



2020 ANNUAL MEMBERSHIP REPORT



CUAHSI

universities allied for water research

This material is based on work supported by the National Science Foundation (NSF) under Grant Numbers 1338606 and 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.



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- Letter from the President**
- About CUAHSI.....**
- CUAHSI in 2020.....**
- CUAHSI Helps with the Entire Data Lifecycle**
- CUAHSI Data & Computing Services.....**
- Education & Training**
- Funding Opportunities**
- Projects & Partnerships**
- Community Outreach & Engagement.....**
- Membership**
- Financial Overview**
- Governance**
- Staff**

LETTER FROM THE PRESIDENT

Dear Friends,

Well, this is not how any of us pictured 2020, right? Instead of seeing our annual report filled with photos of students enjoying our workshops and images of the 2020 Biennial, we have lots of pictures of virtual meeting screen captures, like the one to the left of our staff meeting on October 29, 2020. Nevertheless, I hope you will take a few minutes to look through this report, where we've highlighted some of CUAHSI's accomplishments in 2020.

Last year in this space, I mentioned CUAHSI's new Diversity, Equity, and Inclusion (DEI) Strategic [plan](#). In support of that plan, which was finalized in February, an ad hoc committee on CUAHSI Membership was formed in early 2020 to review CUAHSI's membership structure to determine if current practices are supportive of CUAHSI's mission and the DEI Strategic Plan. The committee was led by Jay Zarnetske, Michigan State University and committee members included: Andrew Guswa, Smith College; Gigi Richard, Fort Lewis College; Susa Stonedahl, St. Ambrose University, and Beverley Wemple, University of Vermont. This group deserves our gratitude for their service in support of CUAHSI's mission.

In short, among other things the committee recommended that full CUAHSI membership be extended to include primarily undergraduate institutions. You can read the committee's full report and see the proposed bylaws changes [here](#). CUAHSI Member Representatives will be voting on the proposed bylaws changes in early 2021. I am gratified that the CUAHSI Board of Directors recognizes the value of CUAHSI services to all institutions and acknowledges that increasing DEI in hydrologic sciences begins with early engagement in the educational process.

CUAHSI [staff](#) have been working from home since mid-March. Despite this, we have been able to add some highly capable

individuals, including Stanley Coliman, Accountant; Gabby Garcia, Water Resources Specialist; Dr. Deanna McCay, Deputy Director; Dan Palmer, DevOps Engineer ; and Madeline Scranton, Administrative Assistant. We look forward to Soumya Purohit, who was a CUAHSI intern this past summer and is receiving an M.S. in Computer Science from Univ. of Missouri, joining CUAHSI full time in January 2021. Staff have been creative and effective in maintaining CUAHSI services during this time, through virtual training courses, participation in virtual data help desks at the EGU, Ecological Society of America, GSA, and AGU conferences, and numerous virtual presentations, including almost a dozen presentations in November and December alone.

CUAHSI is pleased to have been named the Coordinating Hub for the Critical Zone Collaborative Network (CZCN) in September. This five-year cooperative agreement with NSF will profoundly increase CUAHSI's reach and create exciting new opportunities. Our partners in the HUB are the Lamont-Doherty Earth Observatory at Columbia University; Pennsylvania State University, University of North Carolina's Renaissance Computing Center, the U.S. Geological Survey John Wesley Powell Center, and Utah State University. Please look for new ways to engage with us through the Hub's activities in 2021.

We are striving to create an organization that is both serving and helping lead the water-science community. Let us hear from you on how we are doing. All the best for a healthy and rewarding 2021.



Jerad Bales
President and Executive Director



ABOUT CUAHSI

The Consortium of Universities for the Advancement of Hydrologic Science, Inc. (CUAHSI) is a non-profit organization that supports the advancement of interdisciplinary water science. CUAHSI fosters a diverse and dynamic water science community enabled by shared scientific infrastructure that facilitates the development of 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, citizen scientists, outreach coordinators, environmental

and watershed organizations, corporate entities, and more. Although CUAHSI is a membership organization and attempts to be responsive to member needs, all who are involved in any aspect of water science, water-resources management or water-resources protection and enhancement are part of the CUAHSI community. CUAHSI's programs and services are available to everyone to use - 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.

in 2020

1,548 DATA SETS ADDED TO HYDROSHARE

200 DATASETS FORMALLY PUBLISHED WITH A DIGITAL OBJECT IDENTIFIER

FOUR CONFERENCES ATTENDED BY STAFF (AMS, ESA, GSA, AGU)

13,482 VIEWS ON YOUTUBE

300,000+ HOURS ON ZOOM

ONE VIRTUAL WATER-THEMED TRIVIA NIGHT

4 NEW STAFF MEMBERS JOINED CUAHSI

CUAHSI's mission is to advance water science by strengthening interdisciplinary collaboration in the water science community, to empower the community by providing critical infrastructure, and to promote education in the water sciences at all levels.



NEW & NOTEWORTHY IN 2020

Response to COVID

CUAHSI began to feel the effects of the Coronavirus (COVID-19) pandemic in February 2020, as the Boston area was one of the first locations in the U.S. affected. CUAHSI staff have been working from home (and will continue to do so) since March 23. Numerous events have been cancelled or postponed including the 2020 Summer Institute, 2020 Biennial Colloquium on Water Science, and several training courses.

The COVID-19 pandemic caused a sudden shift to online teaching, increasing the demand for quality online educational resources. There is a large variation in access to and preparation for online delivery among institutions and individual faculty. In response to this shift, CUAHSI and our collaborators, led by Dr. Adam Ward (Indiana University), are delivering and curating quality online content, resources for improving online delivery, and building a community of practice for sharing the burden of maintaining quality teaching during the crisis through a RAPID Award. New products include a [web page](#) linking to online educational resources, a [Hydrology Guest Lecture Database](#), a [HydroShare collection](#) on Educational Resources for Hydrology, and a [virtual forum](#) on transition to the online classroom. We encourage you to share your educational materials through [this platform](#) so that they can be made available to community members.

Critical Zone (CZ) Collaborative Network Coordinating Hub

In 2020 CUAHSI was selected to be the Coordinating Hub for the [Critical Zone \(CZ\) Collaborative Network](#). The 5-year cooperative agreement for the operation of the Hub will include four primary tasks.

1. Enhance and integrate existing data services operated by CUAHSI and EarthChem to support the CZ community.
2. Support discovery through community synthesis activities and via access to community data & modeling cyberinfrastructure.
3. Broaden 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.

CUAHSI's CZ Hub activities will substantially enhance existing CUAHSI water data services, broaden the CUAHSI community, and build on CUAHSI's strengths of education and community support. We invite your participation as we move forward. Learn more about this effort and critical zone science in the article written in Eos [Critical Zone Science Comes of Age](#) (Waldron, 2020).

CUAHSI Diversity, Equity, and Inclusion Strategic Plan

In February of 2020, CUAHSI completed a [Diversity, Equity, and Inclusion \(DEI\) Strategic plan](#). The goals of the CUAHSI DEI Strategic Plan are to (1) increase the diversity of CUAHSI members and member representatives, leadership in CUAHSI activities, and participants in CUAHSI activities; (2) increase equity in all CUAHSI programs and activities; and (3) increase inclusion in all CUAHSI programs and activities. These are challenging goals and we will need the support of the entire community in achieving these goals. Our implementation plan is now under development. We welcome your thoughts on this strategic plan and your ideas for achieving our goals. Please send your comments to DEI@cuahsi.org

CUAHSI Stands with the Black Lives Matter Movement

As staff and the Board of Directors of the Consortium of Universities for the Advancement of Hydrologic Science, Inc. (CUAHSI), we affirm that Black lives matter. We acknowledge that current and aspiring Black hydrologists and geoscientists face barriers of inequity and exclusion. As an organization committed to ensuring access to safe, clean, and sustainable water for all living communities, we recognize that society's management of water and other natural resources has a legacy of structural racism.

CUAHSI, both as an organization and as individuals, is committed to diversity, equity, and inclusion (DEI) in our organization and in our society. CUAHSI can and will do better, and is working to better include under-represented members of water-science communities.

Strategic Outreach with the Science Gateways Community Institute (SGCI)

CUAHSI is partnering with the Science Gateways Community Institute (SGCI) to strengthen our outreach and communications strategies. SGCI is funded by NSF to provide services, resources, community support, and education for science gateways. The outcomes of this project are to further define CUAHSI's current and potential audience, improve brand communication, and implement effective measures of impact. These efforts support CUAHSI's 2018 - 2023 strategic goal to increase visibility, reach, and reputation within the diverse water community by ensuring that our programs and services align with community needs and are effectively communicated to the full extent of our potential audience base.

Accomplishments in Data Services

HydroShare will now be included on Scientific Data and Springer Nature Repository Lists. Researchers who submit manuscripts to these journals may use HydroShare to publish the datasets from their research. This is a major milestone for CUAHSI and the HydroShare team in becoming an authoritative data publishing platform for the scientific community.

A new version of the CUAHSI JupyterHub was designed, implemented, and deployed on the Google Cloud Platform. This replaces the prior version of JupyterHub that was hosted at RENCi (decommissioned on June 30th, 2020) and uses more advanced computing hardware and middleware to support user engagement. Two instances are currently hosted by CUAHSI. CUAHSI's Community JupyterHub is configured to support up to 100 concurrent users to replicate support research and reproducible science. The Educational JupyterHub has already supported 90 concurrent users in a virtual workshop setting, and is intended for classroom and workshop use. We look forward to the educational and research applications that these capabilities will enable into the future.

CUAHSI SUPPORTS THE ENTIRE DATA LIFECYCLE



CUAHSI can help support 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 & 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.

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 14](#)).

Documentation & Processing:

- Describe data sets using CUAHSI's standard metadata templates in [HydroShare](#)
- Receive metadata training and guidance from CUAHSI Staff.

Analysis & Modeling:

- Collaborate with partners by publicly or privately sharing data and analyses in [HydroShare](#).
- Use Jupyter Notebooks or MATLAB to analyze data stored with CUAHSI in [HydroShare](#).

Publication:

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

Maintenance & Storage:

- Increase project sustainability by archiving your data and models with [HydroShare](#).
- Maintain data sets with long-term infrastructure care provided by CUAHSI.

Sharing:

- Share your data publicly so that it is searchable through applications such as Google datasets search and others.
- Promote and disseminate your work through activities like [cyberseminars](#) (See [Page 11](#)), [scientific conferences](#), and [training workshops](#) (See [Page 12](#)).
- Develop education and outreach activities with CUAHSI resources to teach your students and community about the impacts of your research.

**INTERESTED
IN LEARNING
MORE?**

Contact CUAHSI staff at help@cuahsi.org to further discuss how CUAHSI's Data and Compute Services can meet your needs.

CUAHSI Data Services

Hydrologic Information System

CUAHSI's Hydrologic Information System (HIS) provides access to nearly 100 data sources, including over 3.5 million unique time series, from federal agencies, university researchers, and citizen science groups through a single map interface, all in the same format. Search for, preview, and download time-series data like stream gauge measurements, meteorological station measurements, repeated "grab" samples, and soil moisture measurements at data.cuahsi.org.

Four new U.S.-based data services were published in the CUAHSI HIS this year: hydrologic monitoring data for headwaters burned in the 2018 Holy Fire in Leach Canyon, California; soil moisture and weather data from the Roaring Fork Observation Network (iRON), located in the Rocky Mountains of Colorado; data from the Florida Coastal Everglades (FCE) Long Term Ecological Research (LTER) Program; and data from Florida State University's hydrology well. In addition, two international datasets were published: one from Lake Stechlin in Germany and one containing ground water data collected at the Mekong River in Thailand. These data services are discoverable with nearly 100 others at data.cuahsi.org.

HydroShare

HydroShare is a data repository and collaboration environment for sharing and publishing data and models in a variety of flexible formats, and makes data available in a citable, shareable and discoverable manner.

One key accomplishment over this year was the selection of Hydroshare as the primary data repository for the Critical Zone Observatories (CZO). Approximately 430 resources, containing over 2000 files, totaling more than 40GB, were migrated into Hydroshare. To accommodate easy collaboration among research groups and the nine individual CZO sites, Hydroshare was extended to represent multiple research groups in a common Community.

HydroShare's discovery functionality for finding data was enhanced to provide a better user experience and the integration with external search engines was improved to enhance discovery across all major search engines, particularly the google dataset search. In addition many improvements to the core system were developed to enhance reliability and ease of use.

Get started with HydroShare
at www.hydroshare.org

CUAHSI's Compute Services

CUAHSI develops, maintains, and hosts cloud computing software for the water science community that interoperates with HIS and HydroShare. Our goal is to provide tools for analysis, publication, and replication of scientific models and workflows so that they can be used for research, education, and other water-resources applications.

Community Cloud Computing with CUAHSI JupyterHub

[CUAHSI JupyterHub](#) is a cloud computing service that enables users to execute scientific code and explore, modify, and interact with data inside a remote execution environment using Python and/or R programming languages. JupyterHub is integrated with the CUAHSI HydroShare and Hydrologic Information System data repositories, making it easy to leverage community datasets, collaborate, and disseminate research workflows.

JupyterEdu - Support for Educational Cloud Computing

CUAHSI created JupyterEdu to provide cloud computing resources for educational applications. The JupyterEdu computational cluster provides customizable support for educational activities that use Jupyter notebooks for up to 100 participants, including providing an isolated deployment on the Google Cloud, specialized cloud configuration, software installation, and more.

Please contact us at help@cuahsi.org to learn more about how we can provide a JupyterEdu environment to help support your classroom and workshop activities.

MATLAB Online

CUAHSI has partnered with MathWorks to offer a community computational modeling platform using MATLAB software. MATLAB and more than 100 add-ons are used by 5,000 universities worldwide and across industries for a range of applications from climate analysis to medical device development. Together, CUAHSI and MathWorks aim to support practical quantitative thinking and exploration in water science research and education.

[CUAHSI MATLAB Online](#) is connected to 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.

“CUAHSI's support helped me to a collaboration that will result on teaching a new class for my students: Environmental Instrumentation.”

CUAHSI Funding Recipient



EDUCATION & TRAINING

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

Due to circumstances surrounding COVID-19, CUAHSI adapted educational activities to better support water science educators and learners in a virtual setting. However some activities such as the 2020 Summer Institute and the 2020 Biennial Conference have been postponed until 2021.

CUAHSI Virtual University

The [CUAHSI Virtual University \(CVU\)](#) is a unique inter-university online education experience that enables students to participate in specialized online hydrology course modules taught by leading faculty at universities across the country. The CVU:

- Enhances the depth and breadth of graduate course offerings at universities across the nation;
- Enables graduate students to experience new research and courses not offered at their home university;
- Increases the rate of uptake of new research; and
- Facilitates networking among the hydrologic community.

Thirteen universities and 165 students have participated in the CVU since its founding. The unique format enables students to receive course credit for participating in the CVU through their home university.

The next Virtual University will be held in Fall 2021.

Fall 2020 CUAHSI Virtual University Modules and Instructors

Advances in Drone-based Remote Sensing for Hydrologic Applications
Scott Tyler, University of Nevada – Reno

Digital Water: Emerging Data Science and Research Software
Christina Bandaragoda, University of Washington

Ecohydrology of Groundwater Dependent Ecosystems
Steven Loheide, University of Wisconsin Madison

Geographic Information Systems in Water Resources
David Tarboton, Utah State University

Introduction to Open Channel Modeling
Ehab Meselhe, Tulane University

Microwave Radar Remote Sensing: Theory and Applications
Hans-Peter Marshall, Boise State University

Modeling Watershed Dynamics Using Landlab
Erkan Istanbuluoglu, University of Washington

Stream Solute Tracers: What, Why, & How?
Adam Ward, Indiana University

Urban and Stormwater Hydrology
Anne Jefferson, Kent State University

INTERESTED IN TEACHING A MODULE FOR THE CVU?

Visit cuahsi.org/education/cuahsi-virtual-university/ for information and deadlines to apply

Cyberseminars

CUAHSI Cyberseminars feature presentations from experts on new or timely topics of interest to the water science community. The program enables researchers to easily share their work and contribute to an archive of over 200 lectures available to the public.

Presentations from CUAHSI's 2020 Cyberseminar Series are available to view on the [CUAHSI YouTube Channel](#) now:

2020 Winter Cyberseminar Series: Growing the Critical Zone Research Network

Series Hosts:
Kamini Singha, Colorado School of Mines
Pamela Sullivan, Oregon State University
Nicole Gasparini, Tulane University
Li Li, Penn State University
Nicole West, Central Michigan University

CUAHSI-AGU H3S 2020 Cyberseminar Series: Navigating Academic Waters: Essential Skills to Thrive as a Student and Early Career Scientist

Series Hosts:
AGU Hydrology Section Student Subcommittee (H3S)
Professional Development Team

Titles:

- Managing Manuscripts: Writing Manuscript Reviews and Responding to Reviewers
- Discussing Data: Effectively Using and Ethically Sharing Open Data
- Conference Crash Course: A Guide to Communicating Your Way to Success at Scientific Meetings
- You Do Belong: Let's Talk About Impostor Syndrome
- Improving Professional Relationships for a Better, Healthier Academic Experience

**PARTICIPATE
IN OUR
UPCOMING 2021
CYBERSEMINARS**

by registering on our website at cuahsi.org/education/cyberseminars

Virtual Town Hall: NSF Hydrologic Sciences Program Managers

Speakers:
Laura Lautz, **Ingrid Padilla**, **Justin Lawrence**
(Program Managers for Hydrologic Sciences at NSF)

2020 Spring Cyberseminar Series Virtual Forum: Transitioning to the Online Classroom

Series Hosts:
Steve Loheide, University of Wisconsin - Madison
Becca Barnes, Colorado College
Adam Ward, Indiana University
Anne Jefferson, Kent State University
Emad Habib, University of Louisiana - Lafayette
Matthew Ross, Colorado State

NAGT Services for the Water-Education Community

Speakers:
Mitchell Bender-Awalt, Science Education Resource Center (SERC), Carleton College
Anne Egger, NAGT Executive Director
Tom Meixner, University of Arizona

National Water Center Innovators Program: Summer Institute

The [National Water Center Innovators Program Summer Institute](#) is a seven-week experiential learning program that brings graduate students together with academic researchers, other professionals, and National Water Center staff. Since the first Summer Institute in 2015, over 150 students have participated in the program, which continues to play an important role in advancing the National Water Model.

The 2020 Summer Institute was postponed due to the COVID-19 pandemic. However, CUAHSI and the National Water Center look forward to welcoming a new cohort for the summer of 2021.

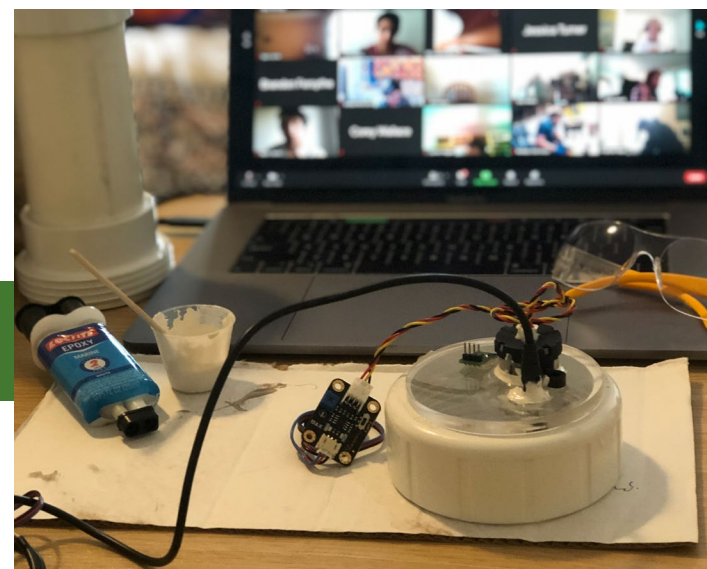
Resources for Online Education

In response to the rapid transition to online learning as a result of the COVID-19 pandemic, CUAHSI announced resources to support instructors transitioning to online learning.

Hydrology Guest Lecture Database

CUAHSI's Guest Lecturer Database helps connect scientists and lecturers with virtual classrooms across the country. Instructors can use the database at cuahsi.org/education/hydrology-guest-lectures/ to connect with colleagues who have volunteered to give lectures on a subject of their expertise, and invite them to give a virtual guest lecture in their classroom.

Support water science education and educators by volunteering to give a virtual lecture [here](#).



Training Workshops

CUAHSI facilitates hands-on training 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's training program creates opportunities for community collaboration and relationship building between participants and instructors from different institutions.

In 2020, CUAHSI launched more virtual training opportunities to supplement in-person training courses. Six training workshops were postponed or cancelled due to COVID-19, but we look forward to hosting them in 2021 or when circumstances allow for in person workshops.

2020 Training Activities

Snow Measurement Field School

January 2020

Lead Instructor: **Carrie Vuyovich**, NASA

Open Hydrological Sensor Technologies Hand - Made Stream Sensor Networks Virtual Workshop

August 2020

Lead Instructor: **Chet Udell**, Openly Published Environmental Sensing (OPENs) Lab at Oregon State University

The Community WRF-Hydro Modeling System Abridged Virtual Training Workshop

November 2020

Lead Instructor: **David Gochis**, NCAR

Open Source Electronic Hardware for Water Research and Real-Time, Online Water Monitoring Virtual Workshop

November 2020

Lead Instructor: **Scott Ensign**, Stroud Water Research Center

Visit cuahsi.org/education/training/ to learn more about CUAHSI's training offers for 2021!



ARE YOU INTERESTED IN ORGANIZING A TRAINING?

CUAHSI provides funds to seed workshop development and assists with organizing, advertising, and executing workshops. New in 2020, CUAHSI is now accepting proposals for virtual training workshops alongside proposals for in person workshops. Proposal guidelines can be found [here](#). Contact Julia Masterman at jmasterman@cuahsi.org for more information.

FUNDING OPPORTUNITIES

CUAHSI supports activities to extend research and develop new products. All programs accept proposals once per year, so be sure to sign up for CUAHSI's newsletter to stay up-to-date on deadlines as they approach or visit cuahsi.org/funding-opportunities to learn more.



IF YOU ARE A PREVIOUS PATHFINDER,
reach out and let us know how you're doing – we would love to hear how your Pathfinder experience has impacted your career!

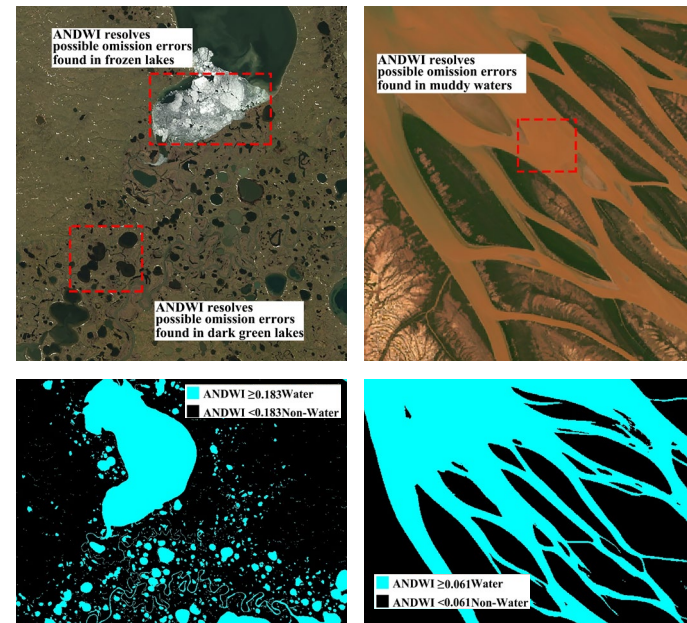
Hydroinformatics Innovation Fellowship

CUAHSI's [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. Scientists at U.S. universities and colleges are eligible for this grant. Preference is given to early career faculty, postdocs, and graduate students.

Programmatic and Gui-driven Retrieval and Visualization Of Streamflow for All Conus Rivers
Mike Johnson, University of California Santa Barbara

A Robust Google Earth Engine-based App to Map Surface Water
Arash Modaresi Rad, Boise State University

A Global Water Quality Dataset Suitable for Water Quality Prediction Using Machine Learning
Holger Virro, Yale University



Instrumentation Discovery Travel Grant

CUAHSI's [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.

Examining The Optical Properties Of Dissolved Organic Matter To Investigate Coupling Between Carbon Quality, Nutrient Availability, And Algal Community Composition
Lienne Sethna, Indiana University Bloomington

Continuous Cold Content Monitoring
Anne Heggli, University of Nevada Reno

Nova Scotia Community College UAS Hyperspectral Sensor Learning Experience
Elizabeth M Prior, Virginia Tech

Utilizing Near Surface Geophysics to Link Critical Zone Subsurface Structure to Water Storage Dynamics
Amanda Donaldson, University of California Santa Cruz

“The pathfinder fellowship was an incredible opportunity for which I am very grateful for. It enabled me to work and learn in an environment that I would not have been able to experience otherwise. This cultivated a deeper understanding of fundamental processes relevant to my research across a diverse range of environmental and cultural settings. The possibility of an extended stay in this location facilitated collaboration and friendships with fellow scientists that had a direct and positive impact on my research and career.”

CUAHSI Funding Recipient

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.

Developing Large-scale 3d Representation of River Networks for Accurate Hydrologic-hydrodynamic Simulations
Sayan Dey, Purdue University

Relating Soil Structure and Hydraulic Properties to Chemical Distributions of Midwestern Mollisols Using Hyperspectral Scanning Technique
Matthew Sena, University of Kansas

Hydrologic Influences on Plant Function Across Climates
Caio Mattos, Rutgers State University of New Jersey

Integrating Root Plasticity into Ecohydrologic Simulation to Predict Seasonal Riverine Flooding Risk Following Eastern Hemlock Loss
Kanishka Singh, Cornell University

Introduce Nitrogen Cycle to the National Water Model
Dongxiao Yin, Louisiana State University

The Impact of Roads on Hillslope Erosion Via Rilling and Gullying in Post-wildfire Landscapes
Claire Vavrus, Colorado School of Mines

Quantifying Impacts of Subsurface Drainage Expansion on Regional Hydrologic Response Using Nasa Land Information System
Eunsang Cho, University of New Hampshire

Turbulent Mixing Below Antarctic Ice Shelves
Andrew Friedrichs, University of California - Davis

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. Although grants were not awarded in 2019, the [LTAW Challenge](#) program underwent a transformation for the Fall 2020 proposal deadline. The new format includes funding options for virtual events, communication workshops, and creating a short film about your research or a water issue in your community. Visit the [CUAHSI website](#) to learn more.

Voices of the Future Award

New to CUAHSI in 2020, the [Voices of the Future Award](#) highlights the voices of undergraduate and graduate students in the water sciences and provides a platform to share their visions for the future of the water science community.

This year's prompt asked students to compose a fact-based opinion paper that addresses one of the following: new science needed to address local to global water issues, processes for moving from water science to impactful water policy, diversity, equity, inclusivity, and/or environmental justice issues and solutions in water science and policy, or any related topic that provides a vision for the future of water science and/or the water resources community.

“The Pathfinder Fellowship Program opened so many doors for me. I would not be where I am today without the support of CUAHSI.”

CUAHSI Funding Recipient

PROJECTS & PARTNERSHIPS

Enabling Water Science and Supporting Scientists

CUAHSI collaborates with and provides expertise to partner organizations through letters of support, data management tools and services, community outreach, and much more. With a focus on interdisciplinary research and collaboration among universities and organizations, CUAHSI helps expand existing community projects and works with the community to support new endeavors. Additional information about the CUAHSI projects listed below, including points of contact, is available at cuahsi.org/projects.

Capacity Building Events and Trainings

CyberTraining: Waterhackweek

The goal of this project is to ensure the successful use of community cyberinfrastructure to support data publication, modeling, collaboration, and open data standards. The project uses CUAHSI Compute (i.e. JupyterHub, MATLAB Online, and Subsetter) and CUAHSI Data repositories (i.e. HIS and HydroShare). It begins with a virtual learning webinar series and culminates in a one-week hands-on capstone event, WaterHackWeek, that focuses on real-world research projects. In 2020, WaterHackWeek was held completely virtually and heavily relied upon CUAHSI's Compute platforms to support instructional material and five research projects. Projects ranged from SAARS-CoV-2 RNA tracing in wastewater to modeling snow-groundwater interactions. In total, 31 faculty, scientists, and students participated in team projects, which can all be found [here](#). A comprehensive listing of lectures and learning resources presented during the hackweek event can be found in HydroShare [here](#).

Flood Apex Program Post-Doc

CUAHSI partners with the Department of Homeland Security [Flood Apex Program](#) to support a postdoctoral student to conduct research that advances flood science. The post-doc also supports the CUAHSI Summer Institute and DHS Flood Apex activities.

International Research Experience for Students - El Salvador

Michigan Technological University (MTU) and CUAHSI received support from the National Science Foundation to host a graduate student summer research experience on agricultural community adaptations to extreme hydrometeorological events in El Salvador.

Data Services and Support Focused Partnerships

CyberWater

The CyberWater project aims to build an open data, open modeling framework software that will expedite the process for fundamental knowledge discoveries. In 2020, CUAHSI organized a focus-group event consisting of 11 students from the University of Virginia, Utah State University, and Washington State University to solicit feedback on the technologies used for model coupling and the modeling approach. This feedback is being used to inform project design decisions.

CSDMS@HydroShare

The CSDMS@HydroShare project with The Community Surface Dynamics Modeling System [CSDMS](#), led by Dr. Greg Tuckers (University of Colorado, Boulder), will foster open, accessible, and reproducible model-data integration for the sciences that deal with water, soil, and sediment at and near Earth's surface by combining the strengths of CUAHSI HydroShare and the CSDMS Workbench simulation modeling tools.

Data Science and Analytics for Water (DSAW)

This project applies data science methods in the hydrology and water resources domain through development of tools that enable extracting meaningful information from a deluge of data while lowering barriers for entry and use. This project uses CUAHSI-supported compute platforms to collaborate, perform visualization and analysis, promote consistent data workflows, and support the reproducibility of science.

Global to Local Analysis of System Sustainability (GLASSNET)

CUAHSI is a collaborator on the NSF-funded AccelNet project [GLASSNET](#), which seeks to address data analysis barriers by linking sustainability science networks and delivering transferable best practices for model and data integration across spatial scales, disciplines, and cultures.

“As a graduate student I had many ideas but was always very funding limited. Even very modest amounts of research money that came my way went far towards the publication of research papers and datasets.”

CUAHSI Funding Recipient

HydroFrame

With the goal of making national hydrologic simulations more accessible, the [HydroFrame](#) team is building tools to rapidly subset, run, and share hydrologic models of any watershed in the U.S. using cloud computing alongside interactive models and lesson plans.

Internet of Water (IoW)

CUAHSI is partnering with the [Internet of Water](#) (IoW) and the [Western States Water Council](#) (WSWC) to advance the mission of the IoW to build a dynamic and voluntary network of communities and institutions to facilitate the opening, sharing, and integration of water data and information. Specifically, CUAHSI is modernizing the CUAHSI [HIS](#) to be more interoperable with a greater variety of data providers and will conduct training workshops at a variety of venues across the U.S.

Urban Flooding Open Knowledge Network (UFOKN)

This project seeks to integrate multiple interconnected systems and merge practices in hydrologic and hydraulic engineering; systems analysis, optimization and control; machine learning, data and computer science; epidemiology; socioeconomics; transportation; and electrical engineering to develop an Urban Flood Open Knowledge Network (UF-OKN). The team recently received support for Phase 2 of the project to implement the OKN for a number of pilot applications in partnership with local, state, and federal organizations.



WELCOME TO CUAHSI

A special welcome to University of California -- Santa Cruz, a new CUAHSI member in 2020.

University Members

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Auburn University
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Brigham Young University
Carnegie Mellon University
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CIMA Research Foundation
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Dalhousie University
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Stroud Water Research Center

MEMBERSHIP

Become a Member

CUAHSI's membership includes over 150 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. Both undergraduate and graduate students, early-career faculty members, tenured academic professionals, and other water professionals all find a place within CUAHSI's diverse community.

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 CUAHSI member organization is eligible for the member discount.

READY TO BECOME A CUAHSI MEMBER?

Learn more online at www.cuahsi.org/about/membership or contact Ainsley Brown at abrown@cuahsi.org.

“CUAHSI has provided me several opportunities to explore new ideas, systems, and tools, that I continue to draw on as my career develops.”

CUAHSI Funding Recipient

07.18
to
07.21
—
2021

SAVE THE [TENTATIVE] DATE:

2021 CUAHSI BIENNIAL SCIENCE COLLOQUIUM

July 18th to July 21st, 2021

Granlibakken Tahoe, Tahoe City, CA

Converging Ideas and Expanding Approaches
in the Hydrologic Sciences

Visit the [CUAHSI website](#) for the most up to date information regarding the 2021 Biennial Science Colloquium.

FINANCIAL OVERVIEW

Key Support

The National Science Foundation provides the core funding for CUAHSI services through a cooperative agreement. During the current project year for the cooperative agreement with NSF, a total of \$2.7M was awarded and it is estimated that \$2.7 M will be spent by December 31, 2020. Other active NSF Grants in 2020 include but are not limited to: EAR-2012893: Networking Hub: Enabling, Supporting, and Communicating Critical Zone Research, OAC-1835818: Framework: Software: NSCI: Computational and data innovation implementing a

national community hydrologic modeling framework for scientific discovery, and EAR-2028793: Rapid: Increased access to infrastructure for distance education in hydrologic science. CUAHSI received additional funding from other sources, which include the National Weather Service for the Summer Institute, the Department of Homeland Security for CUAHSI's Postdoctoral Researcher, NASA for the Snow Measurement Field School, and the Moore Foundation for "Implementing the Internet of Water."

Membership Funds

CUAHSI collects initiation fees and annual dues from members to provide critically needed unrestricted funds. These funds are used for costs that cannot be charged to federal grants, such as the cost of elections, some CUAHSI community events, and

maintaining membership rolls. They provide a buffer for cash flow and in case federal funding is interrupted. This buffer has steadily grown since the initiation of annual dues for U.S.-based members in 2012; 2020 expenses are estimated to be \$23,000.

GOVERNANCE

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

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Photos provided by: Julia Masterman (CUAHSI), Anne Heggli (University of Nevada),
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