G. Aaron Alexander

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Education:

University of Wisconsin, Madison June 2020 – Present	**Ph.D. Candidate in Water Resources Engineering** ***Advisors:*** Drs. Daniel B. Wright, Steven P. Loheide II, Carolyn B. Voter ***Dissertation Title:*** The Role of Widespread Greening on Urban Hydrological and Hydrometeorological Processes ***Expected Graduation:*** Spring 2025
University of California, Davis August 2017 – March 2020	**M.S. in Water Resources Engineering** ***Advisor:*** Dr. Holly J. Oldroyd Emphasis in Micrometeorology/Land-Surface Interactions/Earth Systems Modeling
University of Nevada, Reno August 2013 – May 2017	**B.S. in Physics and Atmospheric Sciences** ***Honors:*** Magna Cum Laude, Westfall Scholar University of Nevada, Reno Outstanding Senior Award, NSF Nevada EPSCoR Grant Recipient 2016, Undergraduate Research Scholarship Recipient 2016, John W. James Scholarship Recipient, Dean's List Fall 2013-Spring 2017

Publications:

- **Alexander, G. A.,** D. B. Wright, C. B. Voter, S. P. Loheide II. City-Scale Evaluation of Urban Ecohydrologic Processes on Surface Energy Balance, Heat, and Humidity (In Review).
- **Alexander, G. A.,** C. B. Voter, D. B. Wright, S. P. Loheide II. Urban ecohydrology: Accounting for sub-grid lateral water and energy transfers in a land surface model. *Water Resources Research*, 2024.
- Tran, V. N., V. Y. Ivanov, W. Huang, K. Murphy, F. Daneshvar, **G. A. Alexander**, J. Kim, D. B. Wright. Flood Connectivity in Urbanscapes Can Reverse Stormwater Systems' Work. *Nature Cities,* 2024.
- Tran, V. N., V. Y. Ivanov, W. Huang, K. Murphy, F. Daneshvar, **G. A. Alexander**, J. Kim, D. B. Wright. Urban flooding is intensified by outdated design guidelines and a lack of a systems approach. *Nature Cities,* 2024.
- Caputi, D.J., J. Trousdell, S. Mehrotra, S. Conoley, **G. A**. **Alexander**, H. J. Oldroyd, I. C. Faloona. Entrainment Rates and Their Synoptic Dependence on Wind Speed Aloft in California's Central Valley. *Boundary-Layer Meteorology*, 2022.
- **Alexander, G. A.,** H. A. Holmes, X. Sun, D. J. Caputi, I. C. Faloona, H. J. Oldroyd. Simulating land-atmosphere coupling in the Central Valley, California: Investigating soil moisture impacts on boundary layer properties. *Agricultural and Forest Meteorology*, 2022
- Kelley, J., D. McCauley, **G. A. Alexander,** W. Gray, R. Siegfried, H. J. Oldroyd. Using Machine Learning to Integrate On-Farm Sensors and Agro-Meteorology Networks into Site-Specific Decision Support. *Transactions of the ASABE*, 2020.

Research Proposals:

- "*A Multi-City Digital Twin Study of the Role of Green Infrastructure in Coupled Land-Atmosphere Prediction",* NASA Land Cover/ Land Use Change, Postdoctoral Researcher (PI: Mutlu Ozdogan, Co-I: D.B. Wright, Anna-Marie Schneider). Award Term 2025-2028. Award Amount $725,781

- *"Assessment of Extreme Short-Duration Rainfall and its Drivers to Support Precipitation Frequency and PMP Analyses",* NOAA, Postdoctoral Researcher (PI D.B. Wright, Co-I: Y. Derin). *Under Review*
- "*Quantifying Satellite Precipitation and Hydrologic Model Parameter Uncertainties to Advance Flood Prediction in Ungauged Regions*", NASA FINESST, Co-I[1] (PI: D. B. Wright & 3 other investigators). Student: Kaidi Peng. Award Term: 2024-2027 Award amount $150,000
- "Leveraging High Resolution Rainfall Simulations to Characterize management Impacts and Urban Resilience". NCAR Computation and Information Systems, Co-I (PI: D. B. Wright). Award Term: 2022- 2025. Award Amount: 5,000,000 computing hours on Cheyenne/ Derecho.
- "Characterizing the Co-Benefits of Urban Greening in Coastal Cities: Reducing Runoff, Extreme Heat, and Heavy Rainfall", Milwaukee Metropolitan Sewerage District. Graduate Student (PI: D. B. Wright & S. P. Loheide). Award Term: 2022-2023. Award Amount: $57,000

Selected Invited Presentations:

- **Alexander, G. Aaron**, C. B. Voter, S.P. Loheide, and D.B. Wright: How Adoption of Green Infrastructure Impacts Uran Hydrologic-Atmospheric Processes. Noah-MP Users Workshop. 3 June 2024
- **Alexander, G. Aaron**, C. B. Voter, S.P. Loheide, and D.B. Wright: Developing New Mosaic and Urban Sub-Grid Scale Modules for Noah-MP. Noah-MP National Monthly Telecon. 27 September 2023
- **Alexander, G. Aaron**, C. B. Voter, S.P. Loheide, and D.B. Wright: Better Representation of Urban Vegetation Alters Surface Water and Temperature Cycles. Climate, People, and the Environment Program Seminar. 11 Apr 2023. https://www.youtube.com/watch?v=UeqhUzJVPvU&list=PLYi-sc-stSe6vkFL0X4swp8d4Wt8HMY9B&index=7
- **Alexander, G. Aaron**, C.B. Voter, S.P. Loheide, D.B. Wright, Mitigating Extreme Rainfall Events in Coastal Communities Using Green Infrastructure, Milwaukee Metropolitan Sewerage District Lunch and Learn, June 10, 2021 (Virtual).

Conference Presentations:

- **Alexander G. A.,** C. B. Voter. S. P. Loheide, D. B. Wright: How Adoption of Green Infrastructure Impacts Uran Hydrologic-Atmospheric Processes. Session: Emerging Concepts and Methods in Modeling Hydrologic and Hydro-climatic Processes. Milwaukee, WI. Presented at Environmental & Water Resources Institute Congress 2024.
- Peng, K., D. B. Wright, S. Hartke, Z. Li, **G. A. Alexander**[1]: Advancing Hydrologic Prediction and Decision-making in Ungauged Regions Through Satellite Precipitation Uncertainty Estimation. H21X-1658: Space-Based Precipitation Observations: Innovations for Science and Applications I Poster. San Francisco, Ca. Presented at AGU Fall Meeting 11-15 Dec 2023.
- Abbasian, M., D. B. Wright, D. Vimont, S. J. Vavrus, M. Notaro, B. FitzGerald. **G. A. Alexander**: How Well Can State-of-the-Art Convection-Permitting Climate Simulations Reproduce Flood Hydrology in the Midwest. H23N-1770: Advancing Hydrologic Modeling and Prediction Using Large-Domain Meteorological and Hydrologic Datasets III Poster. San Francisco, Ca. Presented at AGU Fall Meeting 11-15 Dec 2023.
- **Alexander G. A.,** C. B. Voter. S. P. Loheide, D. B. Wright: Better Representation of Urban Hydrologic Processes Alters Surface Water and Temperature Cycles in Regional Climate Models. CUAHSI Bienniel 2023, 11-15 June 2023
- **Alexander G. A*.,** C. B. Voter. S. P. Loheide, D. B. Wright: Resolving Fine-Scale Lateral Water Transfers in Urban Environments Alters Regional Climate Simulations. Bryson Poster Reception, Madison, WI. 13 Feb 2023 *(*Runner-up in Outstanding Poster Competition)*

[1] Advisor to Graduate Student

- **Alexander G. A.,** C. B. Voter. S. P. Loheide, D. B. Wright: Resolving Fine-Scale Lateral Water Transfers in Urban Environments Alters Regional Climate Simulations. 36CVC-40: Frontiers in Earth Systems Modeling: Bridging the Gap Between Weather, Climate, and Impacts. Denver, Co. Presented at 2023 AMS Annual Meeting, 8-12 Jan 2023
- Hartke, S**, G.A. Alexander**,** D. B. Wright, K. Peng: Impacts of IMERG Precipitation Uncertainty on Near-Surface Hydrologic Fluxes in a Season Long Simulation. 16A.2: Precipitation Processes and Observations for Atmospheric, Land Surface, and Hydrological Modeling III. Denver, Co. Presented at 2023 AMS Annual Meeting, 8-12 Jan 2023 ***(Presenting Author)*
- **Alexander G. A.,** C. B. Voter. S. P. Loheide, D. B. Wright: Better Representation of Urban Hydrologic Processes Alters how Heat Responds to Urban Vegetation in Regional Climate Models. H22Y-1159: Urban Heat, Vegetation, and Water Dynamics: New Insights and Implications for Management and Equity. Chicago, Il. Presented at 2022 AGU Fall Meeting, 12-16 Dec 2022
- **Alexander G. A.,** C. B. Voter. S. P. Loheide, D. B. Wright: Incorporating Impacts of Green Infrastructure into a Large-Scale Land Surface Model. H34H: Urban Heat, Vegetation, and Water Dynamics: New Insights and Implications for Management and Equity. New Orleans, LA. Presented at 2021 AGU Fall Meeting, 13-17 Dec 2021
- **Alexander G. A.*,** C. B. Voter, S. P. Loheide, and D. B. Wright: Incorporating the Hydrologic Impacts of Low Impact Development in a Large-Scale Land Surface Model. American Water Association – Wisconsin Section, Madison, WI, 3-4 March 2021. **(Outstanding Graduate Student Presentation Award Winner)*
- **Alexander G. A.,** X. Sun, J. Trousdell, I. Faloona, H. A. Holmes, and H. J. Oldroyd: Implications of Soil Moisture on Modeled Land-Atmosphere Interactions over Heterogenous Terrain. Meteorology and Climate – Modeling for Air-Quality, Davis, CA, UC Davis , 11-13 Sept 2019
- **Alexander G. A.,** H. A. Holmes, J. Trousdell, I. Faloona, and H. J. Oldroyd: The Influence of Irrigated Soil Moisture on Modeled Land-Atmosphere Interactions and Simulated Flows in the San Joaquin Valley, California. 33rd Conference on Hydrology, Phoenix, AZ, Amer. Meteor. Soc.
- Faloona, I., D. Caputi, J. Smoot, N. Falk, S. A. Conley, **G. A. Alexander,** H. J. Oldroyd: Synoptic Controls on Entrainment Mixing, Shear, and The Three-Layer Atmosphere Above the San Joaquin Valley of California. 23rd Symposium on Boundary Layers and Turbulence, Norman, OK, Amer. Meteor. Soc.
- **Alexander, G. A.,** H. A. Holmes, W. P. Arnott, J. C. Barnard, A. Rollings: Determining Atmospheric Conditions That Impact Solar Energy Potential in Nevada. Eighth Conference on Weather, Climate, Water and the New Energy Economy hosted at Annual AMS National Conference 2018, Seattle, WA, Amer. Meteor. Soc.
- **Alexander, G. A.,** D. Collins, M. Salgado: Direct Measurement of the Impact of Atmospheric Processing on the Size and Properties of Sub- and Super-micron Aerosol Particles. 15th Annual AMS Student Conference, New Orleans, LA, Amer. Meteor. Soc.

Professional Service:

American Geophysical Union Precipitation Technical Committee

Term: February 2024 – Present

- With ~30 other early career scientists, we promote all things precipitation in AGU.
- Lead a Webinar entitled “Precipitation in all its Forms”, where invited discussed the mechanisms through which their precipitation forms, and what the frontiers in precipitation science are!

American Geophysical Union Hydro-JEDI (Justice, Equity, Diversity, Inclusivity) Committee

Term: October 2024 – Present

- With ~10 other early career scientists, address JEDI centric issues in the hydrologic section of AGU.

Civil And Environmental JEDI (Justice, Equity, Diversity, Inclusivity) Committee: UW-Madison

Term: October 2020 – Present

- Represented student voices of the Water Resources Engineering Department within the larger Civil and Environmental Engineering Department.
- Spearheaded the CEE department "Coffee in the Lab", where different lab spaces are used to host monthly free coffee for graduate students.
- Developed both core tenants within the CEE Department as well as new requirements for faculty to receive pay raises based on JEDI requirements.

American Meteorological Society Board of Student Affairs: Professional Development Committee

Term: January 2023 – January 2024

- Along with Holly Mallinson and Margaret Orr, developed the first board for students in the 100+ years of AMS history, which includes the student conference planning committee, professional development committee, media sub-committee, and specialty meeting committee.
- First Co-Chair of Professional Development Chair, where I have developed new professional networking opportunities for early career professionals and students at AMS national meetings, as well as multiple webinars focused on gaining new skills that are currently not addressed by AMS
- Developed a new professional attire scholarship that will help offset costs of students attending their first AMS meeting. This scholarship is in effect for the 2025 Annual Conference!

American Meteorological Society Student Conference

Term: February 2017 – January 2023

- Co-Chair for AMS 2023 in Denver, CO. This involved chairing overall sessions for 500+ students, creating program for entire conference, advocating for students throughout the interfacing with other national groups, and leading a team of 40+ other students around the country.
- Helped organize AMS Student Conference in Austin Texas (2018), Phoenix Arizona (2019), Boston Massachusetts (2020), New Orleans (2021), and Houston (2022).
- Corresponded with national partners for conference session suggestions, coordinated speakers, and planned interactive workshops for students to attend.
- In 2023, spearheaded new sessions focused on new and emerging sectors of weather and water enterprise jobs. Many of the sessions I created were focused on skills students need, both soft skills and ways to take care of oneself in future careers. Further integrated national partnerships like the Society of Physics Students.

  Sessions Planned:

  Overall Co-Chair 2023
  Conversations with Professionals 2021, 2022
  Skills for the Field: Crash Course in Giving a Presentation 2020
  The Social Sphere: Public Policy in the Weather Sector 2019
  Graduate Student Panel 2019
  Interactive Resume Workshop 2020, 2019, 2018
  Academia Breakout Session 2018

Environmental & Water Resources Engineering Showcase
Term: February 2019 – April 2019

- Helped organize inaugural Environmental & Water Resources Engineering Showcase for Civil and Environmental Engineering Department at UC Davis
- Acted as featured presenter to showcase applications of water resource information and Masters of Ceremony for event

Meteorology and Climate - Modeling for Air Quality
Term: August 2017-September 2017

- Volunteered to help plan National Conference for Meteorology, Climate, and Air Quality. Worked to finalize details pertaining to food, organization, and enforced time restrictions for entire conference.

Teaching Experience:

Instructor Assistant: Fall Semester 2024
CEE 516: Hydrologic Data Analysis

- Revamped course homework to integrate more real-world examples remote sensing and high-density rain gage comparisons, spatial and temporal comparisons of extreme temperatures, and flooding in urban regions
- Created course project based around statistical modeling and data uncertainty. Students had to find their own datasets and application and defend out how to characterize uncertainty for their datasets. Projects this semester range from water quality, eddy covariance characterization of dew, and extreme rainfall.

Lead Teaching Assistant: Spring Semester 2023
CEE 311: Hydroscience

- Introductory water resources engineering lab for all civil and environmental engineering students once a week for 2 hours. Further developed quiz questions, exam questions, and lead office hours once a week.
- Developed in lab activities to re-enforce concepts presented in class like group example work time, live coding, and water balance walkthroughs. Each of these utilized flipped classrooms, where students had seen the concepts before joining class time.
- Advised other TAs on best teaching practices.

Instructor Assistant: Fall Semester 2023
CEE 415: Hydrology

- Revamped course homework to integrate more real-world examples including using data from Iowa Floods, flux towers measurements in California, and extreme storms like Hurricane Harvey.
- Developed lecture on land surface energy balance and interconnections with water balance.
- Created course project based around hydrologic modeling, including compiling datasets and walkthroughs for students to extrapolate for their own topics of interest.

Teaching Assistant: Winter Quarter 2020
ECI 146: Water Resources Simulation

- Taught undergraduate level lecture once a week on the theory and implementation of numerical methods for water systems. Topics included discretization of differential equations, stability of numerical methods, and fundamental types models.

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Instructor Assistant: Fall Quarter 2019
ECI 273: Water Resources Systems Engineering

- Modified and graded homework that focused on how to conceptualize and solve reservoir operations as a system.
- Guest lectured on topics focusing around systems in other parts of the water cycle, including interconnections with weather.

Engineering Communication Guest Lecture: April/October 2019

- Taught undergraduate level lecture on impacts of the environment on engineering design. Covered how to read basic data so environmental factors could be considered in final design projects.

Teaching Assistant: Winter Quarter 2019 & Fall Quarter 2017
ECI 100: Introductory Fluid Mechanics

- Organized laboratory lectures and demonstrations for junior level fluid mechanics course. Aided in proctoring examinations, grading laboratory reports, and aiding in creation of final laboratory video projects.

Undergraduate Weather Workshop: May/October 2018

- Developed and taught a five-hour workshop for undergraduate civil and environmental engineering students as a ‘Crash Course’ on the theory behind atmospheric observation.
- Students interacted in groups to develop communication skills and generate a measurement campaign given a real-world scenario

Atmospheric Boundary Layer Dynamics Guest Lecture: November 2018

- Taught graduate level lecture on atmospheric boundary layer modeling focusing on techniques used in current numerical weather predication models

Teaching Assistant: Winter Quarter 2018
ECI 141: Engineering Hydraulics

- Led lab lecture and demonstration covering topics such as pipe flow and open channel flows. Aided in grading laboratory reports, grading midterm exams, and responding to student questions on course content.