GRIFFIN S. MOOERS

1101 Croul Hall, Irvine, CA 92617
gmooers@uci.edu ● (603) 498-9292

EDUCATION

University of California, Irvine | **School of Physical Sciences** | Irvine, CA — Sept. 2018 – Present
Ph.D., Earth System Science | Advisor: Dr. Mike Pritchard | Secondary Advisor: Dr. Stephan Mandt

Cornell University | **College of Agriculture and Life Sciences** | Ithaca, NY — Aug. 2014 – May 2018
B.S., Atmospheric Sciences with Distinction in Research | Advisor: Dr. Arthur T. DeGaetano

RESEARCH EXPERIENCE

University of California, Irvine, Department of Earth System Science | Irvine, CA — Sept. 2018 – Present
Graduate Student Researcher and NSF MAPS Fellow

- Research the potential of deep neural networks to emulate climate models at a fraction of the computational cost.
- Leverage generative modeling techniques including Variational Autoencoders (VAEs) to elucidate details of convection-permitting climate model outputs.
- Implement unsupervised learning methods for objective analysis of tropical convection, climate change, and convective anomaly detection.

Mount Washington Observatory | North Conway, NH — May 2018 – Sept. 2018
Research Intern of Dr. Cathleen Geiger

- Collected observations including (dry and wet bulb) temperature and wind speed at selected sites around the mountain summit from the weather observatory instruments.
- Derived Bowen ratios from observational data and tested for statistically significant site-to-site variations with ANOVA tests to better understand the effect of urbanization on the unique microclimate of mountain summits.

Cornell University, Department of Earth and Atmospheric Sciences | Ithaca, NY — Jan. 2017 – May 2018
Research Assistant of Dr. Arthur T. DeGaetano

- Investigated changing spatial extent and frequency of extreme precipitation in the northeastern United States.
- Developed python modules to identify extreme events in sixty years of high resolution daily gridded precipitation datasets.
- Quantitatively analyzed results through statistical approaches including Theil Slopes and Kendall's Tau test to determine significance of precipitation changes.

Northeast Regional Climate Center | Ithaca, NY — June 2017 – Aug. 2017
Research Intern

- Analyzed the Center's High Resolution and Interpolated datasets for extreme precipitation events.
- Generated turf forecasts to predict ground moisture levels and irrigation needs for regional weather-sensitive businesses.

PEER REVIEWED PUBLICATIONS

Mooers, G., Pritchard, M., Beucler, T., Ott, J., Yacalis, G., Baldi, P., & Gentine, P. (2021). Assessing the potential of deep learning for emulating cloud superparameterization in climate models with real-geography boundary conditions. *Journal of Advances in Modeling Earth Systems*, 13, e2020MS002385. https://doi.org/10.1029/2020MS002385

Mangipudi, H., **Mooers, G.**, Pritchard, M., Beucler, T., & Mandt, S., Analyzing high-resolution clouds and convection using multi-channel VAEs (2021). In Proceedings of the 35th Conference on Neural Information Processing Systems (NeurIPS). https://arxiv.org/abs/2112.01221

Mooers, G., Tuyls, J., Mandt, S., Pritchard, M., & Beucler, T.. (2020). Generative Modeling of Atmospheric Convection. In Proceedings of the 10th International Conference on Climate Informatics (CI2020). *Association for Computing Machinery*, New York, NY, USA, 98–105. https://doi.org/10.1145/3429309.3429324

DeGaetano, A. T., **Mooers, G.**, & Favata, T. (2020). Temporal Changes in the Areal Coverage of Daily Extreme Precipitation in the Northeastern United States Using High-Resolution Gridded Data, *Journal of Applied Meteorology and Climatology*, *59*(3), 551-565. https://doi.org/10.1175/JAMC-D-19-0210.1.

TEACHING EXPERIENCE

University of California Irvine | Irvine, CA

Teaching Assistant, EarthSS 1: Introduction to Earth System Science Sept. 2021 - Dec. 2021

- Instructed several fifty person discussion sections weekly.
- Lectured on topics including weather forecasting, isobaric maps, and precipitation development.
- Graded weekly homework assignments and course examinations.

California State University | Los Angeles, CA

Teaching Assistant, DIRECT STEM Program Sept. 2019 - Feb. 2020

- Taught Python programming to students from underrepresented backgrounds.
- Course designed to prepare students for competitive graduate programs and help diversify STEM.

Cornell University, Department of Earth and Atmospheric Sciences | Ithaca, NY

Teaching Assistant, EAS 2680: Climate and Global Warming Jan. 2018 – May 2018

- Graded homework, projects, and tests for an over 200 student course.
- Proctored course examinations and answered student questions.

Teaching Assistant, EAS 1560: Introduction to Oceanography Aug. 2017 – Dec. 2017

- Guided student laboratory section; prepared and graded weekly coursework, quizzes, and examinations.
- Facilitated discussions on scientific literature as well as climate, environmental, and social issues.

ORAL PRESENTATIONS

G.S. Mooers, M. Pritchard, T. Beucler, P. Gentine, H. Mangipudi, & S. Mandt. *Unsupervised Organization of Convective Updrafts in a Latent Space*. 102nd American Meteorological Society Annual Meeting. 21st Conference on Artificial Intelligence for Environmental Science - Artificial Intelligence for Feature Detection. Houston, TX (January 2022).

G.S. Mooers, M. Pritchard, T. Beucler, P. Gentine, & S. Mandt. *Unsupervised Organization of Turbulent Updraft Regimes and their Global Response to Warming*. American Geophysical Union Annual Meeting. Climate Variability Across Scales and Climate States and Neural Earth System Modeling. New Orleans, LA (December 2021).

G.S. Mooers, S. Mandt, M. Pritchard, T. Beucler, J. Tuyls. *Toward Generative Superparameterized Updrafts with Variational Autoencoder Interpretability*. 101st American Meteorological Society Annual Meeting. 20th Conference on Artificial Intelligence for Environmental Science - AI in Radar Observations, Analysis, and Applications; Physical Interpretability in Machine Learning. New Orleans, LA (January 2021).

G.S. Mooers, and A.T. DeGaetano. *Changes in Extreme Rainfall Event Frequency in the Northeastern U.S. Using High-Resolution Gridded Data Sets*. Science of Earth Systems and Atmospheric Sciences Undergraduate Research Symposium. Ithaca, NY (May 2018).

G.S. Mooers, A.T. DeGaetano, and T. Favata. *Changes in Extreme Rainfall Event Frequency and Spatial Distribution in the Northeastern U.S. Using High-Resolution Gridded Data Sets*. 98th American Meteorological Society Annual Meeting, Conference on Hydrology. Austin, TX (Jan. 2018).

G.S. Mooers, and A.T. DeGaetano. *Changes in Extreme Rainfall Event Frequency in the Northeastern U.S. Using High-Resolution Gridded Data Sets*. 14th Great Lakes Atmospheric Sciences Symposium. Oswego, NY (Nov. 2017).

POSTER PRESENTATIONS

G.S. Mooers, M. Pritchard, T. Beucler, and J. Ott, G. Yacalis, P. Baldi, P. Gentine. *Assessing the potential of deep neural networks for emulating cloud superparameterization in climate models under real geography boundary conditions.* 101st American Geophysical Union Fall Meeting. Machine Learning for Weather and Climate Modeling. (Dec. 2020).

G.S. Mooers, J. Tuyls, S. Mandt, M.S. Pritchard, and T. Beucler. *Generative Modeling of Atmospheric Convection.* 10th Annual International Conference on Climate Informatics. Oxford, UK (Aug. 2020).

A.T. DeGaetano., **G.S. Mooers,** and T. Favata. *Trends in the Spatial Extent of Daily Extreme Precipitation Totals.* 100th American Meteorological Society Annual Meeting. 34th Conference on Hydrology. Boston, MA (Jan. 2020).

G.S. Mooers, M. Pritchard, T. Beucler, and S. Rasp. *Beyond Aquaplanet: Is Deep Learning Emulation of Global Superparameterization Viable in Realistic Settings?* 100th American Geophysical Union Fall Meeting. Innovation and Exploration of Observations and Earth System Models Using Machine Learning and Big Data Analysis II. San Francisco, CA (Dec. 2019).

S. Thunberg, **G.S. Mooers**, and C. Geiger**.** *Collecting, Quantifying, and Characterizing Surface Convective Energy Fluxes on Mount Washington Summit*. 99th American Meteorological Society Annual Meeting. Mountain Meteorology Poster Section. Phoenix, AZ (Jan. 2019).

G.S. Mooers, and A.T. DeGaetano. *Changes in Extreme Rainfall Event Frequency in the Northeastern U.S. Using High-Resolution Gridded Data Sets*. 98th American Meteorological Society Annual Meeting. Austin, TX (Jan. 2018).

G.S. Mooers, and A.T. DeGaetano. *Changes in Extreme Rainfall Event Frequency in the Northeastern U.S. Using High-Resolution Gridded Data Sets*. Science of Earth Systems and Atmospheric Sciences Undergraduate Research Symposium. Ithaca, NY (Dec. 2017).

HONORS AND AWARDS

National Science Foundation Machine Learning and Physical Sciences Fellowship (Grant No. 1633631)	2019-2021
AMS Oral Presentation Honorable Mention and Prize Awarded	2021
Cornell College of Agriculture and Life Sciences Research Honors Program	2018
Nominated for Father James B. Macelwane Annual Award in Meteorology by Cornell Atmos. Sci. Faculty	2018

SERVICE AND MENTORSHIP

Reviewer for Journal of Advances in Modeling of Earth Systems (JAMES) | **USA** May 2021 - Present
Reviewed multiple manuscripts synthesizing climate science and machine learning methods

Research Mentorship | Irvine, CA March 2020 - Present
Direct Supervision | H. Mangipudi (Computer Science Undergraduate at UCI) |

- Weekly one-on-one research meeting.
- Provided undergraduate thesis guidance.

- Progressed to a student-led submission to NuerIPS 2021.

Supplemental Assistance | J. Tuyls (Computer Science Undergraduate at UCI) | J. Lin (ESS Ph.D. student at UC Irvine)
- General technical support provided.
- Helped with coding, remote supercomputing.

Cornell Chapter of the American Meteorological Society | Ithaca, NY

President May 2017 – May 2018
- Managed club activities, finances, and community outreach.
- Represented and promoted Cornell Atmospheric Sciences on campus and at regional and national conferences.
- Doubled funding for the organization.

Treasurer Aug. 2014 – May 2017
- Oversaw budget and fundraising and managed annual Alumni Weekend.
- Strengthened forecasting abilities as a member of Cornell's WxChallenge Team.
- Published articles on climate issues in *Ithacation,* Cornell's atmospheric sciences journal.

CONFERENCE ATTENDANCE

—

103rd American Meteorological Society Annual Meeting, Houston, TX	2022
101st American Geophysical Union Fall Meeting, New Orleans, LA	2021
102nd American Meteorological Society Annual Meeting (Virtual)	2021
100th American Geophysical Union Fall Meeting (Virtual)	2020
10th Annual International Conference on Climate Informatics, London, UK	2020
99th American Geophysical Union Fall Meeting, San Francisco, CA	2019
43rd Northeast Storms Conference Annual Meeting, Saratoga Springs, NY	2018
98th American Meteorological Society Annual Meeting, Austin, TX	2018
14th Great Lakes Atmospheric Sciences Symposium, Oswego, NY	2017
97th American Meteorological Society Annual Meeting, Seattle, WA	2017
5th Tri-State Weather Annual Conference, Danbury, CT	2016
96th American Meteorological Society Annual Meeting, New Orleans, LA	2016

PROFESSIONAL AFFILIATIONS

American Meteorological Society	2015 – Present
American Geophysical Union	2019 – Present
Mount Washington Observatory	2014 – Present

RESEARCH SKILL SET

Atmospheric Sciences:
Forecasting | Mesoscale Meteorology | Synoptic Scale Analysis | Mountain Meteorology | Microclimate | Dynamics | Data Analysis | Climate Modeling | SPCAM | WRF | VAPOR

Computer Science:
Python (xarray, scipy) | Machine Learning (Tensorflow, Keras, PyTorch) | Remote Computing | GPUs | Generative Modeling | Clustering | Dimensionality Reduction | Julia | Matlab | Linux | R | GrADS | Latex | Git | Microsoft Word, Excel, Powerpoint

GRADUATE COURSEWORK

Paleoclimate & Paleoceanography	Global Physical Climatology	Global Biogeochemistry
Humans in the Earth System	Practicum in Earth System Science	Geoscience Modeling & Data Analysis
Machine Learning	Atmospheric Dynamics	Deep Generative Models

RELEVANT UNDERGRADUATE COURSEWORK

Multivariable Calculus for Engineers	Physics (Mechanics and E&M)	Meteorological Obs. & Instruments
Differential Equations for Engineers	Synoptic Meteorology	Thermodynamics & Hydrostatics
Linear Algebra for Engineers	Physical Oceanography	Climate Dynamics
Uncertainty Analysis in Engineering	Physical Meteorology	Advanced Atmospheric Dynamics

INTERESTS

Skiing | Hiking | Running | Swimming | Tennis | Travel | Chess | Cooking | Weather Forecasting (Snow)