience that allowed me to connect with scientists worldwide and further deepened my passion for research. Looking ahead, I'm excited about the potential opportunity to present at AGU through the Bright Stars Program this December. I'm especially interested in using artificial intelligence (AI) to solve environmental challenges and encourage sustainability. I'm excited to continue exploring these fields as I continue my research journey.

"My home state Michigan inspired this project. Michigan has many diverse wetland types, yet they have declined over the past few decades due to factors such as urbanization."

For more on my work, check out my LinkedIn.

EARLY CAREER SPOTLIGHT

Scaling change from headwater streams to the Great Salt Lake

Sara Warix

University of Utah

Warix and students after a day of field work in Albion Basin, Utah.

I am an Assistant Professor in the Geology and Geophysics Department at the University of Utah exploring how climate variability is impacting stream hydrologic and biogeochemical fluxes. The Utah campus is located at the base of the Wasatch Mountains, which have stark climatic, geologic, and land-use gradients, spanning from high-elevation alpine zones to downtown Salt Lake City in under 15 kilometers. Snowmelt-fed rivers that originate in the Wasatch flow through the city before contributing to the Great Salt Lake, which is threatened by drought and increasing water withdrawals. Mountain headwaters that feed susceptible downstream water resources make the Wasatch Mountains an ideal testbed to explore longstanding problems in catchment hydrology, specifically, how upstream perturbations scale through heterogeneous environments.

My goal is to quantify how upstream hydrologic signals move through a watershed and to determine which aspects of watershed heterogeneity most influence outlet fluxes of water and solutes. Streamflow predictions often rely on historic data collected from watershed outlets, which aggregate all upstream processes into a single flux. This approach requires that historic trends are representative of future conditions. However, unprecedented changes in precipitation patterns and land use challenge this assumption. For example, record declines in water table elevation could disconnect upgradient storage features from stream networks, increase stream drying frequency, or cause new weathering reactions, resulting in record low discharge and unprecedented changes in stream chemistry. By identifying the impacts of stream drying on downstream water resources, we can refine hydrologic models to focus on the most relevant watershed traits, improving streamflow prediction.

“By identifying the impacts of stream drying on downstream water resources, we can refine hydrologic models to focus on the most relevant watershed traits, improving streamflow prediction.”

To solve this problem, I am working with a team of graduate and undergraduate students at the University of Utah to instrument nested catchments located along the climatic and geologic gradients inherent to the Wasatch Front. Both catchments contain abundant intermittent streams and contribute to Salt Lake City water resources. Currently, students are working to analyze stream drying patterns, changes in streamflow source, and groundwater and stream age to characterize heterogeneity across climate and geologic gradients, before comparing upstream change to downstream water availability. By linking local observations to downstream supply, our work will contribute to the broader effort to recognize the impact of intermittent streams on watersheds as a whole.

TECHNICAL COMMITTEE

Water and Society

Marc Müller (Chair)

Image source: Wikimedia commons, Author: Jialiang Gao, www.peace-on-earth.org. (License: GFDL/CC-by-sa-2.5)

The Water and Society Technical Committee (TC) advances understanding of the interplay between water systems and human activities across temporal and spatial scales. Our work bridges hydrology, environmental science, engineering, social science, and policy within AGU. We focus on anthropogenic changes in the water cycle and their impacts on human society, ecosystems, and Earth systems, integrating insights on hydrological processes with their social, cultural, and environmental functions.

Our core research themes include:

- **Water Resources Management:** Sustainable planning, distribution, and use of water to meet societal needs while preserving environmental integrity.
- **Social-Hydrological Modelling:** Multi-scale, statistical, and multi-fidelity modeling (e.g., hydrological or water systems models)
- **Water Scarcity and Security:** Addressing challenges of availability, equitable access, and long-term sustainability.
- **Food-Energy-Water-Environment (FEWE) Nexus:** Examining interactions among food, energy, water, and environment to foster resilience and sustainability.
- **Water Governance and Conflicts:** Studying political, social, economic, and administrative systems that shape water management, essential for equity, conflict prevention, and justice.

Connecting with the Committee

We encourage researchers to join our network by completing a Google Form, which helps members find collaborators, identify seminar speakers, and connect with over 100 researchers and professionals. We also host a Google Group (agu-water-and-society@googlegroups.com, 175+ members) and a LinkedIn page (@AGU Water and Society TC) where you can share news, job openings, and research updates. For more information, please visit our website or contact Marc Muller (Chair, Marc.Mueller@eawag.ch), Christine Kirchhoff (Deputy Chair, ckirchhoff22@gmail.com), Hassaan Khan (Secretary, Hassaan_Furqan.Khan@tufts.edu), or Chung-Yi Lin (Social Media Chair, chungyl@clemson.edu).

Water & Society Fellowship

The inaugural Water & Society Fellowship received 72 applications from early-career researchers who are based in, from, or conducting grounded research in the Global South. Designed to support science communication and amplify regional water–society perspectives, the fellowship awards USD 500 to each fellow (funded by the AGU Hydrology Section) to produce five blog posts spotlighting a research group, paper, or project in their region. Posts are reviewed by volunteer TC members and published throughout the year on the W&S LinkedIn page. The fellowship seeks to elevate underrepresented voices, celebrate place-based expertise, raise awareness of water–society challenges in the Global South, and promote more inclusive narratives in global water research.

We are proud to introduce our inaugural fellows: Azmal Hossan, PhD candidate in Sociology at Colorado State University, who is writing on water–society challenges in South Asia, and Gescilam Uchôa, PhD student in Hydraulics and Sanitation at the University of São Paulo, who is spotlighting perspectives from South America.

SISTER ORGANIZATION

Science for Water Action: 50 years of international cooperation through Inter-governmental Hydrological Program at UNESCO

Anil Mishra and Abou Amani

The International Hydrological Decade (IHD, 1965–1974) of UNESCO was conceived as a concerted international effort to bring into focus the badly fragmented subdiscipline of hydrology, to evolve a global perspective on water, and to provide global information on water (Nace, 1980). Between 1965 and 1974, the IHD did much to focus attention on the imperative to judiciously manage the world's freshwater resources (Narasimhan, 2009).

Building on the IHD, the Intergovernmental Hydrological Program (IHP) has evolved to develop combined understanding of hydrologic processes from different regions with recognition of the value of evidence-based, sound water resources management policies. As such, the IHP has played a leading role in facilitating a broad consideration of water in support of international cooperation in hydrological and freshwater sciences. As an international science and policy programme, it acts at the interface with policymakers and has a strong history of supporting the development of both institutional and individual capacity to understand and manage water resources (Jewitt and Mishra, 2022).

“The Intergovernmental Hydrological Program has played a leading role in facilitating a broad consideration of water in support of international cooperation in hydrological and freshwater sciences”

Today IHP is in its 9th Phase (IHP IX 2022–2029), “Science for a Water Secure World in a Changing Environment,” which outlines five key water priority areas and provides tools, methodologies, and approaches to support Member States in achieving the 2030 Agenda and Sustainable Development Goals (SDGs). It represents a methodological response toward transdisciplinary approaches aimed to generate solutions. Furthermore, IHP supports Member States in addressing urgent water-related needs by operationalizing scientific knowledge, research, tools, and methodologies through the UNESCO Water Family, consisting of 29 water-specialized centers, 92 UNESCO water chairs and UNITWIN networks, 17 flagship initiatives, and 171 IHP National Committees and Focal Points. Thus, IHP offers a global scientific platform for international cooperation and provides policy advice to address water security challenges.

As IHP celebrates 50 years of service to Member States, this anniversary represents not only a celebration of past achievements but also highlights UNESCO’s ongoing commitment to ensuring water security for future generations in an era of unprecedented environmental change and growing demands.

Recognizing IHP’s role as a catalyst for transformative change, it has been entrusted to lead and co-lead several UN global initiatives, including the International Year of Glacier Preservation in 2025, co-led with WMO, and the International Decade of Action on Cryospheric Sciences (2025–2034), led by UNESCO.

SAVE THE DATE

Extreme Rainfall in Mountainous Terrain: Modeling and observational challenges for warm-season precipitation

National Academies of Sciences Workshop

Workshop Description

This virtual workshop will consider current scientific understanding and gaps 1) for observing and understanding extreme warm-season rainfall in mountainous terrain, and 2) for modeling such precipitation for active events and retrospective analysis, including producing information needed by hydrologic / hydraulic modeling, with consideration of needs for enhanced probable maximum precipitation (PMP) estimation.

Workshop Date and Time

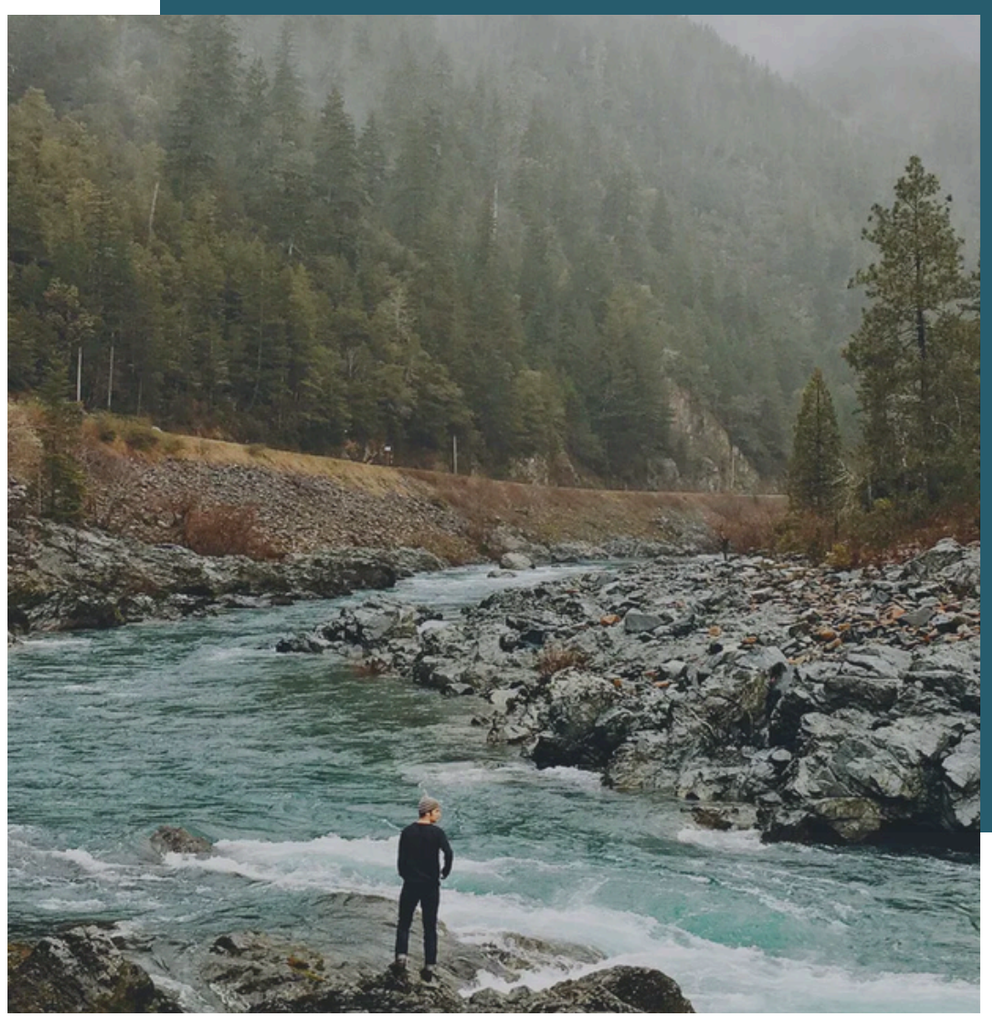
Date: November 4, 2025

Time: 10:00 AM – 5:00 PM ET

Registration Link

Learn more and register here

Call for Contributions



CALL FOR CONTRIBUTORS:

We are seeking contributions for our upcoming 2025–2026 issues. Nominate yourself or a colleague to be featured in one of our regular columns by emailing us at: agu.hydro.news@gmail.com

Column opportunities include:

- Science to Solutions – Connecting hydrology to policy, practice, and community for real-world impact
- Hydrology Horizons – Emerging tools, datasets, methods, or technologies
- Early Career Spotlight – Highlighting the work and journeys of early career hydrologists
- Other – Have a piece that doesn't quite fit? Let's find a space for it—or create one.

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 Resources

Unlock powerful resources to help you grow in your career

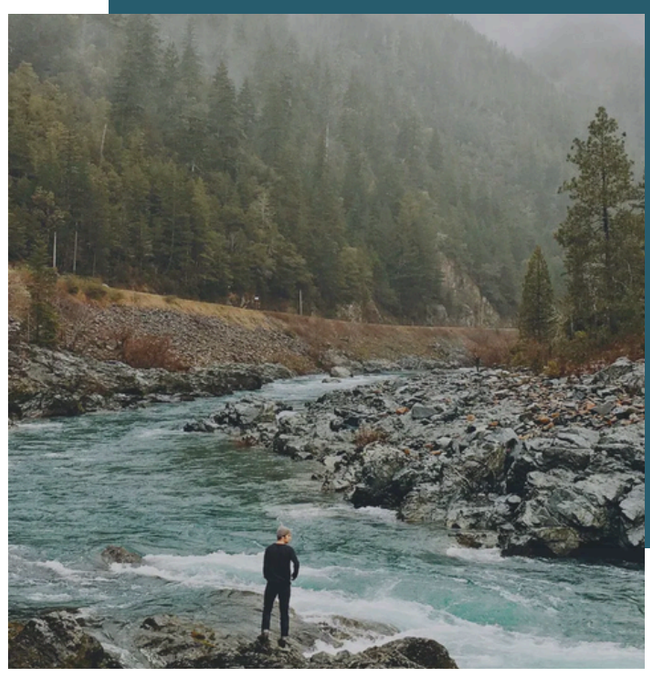
Take full advantage of tools and opportunities designed specifically to support your professional growth—don't miss out!

- Learn and Develop | AGU: Grow your skills and career with learning tailored for Earth and space scientists
- Resource Guides:
  - Careers in Geosciences Resource Guide
  - Graduate School Resource Guide
- AGU Weekly eNewsletter: delivered to your inbox every Thursday!

Impacted AGU Member Support Community

AGU has set up a community on AGU Connect for members impacted by job and funding losses. Please share this with your Section members. Participants can use this forum to share information and resources with one another. Our global community is dedicated to advancing discovery in Earth and space sciences for the benefit of humanity and the environment-and we do that best by lifting up one another. You may also want to add this information to your Section newsletters or other modes of communication. If you have any questions, please reach out to AGU's Section Support Team (agu-SectionHelp@agu.org).

Community Links



AGU Hydrology Section

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

Technical Committee Links

Catchment Hydrology

Website: hydrocatch.weebly.com
BlueSky: @agucatchhydro
LinkedIn: AGU Catchment Hydrology
X: @AGUCatchHydro

Distributed Sesning

Website: connect.agu.org/hydrology/about/tc-committees/sensing
BlueSky: @agu-sensing.bsky.social

Ecohydrology

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

Groundwater

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

Hydrologic Uncertainty

X: @AGU_HU

Hydrology Section Student Subcommittee (H3S)

Website: agu-h3s.org
X: @AGU_H3S
LinkedIn: American Geophysical Union Hydrology Section Student Subcommittee (H3S)

Hydrogeophysics

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

Justice, Equity, Diversity, and Inclusion (JEDI)

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

Precipitation

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

Remote Sensing

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

Soil Processes and Critical Zone

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

Unsaturated Zone

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

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

Water Quality

Website: aguwaterquality.org/
X: @AGU_WQ