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JON SCHWENK

SCIENTIST 3
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EDUCATION

University of Minnesota
Advised by Efi Foufoula-Georgiou (currently UC-Irvine)

Ph.D., Civil, Environmental, and Geo-Engineering	**2016**
P.B.C., Stream Restoration Science and Engineering	**2014**
M.S., Civil, Environmental, and Geo- Engineering	**2012**

Tennessee Technological University
Advised by Faisal Hossain (currently U Washington)

B.Sc., Civil Engineering, *cum laude*	**2007**

PROFILE

Scientist and team leader developing AI methods and data systems for environmental prediction and decision support, with an emphasis on water security and climate impacts. At Los Alamos National Laboratory, I lead interdisciplinary teams that connect machine learning with geospatial and earth/environmental science, and I prioritize open software and data products that make results reproducible and adoptable. I focus on practical, regionally important problems—especially where water and climate directly affect communities, infrastructure, and ecosystems.

APPOINTMENTS & RESEARCH EXPERIENCE

Los Alamos National Laboratory **2017 – present**
Scientist 3, 2, and Director's Postdoc

Research Topics as PI

Climate impacts to national security Led four 4-10 person teams to evaluate how climate change will impact water security, permafrost risk, and future hydropower for US government sponsors.

AI for water-energy Leading a team (4) of Scientists and Postdocs to investigate improved hydropower dam/reservoir management with deep reinforcement learning. Led a team (4) to incorporate human impacts into AI streamflow models.

AI-ready data fusion Led a team (8) of Scientists, postdocs, and students to build an AI-ready, geospatial data platform designed for accelerating data-driven, global river network and watershed modeling and analysis. Created an AI-ready labeled dataset of rivers and in-channel sediment from Landsat images. Leading a team (5) to synthesize permafrost observations into a unified repository.

Permafrost science Led a team (6) of Scientists and Postdocs to develop machine learning models of permafrost presence at local ($1km^2$) scales and evaluate their generalizability.

Remote sensing of water quality Led a team (4) of postdoc and students to develop and deploy a machine learning model of sea surface properties in the Chesapeake Bay using MODIS images and a curated dataset of in-situ observations.

Research Topics as Co-I

Graph learning techniques Advised a graduate student to create novel graph learning classification models that use orders-of-magnitude fewer labeled data and outperform CNN models for multispectral-pixel classification tasks.

Disease forecasting with climate models Co-led a team (5) to develop and integrate a novel scaling unit into the DOE's E3SM for continental-scale prediction of mosquito-borne disease dynamics. Mentored a student to produce AI models of mosquito population dynamics driven by climate model output.

Social and political instability modeling Synthesized curated, multi-modal data and paired with database of instability events to build a data-driven model of instabilities in Pakistan.

Sediment dynamics Mentoring students in a fieldwork-heavy campaign to understand sediment dynamics in *Resacas* of the Rio Grande Delta.

Field work Coring, frost probing, soil sampling, and sensor deployment in Arctic environments. Installed corner reflectors for Sentinel-1 SAR. Soil sampling in the Valles Caldera for wetland restoration monitoring.

Other research Arctic hydrology, river dynamics, river networks, river deltas, Earth System Model validation, DEM analysis for branching angles, COVID responses

University of California, Irvine, CA **2016**
Postdoctoral Researcher

Geomorphic perturbations Used machine learning with satellite image data to demonstrate how and why meander cutoffs perturb river migration and channel widening dynamics.

University of Minnesota, Twin Cities, MN **2010—2016**
Graduate Student

Numerical river modeling Implemented a river migration model to simulate the movement of meandering rivers over long time sales. Created novel analysis techniques to track the history of individual meander bends and demonstrate how a meander bend's geometry post-dicts its formative dynamics.

Remote sensing for geomorph discovery Led a team (5) of computer scientists and undergraduates to map and quantify planform evolutions of a major tropical river at an unprecedented spatial and temporal resolution using machine learning and Google Earth Engine. Developed a comprehensive Matlab software for performing analysis of classified satellite scenes.

Nonlinear dynamics for hydrology Used phase-space methods (transportation distance, embedding dimension, Lyapunov exponents) to show how conversion to croplands and agricultural tiling resulted in a shift in watershed hydrology within the Minnesota River Basin.

Mussel population dynamics Led a modeling effort to assess how human-induced hydrologic changes and increased sediment loads contribute to observed declining mussel populations in Minnesota rivers.

Springburn Natural Engineering and Design, TN **2008-2010**
Engineer in Training (EIT)

Urbanized watershed runoff modeling Created and calibrated a model for predicted runoff response in an urbanized watershed in Crossville, TN. Installed pressure and precipitation gauges to collect calibration/validation data.

Stream design and implementation Developed physical habitat requirements for an endangered mussel species (*Bivalvia:Unionidea*) and assisted in designing a stream to provide suitable habitat in collaboration with The Nature Conservancy.

Tennessee Technological University, TN **2009**
Master's Student

Hydrology-geomorphology relationships: Conducted a fieldwork-intensive river surveying campaign across the Nashville Basin and generated statistical relationships between flow discharge, watershed area, and river morphology

Clarkson University, NY **2006**
Undergraduate Researcher

Soil chemistry: Conducted a series of soil column experiments to understand how redox conditions affect methylmercury production in Huntington Upland soils. Field work to collect *in-situ* samples for experiments

SOFTWARE

[S12] **DeepReservoir [under dev]** — *Python* | GitHub access upon request
- Designed and co-implemented a deep reinforcement learning framework with stablebaselines3 for optimization
- Designed and built a virtual environment of a hydropower reservoir system

[S11] **Pydro [under dev]** — *Python*
- Co-designing a differentiably-programmed runoff/routing model for hybrid physics/AI learning
- Developed a global wildfire-hydrology dataset for training/validation

[S10] **VotE** — *Python*, *PostgreSQL + PostGIS* | GitHub access upon request
- Built a river-centric data platform + API enabling rapid querying, model building, and visualization.
- Designed an AI-ready geospatial schema/workflows for integrating river network–based datasets.

[S9] **dapper** — *Python*, *Google Earth Engine (GEE) API* | GitHub
- Developed a toolset to curate, sample, and format datasets needed to run DOE's E3SM Land Model (ELM).
- Automated end-to-end data preparation workflows using Google Earth Engine.

[S8] **RivGraph** — *Python* | Manuscript 1; Manuscript 2; GitHub
- Extracts river network topology (nodes/links) from georeferenced binary mask rasters for deltas and braided rivers.
- Automatically assigns link directionality and computes topologic + morphologic metrics for networks.

[S7] **rabpro** — *Python*, *GEE API* | Manuscript; GitHub
- Delineates watersheds globally and computes river profiles, slopes, and related longitudinal metrics.
- Computes contributing-basin statistics for arbitrary raster inputs (e.g., topography, precipitation, vegetation) via GEE.

[S6] **RivMAP** — *Matlab* | Manuscript; Mathworks
- Toolbox for extracting planform river morphodynamics from binary channel masks.
- Quantifies centerlines/banklines, width, migration rates, and cutoff events.
- Manuscript; also released at CSDMS and Mathworks.

[S5] **hillsloper** — *Python* | GitHub access upon request.
- Partitions DEMs into constituent hillslopes for high-resolution terrestrial simulations.
- Extracts a connected river network and maintains hillslope–channel connectivity for modeling workflows.

[S4] **satval** — *Python, GEE API*| GitHub access upon request.
- Samples multispectral satellite pixel features aligned in space/time with in-situ water-quality observations.
- Aggregates observations within shared pixel footprints to support satellite–field validation and modeling.

[S3] **Various GEE** — *Javascript*
- Authored a suite of deployable Google Earth Engine scripts for geospatial analysis and data extraction.
- Built reusable, in-browser workflows to accelerate prototyping and sharing of remote-sensing methods.

[S2] **Ecopopper** — *Python* | GitHub
- Generates unstructured grids to bridge scale mismatches between earth system models and ecologic models.
- Supports model coupling and scenario workflows requiring flexible mesh generation.

[S1] **RiverMUSE** — *Matlab* | Manuscript, CSDMS
- Simulates freshwater mussel population dynamics under changing suspended sediment and flow regimes.
- Supports scenario experiments linking hydrology/sediment forcing to ecological response.

TECHNICAL SKILLS

- **AI / ML:** graph learning, neural networks (e.g. CNN, LSTM), deep reinforcement learning (PPO/TD3); sequential and regression modeling (LSTM, forests), computer vision, image analysis (SVM, eCognition)
- **Analysis and modeling**: geospatial data; multiscale spectral analyses (Fourier transforms, wavelet decomposition); nonlinear dynamics; image processing; remote sensing; optimization; graph methods; rainfall-runoff modeling; earth system models, numerical simulation
- **Computation**: high-performance computing; parallelization; database design, construction, and maintenance; *nix and Windows systems; git (GitHub/Gitlab);
- **Languages**: Python, SQL (Postgres/PostGIS), Javascript (Google Earth Engine), R, Matlab, Slurm, Latex
- **Python packages**: geospatial (gdal, geopandas, xarray, pyproj, shapely); image analysis (scikit-image, OpenCV, numpy), ML/DL (scikit-learn, tensorflow, pytorch, neuralhydrology); data/feature engineering (pandas, psycopg2, networkx)
- **Field work**: topographic and channel surveys (total station and dGPS), sediment characterization via sieving and Wolman counts, bankfull identification, stage and flow measurements, soil and water sampling for chemistry and quality, habitat assessment, soil (permafrost) coring, ground control point installation, corner reflector installation, soil characterization

AWARDED FUNDING

Listed funding indicates a significant contribution to the proposal and project. LDRD refers to Lab Directed Research and Development, a competitive internal funding program at LANL.

- CO-I, LDRD Directed Research. Data driven instability and conflict forecasting for actionable intelligence. **$6 million / 3 years** **2025**
- Co-I, DOE ASCR. *Principled, Structure-Preserving, and Uncertainty-Quantified Machine Learning for Scientific Data*, **$6 million / 3 years** **2024**

- PI, LDRD Director's Initiative. *Innovations in permafrost and ground ice modeling for national security applications*. **$400k / 1 year** **2024**
- PI, LDRD Exploratory Research. *Responsive reservoir control for next-generation water security*. **$1 million / 3 years** **2023**
- PI, Classified Sponsor. *Permafrost and wildfire risk across the Arctic*. **$1 million / 9 months** **2023**
- PI, Classified Sponsor. *Climate and human impacts to streamflow in Southeast Asia*. **$1 million / 9 months** **2023**
- Co-PI, LANL Tech Evaluation and Demonstration Project. *Demonstration of rapid climate data access and analysis*. **$150k / 1 year** **2023**
- Co-I, LDRD ER. *Post-wildfire hydrology impacts: a tool for mitigating water security disasters.* **$1 million / 3 years** **2023**
- Co-I, DOE FAIR. *Evaluating water, sediment, and nutrient transport rates and accumulation patterns in alluvial ridge basins between the abandoned river channels (resacas) of the Rio Grande Delta.* **$1.5 million / 3 years** **2023**
- PI, Center for Earth and Space Sciences. *Discerning watershed impacts on streamflow with novel data and machine learning approaches*. **$150k / 2 years** **2022**
- Co-PI, LDRD Director's Initiative. *Accelerating Arctic research through data-model integration using machine learning and optimized observational datasets*. **$500k / 1 year** **2022**
- PI, LDRD Exploratory Research. *A Global, High-Resolution River Network Model for Improved Flood Risk Prediction*. **$1 million / 3 years** **2020**
- Co-I, LDRD Directed Research. *Model-Driven Data Fusion for Infectious Disease Forecasting*, **$3.2 million / 3 years** **2020**
- Co-I, LDRD Reserve. *Human-Natural Systems Prediction under Climate Change*, **$500k** / **1 year** **2018**
- Co-I, ineligible to receive funding. NSF Award 1342994. *Understanding deltas through the lens of their channel networks,* **$334k / 3 years** **2018**
- PI, Director's Postdoctoral Fellowship, LANL. *Impacts of climate and land use on global river dynamics,* **$168k / 2 years** **2017**
- PI, NSF Graduate Research Fellowship. *Modeling river behavior at high spatial and temporal resolutions using a cellular automaton,* **$160k / 3 years** **2010**

HONORS AND AWARDS

- R&D 100 Team Awards: (1) General Award and (2) Corporate Social Responsibility Award for EpiEarth technology **2025**
- Global Security-Intelligence & Emerging Threats Certificate of Outstanding Performance **2024**
- Los Alamos Awards Program – Excellence in Supporting LANL's Climate Impacts for National Security Program, AML Leadership **2024, 2025**
- Large Team Distinguished Performance Award – Climate Impacts Team **2023**

- LANL Promotion to Scientist 3 **2023**
- LANL SPOT awards (for inclusivity, collegiality, performance) **2021, 2022, 2023, 2024, 2025**
- Director's Fellow, Los Alamos National Laboratory **2017**
- Cover image, *Earth and Space Science* 4(2) **2017**
- Saint Anthony Falls Laboratory Alvin G. Anderson Award **2016**
- Cover image, *JGR Earth Surface* 120(4) **2015**
- Tsai Travel Award, University of Minnesota **2015**
- COGS Travel Fellowship, University of Minnesota **2015**
- Sommerfeld Travel Grant Award, University of Minnesota **2014**
- Merit Scholar, Tennessee Technological University **2004-2008**
- Student Government Association Senator of the Year, TN Tech University **2008**

PEER-REVIEWED PUBLICATIONS

For real-time citation tracking, visit my Google Scholar Profile.

[P41] Shaftel, B., …, J. Schwenk, et al. (2026) Integrating climate data and river modeling to reveal Chinook salmon habitat conditions in Sub-Arctic river basins. *Ecosphere.* doi: 10.1002/ecs2.70399

[P40] Limber, R., …, J. Schwenk, et al. (2025) Long short-term memory model to forecast river ice breakup throughout Alaska, USA. *Water Resources Research*. doi: 10.1029/2025WR040635

[P39] Diepeveen, W., J. Schwenk, A. Bertozzi (2025) Latent Diffeomorphic Dynamic Mode Decomposition. *Applied Mathematics Letters*. doi: 10.1016/j.aml.2025.109701

[P38] Solander, K., T. Zhou, K. Bennett, J. Schwenk (2025) Evaluation of CMIP6 streamflow in the Arctic. *Journal of Hydrometeorology*. doi: 10.1175/JHM-D-24-0124.1

[P37] Nair, G., …, J. Schwenk, et al. (2025) Increasing mosquito abundance under global warming. *Earth's Future*. doi: 10.1029/2024EF005629

[P36] Wortmann, M., …, J. Schwenk, et al. (2025) Global River Topology (GRiT): A bifurcating river hydrography. *Water Resources Research*. doi: 10.1029/2024WR038308

[P35] Chang, S., Solander, K., and J. Schwenk (*2025*) Deep learning advances Arctic river water temperature predictions. *Earth and Space Science*. doi: 10.1029/2024WR039053

[P34] Maebius, S., K. Bennett., and J. Schwenk (2024) Machine learning classification strategy to improve streamflow estimates in diverse river basins in the Colorado River basin. *Earth and Space Science.* doi: 10.1029/2024EA003798

[P33] Chen, B., K. Miller, A. Bertozzi, and J. Schwenk (2024) CGAP: A hybrid contrastive and graph-based active learning pipeline to detect water and sediment in multispectral images. *IEEE Applied Earth Observations*. doi: 10.1109/JSTARS.2024.3493073

[P32] Abolt, C., …, J. Schwenk, et al., (2024) Topography drives variability in circumpolar permafrost thaw pond expansion. *JGR Earth Surface*. doi: 10.1029/2024JF007675

[P31] Douglas, M., …, J. Schwenk, et al., (2024) Permafrost formation in a meandering river floodplain. *AGU Advances.* doi: 10.1029/2024AV001175

[P30] Thaler, E., …, **J. Schwenk**, et al., (2024) High-resolution maps of near-surface permafrost for three watersheds on the Seward Peninsula, Alaska derived from machine learning. *Earth and Space Science*. doi: 10.1029/2023EA003015

[P29] Rowland, J., **J. Schwenk**, et al., (2023) Scale-dependent influence of permafrost on riverbank erosion rates. *JGR Earth Surface*. doi: 10.1029/2023JF007101

[P28] Chen, B., Miller, K., Bertozzi, A., and **J. Schwenk** (2023). Batch active learning for multispectral and hyperspectral image segmentation using similarity graphs. *Communications on Applied Mathematics and Computation.* doi: 10.1007/s42967-023-00284-8

[P27] Bennett, K., **J. Schwenk**, et al. (2023) Recent streamflow trends across permafrost basins of North America. *Frontiers in Water*. doi: 10.3389/frwa.2023.1099660

[P26] Chen, B., Miller, K., Bertozzi, A., and **J. Schwenk** (2023). Graph-based active learning for surface water and sediment detection in multispectral images. *IGARRS 2023 IEEE International Geoscience and Remote Sensing Symposium*. doi: 10.1109/IGARSS52108.2023.10282009

[P25] Knights, D., Piliouras, A., **J. Schwenk**, Hariharan, J., Russoniello, C. (2023). Seasonal and morphological controls on nitrate retention in Arctic deltas. *Geophysical Research Letters*. doi: 10.1029/2022GL102201

[P24] Cooper, M., …, **J. Schwenk**, et al. (2023). Detecting change in permafrost active layer thickness from nonlinear baseflow recession analysis. *Water Resources Research*. doi: 10.1029/2022WR033154

[P23] Beesley, L., …, **J. Schwenk**, et al. (2023). Multi-dimensional resilience: a quantitative exploration of disease outcomes and economic, political, and social resilience to the COVID-19 pandemic in six countries. *PLOS one.* doi: 10.1371/journal.pone.0279894

[P22] Stachelek, J., Avendano, S., and **J. Schwenk** (2022). Geographically-aware estimates of remotely-sensed water properties for Chesapeake Bay. *Journal of Applied Remote Sensing*. doi: 10.117/1.JRS.16.044528

[P21] Tejedor, A., **J. Schwenk**, et al. (2022). The Entropic Braiding Index (eBI): a robust metric to account for the diversity of channel scales in multi-thread rivers. *Geophysical Research Letters.* doi: 10.1029/2022GL099681

[P20] Hariharan, J., A. Piliouras, **J. Schwenk**, P. Passalacqua (2022). Width-Based Discharge Partitioning in Distributary Networks: How Right We Are. *Geophysical Research Letters*. doi: 10.1029/2022GL097897

[P19] **Schwenk, J.**, T. Zussman, J. Stachelek, and J. Rowland (2022) rabpro: global watershed boundaries, river elevation profiles, and catchment statistics. *Journal of Open Source Software*. doi: 10.21105/joss.04237

[P18] Konkol, A., **J. Schwenk**, E. Katifori, J. Shaw. (2021) Interplay of river and tidal forcings promotes loops in coastal channel networks. *Geophysical Research Letters.* doi: 10.1029/2022GL098284

[P17] **Schwenk, J.** and J. Hariharan. (2021). RivGraph: Automatic extraction and analysis of river and delta channel network topology. *Journal of Open Source Software*. doi: 10.21105/joss.02952

[P16] Limaye, A., E. Lazarus, Y. Li, and **J. Schwenk**. (2021) River sinuosity describes a continuum between randomness and ordered growth. *Geology*. doi: 10.1130/G49153.1

[P15] Douglas, M., …, **J. Schwenk**, et al. (2021) Organic carbon burial by river meandering partially offsets bank erosion carbon fluxes in a discontinuous permafrost floodplain. *Earth Surface Dynamics*. doi: 10.5194/esurf-2021-80.

[P14] Douglas, M., …, **J. Schwenk**, et al. (2021) Impact of river channel lateral migration on the microbial ecology of a discontinuous permafrost floodplain. *Applied & Environmental Microbiology*. doi: 10.1128/AEM.01339-21

[P13] **Schwenk, J.**, A. Piliouras, J. Rowland. (2020). Determining flow directions in river channel networks using planform morphology and topology. *Earth Surface Dynamics.* doi: 10.5194/esurf-8-87-2020

[P12] Vulis, L., A. Tejedor, **J. Schwenk**, A. Piliouras, J. Rowland, E. Foufoula-Georgiou. (2020) Channel network control on seasonal lake area dynamics in Arctic Deltas. *Geophysical Research Letters.* doi: 10.1029/2019GL086710

[P11] Knights, D., …, **J. Schwenk**, et al. (2019) Nitrate removal across ecogeomorphic zones in Wax Lake Delta, Louisiana (USA). *Water Resources Research*. doi: 10.1029/2019WR026867

[P10] Gran, K., **J. Schwenk**, et al. (2019) The power of environmental observations for advancing multidisciplinary research, outreach, and decision support: the case of the Minnesota River Basin. *Water Resources Research.* doi: 10.1029/2018WR024211

[P9] **Schwenk, J.**, E. Foufoula-Georgiou. (2017). Meander cutoffs nonlocally accelerate upstream and downstream migration and channel widening. *Geophysical Research Letters*, doi:10.1002/2016GL071670

[P8] **Schwenk, J.**, A. Khandelwal, M. Fratkin, V. Kumar, E. Foufoula-Georgiou. (2017). High spatio-temporal resolution of river planform dynamics from Landsat: the RivMAP toolbox and results from the Ucayali River, *Earth and Space Science*, doi:10.1002/2016EA000196

[P7] **Schwenk, J.**, E. Foufoula-Georgiou. (2017). Are process nonlinearities encoded in meandering river planform morphology? *JGR Earth Surface*, doi:10.1002/2016JF003929

[P6] **Schwenk, J.** (2016). Meandering rivers: interpreting dynamics from planform geometry and the secret lives of migrating meanders. Ph.D. Dissertation.

[P5] **Schwenk, J.**, S. Lanzoni, and E. Foufoula-Georgiou. (2015). The life of a meander bend: connecting shape and dynamics via analysis of a numerical model. *JGR Earth Surface*, doi:10.1002/2014JF003252

[P4] E. Foufoula-Georgiou, Patrick Belmont, P. Wilcock, K. Gran, J. Finlay, P. Kumar, J. Czuba, **J. Schwenk**, Z. Takbiri (2016). Comment on "Climate and agricultural land use change impacts on streamflow in the upper midwestern United States" by Satish C. Gupta et al. *Water Res. Research*, doi:10.1002/2015WR018494

[P3] Foufoula-Georgiou, E., Z. Takbiri, J. Czuba, and **J. Schwenk**. (2015). The change of nature and the nature of change in agricultural landscapes: Hydrologic regime shifts modulate ecological transitions. *Water Res. Research*, doi:10.1002/2015WR017637

[P2] Hansen, A.T., J.A. Czuba, **J. Schwenk**, A. Longjas, M. Danesh-Yazdi, and E. Foufoula-Georgiou. (2015). Coupling freshwater mussel ecology and river dynamics using a simplified dynamic interaction model. *Freshwater Science*, doi:10.1086/684223

[P1] **Schwenk, J.**, Faisal Hossain, David Huddleston (2009). A computer-aided visualization tool for stochastic theory education in water resources engineering. *Comp. App. in Eng. Edu*., doi:10.1002/cae.20233

REPORTS

Schwenk, J. and A. Whelsky. (2025) The future of hydroelectric generation in Brazil. Classified document. Los Alamos National Laboratory.

Schwenk, J. et al. (2024) Permafrost impacts on infrastructure in the Arctic. Classified document. Los Alamos National Laboratory.

Schwenk, J. et al. (2024) Comprehensive modeling and evaluation of climate impacts on water dynamics in Southern Asia. Classified document. Los Alamos National Laboratory

Fairchild, G., … J. Schwenk, et al. (2020) Forecasting Regional Stability (FoReSt): Predicting, Quantifying, and Mitigating Regional Stability. OUO document. Los Alamos National Laboratory.

PUBLISHED DATASETS

[D8] Schwenk, J., J. Rowland, A. Piliouras (2023). Observations and machine-learned models of near-surface permafrost along the Koyukuk River, Alaska, USA. ESS-DIVE repository. doi: 10.15485/1922517

[D7] Rowland, J., B. Crosby, J. Schwenk, A. Piliouras, M. Douglas (2023). Riverbank temperatures on the Selawik River, Alaska 2010-2012, and Koyukuk River, Alaska June to July 2018. ESS-DIVE repository. doi: 105485/1922885

[D6] Schwenk, J. and J. Rowland (2022). RiverPIXELS: paired Landsat images and expert-labeled sediment and water pixels for a selection of rivers v1.0. ESS-DIVE repository. doi:10.15485/1865732

[D5] Hariharan, J., A. Pilouras, J. Schwenk, P. Passalacqua (2022). Discharge in Distributary NeTworks (DIDNT) Dataset. OSF Repository. doi: 10.17605/OSF.IO/U732

[D4] Bennett K., C. Talsma, J Stachelek, J. Schwenk (2022): Historical and Future Extreme Event Indices for the Colorado River Basin. doi:10.15485/1862040

[D3] Prior, E., J. Schwenk, and J. Rowland (2022). VotE-Dams: a compilation of global dams' locations and attributes (v1). ESS-DIVE repository. doi: 10.15485/1843541

[D2] Douglas, M., …, J. Schwenk, et al. (2022). Bulk density, grain size, carbon content and isotopes, and nitrogen content of floodplain sediment along the Koyukuk River, Alaska collected in Summer 2018. ESS-DIVE repository. doi: 10.15485/1910300

[D1] Rowland, J. and J. Schwenk. (2019). Global meta-analysis of published river bank erosion and migration rates. Incorporating the Hydrological Controls on Carbon Cycling in Floodplain Ecosystems into Earth System Models (ESMs). doi:10.15485/1571181

SELECTED PRESENTATIONS

• indicates an invited presentation.

- J. Schwenk. "Envisioning the future of global hydrography data." Global Hydrography Workshop. Oxford, UK. September, 2025
- Crumley, R., …, J. Schwenk. "Foundation models for long term weather prediction." July, 2025. LANL IS&T Capability Review.
  J. Schwenk, R. Fiorella, K. Bennett. "The search for optimal resolution in ELM modeling." March, 2025. DOE ESSD PI Meeting.
- Schwenk, J. et al. "Climate analysis of a mega-dam and downstream impacts." US Government Agency meeting. December, 2023.
- Schwenk, J. et al. "A Platform for the next generation of data-driven, river and watershed-centric modeling: Veins of the Earth." Tri-labs (LANL, Sandia, Lawrence-Livermore) Climate Impacts on National Security workshop. December, 2022.

- **Schwenk, J.** "Next-gen data fusion for water security." LANL IS&T Capability External Review. July, 2022.
- **Schwenk, J**. "The secret lives of rivers." Teen Science Café, Los Alamos, NM. March, 2022.
- **Schwenk, J.** et al. "How will a warming Arctic affect permafrost-modulated riverbank erosion?" Southern California Geomorphology Symposium. Irvine, CA. April, 2022.
- **Schwenk, J.** et al. "A Platform for the next generation of data-driven, river and watershed-centric modeling: Veins of the Earth." University of California, Irvine CEE Departmental Seminar. April, 2022.
- **Schwenk, J.** J. Rowland, K. Kaufeld. "Watersheds as natural spatial units: modeling carbon fluxes from riverbank erosion." Interagency Conference on Research in Watersheds. Virtual conference. November, 2020.
- **Schwenk, J.** "Intersections between Earth System Models and remotely-sensed observations." Climate, Ocean and Sea Ice Modeling (COSIM) webinar. August 2020.
  Schwenk, J., A. Piliouras, Y. Zhang, M. Fratkin, J. Rowland, M. Douglas, A. Chadwick, M. Lamb. "Permafrost control on river migration along the Koyukuk River, AK." AGU, San Francisco, CA. December 2019.
  Schwenk, J., A. Tejedor, E. Foufoula-Georgiou, J. Rowland. "Automatic extraction of delta channel network topology. AGU, Washington, D.C. December 2018.
  Vulis, L., A. Tejedor, **J. Schwenk**, E. Foufoula-Georgiou. "Channel-lake connectivity in Arctic deltas." AGU, Washington, D.C. December 2018.
  Rowland, J., **J. Schwenk**, E. Shelef, U. Mishra, J. Muss, S. Stauffer. "Pan-arctic flux of soil organic carbon to rivers by river bank erosion." AGU, Washington, D.C. December 2018.
- **Schwenk, J.**, "A meandering path toward global river morphodynamics." Descartes Labs, November 2018.
  Sare, R., **J. Schwenk**, J. Rowland. "Fluvial response to land use change measured in Landsat time series of migrating rivers." LANL Student Symposium. August, 2018.
- **Schwenk, J.**, A. Khandelwal, M. Fratkin, V. Kumar, and E. Foufoula-Georgiou. "River Morphodynamics from Space: The Landsat Frontier." EGU, Vienna, Austria, April 2017.
  Schwenk, J., E. Foufoula-Georgiou, "A case of self-perturbation: channel responses to meander cutoffs." EGU, Vienna, Austria, April 2017.
- **Schwenk, J.**, "It's high time for high time resolution of river morphodynamics." ACES in the Hole Seminar Series, Los Alamos National Laboratory, January 2017.
- **Schwenk, J.** "Meandering rivers: interpreting dynamics from planform geometry and the secret lives of migrating meanders." Summer Institute on Earth Surface Dynamics, August 2016.
- **Schwenk, J.** "Bend- and Reach-Scale River Planform Dynamics." NCED2 Computational Tools for Modeling Fluvial Processes from Grains to Landscapes, August 2016.
  Schwenk, J., Mulu Fratkin, and E. Foufoula-Georgiou. "Accelerated Migration Due to Cutoffs in the Ucayali River." American Geophyiscal Union, San Francisco, CA, December 2015.
  Schwenk, J., and E. Foufoula-Georgiou. "A natural experiment: Geomorphic consequences of a massive, human-induced cutoffs along the Ucayali River." River Coastal and Estuarine Morphodynamics, 9th Symposium, Iquitos, Peru, September 2015.
  Schwenk, J., E. Foufoula-Georgiou, and S. Lanzoni. "Revisiting nonlinearity in meandering river planform dynamics through Gradual Wavelet Reconstruction." American Geophysical Union, San Francisco, CA, December 2014.

Schwenk, J., S. Lanzoni, and E. Foufoula-Georgiou. "A backwards-in-time Lagrangian framework for extraction of meander bend dynamics: use in meander classification, process diagnostics, and model comparison." American Geophysical Union, San Francisco, CA, December 2013.
Schwenk, J., S. Baumgartner, A. Abeyta, S. Day. "Assessing the need for stream restoration efforts in Bassett Creek." Upper Midwest Stream Restoration Symposium, Minneapolis, MN, March 2012.

SERVICE

LDRD ER review panelist (ESA, DSMA)	**2024-2025**
Trail construction and maintenance – Los Alamos County	**2021 - present**
Association for Women Geoscientists Laramide Chapter – Treasurer and Secretary	**2021 - present**
Teen Science Café presenter for STEM-interested high-schoolers	**2022**
Instructor at "Wildfire Camp" for underrepresented undergrads	**2020- 2022**
Vice-president, Los Alamos Postdoctoral Association	**2017 - 2019**
Los Alamos County Science Fair Judge	**2017 - present**
Hour of code instructor at Barranca Mesa Elementary	**2017**
Association for Women Geoscientists fundraising organizer	**2017 - 2021**
Guest lecturer at Los Alamos High School	**2017 - 2018**
President, Saint Anthony Falls Laboratory Student Council	**2014 - 2016**
Co-Founder and Chair, Saint Anthony Falls Lab Bike Library	**2014 - 2016**
Senator, Tennessee Technological University Student Government	**2007**
Chair, Student Environmental Action Coalition, TN Tech	**2006 - 2007**
Reviewer for NSF, DOE, *Geophysical Research Letters*, *Geology*, *Journal of Hydrology*, *JGR-Earth Surface, Water Resources Research, Journal of Hydraulic Engineering*, *Environmental Modelling & Software*, *Land Degradation and Development, Remote Sensing, International Journal of Geo-Information*	**2015 - present**

LEADERSHIP

Los Alamos National Lab **2009 - present**

- **Advancing Machine Learning Fellowship PI**: Lead organizer of a team that administers an intense, 10-week summer fellowship for Graduate students
- **EES – IC Liaison** : Connecting EES capabilities to national security/intelligence community leads
- **DOE's AI future** : Led LANL's contributions to DOE's AI4ES (earth system predictability) vision and report. LANL's subject matter expert and contributor for DOE's AI4SES (science, energy, and security) vison and report.
- **AGU Session Chair** : Organized session on river dynamics at Fall 2021 AGU meeting.
- **LANL Postdoc Association** : Represented >400 postdocs as Vice President to improve inclusivity, postdoc benefits, and foster community

University of Minnesota **2010 - 2017**

Saint Anthony Falls Student Council : Represented >30 students as President and Vice President

SAFL Bike Library : Led a team of four volunteers to design, fund, and implement a bike library for the Saint Anthony Falls Lab student body

Landsat Analysis of Ucayali River : Led a team of five students in the computer science department to complete a complex, "big-data" analysis resulting in two papers.

Tennessee Technological University **2004 - 2007**

Student Government Association: As Senator, introduced the most bills among the >30 member Senate, mostly in effort to improve energy efficiency and sustainability measures

Student Environmental Action Coalition: As President, successfully campaigned for a student body self-imposed "green energy tax" that enabled the University to purchase renewable energy and implement energy efficiency upgrades

TEACHING AND MENTORSHIP

Los Alamos National Laboratory **2018-present**

Student and Postdoc Mentor

Postdoc Mentees:

Shubhendu Singh (2024 -) | reinforcement learning for reservoir operations | Now: LANL postdoc
Cansu Demir (2025 -) | Arctic E3SM Land Model development | Now: LANL postdoc
Tao Liu (2023-2025) | AI-enabled wildfire hydrology | Now: State of New Mexico
Rajiv Ranasinghe (2023-2025) | LSTM hydrology model development | Now: LANL Scientist
Chuck Abolt (2021-2023) | AI and computer vision | Now: Freshwater Trust
Jemma Stachelek (2021-2023) | Global hydrology | Now: LANL Scientist
Rachel Glade (2019-2021) | Solifluction | Now: University of Rochester Professor
Feng Yu (2018-2019) | Hydrology-focused GIS | Now: Bayer GIS Scientist

Student Mentees:

Mark Reedy (2025 -) | Causal AI for conflict modeling | Now: LANL GRA
Maggie Farley (2024 -) | | Drone field observations for permafrost | Now: LANL GRA
Shuyu Chang (2024) | AI for river temperature prediction | Now: U Connecticut (Incoming Prof.)
Gokul Nair (2022-2025) | Mosquito dynamics under climate change | Now: traveling post-PhD
Sarah Maebius (2022-2024) | AI for hydrologic prediction in arid regions | Now: Princeton PhD student
Elizabeth Prior (2022) | VotE dams creator | Now: Virginia Tech PhD student
Sofia Avendano (2022) | Water quality in Chesapeake Bay | Now: Elementary school teacher
Jay Hariharan (2021-2022) | Flux partitioning in delta networks | Now: US Federal Government
Rachel Ulrich (2021) | Arctic delta hydrology | Now: LANL staff
Bohan Chen (2021-2024) | Graph learning for computer vision | Now: Caltech Postdoc
Tal Zussman (2020) | rabpro development | Now: Columbia University PhD student
Tabatha Clevenger (2020) | Geospatial mapping | Now: Vassar College Academic Coach
Ryan Herring (2020) | ML + SAR for delta channel networks | Now: Math and Science instructor
Gailin Pease (2019) | CNNs for computer vision | Now: Singularity Energy Data Scientist
Mulu Fratkin (2018-2020) | Geomorphology and hydrology | Now: State of Minnesota

Robert Sare (2018) | Software development | Now: X/Google

University of Minnesota, Twin Cities **2015-2016**
Lecturer and TA

- **Lecturer**: Stochastic Geomorphology (CE 8490)
- **Lecturer**: Hydrologic Design (CE 4501)
- **Teaching Assistant**: Fluid mechanics (CE 3502); two semesters. Prepared weekly lectures and lab demonstrations, held office hours, and graded homework for 40 students.
- **Teaching Assistant**: Hydrologic Design (CE 5401); two semesters. Created and presented weekly lectures, designed homeworks, held office hours and graded exams and homeworks for 75 students.