

J Michael Johnson

GEOGRAPHER | DATA SCIENTIST | WATER RESOURCES

Fort Collins, Colorado

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As a geospatial data scientist my expertise lies in bridging data-intensive computational geography with water resources research through open-source software and data solutions. I lead the hydrofabric development and spatial data science efforts for NOAA's Next Generation Water Resources Modeling Framework and, with partners at the USGS, help spearhead a comprehensive suite of federal hydroinformatics products. Throughout my career, I have actively contributed to cutting-edge research, with a focus on publishing impactful findings and fostering collaborative relationships within the scientific community.

Employment

Lynker

Fort Collins, Colorado

CHIEF DATA SCIENTIST/ POD LEAD

Sep 2023 - Present

- Lead spatial data development for the NOAA Office of Water Prediction
- Support local and state level consulting projects related to water resource management and hazard mitigation
- Recruit, retain, and mentor a strong and diverse group of data scientists
- Act as a key liaison between NOAA and external stakeholders, fostering partnerships and knowledge exchange.

WATER RESOURCES DATA SCIENTIST

Aug 2020 - Sep 2023

NOAA Office of Water Prediction

Remote

HYDROFABRIC TECHNICAL DIRECTOR

Sep 2022 - Present

- Lead the development of foundational geospatial products essential to the Next Generation Water Modeling Framework.
- Foster collaboration with the USGS to construct federal software and data products crucial for advancing the NOAA and USGS Water Mission Areas.
- Collaborate closely with member universities of the CIROH (Cooperative Institute for Research to Operations in Hydrology) to facilitate the transition of research findings into operational hydrology practices.
- Direct a team dedicated to pioneering geospatial, machine learning, and cloud-based solutions tailored for open hydrologic science

SENIOR DATA SCIENTIST / LEAD HYDROFABRIC DEVELOPER

Aug 2020 - Present

RESEARCH COORDINATOR

2016

- Coordinate research activities and initiatives within the NOAA Summer Institute program.
- Facilitate collaboration between participants, mentors, and program organizers to ensure the smooth execution of research projects.
- Evaluate the effectiveness of research activities and contribute to the continuous improvement of the program.

University of Alabama

Remote

GRADUATE FACULTY (AFFILIATE)

Oct 2023 - Present

- Serve as member or co-chair on dissertation and thesis committees

Urban Flooding Open Knowledge Network

Remote

LEAD DATA SCIENTIST (INDEPENDENT CONTRACTOR)

Nov 2019 - Apr 2023

- Co-authored successful proposals to NSF and served as an advocate for the team in the initial C-ACCEL program
- Developed and designed a cost effective, cloud native, building level, flood forecasting system for the Continental United States.

UC Santa Barbara

Santa Barbara, California

LECTURER - GEOGRAPHY DEPARTMENT

Summer 2020, 2021

- Designed and taught the first geoinformatics course for UC Santa Barbara.

Visiting Researcher

Amsterdam, Boulder, Tuscaloosa

- **Institute for Environmental Studies. Vrije Universiteit**, Amsterdam, Netherlands: June - July 2019; January - March 2018
- **Research Applications Laboratory. NCAR**, Boulder, Colorado: August - September 2018
- **NOAA National Water Center**. Tuscaloosa, Alabama: Summers of 2016, 2017

Education

University of California, Santa Barbara

SANTA BARBARA, CA

PhD in Geography

2021

- **Advisor:** Dr. Keith C. Clarke
- **Committee:** Hugo Loaiciga, Kelly Caylor, David Blodgett
- **Title:** The Role of Spatial Data Science in Continental Scale Hydrology: Twelve Case Studies in Data Models, Data Structures, Modeling, and Evaluation

California Polytechnic State University

SAN LUIS OBISPO, CA

BS in Anthropology & Geography

2010 - 2015

- Cum Laude
- Outstanding Senior Award: College of Liberal Arts
- **Minors:** (1) GIS for Agriculture (2) Water Science (Watershed Management) (3) Statistics (4) Economics (5) Environmental Studies

Publications

 Google Scholar: 864 citations;  20 collaborators;  34 papers

h-index 13; **i-index** 14

- Fang, S., **Johnson, J.**, Yeghiazarian, L., & Sankarasubramanian, A. (2024). Improved national-scale above-normal flow prediction for gauged and ungauged basins using a spatio-temporal hierarchical model. *Water Resources Research*, 60 (1), e2023WR034557.
- Johnson, J.**, Afshari, S., & Rad, A. (2024). AHGestimation: An r package for computing robust, mass preserving hydraulic geometries and rating curves. *Journal of Open Source Software*, 9 (96), 6145.
- Johnson, J.**, Eyalade, D., Singh-Mohudpur, J., Rad, A., Coll, J., Spies, R., & (2024). Enhancing synthetic rating curve development through empirical roughness built for hydrofabric datasets. *ESS Open Archive*.
- Kim, D., **Johnson, J.**, Clarke, K., & McMillan, H. (2024). Untangling the impacts of land cover representation and resampling in distributed hydrological model predictions. *Environmental Modelling & Software*, 172, 105893.
- Rad, A., **Johnson, J.**, Eyalade, D., & Watters, A. (2024). Geospatial hydrofabric-driven machine learning for channel bathymetry and hydraulics at continental scales. *WaterSciCon*, n24.
- Blodgett, D., & **Johnson, J.** (2023). Hydrologic modeling and river corridor applications of HY_features concepts. *OGC Public Engineering Report*.
- Blodgett, D., **Johnson, J.**, & Andy, B. (2023). Generating a reference flow network with improved connectivity to support durable data integration and reproducibility in the coterminous US. *Environmental Modelling & Software*.
- Johnson, J.**, Blodgett, D., Clarke, K., & Pollak, J. (2023). Restructuring and serving web-accessible streamflow data from the NOAA national water model historic simulations. *Scientific Data*, 10 (1), 725.
- Johnson, J.**, Fang, S., Sankarasubramanian, A., Rad, A., Cunha, L. K. da, & (2023). Comprehensive analysis of the NOAA national water model: A call for heterogeneous formulations and diagnostic model selection. *Journal of Geophysical Research: Atmospheres*, 128 (24), e2023JD038534.
- Kohanpur, A., Saksena, S., Dey, S., **Johnson, J.**, Riasi, M., Yeghiazarian, L., & (2023). Urban flood modeling: Uncertainty quantification and physics-informed gaussian processes regression forecasting. *Water Resources Research*, 59 (3), e2022WR033939.
- Montello, D., Davis, R., **Johnson, J.**, & Chrastil, E. (2023). The symmetry and asymmetry of pedestrian route choice. *Journal of Environmental Psychology*, 102004.
- Narock, T., **Johnson, J.**, & Rad, A. (2023). Enhancing flood risk assessment through machine learning and open data. *EarthArXiv*.
- Rad, A., Abatzoglou, J., Fleishman, E., Mockrin, M., Radeloff, V., Pourmohamad, Y., Cattau, M., **Johnson, J.**, Higuera, P., Nauslar, N., & Sadegh, M. (2023). Social vulnerability of the people exposed to wildfires in US west coast states. *Science Advances*, 9 (38), eadh4615.
- Blodgett, D., & **Johnson, J.** (2022). nhdplusTools: Tools for accessing and working with the NHDPlus. *nhdplusTools: Tools for Accessing and Working with the NHDPlus*.
- Johnson, J.**, Narock, T., Singh-Mohudpur, J., Fils, D., Clarke, K., Saksena, S., & (2022). Knowledge graphs to support real-time flood impact evaluation. *AI Magazine*, 43 (1), 40-45.
- Johnson, J.**, & Clarke, K. (2021). An area preserving method for improved categorical raster resampling. *Cartography and Geographic Information Science*, 48 (4), 292-304.
- Blodgett, D., **Johnson, J.**, Sondheim, M., Wieczorek, M., & Frazier, N. (2020). Mainstems: A logical data model im-

- plementing mainstem and drainage basin feature types based on WaterML2 part 3: HY features concepts. *Environmental Modelling & Software*, 135, 104927.
- Clarke, K., & **Johnson, J.** (2020). Calibrating SLEUTH with big data: Projecting california's land use to 2100. *Computers, Environment and Urban Systems*, 83, 101525.
- Wens, M., Veldkamp, T., Mwangi, M., **Johnson, J.**, Lasage, R., Haer, T., & (2020). Simulating small-scale agricultural adaptation decisions in response to drought risk: An empirical agent-based model for semi-arid kenya. *Frontiers in Water*, 2, 15.
- Clarke, K., **Johnson, J.**, & Trainor, T. (2019). Contemporary american cartographic research: A review and prospective. *Cartography and Geographic Information Science*, 46 (3), 196-209.
- Johnson, J.**, & Clarke, K. (2019). climateR: An r package finding, subsetting, and retrieving geospatial data by AOI. <https://zenodo.org/records/10416587>.
- Johnson, J.**, Munasinghe, D., Eyelade, D., & Cohen, S. (2019). An integrated evaluation of the national water model (NWM) height above nearest drainage (HAND) flood mapping methodology. *Natural Hazards and Earth System Sciences (NHESS)*.
- Johnson, J.**, Wens, M., Zagaria, C., & Veldkamp, T. (2019). Integrating human behavior dynamics into drought risk assessment—a sociohydrologic, agent-based approach. *Wiley Interdisciplinary Reviews: Water*, e, e1345.
- De Cicco, L., Lorenz, D., Hirsch, R., Watkins, W., & **Johnson, J.** (2018). dataRetrieval: R packages for discovering and retrieving water data available from US federal hydrologic web services. *US Geological Survey, Reston, VA*, <https://doi.org/10.5066/P9X4L3GE>.
- Johnson, J.**, Coll, J., Ruess, P., & Hastings, J. (2018). Challenges and opportunities for creating intelligent hazard alerts: The “FloodHippo” prototype. *JAWRA Journal of the American Water Resources Association*.
- Lo'aiciga, H., & **Johnson, J.** (2018). Infiltration on sloping terrain and its role on runoff generation and slope stability. *Journal of Hydrology*, 561, 584-597.
- Johnson, J.**, & Lo'aiciga, H. (2017). Coupled infiltration and kinematic-wave runoff simulation in slopes: Implications for slope stability. *Water*, 9 (5), 327.

Grants and Fellowships

I have personally solicited **\$340,000** for research and development and been a core member of teams who have solicited **\$19,359,519**.

Developing a Freshwater Digital Twin for the Dangermond Preserve	2024
THE NATURE CONSERVANCY, JACK AND LAURA DANGERMOND PRESERVE	PI, Author
NOAA OWP Geospatial Services	2023-2025
NOAA OFFICE OF WATER PREDICTION	Lead Data Scientist, Co-author
NOAA OWP Next Generation Water Resource Modeling Framework Development	2022-2024
NOAA OFFICE OF WATER PREDICTION	Lead Data Scientist, Co-author
Increasing Environmental Data Access through a more robust federated data catalog and extending the climateR model to Python	2023
EARTH SCIENCE INFORMATION PARTNERS	Lead Data Scientist, Co-author
Machine Learning for Flood Risk Assessment	2022
EARTH SCIENCE INFORMATION PARTNERS	Data Scientist
The UFOKN: Delivering Flood Information to AnyOne, AnyTime, AnyWhere	2020-2022
NATIONAL SCIENCE FOUNDATION	Lead Data Scientist, Co-author
Convergence Accelerator Phase I (RAISE): The Urban Flooding Open Knowledge Network (UFOKN)	2019-2020
NATIONAL SCIENCE FOUNDATION	Lead Data Scientist
A National Water Model R Package: Improving access and application of model output	2018-2019
UCAR COMET	Co-PI, Co-author
FOSSFlood: The LivingFlood Application Built on Free Open Source Software	2017-2018
UCAR COMET	Co-PI, Co-author
Integrating farmers' adaptive behaviors in California's Central Valley to assess water and food security risks under climate change	2017-2018
UCGHI PLANETARY HEALTH SEED GRANT	Co-PI, Co-author

CUAHSI HydroInformatics Fellowship

CUAHSI

2020-2021

PI, Author

Jack and Laura Dangermond GIS Fellow in Residence

JACK AND LAURA DANGERMOND

2019-2020

Graduate Student

National Water Center Summer Institute

CUAHSI

2016

Research Coordinator

Disciplines Fellowship

UNIVERSITY OF CALIFORNIA REGENTS

2015-2016

Graduate Student

Teaching experience

I designed an upper division spatial data science course as a UCSB Lecturer, was a teaching assistant for over 15 courses (700+ students), and have lead community workshops for national organizations.

UNIVERSITY TEACHING

Introduction to Geoinformatics

UNIVERSITY OF CALIFORNIA, SANTA BARBARA, CALIFORNIA

Santa Barbara, CA

2021

- Independently developed and taught to address the growing need for data science in the GIS profession.
- Intended to become prerequisite course for the UCSB Geography Department and Masters in GIS Curriculum
- Open course content available here

TEACHING ASSISTANT

Remote Sensing of the Environment 2

DR. VENA CHU, ALANA AYASSE

2021, 2020

Upper-Division

Living with Global Warming

DR. CATHERINE GAUTIER

2020, 2019, 2018, 2016

Lower-Division

Conceptual Modeling and Programming for the Geo-Sciences

DR. KRZYSZTOF JANOWICZ

2020, 2019, 2017

Upper-Division and Graduate

Remote Sensing of the Environment 1

DR. JOE MCFADDEN

2020

Upper-Division

Remote Sensing of the Environment 3

DR. VENA CHU

2019

Upper-Division

Maps and Spatial Reasoning

DR. WERNER KUHN, DR. KEITH CLARKE

2019, 2018, 2017

Lower-Division

Cartographic Design and Geovisualization

DR. KEITH CLARKE

2018

Upper-Division

Environmental Water Quality

DR. HUGO LOAICIGA

2017

Upper-Division

Oceans and Atmosphere

DR. TIM DeVERIES

2016

Lower-Division

WORKSHOPS

End to End Hydrofabric Workflows

CIROH TRAINING AND DEVELOPER'S CONFERENCE

May 2021

Workshop Lead

- Design and led workshops sharing progress within the NOAA Enterprise Hydrofabric Solution

Leveraging the NHGF and NextGen derived products for Research

NOAA 2023 SUMMER INSTITUTE

June 2023

Workshop Lead

The NextGen Hydrofabric: What Is It, How to get it, and how to make your own?

CIROH TRAINING AND DEVELOPER'S CONFERENCE

May 2023

Workshop Lead

- Design and led 2 workshops exposing over 100 new developers to the available tools, data models, and datasets developed.

Introduction to core hydrofabric services and concepts

NOAA 2022 SUMMER INSTITUTE

June 2022

Workshop Lead

Working with Geospatial Hydrologic Data Using Web Services

INTERNET OF WATER

July 2022

Workshop Co-lead

R and Python Tools for Geospatial Water Applications

AWRA 2022 GEOSPATIAL WATER TECHNOLOGY CONFERENCE

May 2022

Workshop Co-lead

AWARD NOMINATIONS

Nominated for UCSB GSA Excellence in Teaching by students

2020, 2019

Nominated for UCSB Geography Excellence in Teaching by faculty member

2020, 2019

Open Source Software

A primary output of my scientific work is open source software in personal, USGS and NOAA repositories.

 Github:  228 followers;  749 stars

AOI

FAST AND FLEXIBLE GEOCODING AND AOI CREATION.

Lead Developer

climateR

INSTANT ACCESS TO GRIDDED AND OBSERVATION CLIMATE DATA.

Lead developer

climateR-catalogs

A CONSISTENT FEDERATED DATA CATALOG FOR PROGRAMMATIC ACCESS.

Lead developer

zonal

FAST, FLEXABLE SPATIAL DATA SUMMARIZATION.

Lead developer

nwmTools

NATIONAL WATER MODEL STREAMFLOW ACCESS.

Lead developer

DOI-USGS/nhdplusTools

MANIPULATING HYDROGRAPHIC DATA WITH THE NHDPLUS DATA MODEL.

Author

DOI-USGS/dataRetrieval

R INTERFACE TO THE USGS DATA HOLDINGS.

Author

DOI-USGS/hyRefactor

MANIPULATING THE NHDPLUS NETWORK FOR HYDROLOGIC MODELING.

Author

NOAA-OWP/hydrofabric

GENERATING DATA PRODUCTS FOR CONTINENTAL SCALE HYDROLOGY

Lead Developer

AHGestimation

ESTIMATING ROBUST, MASS CONSERVING AHG RELATIONSHIPS WITH CROSS SECTION HYDRAULICS AND GEOMETRY

Lead Developer

Invited Presentations

Data and Architectural Advances (and limits) towards improved local and large scale modeling

Feb 2024

NATIONAL RESERVOIR DATA SYMPOSIUM

Invited Talk

Increasing Environmental Data Access: The ClimateR and ClimatePy Ecosystems

Jan 2024

ESIP WINTER MEETING

Plenary

Primer on earth science data standards

Jan 2024

ESIP WINTER MEETING

Invited Talk

The NOAA Next Generation Water Resource Modeling Framework Hydrofabric

Jan 2024

AMS: BALTIMORE

Conference Talk

Current State of the NOAA NextGen Enterprise Hydrofabric System AGU SAN FRANCISCO	Dec 2023 Conference Talk
Integrated Hydro-Terrestrial Modeling 2.0 ICF GLOBAL HEADQUARTERS CONFERENCE CENTER <ul style="list-style-type: none"> Workshops to advance community modeling and integrated water resources management. Nominated by NOAA to attend. 	Oct 2023 Workshop
Meeting Data Where it Lives the power of virtual access patterns ESIP RANTS AND RAVES: INFORMATION TECHNOLOGY AND INTEROPERABILITY (IT&I) TECH DIVE <ul style="list-style-type: none"> Exploring the underutilized potetnial of GDAL virtual access patterns in a 1 hour technical talk. 	Mar 2023 Invited Talk
The NOAA NextGen Water Resources Modeling Framework Hydrofabric: Version 1.0 AGU: CHICAGO	Dec 2022 Conference Talk
Introducing a building level, continental scale, flood risk forecast system AGU: CHICAGO	Dec 2022 Conference Talk
NOAA USGS Quarterly Meetings NOAA-USGS QUARTERLY MEETINGS <ul style="list-style-type: none"> Briefed USGS and NOAA Leadership at Quartly Meeting. Represented ongoing NOAA USGS collaboration. 	Nov 2022 Invited Talk
NOAA USGS Modeling Workshop NATIONAL CONSERVATION TRAINING CENTER FACILITY <ul style="list-style-type: none"> USGS/NOAA Programatic Level Setting 	Oct 2022 Stratigic Planning Workshop
End-to-end Hydrofabric workflows for the NextGen Water Resources Modeling Framework FRONTEIRS IN HYDROLOGY: PUERTO RICO	Jun 2022 Conference Talk
Tools for Processing the NHDPlus into a Hydrofabric Suitable for Use in the NextGen National Water Model AGU: NEW ORLEANS	Dec 2021 Conference Talk