

Melissa L. Breeden

Research Scientist I
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NOAA Physical Sciences Laboratory

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Education

University of Wisconsin-Madison, Atmospheric & Oceanic Sciences **Ph.D.**
Advisor: Professor Jonathan Martin 2013-2018
Dissertation: Diagnosing Initiation of North Pacific Jet Retractions using Piecewise
Tendency Diagnosis and a Linear Inverse Model

University of Wisconsin-Madison, Atmospheric & Oceanic Sciences **B.S.**
Advisor: Professor Galen McKinley 2009-2013
Thesis: Climate Impacts on Multidecadal North Atlantic pCO₂ Variability: 1948-2005

Research Experience

Research Scientist I, Cooperative Institute for Research in the Environmental Sciences and
NOAA Physical Sciences Laboratory, Boulder CO 01/2021 – Present

NOAA Climate and Global Change Postdoctoral Fellow, NOAA Earth System Research
Laboratory, Chemical Sciences Division, Boulder CO 08/2019 – 12/2020

Postdoctoral Research Associate, University of Wisconsin-Madison Space Science and
Engineering Center, Madison, WI 05/2018 – 07/2019

Research Assistant, University of Wisconsin-Madison Department of Atmospheric and Oceanic
Sciences, Madison, WI 08/2013 – 05/2018

Selected Participant, Advanced Climate Dynamics Course, Rondane, Norway 09/2017
University of Bergen, Massachusetts Institute of Technology, University of Washington joint
summer school focused on dynamics of the seasonal cycle

NSF Research Experience for Undergraduates Recipient, Oregon State University College of
Earth, Ocean and Atmospheric Sciences, Corvallis, OR 06/2012 - 08/2012

Publications

Breeden, M. L., Albers, J. R., Butler, A. H., and M. Newman: The spring minimum in subseasonal 2-meter
temperature forecast skill over North America, submitted to *Mon. Wea. Rev.*, Mar 2022.

Pettersen, C., Henderson, S.A., Mattingly, K.S., Bennartz, R., and **M. L. Breeden**, 2022: The Critical Role of
Euro-Atlantic Blocking in Promoting Precipitation in Central Greenland, *JGR Atmospheres*, in press.

Larson, S. M., Okumura, Y., Bellomo, K., and **M. L. Breeden**, 2022: Destructive interference of ENSO on

North Pacific SST and North American precipitation associated with Aleutian low variability, *Journal of Climate*, in press.

Albers, J. R., Butler, A. H., **Breeden, M. L.**, Langford, A. O., and G. N. Kiladis, 2021: Subseasonal prediction of springtime Pacific–North American transport using upper-level wind forecasts, *Weather Clim. Dynam.*, **2**, 433–452, <https://doi.org/10.5194/wcd-2-433-2021>.

Breeden, M. L., A. H. Butler, J. R. Albers, M. Sprenger and A. O. Langford, 2021: The Spring Transition of the North Pacific Jet and its Relation to Deep Stratosphere-to-Troposphere Mass Transport over Western North America, *Atmos. Chem. Phys.*, **21**, 2781–2794, <https://doi.org/10.5194/acp-21-2781-2021>.

Breeden, M. L., R. Clare, J. E. Martin, and A. R. Desai, 2020: Diagnosing the Influence of a Receding Snow Boundary on Simulated Midlatitude Cyclones Using Piecewise Potential Vorticity Inversion. *Mon. Wea. Rev.*, **148**, 4479–4495, <https://doi.org/10.1175/MWR-D-20-0056.1>.

Breeden, M. L., B. T. Hoover, M. Newman, and D. J. Vimont, 2020: Optimal North Pacific Blocking Precursors and Their Deterministic Subseasonal Evolution during Boreal Winter. *Mon. Wea. Rev.*, **148**, 739–761, <https://doi.org/10.1175/MWR-D-19-0273.1>.

Breeden, M. L. & J. E. Martin, 2019: Evidence for Nonlinear Processes in fostering a North Pacific Jet Retraction, *Quart. J. Roy. Meteor. Soc.*, **145**, 1559-1570. doi:10.1002/qj.3512.

Breeden, M. L. & J. E. Martin, 2018: Analysis of the onset of an extreme North Pacific Jet Retraction using Piecewise Tendency Diagnosis, *Quart. J. Roy. Meteor. Soc.*, **144**, 1895-1913. doi: 10.1002/qj.3388.

Breeden, M. L. & G. A. McKinley, 2016: Climate Impacts on Multidecadal North Atlantic pCO₂ Variability: 1948-2009. *Biogeosciences*, **13**, 3387-3396. doi:10.5194/bg-13-3387-2016.

Instructional and Professional Experience

Selected Member , American Geophysical Union Atmospheric Sciences Early Career Committee	10/2019 – 12/2021
Selected Attendee , Earth Science Women’s Network Leadership Development Workshop, Boulder, Colorado	10/2018
Sponsored Participant , American Geophysical Union Geoscience Congressional Visits Day, Washington D.C.	09/2018
Instructor , Wisconsin Center for Academically Talented Youth Advanced Learning Program, University of Wisconsin-Madison	06/2017 - 07/2017
Sponsored Participant , American Meteorological Society Summer Policy Colloquium, Washington, D.C.	06/2017
Chair , Graduate Student Association Welcome Committee, University of Wisconsin-Madison, Department of Atmospheric & Oceanic Sciences	08/2014 - 09/2017
Graduate Teaching Assistant , University of Wisconsin-Madison	Fall 2015

Department of Atmospheric & Oceanic Sciences
Course: The Frontal Cyclone (AOS452)

Fall 2016

Graduate Teaching Assistant, University of Wisconsin-Madison
Department of Atmospheric & Oceanic Sciences
Course: Atmospheric & Oceanic Dynamics II (AOS311)

Spring 2015

Electronics Assistant, University of Wisconsin-Madison
Department of Physics
Research Project: Madison Symmetric Torus (Plasma Physics)

02/2010-
05/2013

Awards

- * NOAA Climate and Global Change Postdoctoral Fellowship, 2019
- * Waves to Weather travel award to attend the Cyclone Workshop, 2019
- * Colloquium Student Service Award, Department of Atmospheric & Oceanic Sciences, April 2016
- * Third Place Poster Presentation, 28th Conference on Climate Variability and Change, AMS Annual Meeting, January 2016
- * Best Student Presentation, 18th Conference on Middle Atmosphere, AMS Annual Meeting, January 2015
- * Department Travel Award to attend AMS Annual Meeting: 2014-2017

Outreach and Service

- * Member of the American Meteorological Society, American Geophysical Union and American Physical Society
- * Member of the UW-Madison Postdoctoral Research Symposium Committee, 2018
- * Bias Training Workshop, Department of Educational Sciences, UW-Madison, February 2017
- Member of the Cyclone Workshop Science Committee, 2018 – 2019
- Local Manager, University of Wisconsin-Madison, WxChallenge National Weather Forecasting Competition, 2015-2017.
- Member of Graduate Student Association Welcome, Colloquium, & Graduation Committees, 2014-2018
- Expanding Your Horizons program held annually for middle school-aged girls to promote interest in science, University of Wisconsin-Madison, November 2014-2017.
- Wisconsin Science Festival volunteer performing rotating tank demonstrations, October 2014.
- Aldo Leopold Nature Center volunteer performing science demonstrations, October 2013-2014.
- The Wonders of Physics outreach performance, Department of Physics, University of Wisconsin-Madison, 2011-2012.

Presentations

Invited: ATOC

Invited: AMS

PSL seminar

Invited: NC State

CSU ML talk

Breeden, M., B. T. Hoover, M. Newman, and D. J. Vimont: Diagnosing North Pacific Blocking using a Linear Inverse Model, American Geophysical Union Fall Meeting, San Francisco, CA, December 2019.

Breeden M., and J. E. Martin: The role of nonlinear processes in fostering a North Pacific jet retraction, Cyclone Workshop, Seeon, Germany, October 2019.

Invited presentation: Breeden M., J. E. Martin, B. T. Hoover, M. Newman and D. J. Vimont: North Pacific Blocking: Introduction to Dynamical Mechanisms and Contributions from Tropical and Extratropical Forcing. State College of New York Albany Department of Atmospheric and Earth Sciences, Albany, NY, March 2019.

Breeden, M., B. T. Hoover and M. Newman, 2019 (oral): Diagnosing North Pacific Blocking using a Linear Inverse Model. American Meteorological Society Annual Meeting, Phoenix, AZ, January 2019.

Invited presentation: Breeden M., North Pacific Jet Retractions: Introduction to Dynamical Mechanisms. San José State University Department of Meteorology and Climate Science, San José, CA, December 2018.

Breeden, M., 2018 (oral): Lessons Learned from the Earth Science Women's Network Leadership Workshop. Department of Atmospheric and Oceanic Sciences Seminar Series, University of Wisconsin-Madison, Madison, WI, November 2018.

Invited Presentation: Breeden M., J. E. Martin, B. T. Hoover, M. Newman, and D. Vimont, 2018 (oral): North Pacific Jet Retractions: Dynamic Mechanisms and Contributions from Midlatitude and Tropical Forcing. Physical Sciences Division, National Oceanic and Atmospheric Administration-Earth Science Research Laboratory, Boulder, CO, October 2018.

Breeden M. and J. E. Martin, 2018 (oral, Ph.D. Defense): Diagnosing the onset of North Pacific Jet Retractions using Piecewise Tendency Diagnosis and a Linear Inverse Model. Department of Atmospheric and Oceanic Sciences Colloquium Series, University of Wisconsin-Madison, Madison WI, April 2018.

Breeden M., and J. E. Martin, 2018 (oral): Comparing North Pacific Wintertime Blocking and Jet Retractions: Identification, Structure, and Mechanisms. American Meteorological Society Annual Meeting, Austin, TX, January 2018.

Lecture: Midlatitude Cyclones and Cyclogenesis, Introduction to Weather and Climate (AOS 100), Department of Atmospheric and Oceanic Sciences, University of Wisconsin-Madison, October 2017.

Breeden M., and J. E. Martin, 2017 (oral): Diagnosing the Lifecycle of an LC1- Breaking Wave using Piecewise Tendency Diagnosis. Cyclone Workshop, Sainte-Adele, Quebec, CA, October 2017.

Invited Lecture: Introduction to North Pacific Jet Variability and Blocking. Geosciences Department, Northern Illinois University, April 2017.

Breeden M., and J. E. Martin, 2016 (oral): Onset of a Dipole-Type Block in the Wintertime North Pacific. Workshop on Atmospheric Blocking, Department of Meteorology, University of Reading, Reading, UK, April 2016.

Breeden, M & Martin, J.E., 2015 (oral): Case Study of a Cold-Season Jet Retraction Event. American Meteorological Society Annual Meeting. Phoenix, AZ, USA, January 2015.

Breeden, M. & McKinley, G.A., 2014 (oral): Impacts of Climate Variability on North Atlantic pCO₂: Modeled for 1948-2005. Ocean Sciences Meeting. Honolulu, HI, USA, February 2014.