Marie C. McGraw, PhD

Cooperative Institute for Research in the Atmosphere
Colorado State University
Fort Collins, CO, USA

marie.mcgraw@colostate.edu
Google Scholar
marie-mcgraw.github.io

Current Position

07/2022 - present	**Research Scientist I** Cooperative Institute for Research in the Atmosphere (CIRA), Colorado State University, Fort Collins, CO, USA Current research topics: machine learning and tropical cyclone prediction, uncertainty quantification for machine learning in geosciences

Education

10/2015 - 03/2019	**Ph.D., Atmospheric Science**, Colorado State University, Fort Collins, CO, USA Advisor: Elizabeth Barnes
06/2013 - 10/2015	**M.S., Atmospheric Science**, Colorado State University, Fort Collins, CO, USA Advisor: Elizabeth Barnes
09/2008 - 06/2012	**B.Sc., Mechanical and Ocean Engineering**, Massachusetts Institute of Technology, Cambridge, MA, USA

Previous Experience

07/2021 - 07/2022	**Postdoctoral Research Associate**, Cooperative Institute for Research in the Atmosphere, Fort Collins, CO, USA Advisor: Prof. Imme Ebert-Uphoff, Dr. Kate Musgrave
06/2019 - 06/2021	**Postdoctoral Research Associate**, University of Washington, Seattle, WA, USA Advisor: Prof. Cecilia Bitz
06/2013 - 05/2019	**Graduate Research Assistant**, Colorado State University, Fort Collins, CO, USA Advisor: Prof. Elizabeth Barnes

Technical Skills

Research expertise: machine learning and tropical cyclone forecasting, uncertainty quantification in machine learning, large scale atmospheric and climate dynamics, sea ice predictability

Programming: Python (including `scikit-learn`, `pandas`, `xarray`, `scipy`, `statsmodels`, `cartopy`, Jupyter notebooks); MATLAB; git; familiarity with Fortran and NCAR Command Language

Data analysis: Experienced with large geospatial datasets, including coupled climate and weather model output, ensemble prediction systems, reanalysis, and satellite observations; experienced with statistical modeling and data science analyses for atmospheric science, including Bayesian causal inference, probabilistic graphical modeling, and vector autoregressive models.

Selected Publications (14 total)

4. Haynes, K., R. Lagerquist, **M. McGraw**, K. Musgrave, and I. Ebert-Uphoff (2023): Creating and evaluating uncertainty estimates with neural networks for environmental-science applications, *Artificial Intelligence for Earth Systems*, doi:10.1175/AIES-D-22-0061.1.

3. **McGraw, M.C.** and E.A. Barnes (2020): New Insights on Subseasonal Arctic-Midlatitude Causal Connections from a Regularized Regression Model. *Journal of Climate*, doi:10.1175/JCLI-D-19-0142.1.

2. Samarasinghe, S., **M.C. McGraw**, E.A. Barnes, and I. Ebert-Uphoff (2019): A study of links between the Arctic and the midlatitude jet-streams using Granger and Pearl causality. *Environmetrics,* doi:10.1002/env.2540.

1. **McGraw, M.C.**, and E.A. Barnes (2018): Memory matters: A case for Granger causality in climate variability studies. *J. Climate*, **31,** doi:10.1175/JCLI-D-17-0334.1.

Selected Presentations

Invited

Seminar, ITU "AI for Good" Seminar Series, 03/2023. *AI for Tropical Meteorology: Challenges and Opportunities.* T. Beucler and **M.C. McGraw**.

Presentation, Aspen Global Change Institute Workshop on Earth System Modeling with Machine Learning and Big Data, 06/2022. *Causality and Interpretability.* **McGraw, M.C.**, and I. Ebert-Uphoff.

Submitted

22nd AI Conference, AMS Annual Meeting, Denver, CO, USA. *What can machine learning methods tell us about the tropical cyclone intensity forecasting problem?* **McGraw, M.C.**, K.D. Musgrave, J.A. Knaff, C.J. Slocum, and I. Ebert-Uphoff.

7th International Workshop on Climate Informatics, 09/2017, Boulder, CO. *A study of causal links between the Arctic and the midlatitude jet-streams* (spotlight presentation). Samarasinghe, S., **M.C. McGraw**, E.A. Barnes, and I. Ebert-Uphoff (co-first author with S. Samarasinghe).

SPARC Dynamical Variability Workshop, Helsinki, Finland. *Understanding the forced response to volcanic eruptions in climate models within the context of internal variability.* **McGraw, M.C.**, and E.A. Barnes.

Teaching, Mentoring, & Service

Mentoring: Marshall Baldwin (summer 2022, NOAA Hollings Scholar); Julia Shates (summer 2014, NSF REU intern)

Diversity, Equity, and Inclusion: Member, Diversity, Equity, and Inclusion Committee, University of Washington (2019-2021)

Teaching: Guest lecturer, "Uncertainty Quantification and Machine Learning", AI2ES Summer School on Trustworthy AI; Graduate teaching assistant ("Objective Analysis in Atmospheric Science", spring 2018; "Atmospheric Dynamics I", fall 2015. Both at Colorado State Unviersity)

Professional Service: Session co-chair for 22nd Annual AMS AI Conference; Postdoc representative, Department of Atmospheric Sciences Colloquium Committee, University of Washington (2020-2021); reviewer for 7 peer-reviewed scientific publications (including *Journal of Climate*, *Geophysical Research Letters*, *Weather and Climate Dynamics*, and *Nature Climate Change*); proposal reviewer for the National Science Foundation.