



# CONNECTING WATER SCIENCE

AGU HYDROLOGY  
SECTION NEWSLETTER

*On the cover:  
See page 01*

NOVEMBER 2025



# Connecting Water Science: Toward a Coherent Understanding of the Terrestrial Hydrosphere

Georgia Destouni, Editor-  
In-Chief of *Water  
Resources Research*



My vision of a key path forward for water science, and for *Water Resources Research* as a leading journal, is to strengthen research that links the many subsystems of Earth’s terrestrial water into the integrated [terrestrial hydrosphere](#) that they truly form. We know that water doesn’t live in neat compartments. Fractions of the same precipitation water that infiltrate soils, are taken up by plants, evaporate, freeze and thaw, percolate to groundwater, flow as groundwater and surface water, and are drawn and recharged by humans. What we don’t yet know is how large these fractions are and how they change over time across regions and globally.

Grand challenges of too much water, too little water, or excessively polluted water depend on the complex movements and interactions of water within the subsystems of the terrestrial hydrosphere. Yet scientists in hydrology and other water-related disciplines often avoid this complexity by studying select water subsystems and aspects in isolation. Surface-water hydrologists focus on rivers, hydrogeologists on groundwater, ecologists on wetlands, hydrometeorologists on precipitation, biogeochemists on constituent concentrations, social scientists on human water use. Each has pieces of the puzzle, but not the full picture.

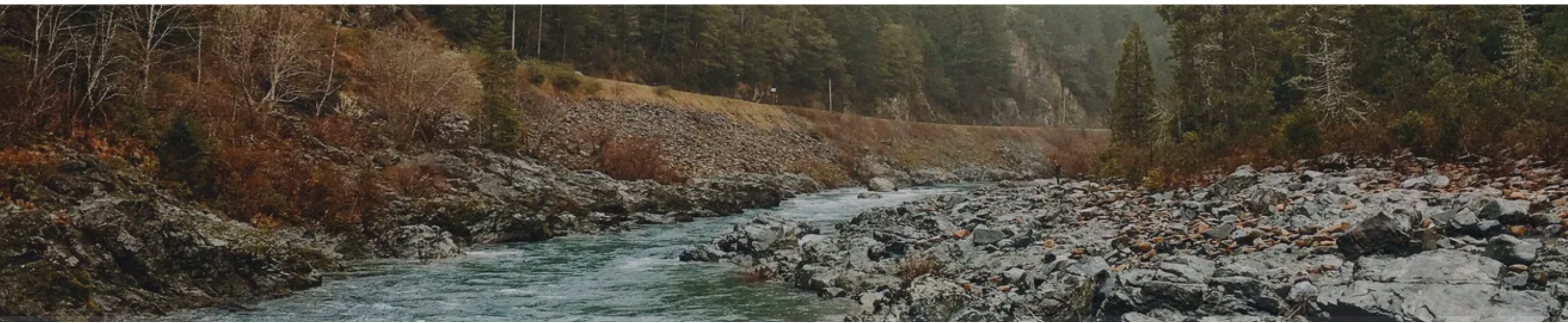
Developing a realistic, big-picture of the terrestrial hydrosphere and its multifaceted roles in the Earth System requires compatibility and coherence among the various facets of water science. This is a major cross-domain research challenge, with high potential gains. The gains include deeper and more realistic understanding, and sharper methods and tools for predicting, managing, and innovatively utilizing the many parts, aspects, and functions of water in a changing world.

We must better understand, manage, and predict the terrestrial hydrosphere because its function and evolution as an interconnected whole affect societies and ecosystems worldwide. The water on land is a key resource and a source of major risk—for example through floods, droughts, and spreading of pollutants and pathogens. It is also a mirror system that reflects and can help us detect and predict the states and trends of other Earth System spheres, as well as the overall planetary health—much like how we measure and interpret blood pressure and composition to diagnose human health conditions. Such advances are central in the scope of *Water Resources Research* to achieve a broad understanding of water’s role in the Earth System. Authors are encouraged to **contribute by 31 March, 2026 to the journal’s 60th anniversary [special collection](#)** addressing such themes.

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# Announcements

## ABSTRACT SUBMISSIONS FOR AGU25 LATE-BREAKING SESSIONS DUE NOV. 5!

Submit an abstract to an AGU25 late-breaking session! Submissions will be accepted through **Wednesday, 5 November**. Learn more about these late-breaking sessions and submit your abstract today: <https://www.agu.org/annual-meeting/present/abstracts#abstracts-overview#abstracts-overview>

## AGU ANNUAL MEETING 2025 TECHNICAL COMMITTEE (TC) MEETINGS

All Technical Committee (TC) Meetings at the **AGU Annual Meeting 2025 (AGU25)** will be self-organized by the respective committees. Hydrology Section Leadership recommends scheduling TC meetings on **Monday, 15 December**—either in the morning or during lunch—to avoid overlap with AGU25 sessions. Holding meetings on this day ensures TC chairs have their updates ready for the **TC Chair-Only Meeting**, which is scheduled for **Tuesday, 16 December** in the morning (time and location TBC; TC chairs stay tuned for an email with details).

Are you part of a TC and interested in joining its AGU25 meeting? Please contact your TC chair for details. If you are not yet a member of a TC but would like to join, please refer to the links provided at the end of this newsletter to learn more about each TC and how to get involved.

## WHAT’S NEXT FOR THE AGU HYDROLOGY SECTION: BUILDING AN EQUITABLE AND INCLUSIVE COMMUNITY IN HYDROLOGIC SCIENCES

### AGU Annual Meeting 2025 Town Hall

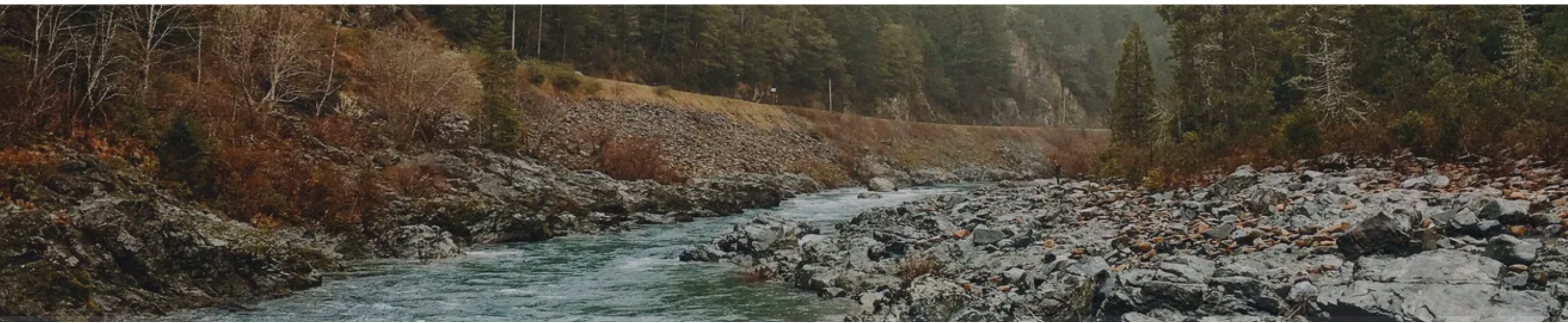
Join us for a vital town hall meeting hosted by the Hydrology Section, dedicated to advancing justice, equity, diversity, and inclusion within our community. This session aims to share the progress of our initiatives related to this mission, gather valuable feedback from our members on these efforts, and provide a forum for discussing ongoing needs and observations related to equity and inclusion in our field. Agenda Highlights: Updates from Hydrology Section leadership on initiatives to promote community. Feedbacks on thoughts and experiences on the implementation of these initiatives as members of the hydrology community. Open floor for questions and comments, encouraging a dynamic exchange of ideas and perspectives. Who Should Attend?: This town hall is open to all Hydrology Section members and those in related fields who are keen to contribute to and learn about our ongoing efforts towards creating a more equitable, diverse, inclusive, and just professional community. Our Objective: With your feedback, we aim to foster meaningful dialogue and collaboration among members, strengthening our commitment to equitable and inclusive science through the Hydrology Section. Don’t miss this opportunity to be part of shaping a more equitable and inclusive future in our field.

**Date:** Monday, December 15, 2025

**Time:** 13:00 - 14:00 CST (in-person at AGU)

**Event Link:** [TH13C - What’s Next for the AGU Hydrology Section: Building an Equitable and Inclusive Community in Hydrologic Sciences](#)





# Announcements

## NAVIGATING BROADER IMPACTS IN THE CURRENT POLITICAL CLIMATE

### AGU Annual Meeting 2025 Union Session

Amid increasing political scrutiny, traditional language and approaches to broader impacts have become more challenging to include in successful proposals. Yet these activities remain vital for a robust workforce and impactful science. Hosted by a cross-sectional AGU working group, this session will feature diverse perspectives across AGU sections and career stages, sharing practical strategies for designing and communicating broader impact activities that uphold their core values of inclusion, public engagement, and societal well-being. Speakers will present their experiences, followed by a panel discussion and audience Q&A. The session will conclude with interactive small-group discussions where participants can exchange ideas, build supportive networks, and contribute to a co-created set of best practices to be shared on AGU platforms.

**Date:** Tuesday, December 16, 2025  
**Time:** 14:15 - 15:45 CST (in-person at AGU)  
**Event Link:** [U23B - Navigating Broader Impacts in the Current Political Climate](#)

## JUSTICE, EQUITY, DIVERSITY, AND INCLUSION COMMITTEE

Greetings, colleagues! The AGU Hydrology Section’s Justice, Equity, Diversity, and Inclusion Committee (Hydro-JEDI) is actively welcoming new members. We meet monthly to engage in outreach and planning of the town hall and union session at AGU Annual Meetings. All are welcome to attend our meetings.

### Hydro-JEDI committee November monthly meeting

**Date:** Friday, November 21, 2025  
**Time:** 12:00 - 1:00 pm ET (9:00 - 10:00 am PT).  
**Meeting Link:** Please contact Co-Chairs Sooyeon Yi and Dan Myers (personal capacity) at [aguhydrojedi@gmail.com](mailto:aguhydrojedi@gmail.com) for the meeting link. We look forward to meeting with you. You can also view our webpage for more information: [Justice, Equity, Diversity, and Inclusion Committee - Hydrology](#).



## INTERPORE2026

The International Society for Porous Media (InterPore) will hold its 18<sup>th</sup> annual meeting, InterPore2026, the International Conference on Porous Media. The conference will be organized in cooperation with Nantes Université, IMT Atlantique, ONIRIS Nantes, CNRS and Université Gustave Eiffel.

InterPore2026 will take place at [La Cité Nantes Congress Centre](#), ideally located in the heart of Nantes, France. Overlooking the Loire River and just steps from the historic city center, the venue offers state-of-the-art facilities and a welcoming atmosphere for international conferences.

**Dates:** 19 – 22 May 2026, Conference Courses: 18 & 23 May 2026  
**Website:** [www.interpore.org/2026](http://www.interpore.org/2026)



# Reminiscences, Thanks, Regret, Concern, Hope

P.C.D. (“Chris”) Milly,  
Robert E. Horton Medal Awardee

Back when I was a kid, a stream flowed through the bottomland at the base of the steep, forested hill behind our house. Thanks to my adventurous brother, I got out of the house and into that riparian environment. Clear ripples and turbid floods were observed. Nylons on coat hangers netted minnows. Earthen dams were built and breached. Silent, swift hands caught frogs off-guard. Skunk cabbage leaves wrapped cigars, and birch twigs cleaned teeth. Turtles and snakes abounded.

Ironically, I couldn’t swim well. On family vacation, I ventured too far into Lake Waramaug. I flailed, panicked, and completely blacked out. Thanks to an attentive lifeguard, I survived.

The happier experiences by the stream later met my interest in math, and I discovered hydrology. What followed now feels as if it had been predetermined, as if I had been a twig picked up by a flood and carried ever downgradient through the stream network of academia. Unfortunately, I didn’t swim well there either. I flailed and failed. Thanks to a rescue team of visionary USGS and NOAA science leaders, I was pulled from the academic waters, resuscitated, and taken to a land whose hydroscape was far better suited to me. I survived.

Unfortunately, to cope with certain challenges I encountered through my years of childhood and academia, I had developed a regrettable strategy of harmful neglect of self and others. For too many of my years of federal service, I continued to focus excessively on satisfying the overwhelming (to my neurodivergent brain) demands of professional life.

That prioritization of scientific career over private life stings even more as I’ve realized how our science is sometimes ignored anyway—or applied only selectively—to favor powerful, capitalist interests instead of a sustainable common good.

Earth has the capacity and several billion more years of time, with or without us, to repair what has been done to it. I hold out hope that our species will use our science to partner lovingly in that repair work, so that we can continue to enjoy, marvel at, and justly share Earth’s beauty, mysteries, and countless gifts.

(My December 2024 [Robert E. Horton Medal acceptance remarks, linked here](#), expressed my gratitude to those whose support heartened me through the years, as well as my concern for the future.)



Fledgling hydrologist P.C.D. Milly (in suspenders) searching for Niagara Falls

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Rio Bonham

Horton Research Grant

University of Florida

I am a Ph.D. student in the [Agricultural and Biological Engineering department at University of Florida](#), and I am grateful to receive one of the 2024 Horton Research Grants. Under the supervision of Dr. Rafael Muñoz-Carpena and Dr. Henry Medeiros, my work focus on meaningfully incorporating Traditional Ecological Knowledge (TEK) of the Blackfeet Nation, Amskapi Piikani, of northern Montana into quantitative flood models.

Floods are among the most destructive natural disasters, causing significant loss of life and property globally every year. The occurrence, location, and impact of floods depend on a complex interplay of meteorological, physical, and social factors. This highlights the critical need for high-quality data, especially in data-scarce areas lacking established monitoring infrastructure. Techniques like using satellite data can help address these gaps, but limitations in resolution and time of record mean that much of the picture remains incomplete.

Meanwhile, individuals living in data-scarce regions observe and interact with the landscape, gathering knowledge that cannot be captured by sparse monitoring stations or satellites. Indigenous communities in particular hold a deep, nuanced understanding, referred to as TEK, that only comes from living with the land for generations. Location-specific TEK reaches back thousands of years for communities not fully displaced from their homelands, such as the Blackfeet Nation.

The Blackfeet community has graciously welcomed and taught me about their culture and homelands, an experience for which I am especially thankful as a non-native researcher. I am deeply grateful for the Horton Research Award, which has enabled me to deepen my engagement with the community through additional travel and data collection. Moving forward, I plan to continue collaborating with the ongoing work at the [Medicine Spring Library at Blackfeet Community College](#) to sustain and steward TEK through community interviews and digitization of cultural archives. Then, I will apply artificial intelligence techniques to integrate TEK modalities (e.g. oral histories, text documents) with more structured data modalities (e.g. satellite imagery, precipitation) to develop a flood prediction model.

We do not claim to fully capture the vitality of TEK through digital abstractions. However, we do believe this framework for incorporating TEK into the flood model will improve its performance and increase its actionability. While our work is specific to the Blackfeet Nation, we envision this approach can be adapted and applied across other communities and environmental processes.



Tagging along with a local nonprofit, [Piikani Lodge Health Institute](#), to learn about key hydrological considerations in land management from producers on the Blackfeet Nation.

“Indigenous communities in particular hold a deep, nuanced understanding, referred to as TEK, that only comes from living with the land for generations.”



# Glaciers and Groundwater: Connecting Science and Community

Ayobami Oluwadunsin Oladapo,  
Purdue University

## WHAT IS THE FOCUS OF MY RESEARCH AND WHY IS IT IMPORTANT?

Rapidly retreating alpine glaciers under a warming climate are reshaping hydrogeological and hydrological processes in mountain watersheds through changing temperatures, precipitation patterns, and types. Glaciers in these locations are iconic surface features as well as vital sources of freshwater for high-mountain ecosystems and downstream communities. Recent research shows that meltwater is an essential component of the alpine water cycle because meltwater serves as an important source of mountain-block recharge, supporting groundwater flow processes. Meltwater not only feeds rivers but also infiltrates bedrock and sediments, recharging hidden aquifers that sustain streams, springs, ecosystems, and human water supplies during dry periods. [\[1\]](#),[\[2\]](#),[\[3\]](#).

At Purdue University’s EAPS Department, my M.S. research focused on where glacial meltwater is stored, its role in mountain groundwater systems, and how these processes may change as glaciers shrink. I studied Glacier National Park (Montana) and Mount Hood National Forest (Oregon) to identify dominant groundwater flowpaths, assess their connectivity with geochemical and isotopic tools, and understand processes that preserve glacial meltwater’s isotopic fingerprint using strontium isotopes ( $^{87}\text{Sr}/^{86}\text{Sr}$ ), tritium ( $^3\text{H}$ ), chlorine-36 ratios ( $^{36}\text{Cl}/\text{Cl}$ ), and stable water isotopes. The isotopic signatures provided a quantitative framework for linking water to bedrock sources, distinguishing groundwater flow and storage in fractured bedrock, proglacial alluvium, and preferential flow paths along geological contacts in the bedrock.

Results from Glacier National Park show groundwater flow is mostly contained within high-elevation carbonate rock units, potentially restricting circulation depths and connectivity across spatial scales. This limited connectivity could reduce groundwater discharge to alpine springs and baseflow, diminishing hydrogeologic resilience as glacial ice diminishes further. In contrast, groundwater flowpath connectivity in the Mount Hood system was much higher across scales. As glaciers retreat and hydrogeologic systems adapt, the hidden storage in mountain aquifers becomes vital for alpine ecosystems. Identifying where meltwater is stored, how pathways connect across scales, and which areas of baseflow are vulnerable helps guide monitoring, protect critical recharge zones, and anticipate water availability for ecosystems and communities.

For my Ph.D., I shifted focus to studying hydrogeological processes in glacial-sediment aquifers in northern Indiana. My research focuses on quantifying groundwater–surface water interactions in unconsolidated aquifers, including stratified drift, buried-river valley, and alluvial outwash aquifer systems. I aim to quantify how these different systems communicate with one another and how they respond to both natural and anthropogenic changes, and seasonal and climatic variations. These insights are vital for water management in regions where agricultural, industrial, and municipal demands increasingly depend on finite groundwater resources.



Measuring snow depth during a Snow Measurement Field School, January 2024

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# Glaciers and Groundwater: Connecting Science and Community

Ayobami Oluwadunsin Oladapo, Purdue University

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## PUBLIC OUTREACH IS AN IMPORTANT COMPONENT OF MY RESEARCH.

Understanding the importance of sharing science widely, I produced a short documentary, [Alpine Glaciers, Groundwater, and the Future of Mountainous Areas](#), presenting Glacier National Park findings in an accessible format for scientists, park managers, and the public. This short documentary will accompany a manuscript based on my M.S. research that is currently being revised. The funding for this documentary was provided by the Hydrologists Helping Others (H2O) student research grant, supported by an EAPS donor with the intent that science findings be made public to Native American communities living near the study sites.

Building on my passion for science communication, I co-created a second documentary, [The Little-Known Tales of the Thirsty Chip](#), funded by the CUAHSI Let’s Talk About Water Grant. Developed with two Purdue peers, the documentary explores links between semiconductor manufacturing and water use, showing the intersection of hydrology, technology, and sustainability. It aims to educate the public about the water footprint of high-tech industries and the importance of efficient water resource management.

With my EAPS advisor, I co-organized an international outreach event highlighting recent research from Glacier National Park, Mount Hood National Forest, and the Andes Mountains ([Read About it Here](#)). Hydrogeologists, environmental engineers, and other experts gathered to discuss how alpine hydrological systems respond to glacial ice loss. This event fostered discussions aimed at enhancing our understanding of how alpine hydrological systems will respond and are responding to the loss of glacial ice.

These projects exemplify my effort to combine hydrogeologic research with public communication and community engagement. From investigating how glaciers sustain groundwater to illuminating the hidden water demands of modern industry, this reflects my commitment to connecting science, sustainability, and society.

My research and outreach were funded by the National Science Foundation (NSF) Hydrologic Sciences Program (EAR-1904075, EAR-1904159) and the Purdue University Hydrologists Helping Others (H2O) student research grant.

For more on my work, connect on [LinkedIn](#).

“Understanding the importance of sharing science widely, I produced a short documentary, [Alpine Glaciers, Groundwater, and the Future of Mountainous Areas](#), presenting Glacier National Park findings in an accessible format for scientists, park managers, and the public. ”



Anna Marshall

University of Tennessee, Knoxville, Riverscapes Lab



I’ve always been drawn to rivers. Growing up in the woods and waters of Maine, I spent every chance I could get submerged in water or building intricate channels of my own. I was convinced I was just playing, but even then, I was fascinated by how water moves, shapes the land, and tells a story. If I could go back and tell that kid that playing in water could become a career, I’m not sure I would have believed it.

It was in college that I learned to read a river as a scientist for the first time—asking how past impacts shape the systems we study today. Afterward, I managed restoration projects across the Northeast—ranging from dam removals to wetland recovery—which grounded me in the real-world applications of river science. That work fueled my curiosity and ultimately led me to pursue an MS and PhD in geosciences at Colorado State University, where I explored the physical complexity and interactions that govern dynamic river corridors.

Now, as I begin my second year as an assistant professor at the [University of Tennessee in Knoxville](#), I reflect on my own life river— how it has shifted and merged with others to create paths that guided me here. Central to that journey have been mentors and collaborators who shaped me into both a better scientist and a more rounded person, exemplifying that science thrives when it is joyful, curious, and shared. Chasing curiosity and adventure in tandem, I’ve found meaning in place-based work tied to the communities I call home.

I carry these lessons into the [research group](#) I am building—connected across diverse backgrounds, methods, and scales. We ask questions about how riverscapes function, how humans engage with them, and what it means to restore processes when those systems are stressed. We do this work in ways rooted in place—wading into streams, hiking through floodplains, and getting our research into the hands of decision-makers. In doing so, we are continually reminded that science, like a river, thrives when it moves freely, bends to curiosity, and carries with it both discovery and delight.



Anna Marshall at one of her field sites in East Tennessee where her group has been monitoring biophysical response to river restoration activities.

“Chasing curiosity and adventure in tandem, I’ve found meaning in place-based work tied to the communities I call home.”

“We are continually reminded that science, like a river, thrives when it moves freely, bends to curiosity, and carries with it both discovery and delight.”



## Advice from Two Social and Geospatial Scientists to Water Scientists in Uncertain Times



Zachary Sugg,<sup>1</sup> Jacqueline M. Vadjunec<sup>2</sup>

<sup>1</sup>Associate Director for Research; Babbitt Center for Land and Water Policy, Lincoln Institute of Land Policy

<sup>2</sup>Professor and Associate Chair; Department of Geography and Environmental Sustainability, University of Oklahoma

We were invited to speak to the hydrological science readership from the perspectives of two social and geospatial scientists working on water-related issues. Zachary works on land and water policy research at a [nonprofit](#), while Jackie (a former NSF Program Officer and academic) works on land and water governance issues using mixed and participatory approaches in the [Southern Great Plains](#). **As fellow travelers in the water science community**, the new funding landscape has us (re)imagining, not only our own research futures, but also the future of the next generation. Here, we want to take a moment to stress the power and importance of human agency.

We are inspired by our Earth and Planetary Science colleagues, who suggest that, when conducting research with communities, we should center our “[relationships first and always](#).” By committing to fostering authentic, reciprocal relationships, many of us might find our science sustained and nurtured through surprising avenues of mutual support. Recently, we have been humbled to see community partners—such as local governments, other researchers, Tribal Nations, and citizen scientists—generously provide financial and/or logistical support in response to others’ lost funding. With effective communication, mutual respect, and a shared sense of resourcefulness, we can harness the power and promise of human agency to achieve extraordinary outcomes!

A funded example of mutual relationship building is the [Co-producing Resilient Socio-Ecological Systems in Grasslands](#) NSF-funded Research Coordination Network (known as “GRAS-SES RCN”). The initiative convenes geographers, hydrologists, conservation biologists, STEM educators, agricultural extensionists, local, state, Tribal governments, and nonprofit practitioners to collaboratively define shared questions, theoretical framings, methods, and metrics to coproduce research on resilient socio-ecological systems (SES) in grassland communities. GRAS-SES aims to facilitate collaboration, expand networks, develop the next generation of scholars and professionals, and foster collective learning. GRAS-SES is focused on SES resilience around land, water, and people in the North American Great Plains, but the model could work anywhere. Such a model is also relatively low-cost. GRAS-SES is mainly an investment in human infrastructure for growing the transdisciplinary and convergent research community needed for solving wicked problems. We ask collaborators to embrace their scrappiness to bring what they can contribute to the table. While the RCN hosts regular working group meetings and virtual events, a seed grant competition, and other activities, we also work to foster a culture of community based on mutual respect, reciprocity, and service. Additionally, we have also self-funded/crowd-funded multi-day workshops, SES middle school science fair outreach, and other (in)formal STEM-ed activities. We welcome anyone interested to join.

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# Advice from Two Social and Geospatial Scientists to Water Scientists in Uncertain Times



Zachary Sugg,<sup>1</sup> Jacqueline M. Vadjunec<sup>2</sup>

<sup>1</sup>Associate Director for Research; Babbitt Center for Land and Water Policy, Lincoln Institute of Land Policy

<sup>2</sup>Professor and Associate Chair; Department of Geography and Environmental Sustainability, University of Oklahoma

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There are many other models worth exploring (e.g., [Household Water Insecurity Experiences \(HWISE\) RCN](#) and the [Intermountain West Transformation Network](#)). Importantly, the RCN model and generally ‘thin’ budget asks us to focus on amplifying human and social capital, which not all of us have been trained to do. When the immediate payoff for research capacity is often unknown, thinking as a broader collective can seem unnatural for many lab-based, traditionally trained scientists. But perhaps, these uncertain times can inspire new forms of collaboration we haven’t previously imagined.

In [The Serviceberry: Abundance and Reciprocity in the Natural World](#), Robin Wall Kimmerer (2024) reminds us of our place in the world and that “all flourishing is mutual.” Consequently, we propose that people take the time to invest in their relationships and find places to thrive and also support others. Beyond national and international associations, these could include specialty groups and networks, such as the American Association of Geographers (AAG) [Water Resources Specialty Group](#) or the American Planning Association (APA) [Water and Planning Network](#), which fosters collaboration on water issues related to urban, community, and environmental planning. There are also more local and/or virtual “third spaces” such as writing groups, ‘research on tap,’ or cafe series— all spaces for us to build mutually supportive communities.

In light of the challenges facing science, we believe we need more spaces that **allow time to think, connect, and imagine**. Networks are no longer just professional add-ons—they may be our lifeline for continuity, creativity, and support. Importantly, we suspect that fostering mutual support will benefit us all. Let’s keep building community. We’re listening. **Let’s keep talking.**



# Nowcasting Extreme Weather for Africa by UKCEH



Jawairia A. Ahmad, UK Centre for Ecology and Hydrology (UKCEH)

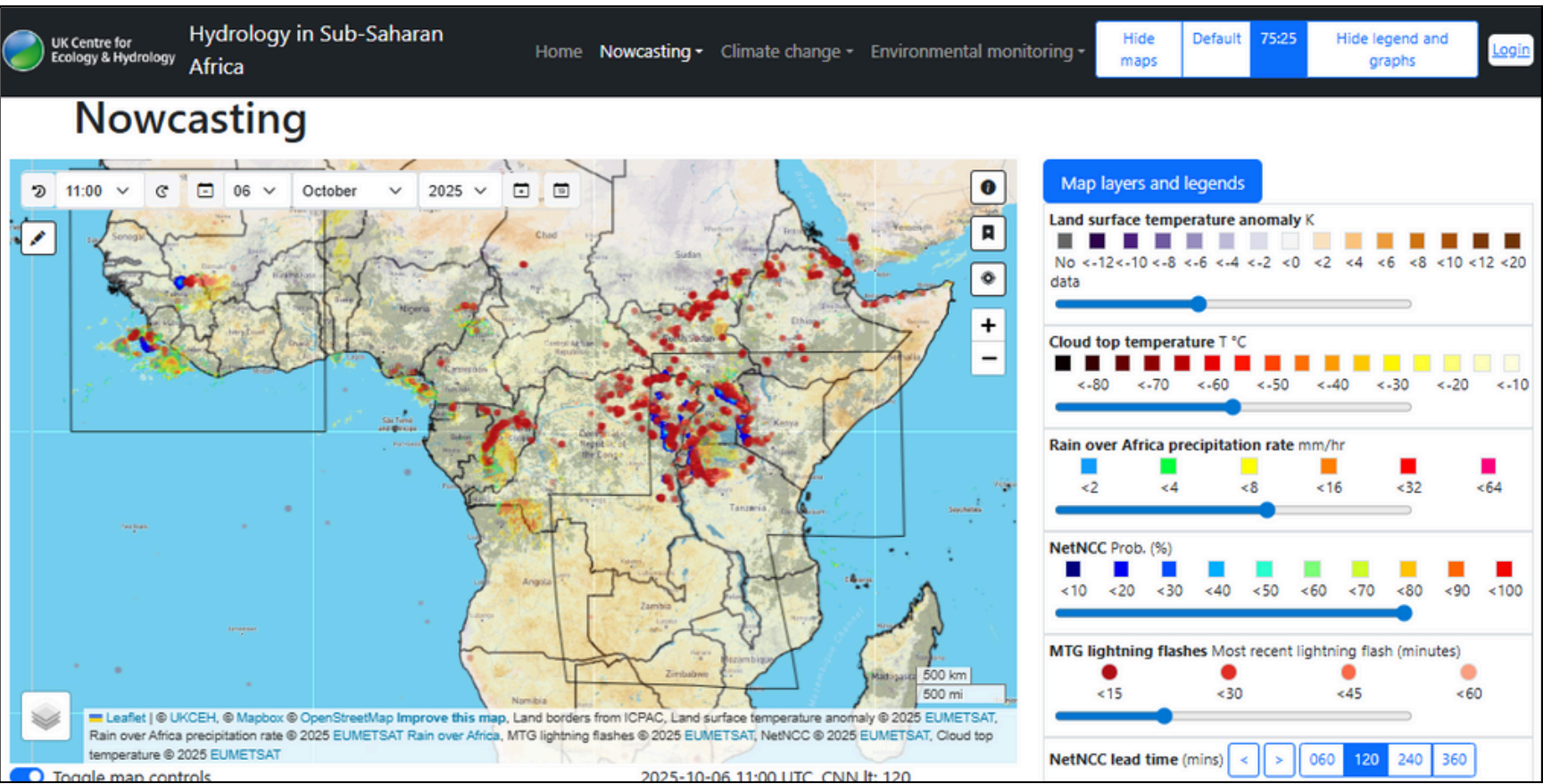
The Early Warnings for All (EW4All) initiative by the World Meteorological Organization (WMO) aims to develop early warning systems for extreme hydro-meteorological events accessible to all people. This ambitious goal is backed by the United Nations (UN), with Secretary-General António Guterres stating on World Meteorological Day (23 March 2022):

*“Today, one third of the world’s people, mainly in least developed countries and small island developing states, are still not covered by early warning systems... This is unacceptable, particularly with climate impacts sure to get even worse. Early warnings and action save lives. To that end, today I announce the United Nations will spearhead new action to ensure every person on Earth is protected by early warning systems within five years.”*

Africa experiences large storms, over 100 km in size, capable of very intense rainfall and significant damage, but forecasting them remains a challenge. In response to these challenges and EW4All goals, researchers at the UK Centre for Ecology & Hydrology (UKCEH) have developed a freely available [nowcasting.portal](#) to provide communities with earlier, more accurate storm warnings across Africa. The portal integrates near real-time hydrometeorological data that influence storm development and extreme rainfall in at-risk regions.

The portal incorporates near real-time satellite observations, including precipitation, land and cloud top temperature, lightning, and convective storm tracks. It also offers data-driven and probabilistic nowcasts of convective cores associated with intense rainfall, providing lead times between one and six hours. Updated nowcasts are available every 15 minutes. Artificial intelligence and satellite data help overcome the lack of ground-based operational weather radars in Africa.

Our data-driven nowcasting model (NetNCC) uses thermal infrared information to predict convective cores at a fine spatial resolution (<5km). NetNCC delivers high prediction accuracy for shorter lead times (up to 2–3 hours), as confirmed by observed rainfall and lightning datasets. Real-time lightning data from the Meteosat Third Generation satellite has proven particularly useful for tracking thunderstorms. The development of the nowcasting portal is an ongoing process, in collaboration with meteorological services in Africa to deliver tools that fit their operational weather forecasting needs. Feedback from the hydro-meteorological community to improve the portal is welcome.



Nowcasting portal developed by UKCEH for operational weather forecasting in Africa to facilitate the development of regional early warning systems.



*This research has been funded by the UK Natural Environment Research Council, Engineering and Physical Sciences Research Council, UK Foreign and Commonwealth Development Office and Weather and Climate Information Services (MET Office UK).*

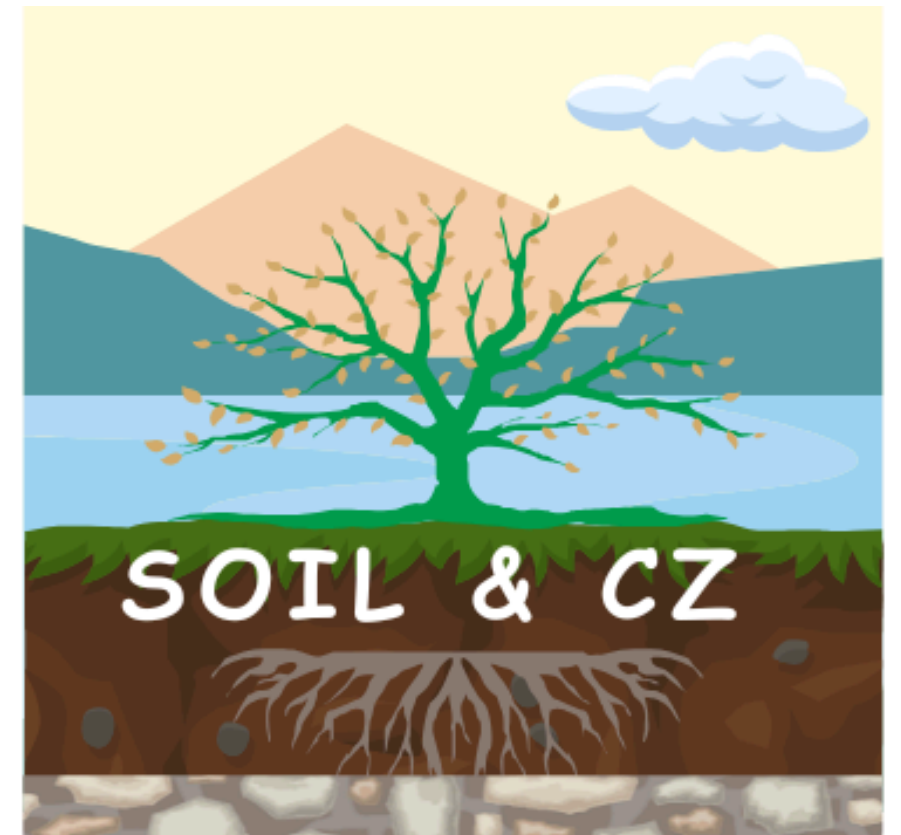


# Soils Processes and Critical Zone

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Salvatore Calabrese (chair), Yakun Zhang (vice-chair)

Established in 2011 by the Hydrology and Biogeosciences sections of AGU, the Soils Processes and Critical Zone (SPCZ) Technical Committee promotes the Soil and Critical Zone as a central biogeochemical–hydrological interface that provides essential ecosystem services. Our mission is to integrate cross-disciplinary expertise, initiatives, and policy to address global challenges—such as climate change, food security, water and land resources, and ecosystem health—from the perspective of the Soil and the Critical Zone.



In recent years, the SPCZ TC developed a “Guide to Soil Processes and the Critical Zone”, helping the community navigate relevant AGU topic sessions. Now, sessions can be easily accessed by selecting the “**Critical Zone**” index term in the online program. These sessions span Hydrology, Biogeosciences, Earth Surface Processes, and more.

Looking ahead to AGU25, our focus is on community building and networking. We’re excited to host another **Soil Mixer**—an informal social gathering outside the convention center. Last year’s event drew over 30 attendees for an evening of fun and new connections. We have also reserved **conversation pods** (Monday and Wednesday, Hall EFG pod 1, 12:15-13:15) to foster engagement between attendees and TC members—come visit us!

New this year, we’re launching **student travel awards** to support graduate students attending the AGU Annual Meeting and presenting research relevant to Soil Processes and Critical Zone Science.

For more information about our activities at AGU25, please follow our new LinkedIn page ([SPCZ page](#)). Be on the lookout for information about our Soil Mixer and conversation pods. We will also be posting information about the travel awards. To learn more about our TC, including its members, and for ways to become involved (e.g., joining our community, organizing AGU topic sessions and social events), please visit also our website ([SPCZ website](#)) or reach out to Salvatore Calabrese (Chair, [salvatore.calabrese@ag.tamu.edu](mailto:salvatore.calabrese@ag.tamu.edu)), Yakun Zhang (ViceChair, [yakun.zhang@oregonstate.edu](mailto:yakun.zhang@oregonstate.edu)), or any members.

We welcome new members and collaborators—whether you're interested in organizing AGU sessions, joining our community, or helping shape future SPCZ events!



Unsaturated Zone

Lazaro Perez

We are excited to share updates on recent activities, research achievements, and opportunities from our vibrant Unsaturated Zone Technical Committee.

NEWS

Yves Méheust Honored by the Institut Universitaire de France

Yves Méheust was appointed Senior Member of the Institut Universitaire de France, a prestigious academic honor in recognition of his exceptional contributions. This honor recognizes his pioneering research on multiphase flow and transport in fractures, intersecting microfluidics, reactive processes, and geophysical monitoring.

New Faculty Members

- Dr. Behzad Ghanbarian recently joined the University of Texas at Arlington after moving from Kansas State University. At UTA, he established the iResearchE3 Lab to pursue interdisciplinary research at the intersection of Earth, Energy, and Environment, focusing on computational methods utilizing modern statistical physics, artificial intelligence, and data science to tackle complex challenges.
- Dr. Felix Ogunmokun joined Tennessee State University as an Assistant Professor of Soil Physics. His research examines water and nutrient dynamics in the unsaturated zone, with a focus on soil–water interfacial processes and their impact on sustainable agriculture. Through the integration of field experiments, geophysical tools, sensor technologies, and modeling approaches, Dr. Ogunmokun aims to enhance water and nutrient use efficiency while protecting groundwater quality.

UZTC COMMUNITY HIGHLIGHTS

*Smits Research Group, led by Kathleen Smits (Southern Methodist University & Colorado School of Mines): A Year of Impactful Research and Mentorship*

- **Award Recognition:** Postdoctoral researcher Navodi Jayarathne earned the SSSA 2025 Truog Soil Science Outstanding Dissertation Award for her thesis, Transport of Multi-Phase Multi-Component Fluids in the Shallow Subsurface Influenced by Soil and Surface Boundary Conditions: Experimental and Numerical Study with Application to Natural Gas Leakage.
- **Cadet Summer Research Program:** Through the Cadet Summer Research Program, the team at SMU and Colorado School of Mines hosted Cadet Darby Doyle from the United States Air Force Academy. Under the mentorship of Dr. Kathleen Smits and her team, Darby examined soil physical and hydraulic properties linked to underground natural gas leaks.
- **International Collaboration:** Students from Southern Methodist University, Colorado School of Mines, and Universidad Nacional de Colombia participated in a four-week NSF-funded IRES program in Medellín, Colombia, gaining valuable cross-cultural field experience in sustainable mining practices.



The group continues to merge field experimentation, modeling, and education to foster a diverse, skilled community of researchers tackling real-world hydrologic challenges.

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# Unsaturated Zone

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## NEW RESEARCH INITIATIVES

### Recharge Transit Times in Layered Soils

Researchers from UC Davis, including TC member Helen Dahlke, collaborated with the University of Naples and UC Riverside to investigate recharge transit times in multilayered agricultural soils using calibrated HYDRUS-1D models and tracer-based methods. The team compared three modeling methods to capture both fast preferential and slow matrix flow during Agricultural Managed Aquifer Recharge in California’s Central Valley. Results revealed that coarse-textured layers can either accelerate or delay recharge depending on their depth and degree of saturation, while preferential pathways significantly shorten transit times in sandy or structured profiles.

### Redox Shifts During Managed Aquifer Recharge

TC members Veronica Morales and Helen Dahlke, in collaboration with the USDA, are exploring how transient redox dynamics unfold during MAR in the vadose zone. Their findings show that short-lived redox shifts arise from the interplay between oxygenated recharge water entering initially dry soils, limited gas exchange at the soil-air interface, and oxygen consumption by microbes sensitive to moisture and depth. Using drywell simulations with repeated wetting-drying cycles, the team coupled microbial respiration and physical transport processes within a Damköhler framework, revealing that oxygenated plumes formed during recharge are small and transient.

### Enhanced Reaction Kinetics in Stationary Two-Phase Flow

TC member Joaquin Jimenez-Martinez and his research group investigated how reaction kinetics in the liquid phase are enhanced during multiphase flow conditions, such as those in the unsaturated zone. Their study demonstrates the dependence of the liquid phase’s reaction kinetics on the flow rate of the nonwetting immiscible phase. These findings highlight the need for more robust predictive models that apply to highly dynamic (transient) environments, as classical transport models fail to account for such dynamic effects.





Bill Alley, Director of Science and Technology

ABOUT NGWA:

NGWA is a community of groundwater professionals working together to advance groundwater knowledge and the success of our members through education and outreach; advocacy; cooperation and information exchange; and enhancement of professional practices.

EDUCATION & EVENTS:

Hydrogeology of States Webinar Series:

Hydrogeology, water use, and water management vary widely across the United States making each state unique. This webinar series explores the issues encountered in each of the 50 states – one at a time.

Problematic Contaminants Webinar Series:

While considerable focus is appropriately directed to PFAS in groundwater; other contaminants remain of concern. This series focus on these legacy and emerging contaminants.

Conferences:

- [Science & Engineering Forum at Groundwater Week](#) – December 9-11, 2025 in New Orleans, Louisiana
- [PFAS in the Age of Uncertainty Conference](#) – March 9-10, 2026 in San Antonio, Texas
- Meeting the Challenges of Groundwater in Fractured Rock Conference – September 21-22, 2026 in Burlington, Vermont

[www.ngwa.org](http://www.ngwa.org)

For more information contact: [stenney@ngwa.org](mailto:stenney@ngwa.org)

PUBLICATIONS:

- **Groundwater®** is a leading international journal dedicated to groundwater, featuring research on topics like groundwater flow, hydrogeochemistry, well hydraulics, contamination, geophysics, management, policy, and hydrology history.
- Authors are encourage to contribute to a [Groundwater® Special Issue on Managed Aquifer Recharge](#). Submit a brief synopsis of your proposed manuscript by December 5, 2025. Final papers are due by March 6, 2026.
- **Groundwater Monitoring & Remediation®** is a leading journal on groundwater monitoring and cleanup, featuring columns by industry experts, news, EPA updates, and peer- reviewed papers.

MEMBERSHIP CATEGORIES:

- Company Membership
- Scientist/Engineer
- Individual Membership
- Government or Academic Membership
- Early Career Professional Membership
- Student Membership



# 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. Participants can use this forum to share information and resources with one another. If you have any questions, please contact AGU's Section Support Team ([agu-SectionHelp@agu.org](mailto:agu-SectionHelp@agu.org)).



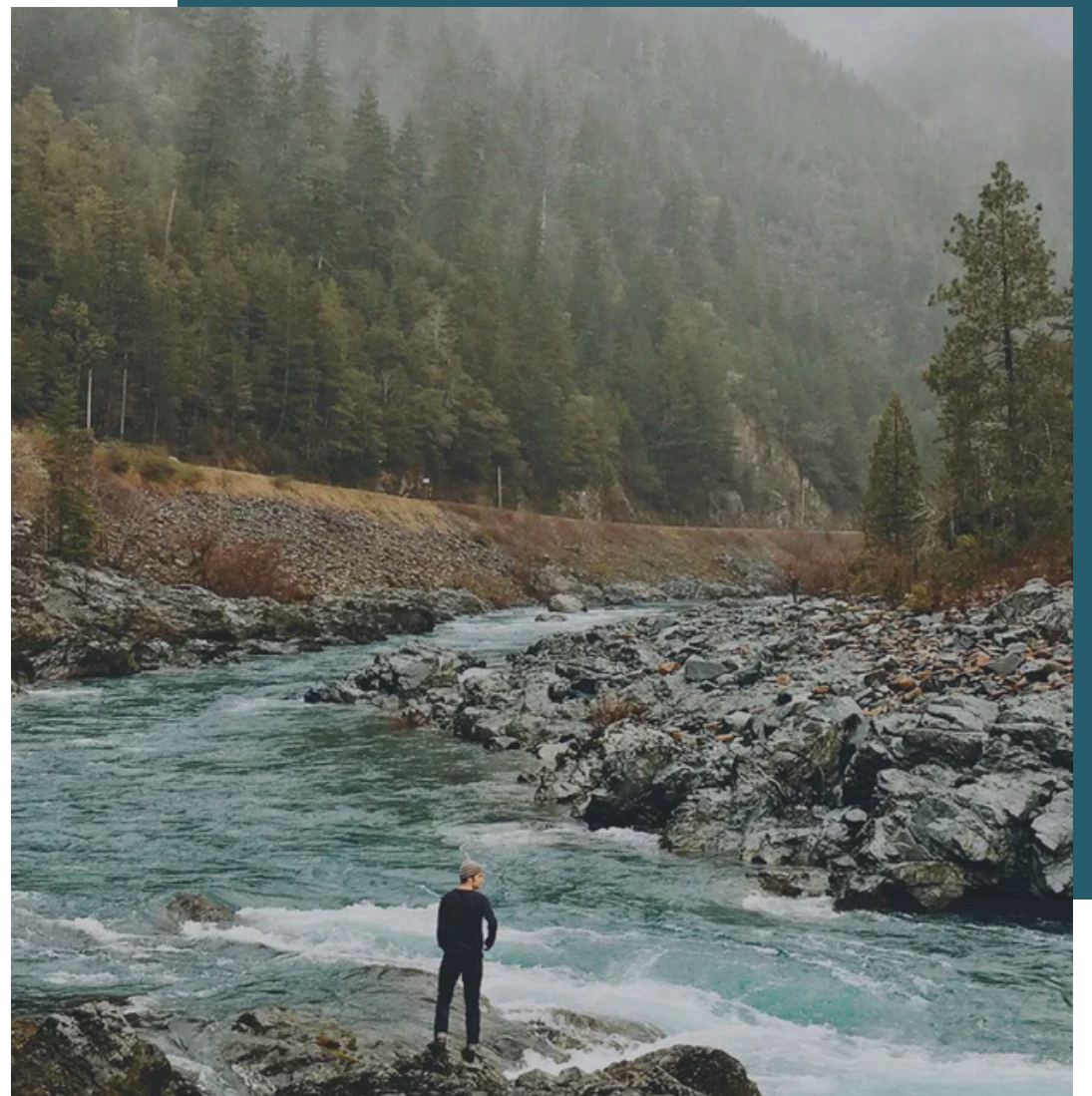
## Interviews with Interesting Hydrologists

The AGU Hydrology Section offers a [video series featuring interviews with eminent hydrologists](#) reflecting on key achievements in the field during the 20th century. These videos highlight the progression of hydrological science and offer valuable insights for scientists and educators alike.



# Call for Contributors

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## 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](mailto: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 Links



## AGU Hydrology Section

Website: [connect.agu.org/hydrology](https://connect.agu.org/hydrology)  
BlueSky: [@hydrology-agu.bsky.social](https://bsky.app/profile/@hydrology-agu.bsky.social)  
X: [@Hydrology\\_AGU](https://twitter.com/Hydrology_AGU)

## Technical Committee Links

### CATCHMENT HYDROLOGY

Website: [hydrocatch.weebly.com](https://hydrocatch.weebly.com)  
BlueSky: [@agucatchhydro](https://bsky.app/profile/@agucatchhydro)  
LinkedIn: [AGU Catchment Hydrology](https://www.linkedin.com/company/AGU-Catchment-Hydrology)  
X: [@AGUCatchHydro](https://twitter.com/AGUCatchHydro)

### DISTRIBUTED SENSING

Website: [connect.agu.org/hydrology/about/tc-committees/sensing](https://connect.agu.org/hydrology/about/tc-committees/sensing)  
BlueSky: [@agu-sensing.bsky.social](https://bsky.app/profile/@agu-sensing.bsky.social)

### ECOHYDROLOGY

Website: [connect.agu.org/hydrology/about/tc-committees/ecohydrologymain](https://connect.agu.org/hydrology/about/tc-committees/ecohydrologymain)  
X: [@AGUecohydro](https://twitter.com/AGUecohydro)

### GROUNDWATER

Website: [connect.agu.org/hydrology/about/tc-committees/groundwater](https://connect.agu.org/hydrology/about/tc-committees/groundwater)  
X: [@AGU\\_GWHydro](https://twitter.com/AGU_GWHydro)  
LinkedIn: [AGU Groundwater Hydrology](https://www.linkedin.com/company/AGU-Groundwater-Hydrology)

### HYDROLOGIC UNCERTAINTY

Website: [connect.agu.org/hydrology/about/tc-committees/hydro-uncertainty](https://connect.agu.org/hydrology/about/tc-committees/hydro-uncertainty)  
X: [@AGU\\_HU](https://twitter.com/AGU_HU)

### HYDROLOGY SECTION STUDENT SUBCOMMITTEE (H3S)

Website: [agu-h3s.org](https://agu-h3s.org)  
X: [@AGU\\_H3S](https://twitter.com/AGU_H3S)  
LinkedIn: [American Geophysical Union Hydrology Section Student Subcommittee \(H3S\)](https://www.linkedin.com/company/American-Geophysical-Union-Hydrology-Section-Student-Subcommittee-(H3S))

### HYDROGEOPHYSICS

Website: [connect.agu.org/hydrology/about/tc-committees/hydrogeophysics](https://connect.agu.org/hydrology/about/tc-committees/hydrogeophysics)  
X: [@AGUhydrogeophy](https://twitter.com/AGUhydrogeophy)  
Instagram: [@aguhydrogeophysics](https://www.instagram.com/aguhydrogeophysics)

### JUSTICE, EQUITY, DIVERSITY, AND INCLUSION (JEDI)

Website: [connect.agu.org/hydrology/about/tc-committees/hydrojedi](https://connect.agu.org/hydrology/about/tc-committees/hydrojedi)

### PRECIPITATION

Website: [connect.agu.org/hydrology/about/tc-committees/pretech](https://connect.agu.org/hydrology/about/tc-committees/pretech)  
Facebook: [AGU Precipitation](https://www.facebook.com/AGUPrecipitation)  
X: [@AGUPrecip](https://twitter.com/AGUPrecip)  
Instagram: [@AGU\\_precipitation](https://www.instagram.com/AGU_precipitation)  
LinkedIn: [AGU Precipitation](https://www.linkedin.com/company/AGU-Precipitation)

### REMOTE SENSING

Website: [connect.agu.org/hydrology/about/tc-committees/remote-sensing](https://connect.agu.org/hydrology/about/tc-committees/remote-sensing)  
LinkedIn: [AGU Hydrology Section's Remote Sensing Technical Committee group](https://www.linkedin.com/company/AGU-Hydrology-Section's-Remote-Sensing-Technical-Committee-group)

### SOIL PROCESSES AND CRITICAL ZONE

Website: [connect.agu.org/biogeosciences/tc-committees/soils-spcztc](https://connect.agu.org/biogeosciences/tc-committees/soils-spcztc)

### UNSATURATED ZONE

Website: [connect.agu.org/hydrology/about/tc-committees/unsat](https://connect.agu.org/hydrology/about/tc-committees/unsat)  
X: [@UnsatHydro](https://twitter.com/UnsatHydro)

### WATER AND SOCIETY

Website: [connect.agu.org/hydrology/about/tc-committees/water-and-society](https://connect.agu.org/hydrology/about/tc-committees/water-and-society)  
X: [@AGU\\_WS](https://twitter.com/AGU_WS)  
Google: [groups.google.com/agu-water-and-society](https://groups.google.com/agu-water-and-society)

### WATER QUALITY

Website: [aguwaterquality.org/](https://aguwaterquality.org/)  
X: [@AGU\\_WQ](https://twitter.com/AGU_WQ)