



2023 ANNUAL MEMBERS REPORT



3

LETTER FROM THE PRESIDENT

4

ABOUT CUAHSI

5

CUAHSI DIVERSITY, EQUITY, AND INCLUSION

9

CUAHSI SUPPORTS THE ENTIRE DATA LIFECYCLE

10

DATA AND CLOUD COMPUTING SERVICES

12

EDUCATION AND TRAINING

16

GRANTS AND FELLOWSHIPS

18

MEMBERSHIP

20

CUAHSI FINANCIAL OVERVIEW

21

GOVERNANCE

This material is based on work supported by the National Science Foundation (NSF) under Award EAR-1849458. Any opinions, findings and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the NSF.



Consortium of Universities for the Advancement of Hydrologic Science, Inc.
Arlington, MA 02476
email: commgr@cuahsi.org
website: www.cuahsi.org



LETTER FROM THE PRESIDENT

Dear CUAHSI community members,

2023 was a significant year of change and progress for CUAHSI and I hope you enjoy taking in the exciting highlights featured in the remainder of the report below. I am one of six new hires that joined CUAHSI this year. The role of CUAHSI President and Executive Director is a humbling one, and I've appreciated contributing to the exciting and compelling work of CUAHSI alongside excellent staff.

Our mission and vision statements were updated this year as part of developing a [strategic plan](#) for the next phase of CUAHSI. CUAHSI exists "to empower the water community and advance science through collaboration, infrastructure, and education" and our vision for the future is "a thriving water community – enabled by shared resources – developing an integrated understanding of water, earth, ecosystems, and society to meet human and environmental needs." I hope you find these words to be compelling to you and inviting to others that haven't yet connected with CUAHSI. Strategic plans are high-level documents designed to collaboratively set our goals and priorities for the future.

The real work CUAHSI does is through the tireless daily effort staff put in to engage with the community and provide key resources and infrastructure that address critical needs. By any measure, 2023 was a productive year for the team. We hosted a successful [CUAHSI Biennial Colloquium](#) (our first in-person since 2018), helped a new cohort of National Water Center [Summer Institute](#) Fellows advance water prediction goals, made significant progress modernizing HydroShare and other popular services (e.g., model domain subsetter) to take advantage of the commercial cloud, collaborated with our partners at USU and Columbia on the release of a multi-repository [data submission portal](#) for the Critical Zone Network, launched a new [undergraduate research opportunity for Critical Zone science](#), and supported 11 teaching modules via [CUAHSI Virtual University](#). More details on these outcomes and more are included in the sections below.

We used our strategic plan and input from staff and the community to frame three core objectives in a new four-year funding proposal that we submitted to NSF in early December: (i) provide robust and reliable central water data publishing, (ii) simplify common water data management problems for the community with human and cyberinfrastructure solutions, (iii) co-develop, curate, and share educational and collaborative resources that prepare the community for inclusive and transformative water science. The details and deliverables for meeting these objectives include sustaining many of the CUAHSI programs and services you've come to rely on plus a mix of enhancements and new offerings. I'm also prioritizing operations and accounting improvements to make sure the organization has the support it needs to run sustainably into the future.

I'm looking forward to a year of exciting collaborations and continued progress for the water community in 2024.

Regards,

Jordan S Read



ABOUT CUAHSI

CUAHSI supports the advancement of interdisciplinary water science. CUAHSI fosters a diverse and dynamic water science community enabled by shared scientific infrastructure that facilitates an integrated understanding of the interactions among water, earth, ecosystems, and society. CUAHSI's programs and resources are available to everyone and have been used by students, educators, volunteer scientists, outreach coordinators, environmental and watershed organizations, corporate entities, and more. CUAHSI is a membership-based organization and attempts to be responsive to member needs. However, anyone involved in any aspect of water science, water-resources management, or water-resources protection and enhancement is a part of the CUAHSI community. CUAHSI's programs and services are available to everyone - many free of charge - regardless of membership

status. YOU are an integral part of CUAHSI and we hope you will take advantage of our many diverse programs and services. Learn more about our programs and services at www.cuahsi.org.

CUAHSI underwent significant staffing changes in 2023. Dr. Jerad Bales retired in February 2023 after serving six years as CUAHSI's Executive Director. CUAHSI welcomed Dr. Jordan Read to serve as the new Executive Director, Dr. Irene Garousi-Nejad as Research Scientist, Maureen Ako and Laura Davis joined as Controller and Accountant, Lindsay Platt as Operations Data Science, and Abner Bogan as Environmental Data Scientist.

The 2023 – 2028 strategic plan was developed, submitted to NSF, and shared with the community.

You can find a copy of the plan [here](#).



4

CUAHSI DIVERSITY, EQUITY, AND INCLUSION

CUAHSI strives to ensure that diversity, equity and inclusion are core values reflected in our culture and practices.

Our vision is that CUAHSI's [commitment to Diversity, Equity and Inclusion](#) (DEI) will strengthen interdisciplinary collaboration by promoting the acceptance of diverse ideas and perspectives in the hydrologic sciences.

A [Code of Conduct](#) has been 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.

In alignment with the Diversity, Equity, and Inclusion Strategic Plan (2020), CUAHSI is working to expand its services to undergraduate students and the faculty who teach them. CUAHSI launched a study to understand the needs of faculty who teach and mentor undergraduate students in the water sciences. The data were collected in two phases: (1) a survey to conduct a landscape analysis to understand the range of needs that faculty have; and (2) a collaborative session with a subset of survey respondents to develop recommendations for how CUAHSI can provide resources to address the faculty-identified needs. The data are being analyzed with Dr. Cory Forbes and Ph.D. student Jessica Marasovic from the University of Texas at Arlington.

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



Photo Credit: Dylan Blaskey, Juan Camacho Puerta and Illustrator, Simona Love



5

IN
2023

2,728 NEW HYDROSHARE
RESOURCES CREATED

31 HYDROSHARE RELEASES

117,152 VIEWS ON YOUTUBE

194 NEW DIGITAL OBJECT IDENTIFIERS (DOI) ISSUED | TWITTER FOLLOWERS INCREASED BY **15.6%**

23 STUDENTS PARTICIPATED IN THE 8TH NATIONAL WATER CENTER INNOVATORS PROGRAM

134 ATTENDEES AT THE BIENNIAL COLLOQUIUM

6 NEW STAFF | **33%** INCREASE IN MEMBERS JOINED CUAHSI | NEWSLETTER SUBSCRIBERS

96% OF HELP DESK REQUESTS WERE ANSWERED WITHIN **1 BUSINESS DAY**

“That’s one heck of a 2023 for @CUAHSI!”
Adam Ward, Oregon State University
- via Twitter

New In CUAHSI Data Services: New HydroShare Help Content

Instructional YouTube Videos:

The “[HydroShare How To](#)” video playlist includes short instructional videos that provide information on HydroShare functionality. The playlist now contains 20 videos. A new playlist for [CUAHSI’s compute services](#) was created, with two videos added, one on preconfigured environments, and one on Jupyterhub.

Bi-Monthly Webinars.

CUAHSI piloted a webinar series on data services to train users on CUAHSI data infrastructure and give users direct access to CUAHSI support staff. These webinars occur on a bi-monthly basis, and currently rotate between two topics, “An Introduction to HydroShare” and “An Introduction to CUAHSI Compute Services.” These two webinars are intended for beginner audiences who are unfamiliar with CUAHSI data services, or those who are seeking an update on recent features and additions to CUAHSI data services. Recordings of past webinars can be found on our [YouTube channel](#).

Critical Zone Collaborative Network (CZNet) Coordinating Hub

CUAHSI is the lead of the Coordinating Hub for the [Critical Zone Collaborative Network \(CZNet\)](#).

The 5-year cooperative agreement for the operation of the Hub includes four primary tasks:

1. Enhance and integrate existing data services operated by CUAHSI, EarthChem, and others to support the Critical Zone (CZ) community. Please visit the CZNet [Data Submission Portal](#) to learn more, including best practices, a quick start guide, and more.

2. Support discovery through community synthesis activities and via access to community data and modeling cyberinfrastructure.
3. Expand the CZ community through outreach and education activities to create a broader, more inclusive community dedicated to CZ research.
4. Enhance collaboration among the CZ Thematic Clusters through coordination, sharing, community meetings, and outreach.

In 2023, the Coordinating Hub launched a Research Experience for Undergraduate students funded by the National Science Foundation (NSF-REU). Ten students were accepted into the 2023 Summer program. The award covered costs for travel, their work, meals, housing and a stipend.

Seven of these students presented their research at the American Geophysical Union’s Fall Meeting. CUAHSI’s CZ Hub activities substantially enhance existing data services, broaden the CUAHSI community, and build on CUAHSI’s strengths of education and community support. To learn more about the Critical Zone Network, the NSF REU and to subscribe to the newsletter, visit the website [here](#).

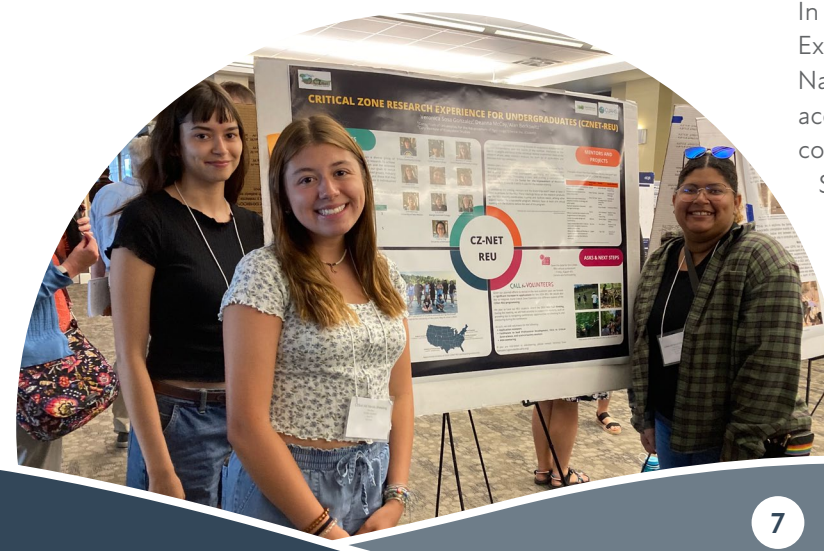


Photo Credit
Lisa Mucciacito & Deanna McCay



CUAHSI Biennial Colloquium 2023

Discovering New Horizons in Water Science

June 11-14, 2023

Granlibakken Tahoe, Tahoe City, CA



CUAHSI's Biennial Colloquium is a symposium that brings together the water science community. Researchers present their latest findings and developments, facilitate community workshops, and interact with colleagues from different disciplinary fields from all over the country. The Biennial offers a unique opportunity and a casual environment for participants to discuss ideas, network with colleagues, and build new relationships.

The 2023 CUAHSI Biennial Colloquium took place June 11-14 at the Granlibakken Tahoe Resort in Tahoe City, CA. This was the first in-person Biennial since 2018, as the 2020 Biennial was canceled due to the Covid-19 Pandemic. The meeting location was selected after receiving community feedback to hold the meeting on the west coast. This is the farthest west the meeting has been held.

The theme for the 2023 Biennial was Discovering New Horizons in Water Science, and highlighted new ways of doing inclusive and collaborative research, new perspectives, new knowledge frameworks, new ways of learning, new tools, and new metrics of success. Over 130 people were in attendance, and the audience included a mix of students and professionals from academic institutions, government agencies, NGO's, as well as CUAHSI staff and the board of directors. Over the course of four days, there were three keynote speakers, twelve sessions, five workshops, twelve lightning talks, 39 poster presentations, a film screening, and an off-site field trip to the Tahoe Dam.

“Enjoying bringing @crowd_water to Lake Tahoe and the @CUAHSI biennial. Great to meet so many wonderful hydrologists in person”

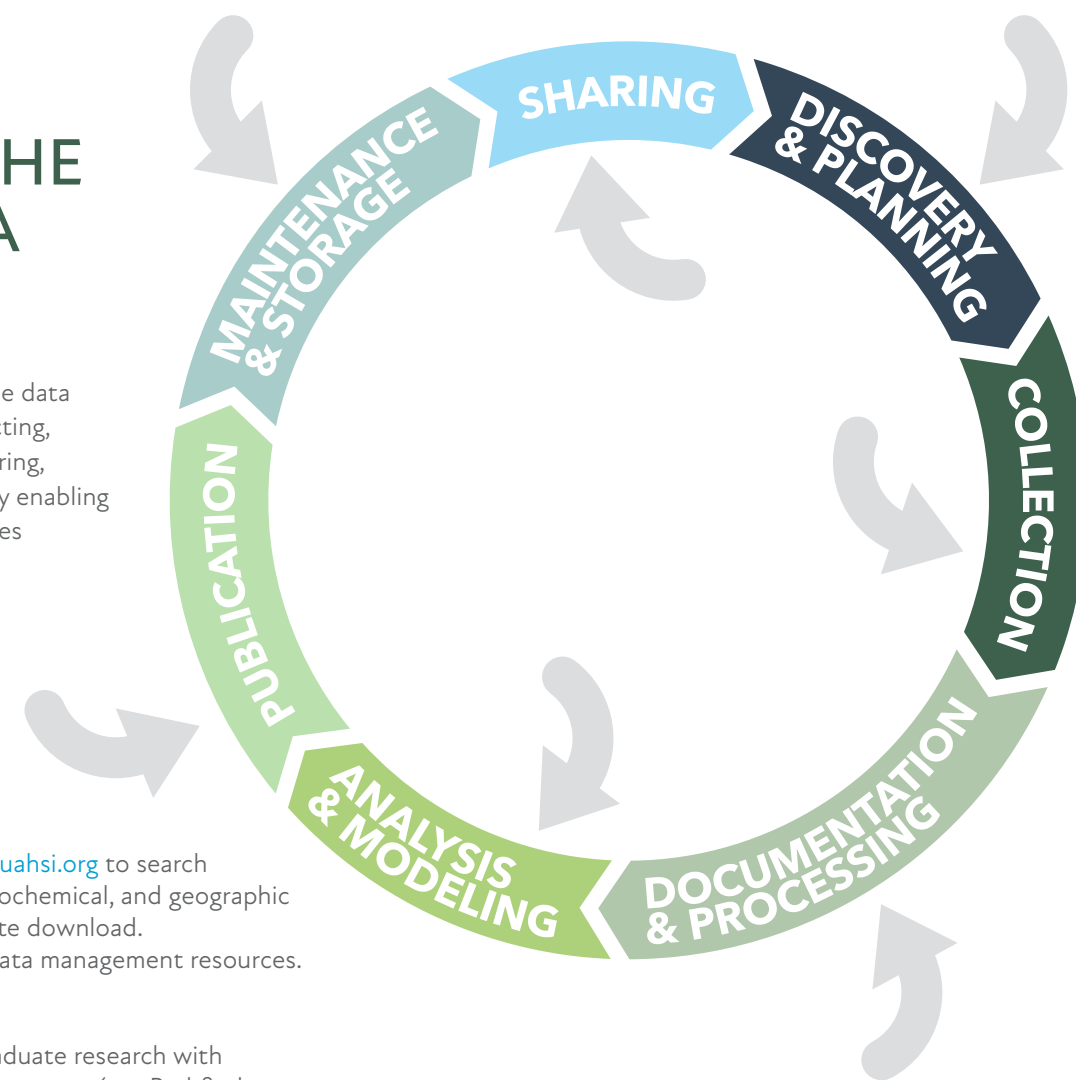
Jan Seibert, University of Zurich - via Twitter



8

CUAHSI SUPPORTS THE ENTIRE DATA LIFECYCLE

CUAHSI supports all aspects of the data management life cycle, from collecting, storing, and analyzing data, to sharing, publishing, and citing data, thereby enabling 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.
- Obtain training on CUAHSI's data management resources.

Data Collection:

- Add additional field sites to graduate research with CUAHSI [Pathfinder Fellowship](#) support (see Pathfinder Fellowships on Page 17).
- Learn new data collection techniques or instrumentation with [hands-on training](#) and [Instrumentation Discovery Travel Grants](#) (see Trainings and Workshops Page 13 and Instrumentation Discovery Travel Grants Page 16).

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 Domain 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:

- Share your data publicly so that the data are 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 13).
- Develop education and outreach activities with CUAHSI resources to share new approaches, research results, and methods with the community.
- Easily learn to use HydroShare's many features through the [HydroShare How To YouTube Playlist](#)

9

DATA AND CLOUD COMPUTING SERVICES

CUAHSI provides free and open source software that supports managing, archiving, sharing, discovering, publishing, and analyzing all types of water data. These services support documentation of workflows and enable hydrologic modeling in a collaborative environment. In this section, some of our new features, services, and applications added in 2023 are highlighted.

HydroShare

Thirteen releases containing updates were merged into the HydroShare system in 2023, among them some were notable for their importance and impact on user experience.

- **Human in the loop - metadata curation**
One of the most significant changes to HydroShare was implemented in January of 2023. Human in the loop, a functionality that allows CUAHSI staff to review the metadata for resources submitted for formal publication, has been successful in increasing oversight of material published in HydroShare and raising the minimum metadata standard for published resources. [The Github Issue containing implementation details can be found here.](#)
- **CUAHSI single sign on**
CUAHSI single sign on is another major improvement to the HydroShare system. This integration allows users to link their ORCID to their HydroShare account. This integration also introduced increased user account validation requirements to reduce spam users on the platform. As a result, in future years, CUAHSI will be better able to project the true number of active users on HydroShare. In addition it simplifies user federation with other institutions which greatly improves collaboration across institutions. [The github issue containing implementation details can be found here.](#)

- **File optimizations**
File upload optimizations made in 2023 decreased the time required for a user to upload a large number of files. This release increased the speed at which the My Resources page loads. [The github issue containing implementation details can be found here.](#)

Key improvements for 2024 are the migration of the Hydroshare ecosystem to the commercial cloud to enhance performance and enable continued growth as well as a more efficient way to enforce the Quota limit.

Hydrologic Information System(HIS)

CUAHSI's data management system, HIS, was used steadily by the community in 2023. Sensor data from more than 100 services is available for download. In response to advancing technologies and an increase in data volumes, modernization efforts began, in partnership with Dendra Science (NSF grant #2126386), to update the existing system and adapt it for new use cases. The goal is to maintain most of the current functionality and add components to provide real time sensor management capabilities, support for streaming data, and improved data curation. A pilot implementation that began several years ago with support from a private foundation will continue in 2024.

2023 Educational Institutions with HydroShare Users

- Primarily Undergraduate Institutions (PUI)¹
- Minority Serving Institutions (MSI)²
- Both PUI and MSI
(not mapped: University of Guam)
- Not classified as a PUI or MSI

¹Council on Undergraduate Research, 2012
²Rutgers Center for Minority Serving Institutions, 2022

Figure 1. Map showing HydroShare users by institution type.

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 and HIS data repositories, making it easy to leverage community datasets, collaborate, and disseminate research workflows with peers. Designed to provide equitable access to scientific cloud computing, this service consists of an array of pre-configured environments, each containing an assortment of preinstalled scientific libraries and models, to lower the technological barriers that impede scientific research and education. Persistent data storage enables users to save both completed and ongoing work, making it ideal for a variety of research and educational uses. CUAHSI maintains tools and libraries, such as *hsclient* and *HydroShare-on-Jupyter*, to simplify data access and synchronization with HydroShare.

CUAHSI's Community JupyterHub platform has continued to gain adoption within the water science community for both general-purpose research/education applications as well as for formal workshops and tutorial-structured events. In 2023, approximately 5,154 cloud computing instances were launched directly from HydroShare by about 507 unique users.

JupyterEdu - Support for Educational Cloud Computing

JupyterEdu is part of CUAHSI's ongoing effort to provide equitable access to cloud computing resources for water science research and education. This initiative provides event-specific cloud computing infrastructure for educational events such as workshops and classroom exercises. Using the same underlying cyberinfrastructure as the Community JupyterHub, CUAHSI is able to provide pre-configured computing environments for education-focused content that require event-specific tools, software, and custom hardware configurations. CUAHSI has provided computing 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](#)).

Please contact help@cuahsi.org to get involved or learn more about CUAHSI's web application services.

CUAHSI Domain Subsetter

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). 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 the NWM and ParFlow-CONUS domain data that would otherwise require extensive computational resources and expertise to generate. This service is currently undergoing an extensive redesign to eliminate current spatial restrictions imposed when extracting domain data as well as adding support for additional capabilities such as subsetting the NOAA Next Generation HydroFabric. The CUAHSI Domain Subsetter 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](#)).

EDUCATION AND 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.



CUAHSI Virtual University

The [CUAHSI Virtual University \(CVU\)](#) is a unique inter-university 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 2023, 73 students participated in the CVU, with each student participating in at least one module of their choosing. The modules included:

Geophysical Data Interpretation for Critical Zone Hydrology

Instructor: Qifei Niu, Boise State University

Food, Water, & Water Systems: Informatics and Resilience - Parts 1 & 2

Instructor: Benjamin Ruddell, Northern Arizona University

Water Quality and the Critical Zone

Instructor: Elizabeth Boyer, Pennsylvania State University

Applications of Climate and Remote Sensing Data in Hydrology

Instructor: Justin Huntington, University of Nevada-Reno

Snow Hydrology: Focus on Modeling

Instructor: Jessica Lundquist, University of Washington

Sustainable Human-Water Systems

Instructor: Landon Marston, Virginia Tech

Applying Geographic Information Systems for Terrain and Watershed Analysis in Hydrology

Instructor: David Tarboton, Utah State University

Ecohydrology of Groundwater Dependent Ecosystems

Instructor: Steve Loheide, University of Wisconsin - Madison

Hydrological Catchment Modeling Using Bucket-Type Models

Instructor: Jan Seibert, University of Zurich

Hydrologic Data Visualization

Instructor: Samuel Zipper, University of Kansas

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



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. Again in 2023, CUAHSI hosted a series that included a discussion portion with working sessions for attendees.

Presentations from CUAHSI's 2023 Cyberseminar Series are available to view on the [CUAHSI YouTube Channel](#). The 2023 series included:

The Food-Energy-Water Nexus: Using Hydroviz to Support Undergraduate Student Learning about Complex Socio-Hydrologic Issues

Conveners and Speakers: Cory T. Forbes, University of Texas at Arlington; Silvia Jessica Mostacedo Marasovic, University of Texas at Arlington; Emad Habib, University of Louisiana at Lafayette; Jenny Byrd, University of Louisiana at Lafayette

Integrating Citizen Science with Water Resources Research Across the Globe

All sessions in this series were convened by Dr. Ilja van Meerveld, University of Zurich, Switzerland; Dr. Thom Bogaard, TU Delft, Netherlands; Dr. Kris Stepenuck, University of Vermont, United States; Dr. Jan Seibert, University of Zurich, Switzerland

- Best practices in designing a citizen science project to achieve intended goals and recruiting a diverse audience
- Citizen science in outreach and education
- Starting simple (part I): Simple hands-on methods for water quality monitoring
- Starting simple (part II): Basic methods for water quantity monitoring
- Addressing social and ethical dilemmas in managing a citizen science project
- App, mobile phone, and sensor-based hydrological monitoring
- Lessons learned: Sustaining participation over decades and avoiding potential pitfalls
- Using citizen science data to inform hydrological models and policies

Navigating Academic Waters: Finding Your Niche

All sessions in this series were convened by the AGU Hydrology Section Student Subcommittee (H3S) Professional Development Team

- Where to Go from Here: Narrowing Your Professional Path Parts I & II
- The What, Why, and How of Building Your Personal Research Brand Parts I & II
- Developing Effective Mentoring Relationships Parts I & II

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.

2023 Workshops

Snow Measurement Field School

March 2023

Location: Heber City, UT

Lead Instructor: McKenzie Skiles, University of Utah

Reactive Transport with Sophisticated Reaction Networks: Hands-on Experience with the PFLOTRAN Reaction Sandbox

November 2023

Location: Pacific Northwest National Laboratory, Richland, WA

Instructors: Glenn Hammond, Pacific Northwest National Laboratories; Xingyuan Chen, Pacific Northwest National Laboratories

“Another successful Snow Measurement Field School in the books! Amazing to host in UT, thanks to all the awesome students for coming out to learn in the best snow on earth!”

McKenzie Skiles, University of Utah - via Twitter



ARE YOU INTERESTED IN ORGANIZING A WORKSHOP?

CUAHSI provides funds to seed workshop development and assists with organizing, advertising, and executing workshops. Proposal guidelines can be found [here](#). Contact Julia Masterman at jmasterman@cuaHSI.org for more information.

Photo Credits
Julia Masterman & Haejo Kim

National Water Center Innovators Program: Summer Institute

In 2015, the National Weather Service, in partnership with CUAHSI, established the National Water Center Innovators Program to engage the academic community in research to advance the mission of the National Water Center (NWC). The primary activity of the program is a seven-week Summer Institute which takes place at the NWC, on the University of Alabama campus, in Tuscaloosa, Alabama. This immersive training program brings together graduate students, researchers, and NWC staff to work on projects

designed to improve water-related products and decision-support services. Since the first Summer Institute in 2015, more than 180 students have participated in the program, which continues to play an important role in developing and refining the National Water Model. The Summer Institute is a collaboration between CUAHSI, the University of Alabama, and the National Water Center and is supported by the Cooperative Institute for Research to Operations in Hydrology (CIROH).

2023 Summer Institute Recap

CUAHSI held the 2023 Summer Institute at the University of Alabama in Tuscaloosa, AL from June 12 – July 27, 2023. This cohort included 23 graduate students from 15 different US-based universities. The projects, theme leaders, and teams are summarized below:

Theme: **Hydro-Data Science for NextGen**

Theme led by: Jonathan Frame, Floodbase

Project: **Data Assimilation for Improving Forecast Accuracy and Streamflow Prediction in Ungauged Basins**

Project team: Ehsan Foroumandi, University of Alabama; Jeil Oh, University of Texas at Austin; Parnian Ghaneei, University of Alabama; Sujana Timilsina, University of Texas at Austin

Project: **On Numerical Methods and Differentiable Modeling for Soil Process Representations in the Nextgen Framework in Arid Region**


Project team: Ryoko Araki, San Diego State University & University of California Santa Barbara; Soelem Aafnan Bhuiyan, George Mason University; Tadd Bindas, Penn State University; Jeremy Rapp, Michigan State University


Theme: **Urban Flooding Under Climate Change**

Theme led by: Kyle Mandli, Columbia University

Project: **Analysis of Flood Drivers Contributions to Compound Flooding Using Coupled Modeling and Machine Learning**

Project team: Javed Ali, University of Central Florida; Sadaf Mahmoudi, University of Alabama; Farnaz Yarveysi, University of Alabama; Samuel Daramola, Virginia Tech

Additional program information and the 2023 technical report can be found [here](#). 



“I had the opportunity, brought about by @nwsnwc and @CUAHSI and @UA_CIROH, to be a 2023 Summer Institute Fellow and meet all the brilliant and hardworking people who had a part at this event. It was an honor to work with my teammates, #TheFloodSorcerers.”

Sadaf Mahmoudi, PhD candidate, University of Alabama
- via Twitter

Theme: **Real-Time Urban Flooding Awareness**

Theme led by: Barbara Minsker, Southern Methodist University

Project: **Predicting Flood Inundation Susceptibility Using HAND FIM, Crowd-Sourced and Satellite Data with Machine Learning**

Project team: Azadeh Hosseinzadeh, Southern Methodist University; Elnaz Heidari, Clemson University; Monica Cardona, Florida International University; Roja Najafi, Brigham Young University

Theme: **Channel Flow Routing and Flood Inundation Modeling**

Theme led by: Sagy Cohen, University of Alabama; Ehab Meselhe, Tulane University

Project: **Quantifying the Sources of Uncertainty in OWP HAND-FIM Predictions**

Project team: Umada Abeysinghe, University of Missouri; Anne Holt, San Diego State University; Karina Larco, Brigham Young University; Meraj Sohrabi, University of Alabama

Project: **Improving the Fidelity and Performance of OWP HAND-FIM Using a Surrogate Model Technique (SMT)**

Project team: Berina Mina Kilicarslan, Stevens Institute of Technology; Qianqiu Longyang, Arizona State University; Victor Obi, Kent State University

Supporting Education in Water Science

CUAHSI is making a concerted effort to expand our services and programs for undergraduate students. A landing page on the CUAHSI website has been created with 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.



GRANTS AND 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:

- Towards Probabilistic PFAS Transport Modeling: A Case Study
William Gnesda
University of Wisconsin-Madison
- Multi-Source and Multi-Temporal Google Earth Engine App for Emergency Flood Mapping
Seyed Mohammad Ebrahim Hamidi
University of Alabama
- Quantification of Salt-Marsh Platform for RTK-GNSS Sea Level Rise Modelling
Morgan Harbin
Embry-Riddle Aeronautical University
- A Global Dataset of Monthly Irrigated and Rainfed Cropped Areas (MIRCA) for the 21st Century
Endalkachew Kebede
University of Delaware
- Creating a Public US National Groundwater Wells Dataset
Chung-Yi Lin
Virginia Tech

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:

- Enhancing Urban Flood Prediction Accuracy Through Advanced Hydroinformatics Techniques
Mohamed Abdelkader
Stevens Institute of Technology
- Reducing Biases in River Temperature Data Through Indigenous Community Observation Networks
Dylan Blaskey
University of Colorado, Boulder
- Eddy Covariance Instrumentation for Urban Green Stormwater Infrastructure Research
Michael Burns
Villanova University
- Introducing High-Resolution Machine Learning Discharge Imagery to Understand the Effects of Convective Storms in Urban Stream Responses Across the Dallas-Fort Worth Metropolitan Area
Juan Camacho-Puerto
University of Texas, Arlington
- Binational Reservoir Instrumentation and Treaty Compliance
Vianey Rueda
University of Michigan at Ann Arbor

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. Current awardees are:

- Quantifying the Timing and Magnitude of Chloride Transport Through the Vadose Zone: Implications for Chloride Transport Modeling and Future Scenario Analyses
Amanda Carneiro Marques
University of Massachusetts, Amherst
- The Impacts of Surficial Lithology and Physicochemical Processes on Formation of Natural Reactive Barrier (NBR) Along the Riverbank of Hooghly River, India
Kyungwon "Won" Kwak
Texas A&M University
- Drivers and Feedbacks of Channel Bifurcations in Anastomosing Rivers
Anna Marshall
Colorado State University
- Linking Smartphones, Sensors, and Satellites to Understand Riverine Sediment Transport on the Himalayas
Rajaram Prajapati
University of Pittsburgh
- Understanding Community Connections with Nature in California, El Salvador
Caitlyn Sutherlin
Michigan Technology University
- Quantifying the Influence of Tree Water Uptake on the Spatial Heterogeneity of Soil Organic Matter
Micah Unruh
University of Kansas

Let's Talk About Water

The [Let's Talk About Water \(LTAW\)](#) program provides funds to support events that promote water and earth science education by using film and panel discussions to engage audiences and encourage critical thinking. The new format for LTAW includes funding options for virtual events, communication workshops, and creating a short film about your research or a water issue in your community. Applications are accepted in the fall. Current awardees are:

- Denali in Transition: Snow-Vegetation Interactions in the Subarctic
Johanne Marie Odasz Albrigtsen
University of Nevada, Reno
- The Unheard Tale of Thirsty Chips
Ayobami Oluwadunsin Oladapo
Purdue University
- Increase Knowledge, Concern, and Action About Local Water and Sustainability Issues within the Upper Dupage River and Salt Creek Systems
Reed M. Perkins
North Central College
- The Rusting of Arctic Rivers
Brett A. Poulin
University of California, Davis



MEMBERSHIP

Become a Member

CUAHSI's membership includes more than 115 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.

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.

READY TO BECOME A CUAHSI MEMBER?

Learn more [online](#) or contact Maddie Scranton at mscranton@cuahsi.org.



CUAHSI is now accepting membership from Primarily Undergraduate Institutions (PUI)

Check our [website](#) for more information

Welcome to CUAHSI

A special welcome to new CUAHSI Members of 2023: Villanova University and University of North Georgia

Active Members as of December 2023

Arizona State University
 Auburn University
 Boise State University
 Brigham Young University
 California State University at Chico
 Carnegie Mellon University
 Clemson University
 Colorado School of Mines
 Colorado State University
 Dartmouth College
 Drexel University
 Duke University
 Georgia State University
 Indiana University
 Iowa State University
 Kent State University
 Michigan State University
 Michigan Technological 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
 Stanford University
 State University of New York - Buffalo
 State University of New York - ESF
 Syracuse University
 Temple University
 University of Alabama
 University of Arizona
 University of Arkansas
 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 Memphis
 University of Michigan
 University of Minnesota
 University of Missouri
 University of Nebraska
 University of Nevada - Reno
 University of New Hampshire
 University of North Carolina System
 University of North Georgia
 University of Notre Dame
 University of Pittsburgh
 University of South Florida
 University of Texas - Arlington
 University of Texas - Austin
 University of Utah
 University of Vermont
 University of Virginia
 University of Wisconsin - Madison
 University of Wyoming
 Utah State University
 Villanova University
 Virginia Tech
 West Virginia University

International Affiliate Members

Cadi Ayyad University
 Centre for Ecology and Hydrology
 CIMR Research Foundation
 Commonwealth Scientific and Industrial Research Organisation (CSIRO), Australia
 Dalhousie University
 Indian Institute of Technology Kharagpur
 National Environmental Engineering Institute

McMaster University
 Pacific Geographical Institute
 Queensland University of Technology
 Suez Canal University
 Swedish Hydrological Council (SHR)
 UNESCO - IHE Institute for Water Education
 Universidad de El Salvador - Facultad Multidisciplinaria Paracentral
 Universidad de las Américas Puebla
 University of British Columbia
 University of Calgary

University of Copenhagen
 University of Ljubljana
 University of New Brunswick
 University of Padova
 University of Quebec
 University of Queensland
 University of Saskatchewan
 University of Sidi Mohamed ben Abdellah
 University of Trento, Italy
 University of Waterloo
 University of Zurich
 Yonsei University

Non-Profit Affiliate Members

Albion College
 Cleveland State University

Desert Research Institute
 Eastern Illinois University
 Open Geospatial Consortium
 Plymouth State University
 RTI International

Smithsonian Environmental Research Center
 Stockton University
 Stroud Water Research Center

Preparations have begun for the bi-annual, CUAHSI and American Geophysical Union (AGU) co-sponsored event, Water Science Conference (WaterSciCon).

This event, formerly the Frontiers in Hydrology Meeting, will take place June 24-27, 2024 in St. Paul, MN.

The theme for the meeting is Catalyzing Collaboration.

The window to submit abstracts for sessions, workshops and town halls was open between September 1 - October 11.

Registration for this event will open in March of 2024.



**SAVE
THE DATE!**

**24th to 27th
June 2024
St. Paul, MN**

CUAHSI FINANCIAL OVERVIEW

A grant from the National Science Foundation (NSF) provided core funding for CUAHSI services in 2023 and made up more than half of our funding portfolio. The remaining grant funding came from reimbursement of work performed on seven other NSF awards and fourteen federal subawards. CUAHSI's funding portfolio has increased in complexity over the years and requires careful management and operations. A significant effort began in 2023 to hire new financial staff and create or augment processes for managing financial data, supporting our required audits, and timely budget reporting.

CUAHSI collects new member initiation fees and annual membership dues to provide critically needed unrestricted

funds. These funds have been used in the past to pay for expenses that cannot be covered by federal grants (such as unallowed costs or the effort to maintain membership rolls) and to boost strategic projects via cost-sharing. The remaining balance of membership dues and initiation fees provides critical cash to cover expenses that are reimbursed later by funders, which is essential given CUAHSI's current work portfolio is expense-reimbursement grants. As we prepare the organization for a sustainable future, CUAHSI's Executive Director and Board will be examining our financial picture and pursuing alternative sources of funding to better serve our community-oriented mission.

GOVERNANCE

2023 CUAHSI Board of Directors

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.

HOORI AJAMI
University of California-Riverside

ALEJANDRO FLORES
Boise State University

JP GANNON
Virginia Tech

DREW GUSWA
Smith College

ANNE JEFFERSON
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

CRYSTAL NG
University of Minnesota

ANNE NOLIN
University of Nevada - Reno

ASA RENNERMALM
Rutgers University

JAY ZARNETSKY
2023 Chair
Michigan State University

MARGARET ZIMMER
University of California -
Santa Cruz

2023 CUAHSI Officers

JORDAN READ
President
CUAHSI

ADAM WARD
Secretary
Oregon State University

TROY GILMORE
Treasurer
University of Nebraska - Lincoln

2023 CUAHSI Staff

JORDAN READ
Executive Director

MAUREEN AKO
Controller

SCOTT BLACK
Senior Software Specialist

ABNER BOGAN
Environmental Data Scientist

ANTHONY CASTRONOVA
Senior Research Hydrologist

EMILY CLARK
Project Manager

CLARA COGSWELL
Community Support Hydrologist

DEVIN COWAN
Research Programmer

LAURA DAVIS
Accountant

IRENE GAROUSI-NEJAD
Research Scientist

JULIA MASTERMAN
Scientific Education
& Outreach Specialist

DEANNA MCCAY
Deputy Director

LISA MUCCIACITO
Community Outreach Specialist

LINDSAY PLATT
Operations Data Science

KRISTIN RAUB
Resilience Research Scientist

MADDIE SCRANTON
Executive Assistant

MARTIN SEUL
Technical Director

VERONICA SOSA GONZALEZ
Education Program Manager

CONNECT WITH CUAHSI
for the latest news and opportunities



Consortium of Universities for the Advancement of Hydrologic Science, Inc.
Arlington, MA 02476
www.cuahsi.org

Photos provided by: Javed Ali, Dylan Blaskey (Cover Photo), Sagy Cohen, Anne Holt, Haejo Kim, Deanna McCay, Anna Marshall, Julia Masterman, Lisa Mucciacito, Juan Camacho Puerta, Veronica Sosa Gonzalez, Micah Unruh