

Dr. J Michael Johnson

GEOGRAPHER | DATA SCIENTIST | WATER RESOURCES

Fort Collins, Colorado

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I am a **geospatial data scientist** leading the **hydrofabric development for NOAA's Next Generation National Water Model** along with collaborative federal efforts to define a national suite of hydroinformatic data products. I seek to bridge **data-intensive computational geography** with **water resources research** to design new data products and develop open-source software to ease community access to big geospatial data.

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

WATER RESOURCES DATA SCIENTIST

Aug 2020 - Sep 2023

NOAA Office of Water Prediction

Remote

HYDROFABRIC TECHNICAL DIRECTOR

Sep 2022 - Present

- Develop foundational geospatial products to support the Next Generation Water Modeling Framework
- Collaborate with the USGS to build a suite of federal software and data products to support the NOAA and USGS Water Mission Areas
- Work with the CIROH member universities to support research to operation hydrology
- Lead a team developing novel machine learning, geospatial, and cloud based solutions for open hydrologic science

SENIOR DATA SCIENTIST @ NWS / LEAD HYDROFABRIC DEVELOPER

Aug 2020 - Present

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.

NOAA Office of Water Prediction

Tuscaloosa, Alabama

RESEARCH COORDINATOR

2016

- Led students towards the successful execution of projects related to the National Water Model Research Fellowship

Visiting Researcher

Amsterdam, Boulder, Tuscaloosa

2016 - 2018

- **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

PhD in Geography

SANTA BARBARA, CA

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

- 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: 470 citations;  20 collaborators;  27 papers
 h-index 10;  i-index 12

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.

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.

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.

Johnson, J. (2022). The role of spatial data science in continental scale hydrology: Twelve case studies in data models, data structures, modeling, and model evaluation. *University of California, Santa Barbara*.

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 implementing 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.

Blodgett, D., & **Johnson, J.** (2018). nhdplusTools: Tools for accessing and working with the NHDPlus. *Available from https://code.usgs.gov/Water/nhdplusTools*.

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., Coll, J., Cohen, S., Nelson, J., Ogden, F., Praskiewicz, S., & ... (2017). National water center innovators program summer institute report 2017. *Consortium of Universities for the Advancement of Hydrologic Science, Inc.*

Johnson, J., & Lo’aiciga, H. (2017). Coupled infiltration and kinematic-wave runoff simulation in slopes: Implications for slope stability. *Water*, 9 (5), 327.

Johnson, J., & Howell, G. (1996). Thermal maturity of sedimentary basins in alaska. *US, Geological Survey Bulletin*, 2142, 1-19.

Grants and Fellowships

I have personally solicited **\$451,000** for research and development and been a core member of teams who have solicited **\$19,292,519**.

NOAA OWP Geospatial Services	\$8,000,000
NOAA OFFICE OF WATER PREDICTION	2023-2025
NOAA OWP Next Generation Water Resource Modeling Framework Development	\$7,300,000
NOAA OFFICE OF WATER PREDICTION	2022-2024
Increasing Environmental Data Access through a more robust federated data catalog and extending the climateR model to Python	\$6,000
EARTH SCIENCE INFORMATION PARTNERS	2023
Machine Learning for Flood Risk Assessment	\$20,000
EARTH SCIENCE INFORMATION PARTNERS	2022
The UFOKN: Delivering Flood Information to AnyOne, AnyTime, AnyWhere	\$2,853,561 (Subaward: \$240,000)
NATIONAL SCIENCE FOUNDATION	2020-2022
Convergence Accelerator Phase I (RAISE): The Urban Flooding Open Knowledge Network (UFOKN)	\$1,027,958 (Subaward: \$100,000)
NATIONAL SCIENCE FOUNDATION	2019-2020
A National Water Model R Package: Improving access and application of model output	\$15,000
UCAR COMET	2018-2019
FOSSFlood: The LivingFlood Application Built on Free Open Source Software	\$5,000
UCAR COMET	2017-2018

Integrating farmers' adaptive behaviors in California's Central Valley to assess water and food security risks under climate change	\$10,000
UCGHI PLANETARY HEALTH SEED GRANT	2017-2018
CUAHSI HydroInformatics Fellowship	\$5,000
CUAHSI	2020-2021
Jack and Laura Dangermond GIS Fellow in Residence	\$5,000
JACK AND LAURA DANGERMOND	2019-2020
National Water Center Summer Institute	\$15,000
CUAHSI	2016
Disciplines Fellowship	\$30,000
UNIVERSITY OF CALIFORNIA REGENTS	2015-2016

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	Santa Barbara, CA
UNIVERSITY OF CALIFORNIA, SANTA BARBARA, CALIFORNIA	2021
<ul style="list-style-type: none"> 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	2021, 2020
DR. VENA CHU, ALANA AYASSE	Upper-Division
Living with Global Warming	2020, 2019, 2018, 2016
DR. CATHERINE GAUTIER	Lower-Division
Conceptual Modeling and Programming for the Geo-Sciences	2020, 2019, 2017
DR. KRZYSZTOF JANOWICZ	Upper-Division and Graduate
Remote Sensing of the Environment 1	2020
DR. JOE MCFADDEN	Upper-Division
Remote Sensing of the Environment 3	2019
DR. VENA CHU	Upper-Division
Maps and Spatial Reasoning	2019, 2018, 2017
DR. WERNER KUHN, DR. KEITH CLARKE	Lower-Division
Cartographic Design and Geovisualization	2018
DR. KEITH CLARKE	Upper-Division
Environmental Water Quality	2017
DR. HUGO LOAICIGA	Upper-Division
Oceans and Atmosphere	2016
DR. TIM DEVERIES	Lower-Division

WORKSHOPS

Leveraging the NHGF and NextGen derived products for Research	June 2023
NOAA 2023 SUMMER INSTITUTE	Workshop Lead
The NextGen Hydrofabric: What Is It, How to get it, and how to make your own?	May 2023
CIROH TRAINING AND DEVELOPER'S CONFERENCE	Workshop Lead
<ul style="list-style-type: none"> Design and led 2 workshops exposing over 100 new developers to the avaiable tools, data models, and dataset developed. 	
Introduction to core hydrofabric services and concepts	June 2022
NOAA 2022 SUMMER INSTITUTE	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](#):  189 followers;  692 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, FLEXIBLE 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

FHGestimation

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

Lead Developer

Invited Presentations

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

Oct 2023

Workshop

- Workshops to advance community modeling and integrated water resources management.
- Nominated by NOAA to attend.

Meeting Data Where it Lives the power of virtual access patterns

ESIP RANTS AND RAVES: INFORMATION TECHNOLOGY AND INTEROPERABILITY (IT&I) TECH DIVE

Mar 2023

Tech Talk

- Exploring the underutilized potetnial of GDAL virtual access patterns in a 1 hour technical 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

- Briefed USGS and NOAA Leadership at Quartly Meeting.
- Represented ongoing NOAA USGS collaboration.

Nov 2022
Tech Talk

NOAA USGS Modeling Workshop

NATIONAL CONSERVATION TRAINING CENTER FACILITY

- 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

ESIP