Melissa Breeden

Postdoctoral Fellow
melissa.breeden@noaa.gov
(630) 335-3994
https://melissabreeden.weebly.com

Chemical Sciences Division
NOAA Earth System Research Laboratory

325 Broadway
Boulder, CO 80305

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 pCO_2 Variability: 1948-2005

Research Experience

NOAA Climate and Global Change Postdoctoral Fellow, NOAA Earth System Research Laboratory, Chemical Sciences Division — 08/2019 – Present
Supervisor: Dr. Karen Rosenlof
Research: Evaluating the impact of climate processes on stratosphere-to-troposphere ozone transport over North America

Postdoctoral Research Associate, University of Wisconsin-Madison Space Science and Engineering Center — 05/2018 – 07/2019
Principal Investigators: Dr. Brett Hoover & Dr. Matthew Newman
Research: Prediction, Sensitivity and Dynamics of subseasonal to seasonal phenomena using Linear Inverse Models
Principal Investigators: Dr. Ankur Desai & Dr. Jonathan Martin
Research: Influence of winter snow cover extent on North American mid-latitude disturbances

Research Assistant, University of Wisconsin-Madison Department of Atmospheric and Oceanic Sciences — 08/2013 – 05/2018
Principal Investigators: Dr. Jonathan Martin & Dr. Brett Hoover
Research: Diagnosing Initiation of North Pacific Jet Retractions using Piecewise Tendency Diagnosis and a Linear Inverse Model

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

Research Assistant, University of Wisconsin-Madison — 06/2013 – 03/2016
Department of Atmospheric & Oceanic Sciences
Advisor: Dr. Galen McKinley
Research: Modeling and diagnosing climate impacts on multidecadal pCO_2 variability

NSF Research Experience for Undergraduates Recipient, Oregon State University College of Earth, Ocean and Atmospheric Sciences — 06/2012 - 08/2012
Advisor: Dr. Andreas Schmittner
Research: Comparing meridional overturning circulation portrayal in CMIP5 models between the Last Glacial Maximum and 20th Century

Instructional and Professional Experience

Selected Member, American Geophysical Union Atmospheric Sciences Early Career Committee — 10/2019 – Present

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 — Fall 2016
Course: The Frontal Cyclone (AOS452)

Graduate Teaching Assistant, University of Wisconsin-Madison — Spring 2015
Department of Atmospheric & Oceanic Sciences
Course: Atmospheric & Oceanic Dynamics II (AOS311)

Electronics Assistant, University of Wisconsin-Madison — 02/2010-
Department of Physics — 05/2013
Research Project: Madison Symmetric Torus (Plasma Physics)

Publications

Albers, J. R., A. H. Butler, **M. L. Breeden**, A. O. Langford, G. N. Kiladis: Subseasonal prediction of springtime Pacific-North American transport using upper-level wind forecasts, submitted to *Weather and Climate Dynamics.*

Breeden, M. L., A. H. Butler, J. R. Albers, M. Sprenger and A. O. Langford: The Spring Transition of the North Pacific Jet and its Relation to Deep Stratosphere-to-Troposphere Mass Transport over Western North America, submitted to *Atmospheric Chemistry and Physics*.

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 pCO_2 Variability: 1948-2009. *Biogeosciences*, **13**, 3387-3396. doi:10.5194/bg-13-3387-2016.

Professional Awards and Activities

* Waves to Weather travel award to attend the Cyclone Workshop, 2019
* Member of the UW-Madison Postdoctoral Research Symposium Committee, 2018
* Member of Graduate Student Association Welcome, Colloquium, & Graduation Committees, 2014-2018
* Bias Training Workshop, Department of Educational Sciences, UW-Madison, February 2017
* 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
* Member of the American Meteorological Society, American Geophysical Union and American Physical Society

Outreach and Service

- Collaborator with Kelty Camping and Hiking Gear, 08/2019 – Present
- Member of the Cyclone Workshop Science Committee, 2018 – Present
- Local Manager, University of Wisconsin-Madison, WxChallenge National Weather Forecasting Competition, 2015-2017.
- 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

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 pCO_2: Modeled for 1948-2005. Ocean Sciences Meeting. Honolulu, HI, USA, February 2014.