Marie C. McGraw, PhD

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Current Position

07/2021 - present	**Postdoctoral Research Associate** 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

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.

Publications (10 total)

4. **McGraw, M.C.**, E. Blanchard-Wrigglesworth, R.P. Clancy, and C.M. Bitz (2022): Understanding the predictability of Arctic sea ice loss on subseasonal timescales. *J. Climate*, **35**, doi:10.1175/JCLI-D-21-0301.1.

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, Data-Driven Atmospheric and Water Dynamics Group, University of Lausanne, Switzerland, 04/2022. *Machine learning and tropical cyclone forecasting.* **McGraw, M.C.**, K.D. Musgrave, and I. Ebert-Uphoff.

Seminar, Department of Atmospheric Sciences, University of Washington, Seattle, WA, 11/2019. *Using causal discovery to explore Arctic-midlatitude dynamics.* **McGraw, M.C.**, and E.A. Barnes.

Submitted

35th AMS Conference on Hurricanes and Tropical Meteorology, 05/2022, New Orleans, LA, USA. *What can machine learning 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.

American Geophysical Union Annual Meeting, 12/2020, remote. *Extreme sea ice loss on subseasonal timescales in S2S forecast models* (poster). **McGraw, M.C.**, E. Blanchard-Wrigglesworth, R.P. Clancy, and C.M. Bitz.

American Geophysical Union Annual Meeting, 12/2018, Washington, DC. *Using causal discovery to explore Arctic-midlatitude dynamics.* **McGraw, M.C.**, and E.A. Barnes.

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: Graduate teaching assistant ("Objective Analysis in Atmospheric Science", spring 2018; "Atmospheric Dynamics I", fall 2015. Both at Colorado State Unviersity)

Professional Service: 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.