Tyler Waterman

NSF Postdoctoral Fellow ▪ University of Utah ▪ Mechanical Engineering
tyler.waterman@utah.edu ▪ tswater.github.io ▪ Google Scholar

Education

Duke University

PhD in Civil and Environmental Engineering, Hydrology and Fluid Dynamics Track 05/2024

- 2024 Dissertation: *Representing the Heterogeneity of Land-Atmosphere Interactions in Earth System Models*
- Certificate in College Teaching
- Preparing Future Faculty (PFF) Fellow

University of California Berkeley

B.S in Civil and Environmental Engineering 05/2019

- 2018 Honors Research Thesis: *Developing a Framework for Modern Modeling of Interception Loss in Forest Canopies* advised by Dr. Sally Thompson
- 2017 Honors Research Thesis: *Development of Efficient CRISPR-Cas9 Genome Editing in Desulfovibrio vulgaris Hildenborough (DvH) for Studying Anaerobic Microbial Functions and Interactions* advised by Dr. Lisa Alvarez Cohen

Academic Interests

Earth systems science, land-atmosphere interactions, boundary layer meteorology, environmental data, mesoscale meteorology, atmospheric science, earth system model development, hydrology, ecohydrology, large eddy simulation, machine learning, remote sensing, pedagogy in earth systems science

Research Appointments

University of Utah: Dr. Marc Calaf

NSF Postdoctoral Fellow (July 2024 – Present)

Developing novel parameterizations of turbulent exchange between the land and atmosphere and examining the physics of momentum, heat, carbon and moisture in the atmospheric boundary layer

Duke University: Dr. Nathaniel Chaney Hydrology Lab

Research Assistant (August 2019 – May 2024)

Leveraged large datasets (NEON, satellite, etc.), as well as coarse and high resolution modeling, to understand heterogeneity and land-atmosphere interactions and develop novel, heterogeneity-aware parameterizations

University of California Berkeley: Dr. Sally Thompson Ecohydrology Lab

Undergraduate Researcher (May 2018 – January 2019)

Participated in field work in fire ecology and hydrology while developing a model of canopy rain interception

Teaching Experience

Duke Civil and Environmental Engineering

Environmental Spatial Data Analysis – Teaching Assistant (Fall 2021)

- Taught and helped develop materials for a series of course lectures
- Codeveloped course assignments with instructor, graded them, and answered student questions
- Anonymous Feedback: "*Tyler was an Integral part of my learning*" (download full evaluations here)

Fluid Mechanics – Teaching Assistant (Fall 2022)

- Led undergraduate lab sessions and experiments on fluids topics
- Held office hours and graded student coursework
- Anonymous Feedback: *"Tyler teaches for learning and understanding rather than assignment completion. In office hours he would challenge me to fully understanding the background knowledge, concepts and applications of the questions"* (download full evaluations here)

Berkeley Civil and Environmental Engineering

International Water Development – Student Instructor (Spring 2018)

- Established and created the curriculum for a lower division Berkeley undergraduate course on water systems in developing countries
- Taught basic computer aided design and principles of water development, water systems, social implications of water, and the design process to Berkeley undergraduate students

Honors, Grants and Awards

2024 NSF-AGS Postdoctoral Fellowship "Extending the Applicability of Monin-Obukhov Similarity Theory-based Surface Layer Parameterizations to Complex Surfaces in Earth System Models" ($200,000)

2024 GEWEX OSC Early Career Support ($2000)

2022 Preparing Future Faculty Fellow ($500)

2022 Duke Professional Development Fund ($250)

2020 NSF Graduate Research Fellowship Program – Honorable Mention

2019 Pratt Gardner Fellowship ($10,000)

2018 Slotman Award for Excellence in New Student Services

2015 Croul Family Scholarship ($4,000)

Publications

Waterman, T., Stiperski, I., Chaney, N., Calaf, M. (2025) Evaluating Anisotropy-based Monin-Obukhov Similarity Theory over Canopies and Complex Terrain. In Review *Quarterly Journal of the Royal Meteorology Society*. Preprint on arxiv: https://doi.org/10.48550/arXiv.2502.13970

Waterman, T., Dirmeyer, P., and Chaney, N., (2025) Surface Flux Homogenization and Its Impacts on Convection across CONUS. *J. Hydrometeor.*, 26, 709–724, https://doi.org/10.1175/JHM-D-24-0098.1.

Waterman, T., Bragg, A., Hay-Chapman, F. et. al. (2024) A Two-Column Model Parameterization for Subgrid Surface Heterogeneity Driven Circulations. *Journal of Advances in Modelling Earth Systems*. 16, e2023MS003936 https://doi.org/10.1029/2023MS003936

Waterman, T., Bragg, A., Katul, G., Chaney, N. (2022) "Examining Parameterizations of Potential Temperature Variance Across Varied Landscapes for use in Earth System Models" *Journal of Geophysical Research: Atmospheres*, 127, https://doi.org/10.1029/2021JD036236

Fowler, M., Neale, R., **Waterman, T.**, et. al (2024) Assessing the Atmospheric Response to Subgrid Surface Heterogeneity in the Single-column Community Earth System Model, version 2 (CESM2). *Journal of Advances in Modelling Earth Systems, 16(3). https://doi.org/10.1029/2022MS003517*

Torres Rojas, L., **Waterman, T.**, Cai, J., Zorzetto, E. Wainwright, H., Chaney, N. (2024) A geostatistics-based tool to characterize spatio-temporal patterns of remotely sensed land surface temperature fields over the Contiguous United States. *Journal of Geophysical Research: Atmospheres, 129. https://doi.org/10.1029/2023JD040679*

Bacelar, L., Torres Rojas, L., Vergopolan, N., **Waterman, T.,** Chaney, N. Leveraging clustering to enable locally relevant and computationally efficient runoff predictions. Revision *Journal of Hydrology*. Preprint: http://dx.doi.org/10.2139/ssrn.4737923

Lau, R., Seguí, C. **Waterman, T.,** Chaney, N., Veveakis, M. (2024) InSAR-Informed In-Situ Monitoring for Deep-Seated Landslides: Insights from El Forn (Andorra). *Journal for Remote Sensing and the Environment, 24.* Preprint: https://doi.org/10.5194/nhess-24-3651-2024

Talks, Posters and Presentations

Waterman, T., "Extending Generalized Surface Layer Scaling to Diverse, Complex Terrain and Canopies for Improved Land-Atmosphere Exchange" Invited Talk, Innsbruck, Austria, 2025

Waterman, T., Stiperski, I., Calaf, M. "Extending Generalized Surface Layer Scaling to Diverse, Complex Terrain and Canopies for Improved Land-Atmosphere Exchange" European Geophysical Union, Talk, Vienna, Austria, 2025

Waterman, T., Stiperski, I., Chaney, N., Calaf, M. "Extending Applicability of Monin-Obkuhov Similarity Theory (MOST) Across Heterogeneous Ecosystems for Improved Land-Atmosphere Exchange" American Meteorological Society Annual Meeting, Talk, New Orleans, 2025

Waterman, T., Dirmeyer, P., Chaney, N. "Evaluating the Impact of Surface Flux Homogenization in Land-Atmosphere Interactions" American Meteorological Society Annual Meeting, Talk, New Orleans, 2025

Waterman, T., "Impact of Scale Disparity in Land-Atmospheric Coupling on Continental Precipitation Patterns" NOAA Precipitation Prediction Grand Challenge Research and Applications Workshop, Invited Talk, College Park, MD, 2024

Waterman, T., Stiperski, I., Chaney, N., Calaf, M. "Extending Applicability of Monin-Obkuhov Similarity Theory (MOST) Across Heterogeneous Ecosystems for Surface Layer Parameterizations in ESMs" American Geophysical Union Fall Meeting, Talk, 2024

Waterman, T. Dirmeyer, P., Chaney, N. "Evaluating the Impact of Kilometer-Scale Surface Heterogeneity on Mesoscale Atmospheric Dynamics" GEWEX Open Science Conference, Talk, Sapporo, Japan, 2024

Waterman, T. , Bragg, A., Hay-Chapman, F., Dirmeyer, P., Fowler, M., Chaney, N. "Parameterizing the Large Scale Impact of Land Surface Heterogeneity Induced Circulations on Convective Cloud Development" European Geophysical Union General Assembly, Talk, Vienna, Austria, 2023

Waterman, T., Bragg, A., Hay-Chapman, F., Dirmeyer, P., Fowler, M., Chaney, N. "Parameterizing the Large Scale Impact of Land Surface Heterogeneity Induced Circulations on Convective Cloud Development" National Center for Atmospheric Research Climate and Global Dynamics, Invited Talk, Boulder, CO, 2023

Waterman, T. Bragg, A., Hay-Chapman, F., Dirmeyer, P., Fowler, M., Chaney, N. "A Two Column Model for Parameterizing Heterogeneity-Driven Sub-Grid Circulations" Coupling of Land and Atmospheric Sub-grid Parameterizations (CLASP) Project Meeting Princeton GFDL. Invited Talk* (assisted with organization after invitation) Princeton, NJ, 2023

Waterman, T. Bragg, A., Chaney, N. "Modeling the Impact of Sub-Grid Land Surface Heterogeneity on Convective Cloud Development in Earth System Models" American Meteorological Society 103rd Annual Meeting, Poster, Denver, 2023

Waterman, T. Bragg, A., Chaney, N. "Modeling the Impact of Sub-Grid Land Surface Heterogeneity on Convective Cloud Development in Earth System Models" American Geophysical Union Fall Meeting, Poster, Chicago, 2022

Waterman, T., Chaney, N. "A Multi-Column Approach to Resolving Heterogeneity Induced Secondary Circulations" European Geophysical Union General Assembly, Talk, Remote, 2022

Waterman, T., Laura, T., Chaney, N. "Exploring How Heterogeneities in Land Surface Temperature Drive the 'Missing Flux'" Frontiers in Hydrology Meeting, Poster, 2022

Waterman, T., Chaney, N. "Capturing the Effects of Surface Flux Heterogeneity on the Lower Sub-grid Atmosphere in Earth System Models with a Multi-Column Approach" American Geophysical Union Fall Meeting, Poster, 2021

Waterman, T., Chaney, N. "A Multi-Column Approach to Resolving Heterogeneity Induced Secondary Circulations" Coupling of Land and Atmospheric Sub-grid Parameterizations (CLASP) Fall Project Meeting, Talk, Remote, 2021

Waterman, T., Chaney, N. "Evaluating and Improving Parameterizations of the Variance of Temperature Fluctuations Over Heterogeneous Landscapes for Surface Boundary Conditions in Atmospheric Models", European Geophysical Union General Assembly, Talk, Remote, 2021

Waterman, T., Chaney, N. "Parameterizing the Variance of Temperature Fluctuations Over Heterogeneous Landscapes for Surface Boundary Conditions in Atmospheric Models", American Geophysical Union Fall Meeting, Talk, Remote, 2020

Waterman, T., Chaney, N. "Improving Higher Order Surface Turbulence Statistics for CLUBB", Coupling of Land and Atmospheric Sub-grid Parameterizations (CLASP) Fall Project Meeting, Invited Talk, Remote, 2020

Leadership, Outreach Mentoring and Service

STEM Ambassador Program

NSF STEM Ambassador (Fall 2025 – Spring 2026)

- Year long training program in science communication and public outreach
- Developing an individual education outreach program involving incarcerated youth through STEMCAP

Student Mentoring and Advising

- Duke University: Sarah Bailey (Thesis),
- University of Utah: Giulia Salmaso (PhD), Ben Udina (PhD), Zane Frey (Masters/PhD)

National Ecological Observation Network (NEON) Advisor

Surface-Atmosphere Exchange Technical Working Group Member (January 2025 –)

Duke Hydrology and Fluid Dynamics (HFD) Seminar

Founder and Organizer (January 2022 –December 2023)

- Facilitating a biweekly space for students and postdocs in the HFD program to practice talks

Peer Reviewer
Earth and Space Science, Quarterly Journal of the Royal Meteorological Society, Geoscientific Model Development

Engineers Without Borders (EWB) UC Berkeley Chapter
Chapter Education Director (November 2017 – November 2018)
- Established an educational curriculum for new members of the chapter, teaching technical and soft skills necessary to promote EWB's mission of international development

Chapter Vice President (May 2017 – January 2018)
- Organized and coordinated chapter meetings and project managers,

Project Manager (May 2016 – May 2017)
- Managed a 1500-person water project for a developing community including basic research, finances, design, planning, construction scheduling, and coordination between 30+ project members and professional contacts

UC Berkeley New Student Orientation
Orientation Mentor (December 2016 – May 2019)
- Organized events and trained orientation leaders to welcome new students
- Facilitated and helped train orientation leaders to facilitate diversity equity and inclusion (DEI) training for students covering implicit bias and awareness of socio-economic barriers in academia among other topics

Memberships

American Geophysical Union (2019 – present)
Member Society of Duke Fellows (2019 – 2024)
American Meteorological Society (2022 – present)
Member UC Berkeley Chi Epsilon Civil Engineering Honors Society (2016 – 2019)