

**CSDMS**

community surface  
dynamics modeling system

# ON THE SURFACE

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*CSDMS Quarterly Newsletter*  
September 2019

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**Earth Surface Process Institute (ESPIIn)**

**Coming Summer 2020!**



CSDMS will host a **10-day, immersive training experience for 25 graduate students, postdoctoral fellows and early career faculty** at the CSDMS Integration Facility at the University of Colorado, Boulder. ESPIIn will offer hands-on training in best programming practices, open source software development, advanced use of version control systems, writing unit tests, HPC-based sensitivity testing and model uncertainty quantification techniques. Several days will be dedicated to working collaboratively on authentic research and coding projects. Participants

will also work on developing their own codes.

A mix of experienced scientists, visiting faculty, software engineers and research computing experts will provide training and instruction. **Additional details (including cost/travel support) and application deadlines will be announced soon!**

Keep an eye on the [CSDMS Events page](#) and follow CSDMS <https://twitter.com/CSDMS> on Twitter for updates.

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## CSDMS Workshop at AGU Fall Meeting

CSDMS will offer a full-day tutorial at the AGU 2019 Fall Meeting entitled, "[Exploring Surface Processes: How to Build Coupled Models](#)" on Sunday, December 8th, 2019 in San Francisco, CA.

Come learn about the CSDMS Python Modeling Tool (*pymt*) and Landlab and how to use them to run simulations and visualize output of coupled innovative models that can be used to analyze and predict how the Earth's surface responds to environmental change and human influence.

[Please register for the workshop through the AGU Fall Meeting Registration page.](#)

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Please join us for the CSDMS Fall 2019 Webinar Series! **Registration is required** and links are provided below (including additional details on the webinar).

### [\*\*Bayesian Evidential Learning: a protocol for uncertainty quantification in Earth systems\*\*](#)

Monday, October 14, 2019, 1:00PM ET

*Jef Caers, Stanford University*

### [\*\*Continuous streamflow and nearshore wave monitoring from time-lapse cameras using deep neural networks\*\*](#)

Tuesday, November 12, 2019, 12:00PM ET

*Dan Buscombe, Northern Arizona University*

### [\*\*Regional Ocean Modeling System \(ROMS\) Cohesive Sediment Bed Model\*\*](#)

Monday, November 18, 2019, 2:00PM ET

Previous CSDMS-sponsored webinars are [archived here](#) and available for viewing anytime. If you have suggestions for future Webinars, please contact [csdms@colorado.edu](mailto:csdms@colorado.edu).

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## New Landlab Components available in PyMT

[PyMT is an Open Source Python package](#), developed by the CSDMS, that simplifies the process of learning, operating, and coupling models - freeing researchers to focus on exploring ideas, testing hypotheses, and comparing models with data. A recent collaboration with the Landlab team to develop a landlab-BMI bridge has **resulted in the following 14 components being available as PyMT components:**



- **DepthDependentDiffuser:** a depth and slope dependent linear diffusion rule in the style of Johnstone and Hilley (2014).
- **ExponentialWeatherer:** Exponential weathering of bedrock on hillslopes. Uses exponential soil production function in the style of Ahnert (1976).
- **Flexure:** Lithospheric flexure.
- **FlowAccumulator:** Accumulate flow and calculate drainage area.
- **FlowDirectorD8:** Single-path (steepest direction) flow direction finding on raster grids by the D8 method.
- **FlowDirectorDINF:** Direct flow by the D infinity method (Tarboton, 1997).
- **FlowDirectorSteepest:** Find the steepest single-path steepest descent flow directions.
- **FlowRouter:** Single-path (steepest direction) flow routing, and calculates flow directions, drainage area, and (optionally) discharge.
- **LinearDiffuser:** 2D diffusion using an explicit finite-volume method.
- **OverlandFlow:** Simulate overland flow using de Almeida approximations.
- **SoilMoisture:** Simulate root-zone average soil moisture at each cell using inputs of potential evapotranspiration, live leaf area index, and vegetation cover.
- **StreamPowerEroder:** A simple, explicit implementation of a stream power algorithm.
- **TransportLengthHillslopeDiffuser:** Hillslope diffusion component in the style of Carretier et al. (2016, ESurf), and Davy and Lague (2009).
- **Vegetation:** Simulate net primary productivity, biomass and leaf area index at each cell based on inputs of root-zone average soil moisture.

Since the launch last February, new components/models continue to be added to the PyMT-enabled list each month. [A listing of all the PyMT components can be found through the pymt-lab organization on GitHub.](#)

[An introductory tutorial on PyMT, provided by lead RSE, Eric Hutton is available on the CSDMS web site.](#) Remember! CSDMS offers Software Engineering support if you have a

model you would like brought into PyMT. Our RSEs are excited to work with you to make your model more powerful and easily accessible to a wider audience. To request assistance please contact CSDMS @ [colorado.edu](mailto:colorado.edu).

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## CSDMS 2020 Annual Meeting

### Registration opens in October!

Please join us for the 11th CSDMS Annual Meeting in Boulder, Colorado, May 19th - 21st, 2019. This year's meeting entitled "**CSDMS 2020 - Linking Ecosphere and Geosphere**", is co-organized by the [International Society for Ecological Modeling](#), the [International Soil Modeling Consortium](#), the CSDMS Ecosystem Dynamics Focus Research Group and the Critical Zone Focus Research Group.

Registration will open in early October this year! Please check the [CSDMS home page](#) and monitor your emails for the official announcement.

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## Community Member Spotlight

CSDMS is delighted to announce that [Olaf David](#) has been elected as Co-chair of the CSDMS Cyberinformatics and Numerics WG. Olaf is a research scientist in the Department of Civil and Environmental Engineering and Department of Computer Science at Colorado State University. Olaf is also the director of the [Object Modeling System \(OMS\) Laboratory](#) and [Cloud Services Integration Platform](#). His current research interests are focused on leveraging component based modeling for large scale environmental applications within the context of emerging technologies such as scientific cloud computing and machine learning.



Please join us in welcoming **Tian Gan** to the CSDMS Integration Facility Team! Tian will be working as a Research Software Engineer/Post Doc with the CSDMS software development team. Tian is a recent graduate of Utah State University and was affiliated with the Utah Water Research Laboratory (advisor David Tarboton).



The winner of the CSDMS 2019 Poster Award is [John Swartz](#), University of Texas, Austin, for his presentation "[From Distributary to Tributary: Formation and Morphometry of Coastal Stream Networks Governed by Depositional Processes](#)".



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## Final Call! NHESS Special Issue

The deadline is drawing near to submit a paper to the journal *Natural Hazards and Earth System Sciences (NHESS) special issue: 'Advances in computational modeling of geoprocesses and geohazards'*.

This special issue is the result of the NSF funded conference "[Geoprocesses, geohazards - CSDMS 2018](#)". The aim of the special issue is to identify:

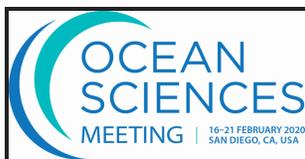
- the current state of the art in our current natural hazard process understanding, both fundamentally in the earth surface processes as well as in the modeling approaches and technology,
- important gaps and shortcomings,
- improvements in natural hazard modeling for risk assessment, with a special focus on building a next-generation cyberinfrastructure and a community of modern modeling and data analysis practices,
- modeling and conveying uncertainty in numerical risk assessments, and e) case studies in which numerical models have increased resilience by reducing vulnerability to disasters.

Questions can be directed to [albert.kettner@colorado.edu](mailto:albert.kettner@colorado.edu)

Submission details can be found [HERE](#). Final **submission deadline is October 1 2019**.

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## CSDMS Relevant Sessions AGU Ocean Sciences 2020



[AGU Ocean Sciences 2020](#) will take place February 16th - 21st in San Diego, CA. Abstract submissions are open now and close on September 11, 2019. The primary chairs of several CSDMS-relevant sessions invite you to submit an abstract:

[Sediment Delivery, Transport and Deposition in Marine and Lacustrine Environments](#) - Primary Chair: Courtney Harris, VIMS

[Sustaining Ocean Services in Socio-ecological Systems: Challenges, Opportunities and Perspectives in Resilience Science and Natural Resource Management](#) - Primary Chair:



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