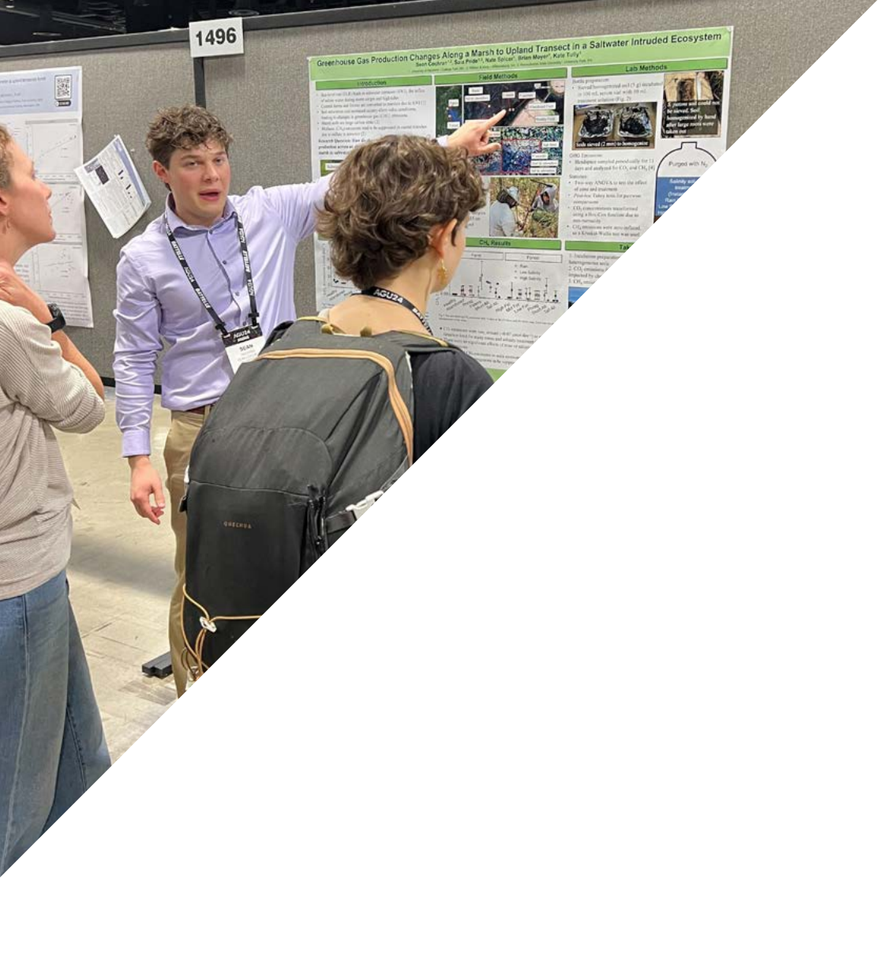
# 2024 CUAHSI ANNUAL REPORT




CUAHSI
allied for water science

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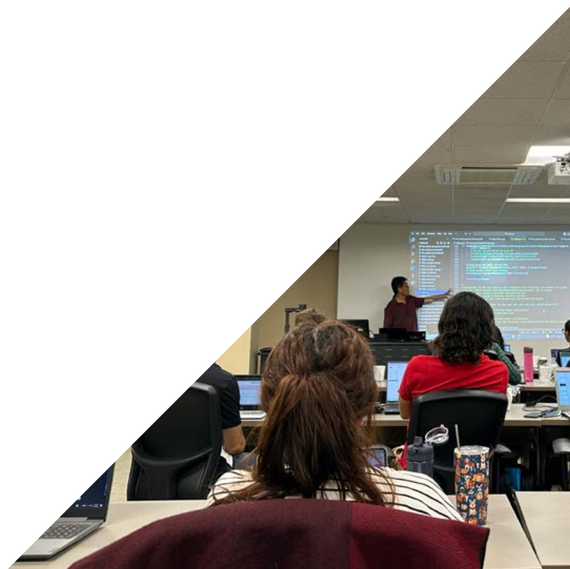


# LETTER FROM THE PRESIDENT

Dear CUAHSI community members,

As I look back on 2024, I am struck by how much has changed and how much we have accomplished in just one year. In the pages that follow, you'll read about the investments we've made in our services—such as the continuing modernization of HydroShare, new capabilities in our cloud computing resources, and expanded training and educational offerings—as well as the many partnerships and research projects that keep CUAHSI at the forefront of water science innovation. We were also thrilled to welcome new staff members, grow our membership with six new institutions, and see the CUAHSI community come together in our first-ever fundraising initiative, which raised over $24,000 to help ensure our long-term financial sustainability.

Our mission remains clear: CUAHSI exists "to empower the water community and advance science through collaboration, infrastructure, and education." In 2024, we continued to deliver on that promise by offering workshops, trainings, fellowships, and grant opportunities—many of them detailed in this report. From launching new research and education collaborations in cloud computing to celebrating the 9th National Water Center Innovators Program Summer Institute (with the 10-year anniversary on the horizon!), CUAHSI remains dedicated to serving as a hub for the work that fuels collective understanding of water, earth, ecosystems, and society.

Thank you for your ongoing support and engagement—it's what makes this community so vibrant. I look forward to our continued collaborations, new ideas, and shared accomplishments in the coming year.

Regards,

Jordan S Read, PhD

President and Executive Director, CUAHSI

# ABOUT CUAHSI

The **Consortium of Universities for the Advancement of Hydrologic Science, Inc. (CUAHSI)** is dedicated to advancing interdisciplinary water science by providing resources, services, and community support that enable an integrated understanding of water in Earth's systems. Our **mission** is to empower the water science community through shared infrastructure, collaboration, and capacity-building initiatives. Guided by our Strategic Plan, CUAHSI expands access to innovative data, models, and computing resources, supports education and workforce development in water sciences, strengthens engagement across academia, government, nonprofits, and industry, and fosters an inclusive and responsive community that addresses emerging water challenges. CUAHSI's programs and resources are open to all—students, educators, volunteer scientists, outreach coordinators, environmental organizations, and industry professionals alike. While we are a membership-based organization that prioritizes member needs, our services are available to the broader water science community, often free of charge. **YOU** are an essential part of CUAHSI. We invite you to explore our programs and join us in advancing the future of water science. Learn more at www.cuahsi.org.

Our vision is that CUAHSI will strengthen interdisciplinary collaboration by promoting the acceptance of diverse ideas and perspectives in the hydrologic sciences. A Code of Conduct is fully implemented for all CUAHSI services: all participants agree to follow the code; all staff, leaders, committee members, grant awardees, and event leaders sign disclosure forms; and CUAHSI staff provide training at all in-person events (including Summer Institute and workshops). Learn more about our Code of Conduct on our website.

**CUAHSI's mission is to empower the water community and advance science through collaboration, infrastructure, and Education.**



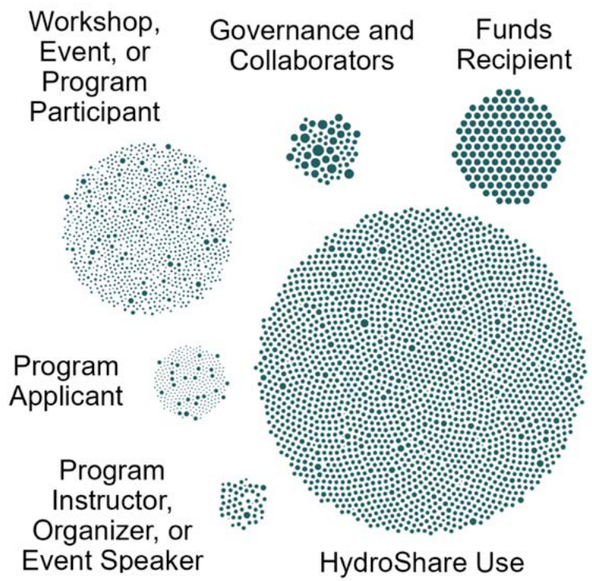



# COMMUNITY ENGAGEMENT

CUAHSI data scientists have worked on new initiatives to improve operations through automated data workflows and reporting. The figure below is a harmonized dataset, each dot represents an individual who engaged in one of these CUAHSI activity types. The larger the bubble, the larger the individual's engagement in that particular activity compared to other people. Bubble sizes can be compared across categories. Through this harmonization effort, over 19,000 of these individual activities were logged in 2024! Furthermore, many of these activities can be linked to a member institution. In early 2025, customized reports were sent to member institutions showing how each engaged with CUAHSI in 2024, as well as recommendations for ways to further leverage CUAHSI tools and services.

The initial effort to harmonize and parse information about how individuals engage with CUAHSI embraced principles around reproducibility and data management. Thus, we have established routines for continuous use of these data throughout 2025 and beyond to make more thoughtful, data-driven decisions about programming and infrastructure investments, and look to automate parts of our reporting efforts. Look for more exciting applications of engagement data from CUAHSI in the future.

## INDIVIDUAL ENGAGEMENTS WITH CUAHSI IN 2024




## COMMUNITY MEETINGS

WaterSciCon, an AGU and CUAHSI co-hosted event, took place from June 24 - 27 in St. Paul, Minnesota. Attendees, which included a large presence from federal agencies, faculty, students, and other non-profits, were very engaged in cutting-edge scientific sessions and hands-on workshops.

The opening night Plenary acted as a focal point and set the tone for the rest of the meeting. The panel discussion featured researchers conducting collaborative work with local indigenous communities on manoomin (wild rice; Psíŋ). During the Q/A period an audience member mentioned how impressed they were by this conversation that featured such diverse perspectives and couldn't have imagined this at a scientific conference plenary five years ago.

Ten CUAHSI staff attended, which provided great coverage across many sections of the meeting. Feedback from participants included positive reactions to the size and scale of the conference. Meaningful conversations and networking with colleagues were highlights of the event. CUAHSI is looking forward to future engagement with the community that we serve.

**660 Registered Attendees**

## CUAHSI DATA SERVICES

HydroShare Help Content

### Instructional YouTube Videos:

The HydroShare How To video playlist includes 20 short instructional videos that provide information on HydroShare functionality. Two videos were re-made and re-uploaded to remain in sync with current HydroShare functionality, including "How to Manage Your Quota" and "How to Upload Data/Files" that features new functionally with large file uploads. Additionally, a playlist for CUAHSI's compute services is available with two videos, one on preconfigured environments, and one on Jupyterhub.

### Data Services Help Desk Webinar Series:

CUAHSI offers a bi-monthly webinar series, providing users with hands-on training and direct access to CUAHSI support staff. The series rotates two topics: **"An Introduction to HydroShare"** and **"An Introduction to CUAHSI Compute Services."** Designed for beginners and those looking for updates on new features, these webinars help users navigate CUAHSI's data infrastructure with confidence. Recordings of past webinars can be found on our YouTube channel.

**348 Help Desk Requests Resolved by Community Support Staff**

# CUAHSI SUPPORTS THE ENTIRE DATA LIFECYCLE

CUAHSI supports every stage of the data management life cycle, from collection, storage, and analysis, to sharing, publishing, and citing data. These efforts ensure transparency, accessibility, and reproducibility in the water sciences.

### Discovery and Planning:

- Visit hydroshare.org and data.cuahsi.org to search thousands of hydrologic, biogeochemical, and geographic data sets available for immediate download. Visit the website to view a sample data management plan to begin the data management planning process, and learn more about data quality control levels.
- Obtain training on CUAHSI's data management resources.
- Easily learn to use HydroShare's many features through the HydroShare How To YouTube Playlist

### Data Collection:

- Add additional field sites to graduate research with CUAHSI Pathfinder Fellowship support (see Pathfinder Fellowships on Page 15).
- Learn new data collection techniques or instrumentation with hands-on training and Instrumentation Discovery Travel Grants (see Trainings and Workshops Page 12 and Instrumentation Discovery Travel Grants Page 15).

### Documentation and Processing:

- Describe data sets using CUAHSI's standard metadata templates in HydroShare.
- Receive metadata training and guidance from CUAHSI Staff.
- Learn about community data best practices with data best practices documentation initially created by and for the Critical Zone Collaborative Network, and available to all.

### Analysis and Modeling:

- Collaborate with partners by publicly or privately sharing data and analyses in HydroShare.
- Use Jupyter Notebooks or MATLAB Online to analyze data stored with CUAHSI in HydroShare.
- Prepare model simulations for the National Water Model and ParFlow-CONUS using the CUAHSI Data Subsetter and share them with colleagues using HydroShare.

### Publication:

- Credit your collaborators with shared authorship in HydroShare. Obtain a permanent link (DOI) to cite data resources in literature in HydroShare.

### Maintenance and Storage:

- Increase project sustainability by archiving your data and models with HydroShare or your time series data with HIS.
- Maintain data sets with long-term infrastructure care provided by CUAHSI.

### Sharing and Collaboration:

- Share your data publicly and make it discoverable through applications such as Google dataset search and others
- Promote and disseminate your work through activities like cyberseminars (see Page 13), scientific conferences, and training workshops (see Page 12).
- Enable colleagues to reproduce your results using HydroShare-linked cloud computing environments.
- Develop education and outreach activities with CUAHSI resources to share new approaches, research results, and methods with the community.

# DATA & CLOUD COMPUTING SERVICES


CUAHSI provides free and open source software for managing, archiving, sharing, discovering, publishing, and analyzing all types of water data. Collectively, our data and cloud computing services promote the creation of  well-documented scientific workflows and enable collaborative hydrologic modeling in an open and transparent environment.

## HYDROSHARE

HydroShare is CUAHSI's flagship hydrologic information system for sharing, publishing, and collaborating on hydrologic data and models. It enables our community to store and manage data and models in a variety of scientific formats, as well as make this information available in a citable, shareable and discoverable manner. HydroShare-linked web applications provide users with gateways to a variety of computing and analysis capabilities to complement their data.

Tools for uploading data, managing sharing permissions, receiving feedback, as well as the option to permanently publish data with a citable DOI, make HydroShare a comprehensive water data management repository. It facilitates collaboration by enabling community users to join groups and share data, and enables users to easily find data and models made available by other users. Privacy controls give researchers flexibility in how they make their data accessible, for example keeping data private until after the release of journal publications or data embargo periods.

In the last year CUAHSI has improved several key areas of HydroShare, focusing on usability, security, and sustainability. Multiple updates were rolled out to address user feedback, streamline the platform, and resolve system errors. A new login system was released which uses trusted partner credentials, ensuring only genuine users join the platform. This updated process automatically approves accounts from institutional email addresses (e.g., .edu, .gov, .org), while other requests undergo manual review for added security. Since implementing this process, HydroShare has averaged approximately 100 new user accounts per month, with nearly 80% being graduate students, faculty, or staff.

To better meet the needs of the research community, HydroShare was successfully migrated to a modern commercial cloud-based system to improve system performance, scalability, and long term sustainability. This transition enabled us to implement better tools for monitoring and managing data storage quotas. Other user experience updates included simplifying the file upload process, enhancing support for common file types like spreadsheets, and improving how metadata is applied to uploaded data for better discoverability. Metadata enhancements were also made to simplify data sharing and reporting for researchers funded by organizations, including the National Science Foundation (NSF). These upgrades ensure HydroShare is more reliable, efficient, and aligned with the evolving needs of its users.

CUAHSI will continue to invest in the growth of HydroShare. Planned initiatives include transitioning our DOI registration capabilities from Crossref to DataCite to provide better support for scientific data publishing.This transition will enable CUAHSI to better describe and manage datasets in a manner that is closely aligned with FAIR (Findable, Accessible, Interoperable, Reusable) principles and ensure that HydroShare data is discoverable and integrated into global data-sharing networks.

**In 2024, there were 1,588 New HydroShare Resources Created, 22 HydroShare Updates & Releases, and 250 New Digital Object Identifier(s) Issued**

## COMMUNITY JUPYTERHUB

CUAHSI's Community JupyterHub is a free, general-purpose, cloud computing service that enables researchers to execute scientific code as well as explore, modify, and interact with data inside a remote execution environment using Python and/or R programming languages. It is integrated with CUAHSI's HydroShare software ecosystem, making it easy to leverage community datasets, collaborate, and disseminate research workflows with peers. Designed to provide broad access to scientific cloud computing, this service consists of pre-configured environments containing scientific libraries and models, to lower the technological barriers that impede scientific research and education. Personalized data storage enables users to save both completed and ongoing work within their environment and come back to them at a later date, making it ideal for a variety of research and educational uses. CUAHSI JupyterHub environments are also configured with tools and libraries for working with data stored in HydroShare.

## JUPYTEREDU

### Support for Educational Cloud Computing

JupyterEdu is part of CUAHSI's ongoing effort to provide access to cloud computing capabilities specifically designed for educational activities and workforce development. This initiative provides event-specific cloud computing infrastructure for educational events such as workshops, classroom exercises, and professional development events. Using the same underlying cyberinfrastructure as the Community JupyterHub, CUAHSI is able to provide pre-configured computing environments for focused content that require event-specific tools, software, and custom hardware configurations. CUAHSI has provided these capabilities for a variety of events ranging from educational seminars consisting of more than 100 participants, specialized computing hardware for machine learning research, terabyte-scale data storage, and regional hydrologic modeling. CUAHSI is always looking to expand support for additional events.

Please contact help@cuahsi.org to learn more about how CUAHSI can support your upcoming classroom or workshop event.

## MATLAB ONLINE

CUAHSI has continued our partnership with MathWorks to offer a cloud-based computational modeling platform using MATLAB software, known as MATLAB Online. Together, CUAHSI and MathWorks are supporting practical quantitative thinking and exploration in water science research and education. The CUAHSI MATLAB Online is integrated with the HydroShare repository to provide access to data and code, and leverages the MATLAB compute environment for analyzing data and reproducing research findings. This capability provides a convenient and freely accessible mechanism for data discovery, collaboration, and reproducibility, and is relevant to a wide range of water resources professionals.

## WEB APPLICATIONS

CUAHSI offers hosting solutions for community-developed web applications written in the Python and R programming languages to alleviate the hosting responsibilities for scientific and educationally-focused software. This enables researchers to focus on science rather than cyberinfrastructure. Several popular web applications focus on the dissemination of science visualization (RiverColor), data discovery (Macrosheds), and science education tools (WaterBalance). CUAHSI continues its collaboration around community modeling by providing a service for extracting static model input datasets for regional studies across the continental United States (CONUS), via the Data Subsetter. This service provides access to critical hydrologic modeling datasets around closely aligned community research efforts. By leveraging a combination of modern cyberinfrastructure techniques and state-of-the science modeling tools, model users have access to multiple versions of National Water Model and ParFlow-CONUS domain data that would otherwise require extensive computational resources and expertise to generate. This web application has supported scientific research studies investigating streamflow predictions using multi-model and multi-precipitation forcings (see Seo et al., 2021), and continental hydrologic intercomparisons (see Tijerina-Kreuzer et al., 2021).

# RESEARCH HIGHLIGHTS

CUAHSI advances collaborative water research by providing critical data services, cyberinfrastructure (e.g., HydroShare, HIS), and workforce training. Supported by agencies including the NSF, National Oceanic and Atmospheric Administration (NOAA), and National Aeronautics and Space Administration (NASA), CUAHSI's research projects foster innovation and open science. The following 2024 highlights showcase progress toward our 2024 annual goals and the broader objectives of our 2023-2028 Strategic Plan.

## ENHANCING CYBERINFRASTRUCTURE FOR WATER RESEARCH

In 2024, CUAHSI devoted significant effort to improving and expanding the cyberinfrastructure that supports water research. These advances, which center around the HydroShare ecosystem, were made possible by funding from NSF and NOAA, emphasize scalability, user-friendliness, and reproducibility in data sharing and analysis.

A key development was the **initial migration of the HydroShare data repository to a commercial cloud environment** (Lead Principal Investigator [PI] Jordan Read, CUAHSI; NOAA NA22NWS4320003*). This transition helps handle larger datasets more efficiently, integrates directly with cloud-based computational notebooks, and streamlines data publishing. New automated metadata extraction on HydroShare allows researchers to spend less time on manual documentation and more time on scientific inquiry.

To address the needs of **large-scale modeling**, CUAHSI upgraded and expanded data subsetting services (Lead PI Anthony Castronova, CUAHSI; NSF award **1835818**). These enhancements enable researchers to work with broader geographic regions and varied model domains, supported by cloud-based storage that simplifies moving large datasets in and out of modeling workflows. This effort not only widens the scope of hydrologic investigations but also helps ensure greater consistency in how data are accessed, cataloged, and shared.

Finally, work continued on a **collaboration-centric modeling framework** designed to make sharing and reproducing hydrologic simulations more accessible (Lead PI Xu Liang, University of Pittsburgh; NSF award **2209833**). This framework incorporates usability testing and user feedback to refine its tools, ensuring they meet the evolving needs of a broad range of scientists. These combined enhancements to CUAHSI's cyberinfrastructure demonstrate our commitment to providing robust, flexible platforms that support data-intensive research while fostering a collaborative, open-science culture.

## OPEN SCIENCE, TRAINING, AND CAPACITY BUILDING

Cultivating a skilled, diverse community of water researchers is central to CUAHSI's mission. In 2024, CUAHSI prioritized accessible training opportunities, open science practices, and robust educational resources to help early-career scientists and seasoned professionals alike work more effectively across disciplines.

A major component of these efforts is **CyberTraining**, an NSF-funded program that introduces participants to modern data science tools, community cyberinfrastructure platforms, and collaborative research workflows (Lead PI Anthony Castronova, CUAHSI; NSF award **1829744**). Through a mix of virtual learning modules and an in-person "hackweek," researchers and students gained practical experience in organizing, publishing, and analyzing hydrologic data. This approach strengthens technical expertise and reinforces best practices for reproducible, open science.

To support educators and workforce development, CUAHSI collaborated on two key **HydroLearn** projects (Lead PI David Tarboton, Utah State University; NOAA **NA22NWS4320003***). In the first effort, one in-person workshop and an 8-day virtual workshop guided Hydrolearn "fellows" in the creation of 9 new learning modules. The second HydroLearn project extended that effort producing more than a dozen modules that focus on authentic, problem-based learning in hydrology. By publishing these resources through an open, online platform, CUAHSI empowers instructors at institutions of all sizes to integrate up-to-date, hands-on materials into their courses.

Together, these training initiatives and instructional materials foster a culture of **open, collaborative scholarship** in water science. By equipping researchers and educators with cutting-edge tools and pedagogy, CUAHSI helps ensure that the next generation of hydrologic scientists is prepared to address complex environmental challenges—and to do so in a way that values transparency, inclusivity, and broad community participation.



## ADVANCING HYDROLOGIC KNOWLEDGE AT SCALE

A deeper understanding of how water moves through diverse landscapes is essential for effective resource management and hazard mitigation. In 2024, CUAHSI advanced this goal by synthesizing region-specific data, refining conceptual frameworks, and building community-driven tools that help researchers see the bigger picture in hydrology.

One such effort involved defining **Perceptual Models of Dominant Hydrologic Processes** across North America (Lead PI Martyn Clark, University of Saskatchewan; NOAA **NA22NWS4320003***). Through five online workshops, experts identified key physiographic gradients and subdivided large U.S. regions into smaller, hydrologically similar landscapes. This work culminated in a prototype map presented at the American Geophysical Union's 2024 Fall Meeting, which is now being refined with community input to guide more targeted studies.

Another initiative of ours focused on **providing access to a community database** containing hydrologic process knowledge from hundreds of experimental watersheds (Lead PI Hilary McMillan, San Diego State University; NSF award **2322510**). By standardizing metadata and linking observations from diverse sites, this capability enables researchers to compare processes across scales more effectively. A prototype web application, now nearing completion, will allow community members to draw insights from this collection of published knowledge. Collectively, these projects help unify hydrologic knowledge and foster large-scale collaborations that address pressing water challenges.

## COMMUNITY PARTNERSHIPS AND REAL-WORLD IMPACT

CUAHSI's commitment to supporting real-world water solutions is reflected in its extensive partnerships with community stakeholders, educational institutions, and cross-disciplinary networks. In 2024, these collaborative efforts—funded by agencies such as NOAA and NSF—focused on aligning scientific research with local needs and expanding opportunities for hands-on learning.

### Strengthening Community Resilience with the National Water Model

Through a multi-phase project, CUAHSI is exploring how the National Water Model (NWM) can enhance local resilience planning (Lead PI Kristin Raub, Northeastern University; NOAA **NA22NWS4320003***). Initial interviews with stakeholders in diverse U.S. communities revealed both an eagerness to use water data and a need for more accessible technical support. CUAHSI responded by developing clear, community-specific use cases to illustrate the NWM's potential for flood risk assessment, infrastructure planning, and decision-making. Future phases will continue to refine these tools in partnership with small communities in Vermont and Missouri, demonstrating how models like the NWM can be adapted for local contexts.

### Collaborating Through the Critical Zone Collaborative Network

CUAHSI leads the Coordinating Hub for the **Critical Zone Collaborative Network (CZNet)** under a five-year cooperative agreement from NSF (Lead PI Jordan Read, CUAHSI; NSF **award 2012893**). Designed to foster discovery and data sharing among multiple Thematic Clusters, the Hub supports virtual and in-person events that bring together researchers from diverse fields. These events help identify shared challenges, encourage interdisciplinary perspectives, and build a cohesive learning environment for the study of Earth's "critical zone"—the near-surface environment where rock, soil, water, and life interact.

### Inspiring Future Scientists Through REUs

The CZNet Research Experience for Undergraduates (REU) program provides hands-on research opportunities in critical zone science (Lead PI Jordan Read, CUAHSI; NSF **award 2244446**). In 2024, nine students joined the program, receiving mentorship, stipends, and the chance to present their work at national conferences. By exposing undergraduates to high-impact research and fostering professional networks, the CZNet REU expands the talent pipeline for hydrologic and environmental science.

Together, these projects showcase how CUAHSI prioritizes **community engagement, education, and stakeholder-driven outcomes**. By collaborating with local groups, leveraging broader research networks, and training the next generation of scientists, CUAHSI ensures that water research remains responsive to pressing societal needs.

*Funding for these projects was provided by the National Oceanic and Atmospheric Administration (NOAA), awarded to the Cooperative Institute for Research on Hydrology (CIROH) through the NOAA Cooperative Agreement with The University of Alabama, NA22NWS4320003.*

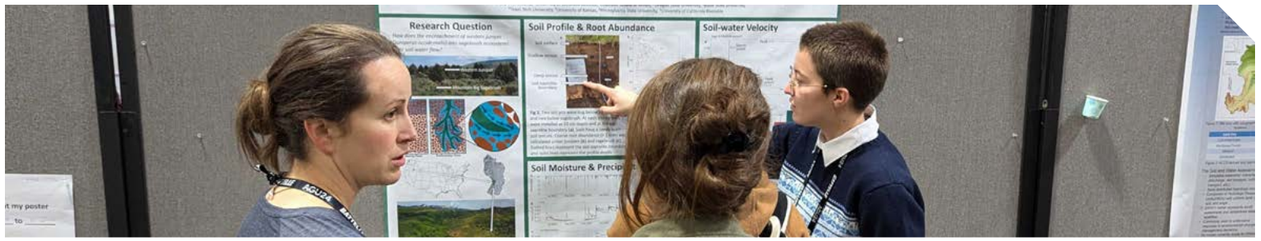
# EDUCATION & TRAINING

CUAHSI provides continual learning opportunities for everyone at every career stage by facilitating programs and services beneficial to students, early career scientists, and advanced career professionals alike.

CUAHSI's educational programming aims to increase access to and promote the use of new, advanced, or specialized instrumentation techniques, field methodologies, data services, and multidisciplinary perspectives on water science within the CUAHSI community. These programs, services and events also serve to increase awareness of CUAHSI Water Data Services. We've added a first-year graduate student guide as an introduction to useful concepts and resources during your first year as a graduate student.

CUAHSI is making a concerted effort to expand our services and programs for undergraduate students. A landing page on the CUAHSI website contains links to several resources including: the graduate programs in water science database, a quick guide to help in determining if graduate school is the right choice for you, information on the CZNet Research Experience for Undergraduate students, information on awards open to undergraduates and a link to a curated playlist of videos on the CUAHSI YouTube channel. Visit the website for more information.

**Visit the CVU website for information on how you can teach a module!**




## CUAHSI VIRTUAL UNIVERSITY

The CUAHSI Virtual University (CVU) is a unique interuniversity online education experience that enables students to participate in online hydrology course modules offered by faculty in specialized research niches across leading institutions. The unique format enables students to receive course credit for participating in the CVU through their home university.

### CVU:

- Enhances the depth and breadth of graduate course offerings for participating universities;
- Enables graduate students to experience new research and courses not offered at their home university;
- Facilitates networking among the hydrologic community.
- In 2024, 35 students participated in the CVU, with each student participating in at least one module of their choosing.

**The modules included:**

**Climate modeling for hydrologists**
Instructor: Sanjiv Kumar, Auburn University

**Applying Geographic Information Systems for Terrain and Watershed Analysis in Hydrology**
Instructor: David Tarboton, Utah State University

**Modeling Coupled Water, Energy, and Carbon Cycles**
Instructor: Alejandro N. Flores, Boise State University

**Hydrological Catchment Modeling Using Bucket-Type Models**
Instructor: Jan Seibert, University of Zurich

**Hydrologic Remote Sensing**
Instructor: Mekonnen Gebremichael, University of California - Los Angeles

**Sensing and Modeling Hydrology of Irrigated Agriculture**
Instructor: Meetpal Kukal, University of Idaho

**Modeling Watershed Dynamics Using Landlab**
Instructor: Erkan Istanbulluoglu, University of Washington

**Seminal Papers in Flood Hydrology**
Instructor: Daniel Wright, University of Madison - Wisconsin

**Applications of Climate and Remote Sensing Data in Hydrology**
Instructor: Justin Huntington, University of Nevada - Reno

**3 New Institutions and 3 New Instructors Participated in 2024**

## CYBERSEMINARS

CUAHSI Cyberseminars feature presentations, panels, and virtual events with experts on new or timely topics of interest. The program enables researchers to share their work and contribute to an archive of over 200 lectures available to the public. Presentations from CUAHSI's 2024 Cyberseminar Series are available to view on the CUAHSI YouTube Channel.
The 2024 series included:

### Perceptual Models of Dominant Hydrologic Processes Across North America: Synthesis Workshop Series

(Lead PI Martyn Clark, University of Saskatchewan; NOAA NA22NWS4320003*)

This series kicked off a community-driven synthesis effort to address a large-scale hydrologic modeling challenge: creating a comprehensive overview of how dominant hydrologic processes varied across large geographic domains. These virtual workshops, which were open to the public, brought together water science experts working in various regions across North America. The workshops covered five main large regions: (1) Eastern Coastal Region, (2) Western Mountain and Coastal Region, (3) Cold Region, (4) Interior Agricultural Region, and (5) Island Region.

**The workshop series were convened by:** Martyn Clark, Ying Fan, Wouter Knoben, Hilary McMillan, Katie van Werkhoven, Jordan Read, and Irene Garousi-Nejad.

### Navigating (beyond) Academic Waters: Expectations, Collaborations & Service

The Navigating Academic Waters webinar series, convened by AGU Hydrology Section Student Subcommittee, aimed to help early career hydrologists identify missing skills, find collaborators, and balance service in their new careers.

The series included:

- **Navigating Academic Waters:** Bridging the Gap: Aligning Academic Training with Professional Expectations
- **Navigating Academic Waters:** Collaboration and Building your Networks
- **Navigating Academic Waters:** Giving Back and Providing Service as a student and early career hydrologist

**307 Individuals Attended at Least 1 Cyberseminar in 2024**

## WORKSHOPS

CUAHSI facilitates workshops and short courses that provide interdisciplinary perspectives on specific technologies or topics that may not be available through any single institution. Along with building new skills, CUAHSI workshops create opportunities for community collaboration and relationship building between participants and instructors from different institutions.

### ARE YOU INTERESTED IN ORGANIZING A WORKSHOP?

CUAHSI can assist with organizing, advertising, and executing workshops. Proposal guidelines can be found here.

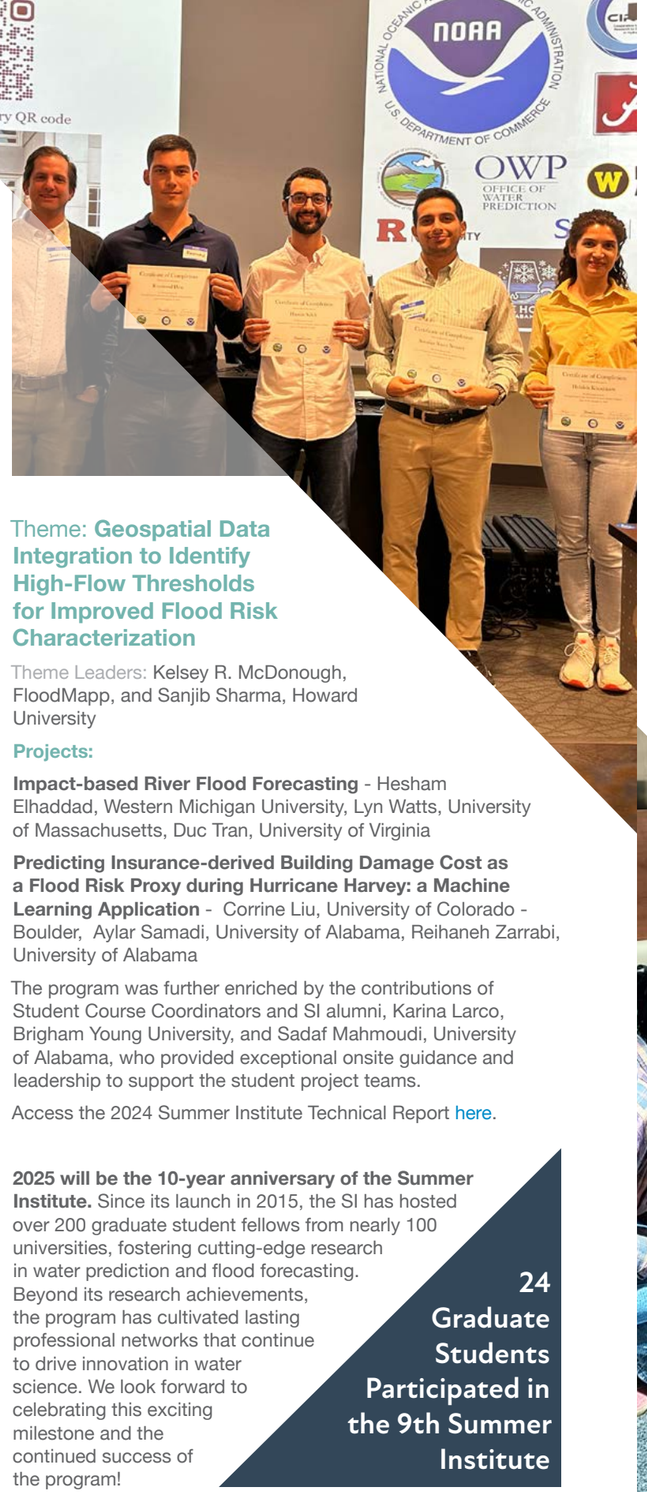
Contact admin@cuahsi.org for more information.

### 2024 Workshop

In partnership with SINTER: Snow International and NASA, CUASHI hosted the 6th Snow Measurement Field School that took place from January 8 - 11 in Bretton Woods, New Hampshire. Course objectives are to give fundamental training in making and analyzing snow measurements and to provide the ability to perform high-quality fieldwork and design studies making snowpack measurements.

Of the 89 applicants 29 participated including a mix of undergraduate and graduate students, and those employed in non-profit, private, and government agencies. The instructors included Dr. Kate Hale, University of Vermont (Lead instructor), Dr. Carrie Vuyovich, NASA, Dr. Eli Deeb, CRREL, Dr. Jack Tarricone, NASA, Dr. Anna Kontu, Finnish Meteorological Institute, and Dr. Jennifer Jacobs, University of New Hampshire. Additionally, graduate student instructors provided partial support including Otto Lang, University of Utah, Arielle Koshkin, Colorado School of Mines, and Adam Hunsaker, University of New Hampshire.

# 2024 CIROH NATIONAL WATER CENTER INNOVATORS PROGRAM: CUAHSI SUMMER INSTITUTE




The National Water Center Innovators Program Summer Institute (SI) (Lead PI Jordan Read, CUAHSI, NOAA, NA22NWS4320003*) is a collaborative, seven-week experiential learning program hosted through the National Weather Service's Office of Water Prediction (OWP), CUAHSI, and the University of Alabama. The SI brings together graduate students, academic researchers, industry professionals, and National Water Center (NWC) staff to tackle innovative projects in water prediction and flood forecasting.

In 2024, 24 graduate student fellows from 14 U.S. universities participated in the program, held from June 9 to July 26 at the University of Alabama. Students formed teams to work on projects under these themes:

## Theme: Assimilation of Geosynchronous Satellite Imagery into NextGen for Improved Modeling

Theme Leader: Jonathan Frame, University of Alabama

**Projects:**

**Investigating SWE predictive capability using GOES bands for the NextGen hydrofabric scale** - Raymond Hess, Rutgers University, Helaleh Khoshkam, University of Hawai'i - Mānoa, Savalan Neisary, University of Alabama, and Hassan Saleh, Western Michigan University

**Identifying Atmospheric Rivers with GOES Satellite Imagery** - Anshul Yadav, Texas A&M University, Janani Kandasamy, George Mason University, Meklit Berihun Melesse, Washington State University, Surabhi Upadhyay, Colorado School of Mines

**Probabilistic Streamflow Prediction Using the Model-Agnostic NextGen Framework** - Ali Sattari, University of Alabama, Reza Morovati, Utah State University, Hossein Gholizadeh, University of Alabama

## Theme: Flood Inundation Mapping (FIM) Uncertainty Analysis and Model Intercomparison

Theme Leaders: Xingong Li, University of Kansas, and Sagy Cohen, University of Alabama

**Projects:**

**Enhancing remote sensing FIM by leveraging terrain-based model** - Jack Edwards, University of Kansas, Francisco Gomez, University of Alabama, Kim Son Do, University of Virginia

**Rapid Flood Inundation Mapping for Dam Break Floods** - Shivakumar Balachandaran, University of South Carolina, Ayman Mokhtar, University of South Carolina, Reza Saleh Alipour, University of Alabama, Parvaneh Nikrou, University of Alabama

## Theme: Geospatial Data Integration to Identify High-Flow Thresholds for Improved Flood Risk Characterization

Theme Leaders: Kelsey R. McDonough, FloodMapp, and Sanjib Sharma, Howard University

**Projects:**

**Impact-based River Flood Forecasting** - Hesham Elhaddad, Western Michigan University, Lyn Watts, University of Massachusetts, Duc Tran, University of Virginia

**Predicting Insurance-derived Building Damage Cost as a Flood Risk Proxy during Hurricane Harvey: a Machine Learning Application** - Corrine Liu, University of Colorado - Boulder, Aylar Samadi, University of Alabama, Reihaneh Zarrabi, University of Alabama

The program was further enriched by the contributions of Student Course Coordinators and SI alumni, Karina Larco, Brigham Young University, and Sadaf Mahmoudi, University of Alabama, who provided exceptional onsite guidance and leadership to support the student project teams.

Access the 2024 Summer Institute Technical Report here.

**2025 will be the 10-year anniversary of the Summer Institute.** Since its launch in 2015, the SI has hosted over 200 graduate student fellows from nearly 100 universities, fostering cutting-edge research in water prediction and flood forecasting. Beyond its research achievements, the program has cultivated lasting professional networks that continue to drive innovation in water science. We look forward to celebrating this exciting milestone and the continued success of the program!

**24 Graduate Students Participated in the 9th Summer Institute**



# GRANTS & FELLOWSHIPS

CUAHSI supports activities to extend research and develop new products. All programs accept proposals once per year. Submission deadlines are announced via the CUAHSI newsletter and website.

## Hydroinformatics Innovation Fellowship

The Hydroinformatics Innovation Fellowship supports projects that result in a hydroinformatics product that can be broadly shared and used. Past awardees have developed software products, data products, and technical manuscripts. Students and scientists at U.S. universities and colleges are eligible for this grant. Applications are accepted in the fall.

**Current awardees are:**

- HySetter: Reproducible and scalable Subsetting of Hydroclimate Data over CONUS
  - Taher Chegini, Purdue University
- Global coastal rivers and estuaries surface reflectance database
  - Punwath Prum, University of Pittsburgh
- A Near-Real-Time Compound Flood Inundation Python Package
  - Mark Wang, University of Texas - Austin

## Instrumentation Discovery Travel Grant

The Instrumentation Discovery Travel Grant (IDTG) program enables scientists to learn the details of hydrologic instrument installation, operation, maintenance, and data processing by visiting experts or scheduling reverse site visits. Applications are accepted in the spring.

**Current awardees are:**

- Collaborative field training and networking on socio-ecohydrological elements of freshwater spring ecosystems across Italy's Mediterranean islands
  - Andrew Lewis, University of Hawai'i - Mānoa
- Soil Hydrologic Sensors to Inform Microscale Mineral Weathering Processes in the Catalina Critical Zone Observatory (CZO)
  - Madison Morris, University of California - Davis
- Microplastics Presence in Critical Zone Groundwater and Riverbed Sediments
  - Rodrigo Villalpando-Vizcaino, University of Memphis

## Pathfinder Fellowship

The Pathfinder Fellowship program provides travel funds to graduate students in hydrology and related sciences to enhance their research by adding a field site to conduct comparative research, collaborating with a research group, or working with researchers on adding an interdisciplinary dimension to a project. Applications are accepted in the fall.

**The 2024 awardees are:**

- Spatial variability of carbon fluxes in the northern Canadian Rocky Mountains
  - Cheristy Jones, University of New Hampshire
- ET partitioning across US ecoregions: a multi-site study using field stable-isotope observations
  - Katarena A. Matos, University of Nevada - Reno
- Combining Indigenous and Western Sciences to Analyze Glacier Retreat in Araucanía, Chile
  - Millie Spencer, University of Colorado - Boulder

**$35,435 Awarded in 2024**

# MEMBERSHIP

CUAHSI's membership includes more than 100 U.S. universities, nonprofit affiliates, and international affiliates who recognize the need for interdisciplinary collaboration and innovative thinking to advance water science and solve society's most pressing water issues.

**CUAHSI encourages membership from Primarily Undergraduate Institutions (PUI). Visit our website for more information.**

Through CUAHSI membership, your institution can:

- Support the growing national and international water science community;
- Contribute to innovations in water science and education;
- Designate representatives for your organization to participate in community governance;
- Receive registration discounts on CUAHSI events and workshops. Anyone affiliated with a member organization is eligible for the member discount.

Reach the membership team at membership@cuahsi.org with any questions!

**READY TO BECOME A CUAHSI MEMBER?** Learn more online or contact membership@cuahsi.org

## WELCOME TO CUAHSI

A special welcome to new CUAHSI Members of 2024: EarthScope, Interstate Council on Water Policy, Southern Methodist University, University of North Georgia, Utah Valley University, and Stevens Institute of Technology.

### Active Members as of December 2024

Arizona State University
Auburn University
Boise State University
Brigham Young University
Carnegie Mellon University
Clemson University
Colorado School of Mines
Colorado State University
Cornell University
Dartmouth College
Drexel University
Duke University
Eastern Illinois University
Florida International University
Georgia Institute of Technology
Georgia State University
Idaho State University
Indiana University
Iowa State University
John Hopkins University
Kent State University
Louisiana State University
Marquette University
Michigan State University
Michigan Technological University
Mississippi State University
Montana State University
New Mexico State University
Northeastern University
Northern Arizona University
Northwestern University
Oregon State University
Pennsylvania State University
Portland State University
Prairie View A&M University
Princeton University
Purdue University
Rutgers University (SUNJ)
Santa Clara University
Smith College
Southern Illinois University
Southern Methodist University
Stanford University
State University of New York - Buffalo
State University of New York - ESF
Stevens Institute of Technology
Syracuse University
Temple University
Texas A&M University
University of Alabama
University of Arizona
University of Arkansas
University of California - Davis
University of California - Irvine
University of California - Merced
University of California - Riverside
University of California - Santa Cruz
University of Central Florida
University of Colorado - Boulder
University of Delaware
University of Florida
University of Georgia
University of Hawai'i
University of Houston
University of Idaho
University of Illinois
University of Iowa
University of Kansas
University of Kentucky
University of Louisiana - Lafayette
University of Memphis
University of Michigan
University of Minnesota
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University of Nevada - Reno
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University of North Georgia
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University of Texas - Arlington
University of Texas - Austin
University of Utah
University of Vermont
University of Virginia
University of Washington
University of Wisconsin - Madison
University of Wyoming
Utah State University
Utah Valley University
Villanova University
Virginia Tech
Washington State University
West Virginia University
Yale University

### International Affiliate Members

Suez Canal University
University of Ljubljana
University of Sidi Mohamed ben Abdellah
University of Zurich

### Non-Profit Affiliate Members

EarthScope
Interstate Council on Water Policy
RTI International
Stroud Water Research Center



# CUAHSI FINANCIAL OVERVIEW

In 2024, CUAHSI maintained core support from the National Science Foundation (NSF; EAR-1849458) and an array of federal subawards, enabling us to sustain our services and community programs and expand into new areas of emphasis. However, because we primarily operate on an expense-reimbursement basis, delays in reimbursements from funders can still strain our cash flow. To mitigate these challenges, we built on initiatives launched in 2023—strengthening our financial and administrative operations, enhancing reporting mechanisms, and making steady progress on our outstanding audits.

We also engaged our community through a new donation campaign, which successfully raised $24,000 in unrestricted funds to help stabilize operations during high-need periods (visit our website to learn more about this initiative and information on how you can make CUAHSI part of your annual giving). In tandem with this effort, CUAHSI reached its highest dues-paying membership total in over a decade, reflecting the consortium's deepening commitment to our shared mission. Moving forward, we remain focused on diversifying our revenue streams and further fortifying our financial resilience, ensuring that CUAHSI continues to serve as a vital resource for the water science community.

# GOVERNANCE

CUAHSI is governed by a Board of Directors elected by and from member institutions. The Executive Committee consists of the Chair, Immediate Past Chair, Incoming Chair, and two at-large members.

In September, CUAHSI members approved changes to the Bylaws to broaden Board eligibility to allow up to five "At-Large" Board members to expand expertise in areas such as non-profit management, legal, and fundraising, while maintaining a majority of Board members from member institutions and preserving member representatives' voting control. Additional revisions streamline Board vacancy and membership processes, update the Treasurer's role and Audit Committee, and enhance financial oversight. These changes support CUAHSI's long-term sustainability.

### 2024 CUAHSI Board of Directors

**Hoori Ajami**
University of California-Riverside

**Amy Burgin**
University Of Kansas (currently, Iowa State University)

**Darren Ficklin**
Indiana University

**Alejandro Flores**
Boise State University

**JP Gannon**
Virginia Tech

**Drew Guswa**
Smith College

**Anne Jefferson**,
2024 Chair,
University of Vermont

**Safeeq Khan**
University of California - Merced

**Sarah Ledford**
Georgia State University

**Steven Loheide**,
University of Wisconsin - Madison

**Ashley Matheny**,
University of Texas - Austin

**Ashok Mishra**
Clemson University (currently Texas A&M University)

**Crystal Ng**
University of Minnesota

**Asa Rennermalm**,
Rutgers University

**Jay Zarnetske**
Michigan State University

### 2024 CUAHSI Officers

**Jordan Read**, President, CUAHSI

**Adam Ward**, Secretary, Oregon State University

**Steve Architzel**, Treasurer, University of California - San Francisco

# CUAHSI STAFF

CUAHSI was pleased to welcome new staff members Summer Conley as Program and Operations Assistant, Sandesh Maddila as Software Engineer, and Leah Turner as Director of Education and Strategic Partnerships.

**Jordan Read**
Executive Director

**Maureen Ako**
Director of Finance

**Scott Black**
Senior Software Specialist

**Abner Bogan**
Environmental Data Scientist

**Anthony Castronova**
Lead of Research

**Emily Clark**
Project Manager

**Clara Cogswell**
Community Support Hydrologist

**Summer Conley**
Program and Operations Assistant

**Devin Cowan**
Research Programmer

**Laura Davis**
Accountant

**Irene Garousi-Nejad**
Research Scientist

**Sandesh Maddila**
Software Engineer

**Julia Masterman**
Science Education and Outreach Specialist

**Lisa Mucciacito**
Community Outreach Specialist

**Lindsay Platt**
Environmental Data Scientist

**Martin Seul**
Technical Director

**Veronica Sosa Gonzalez**
Education Program Manager

**Leah Turner**
Director Of Education and Strategic Partnerships


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