CSDMS Newsletter - November 2026

CSDMS IF <csdms@colorado.edu>
Reply-To: CSDMS IF <csdms@colorado.edu>

Thu, Nov 20, 2025 at 9:05 AM

ON THE SURFACE

CSDMS Newsletter *November 2025*

Join CSDMS

CSDMS is Launching Asynchronous Learning Modules

CSDMS is building a suite of new multi-chapter learning modules designed for new to intermediate learners. These extended exercises allow users to build their expertise in surface dynamics modeling via compelling research questions and topics. Modules are self-paced with embedded prompts and programming challenges to help learners assess their own progress.

We are excited to announce that our first multi-chapter learning module is now live! This first module introduces new users to the **Landlab** numerical modeling platform using the 2013 Colorado floods and landslides as motivation. Each chapter introduces new skills and concepts that build on each other, including importing your own data, calculating rainfall statistics, simulating root zone water dynamics, and calculating the Factor of Safety. This module is well-suited to new and intermediate users of Landlab, where

you will be introduced to building model grids, coupling Landlab components, and running your own custom models. For a brief description of this learning module and instructions on how to run it on the EarthscapeHub, check out https://csdms.colorado.edu/wiki/Learning_Modules. You can also find it under the Education tab on the CSDMS web site.

CSDMS Annual Meeting - Save the Date!

CSDMS 2026: Modeling Landscapes in Motion

Join us at the University of Minnesota, Minneapolis, May 19th-21st, 2026 as we explore and celebrate the many facets of landscapes and seascapes in motion, from landslides to landforms and beaches to basins.

Important Deadlines:

- **Student Modeler Competition** submission deadline is January 25th, 2026. Submission requirements and additional details can be found here.
- A limited number of **Travel Scholarships** will be available and the deadline to apply is February 8th, 2026. Application information will be available on the meeting web page in mid-January.

Please note: registration and poster presentation abstract submissions will open in mid-January, 2026.

CSDMS Fall Webinar Series

Please join us for the final installment of the CSDMS 2025 Fall Webinar Series! Registration is required and link is provided below.

Landlab Developers/Users Community Software Meeting

Thursday, December 4th, 2025 @ 10:00AM MST

Greg Tucker and Eric Hutton, CSDMS IF

Get updates on **Landlab**, and meet fellow users! In this session, the development team will provide a briefing on the latest Landlab developments, and answer your questions. It's also a great opportunity to share your own work with Landlab with fellow users. The meeting is open to all active and soon-to-be active Landlab users.

REGISTER

Previous CSDMS-sponsored webinars are archived here and available for viewing anytime. If you have suggestions for future webinars, please contact csdms@colorado.edu.

2026 Earth Surface Processes Institute
August 3rd through 7th, in Boulder, CO

The Earth Surface Processes Institute (ESPIn) is a week-long immersive training experience for 25 students. ESPIn offers hands-on training in numerical modeling, collaborative coding, and open-source software development, with an emphasis on best practices such as version control, unit testing, continuous integration, and open metadata/modeling standards. ESPIn introduces students to cyberinfrastructure such as the CSDMS Workbench via tutorials delivered on the OpenEarthscape JupyterHub. Students will be provided an opportunity to present their ESPIn team projects in a community webinar sometime during the fall of 2026. Travel and subsistence support will be provided for all selected students for ESPIn and the CSDMS Annual Meeting. **Application window opens December 8th, 2025 and the deadline for submission is January 25th, 2026.**

Application details for the 2026 ESPIn can be found here!

CSDMS OpenEarthScape
2026 Visiting Scholars Program

Application window opens December 8th, 2025 (deadline February 15th, 2026). The Summer Visiting Scholar Program is open to graduate students interested in spending up to 6 weeks at the CSDMS Integration Facility at the University of Colorado, Boulder. Selected students will be working on their own research and will benefit from mentoring with the CSDMS Research Software Engineers and faculty/staff. Our cohorts in 2022 - 2025 were resounding successes and we hope to make the 2026 program even more beneficial for your research progress. We anticipate 1-2 students will be selected for the 2026 program. In addition to proximity to the CSDMS Software Engineers and other

team members, the Integration Facility can provide the following support:

Student
Domestic travel and lodging support for up to 45 days in Boulder. Stipend support is available for US Citizens only and is based on CU GRA rates @100% for summer semester (about $5,500 per month). International students and students in the US on F-1 and J-1 visas are welcome to apply and travel/lodging support will be provided, but stipend support cannot be provided due to visa restrictions.

Advisor
Travel and lodging support for a 7-day trip to Boulder (including per diem and ground transportation) to work collaboratively with CSDMS and the student.

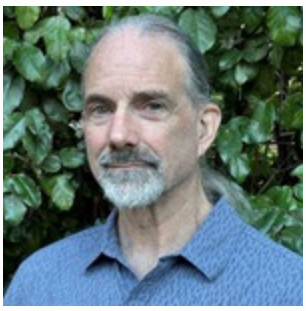
Priority will be given to students that have computational projects that:

- Are "shovel ready".
- Will result in a product, such as a publication, a conference presentation, a new model component, an educational tutorial, etc.

To apply, please send an email to csdms@colorado.edu by February 15, 2026 with your name, brief description of your future goals, description of the specific project that could benefit from CSDMS Integration Facility support and any resulting products proposed. Additionally, we'll need approval from your advisor to participate in the program (this can be in the form of an attached letter or email).

We're excited to work with you and we look forward to chatting about how the CSDMS Integration Facility can most usefully contribute to your research next summer!

CSDMS Community News



Congratulations to **Brad Murray**, Professor of Geomorphology and Coastal Processes and Director of Graduate Studies in the Division of Earth and Ocean Science, Nicholas School of the Environment and Earth Sciences, Duke University who has been selected as a **2025 AGU Union Fellow**. Brad is a long-term CSDMS supporter and served as a founding group chair and (later) as Steering Committee Chair.

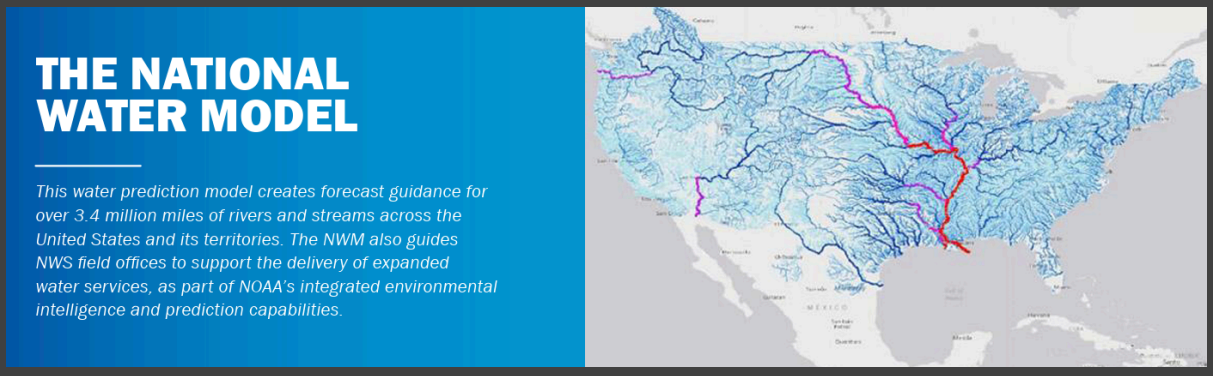
Elowyn Yager, Professor and Co-Director of the Center for Ecohydraulics Research, Civil and Environmental Engineering, University of Idaho is the **2025 recipient**

AGU Marguerite T. Williams Award. The award recognizes excellence in mid-career research and community building in the Earth and planetary surface processes field. Elowyn is currently serving on the CSDMS Steering Committee.

Fengyuan Zhang, Associate Professor, School of Geography, Nanjing Normal University, China, has been appointed as Co-Chair of the CSDMS Initiative - Exploring Interoperability of Modeling Platforms.

CSDMS Workbench in Action

We're starting a new series highlighting research using the CSDMS Workbench! These articles, written by CSDMS community members, will provide examples of CSDMS products being used in a wide range of research applications. If you've been using our Workbench products and are interested in contributing a future highlight, please contact us at csdms@colorado.edu.



The Basic Model Interface: A Research to Operations Success Story
Scott D. Peckham, Institute for Arctic and Alpine Research, University of Colorado, Boulder

In August 2016, NOAA released version 1 of its National Water Model (NWM). This operational, prototype system provided the first-ever continental-scale water forecast capability for the United States. Its purpose was to provide a water modeling capability for the continental US that would improve forecasting for floods and other water-related concerns. However, it soon became clear that the wide range of hydrologic regimes across the US --- in terms of the relative contribution of

various hydrologic processses --- meant that reliance on a single, monolithic model was limiting and would not result in the best possible model performance for all basins. This led NOAA's OWP (Office of Water Prediction) to commission an external review of the NWM code. That review recommended that the National Water Model be redesigned to follow a modern, standards-based architecture and to improve flexibility and usability through the use of reusable component models with standardized interfaces. They also argued that this would increase community involvement, and NOAA has always benefitted from strong ties to the academic community and the "research to operations" paradigm. This ultimately led to a meeting in October 2020 that involved many U.S. water prediction agencies, including NOAA, US Army Corp of Engineers (USACE-ERDC), US Bureau of Reclamation (USBR), US Geological Survey (USGS) and the US Department of Energy (DOE-ORNL), that resulted in a set of agreed-upon requirements for a water resources prediction modeling system. This multi-agency group focused on identifying and selecting appropriate standards for the new modeling system and they adopted the Basic Model Interface (BMI - Peckham et al., 2013). For describing hydrologic features, they also adopted the HY_Features suit of standards from the Open Geospatial Consortium (OGC) WaterML specification. HY_Features is the standard upon which the NextGen Hydrofabric is based.

In early 2021, NOAA's Office of Water Prediction (OWP) began building a prototype of NextGen, the Next Generation Water Resources Modeling Framework. From 2021 to late 2023, a fully-functional prototype of the framework was developed and demonstrated at a series of AGU and AMS meetings. During this time, many hydrologic and coastal models were also refactored to expose the Basic Model Interface. Also during this time, in mid 2022, the Cooperative Institute for Research to Operations in Hydrology (CIROH) began operations as NOAA's first cooperative institute focused on hydrology. CIROH is a consortium of 28 institutions, academic, government, and private, headquartered at the University of Alabama, near the National Water Center, in Tuscaloosa. CIROH began using NextGen early on and developed an easier-to-use, containerized version of NextGen called NextGen in a Box (Patel et al., 2025). In late 2023, NOAA awarded a large contract to Raytheon to develop an operational version of NextGen that is required to support BMI and HY_Features.

NextGen offers an exciting set of new modeling capabilities to academic and federal researchers. Key among these is the flexibility to use different BMI-enabled models for different subbasins within a larger basin. Outflows are combined and routed by a module called “t-route”. This flexibility makes it possible to experiment with different formulations and to then use the most performant model for each subbasin. Models written in C, C++, Fortran, or Python are supported, and this includes machine learning models (e.g. LSTM-based). And the whole system is also

built on top of a standardized, scale-adaptable Hydrofabric of connected waterways and water bodies. Results from this new, BMI-based framework have already been shown to outperform the National Water Model 3.0. NextGen makes it possible to run a suite of models operationally on a huge swath of the US, with all required topographic, meteorological, and soil information being provided by the framework. This is expected to lead to more accurate hydrologic predictions as well as signficant advances in our understanding of hydrology.

Additional Information:
National Water Model (Cosgrove et al. 2024)
https://onlinelibrary.wiley.com/doi/epdf/10.1111/1752-1688.13184

National Water Model (Johnson et al., 2023)
https://agupubs.onlinelibrary.wiley.com/doi/epdf/10.1029/2023JD038534

CSDMS Community Teaching and Research Resources

CSDMS Workbench - https://csdms.colorado.edu/wiki/Workbench
CSDMS Model Repo - https://csdms.colorado.edu/wiki/Model_download_portal
Open Earthscape Jupyter Hub - https://csdms.colorado.edu/wiki/JupyterHub
CSDMS EKT Labs - https://csdms.colorado.edu/wiki/Labs_portal
Office Hours (via Zoom) with a CSDMS Research Software Engineer - 9AM on Wednesdays. To register - https://csdms.colorado.edu/wiki/OfficeHours
CSDMS Jobs Board - https://csdms.colorado.edu/wiki/Jobs
CSDMS Help Desk - https://csdms.github.io/help-desk/
CSDMS Forum - https://forum.csdms.io
CSDMS YouTube Channel - https://www.youtube.com/@CSDMSmovie/videos

Need Ideas for NSF Broader Impacts? CSDMS Can Help!

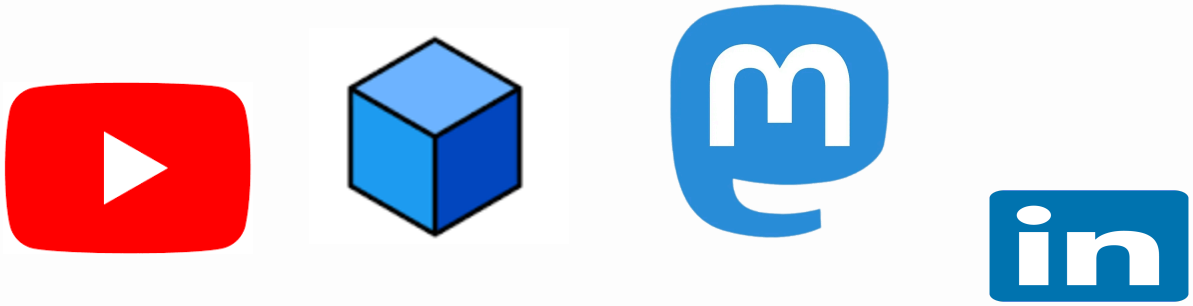
The US National Science Foundation reviews grant proposals based on two criteria:

Intellectual Merit, and Broader Impacts. Turning project-related software into open-source community tools can be a great form of Broader Impact. CSDMS Research Software Engineers can provide guidance and expert assistance in transforming your research codes into high-quality community modules. To learn more, reach out to us at csdms@colorado.edu.

Join us on Bluesky, Mastadon, YouTube and LinkedIn!

Please follow us and be the first to know about all the new CSDMS events and resources!!

@CSDMS.bsky.social on Bluesky,
@CSDMS@fediscience.org on Mastodon, @CSDMSmovie on YouTube and Community Surface Dynamics Modeling System on LinkedIn.



CSDMS is an NSF sponsored program