

**Melissa L. Breeden**  
Research Physical Scientist  
NOAA Physical Sciences Laboratory

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**Education**

University of Wisconsin-Madison, Atmospheric & Oceanic Sciences **Ph.D.**  
2013-2018

University of Wisconsin-Madison, Atmospheric & Oceanic Sciences **B.S.**  
2009-2013

**Research Appointments**

Research Physical Scientist, NOAA Physical Sciences Laboratory, Boulder CO 09/2024 – Present

Research Scientist, Cooperative Institute for Research in the Environmental Sciences and NOAA Physical Sciences Laboratory, Boulder CO 01/2021 – 09/2024

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

**Proposals**

Awarded July 2023: ‘Disaster Relief Supplemental Appropriations Act: Experimental Subseasonal and Seasonal Predictions of Wildfire Indicators over the United States using Machine Learning Techniques’,

Role: PI; Solicitation: NOAA-OAR-CIPO-2023-2007633 Coop Institutes 2023-CIESRDS-Sup Disaster Relief Supplemental Act (DRSA).

Awarded August 2023: ‘IIJA / BIL: Wildland Fire Potential Research to Inform Extended Range Resource Planning

Role: PI; Solicitation: Award: NA23OAR4050186I

**Experience with Research-to-Applications Forecast Products**

2021, developed an empirical dynamical modeling framework to produce subseasonal (weeks 2-6) outlooks of temperature and precipitation for the Famine Early Warning Systems Network.

2024, developed an empirical dynamical modeling framework to produce seasonal (months 1-18) outlooks of vapor pressure deficit and sea surface temperatures to inform fire danger outlooks.

## End-user Focused Documents and Presentations

**Breeden, M. L.**, “September 2025 Famine Early Warning Systems Network (FEWS NET) Seasonal Forecast Review”, delivered to FEWS NET Early Warning Team, September 18, 2025. Published online: <https://fews.net/global/seasonal-forecast-monthly-briefing/september-2025>.

**Breeden, M. L.**, “August 2025 Famine Early Warning Systems Network (FEWS NET) Seasonal Forecast Review”, delivered to FEWS NET Early Warning Team, August 21, 2025. Published online: <https://fews.net/global/seasonal-forecast-monthly-briefing/august-2025>.

**Breeden, M. L.**, “July 2025 Famine Early Warning Systems Network (FEWS NET) Seasonal Forecast Review”, delivered to FEWS NET Early Warning Team, July 24, 2025. Published online: <https://fews.net/global/seasonal-forecast-monthly-briefing/july-2025>.

**Breeden, M. L.**, “June 2025 Famine Early Warning Systems Network (FEWS NET) Seasonal Forecast Review”, delivered to FEWS NET Early Warning Team, June 26, 2025. Published online: <https://fews.net/global/seasonal-forecast-monthly-briefing/june-2025>.

**Breeden, M. L.**, “May 2025 Famine Early Warning Systems Network (FEWS NET) Seasonal Forecast Review”, delivered to FEWS NET Early Warning Team, May 22, 2025. Published online: <https://fews.net/global/seasonal-forecast-monthly-briefing/may-2025>.

**Breeden, M. L.**, “January 2025 Famine Early Warning Systems Network (FEWS NET) Seasonal Forecast Review”, delivered to FEWS NET Early Warning Team January 23 2025 and USAID Bureau of Humanitarian Assistance January 24 2025. Published online: <https://fews.net/global/seasonal-forecast-monthly-briefing/january-2025>.

**Breeden, M. L.**, “December 2024 Famine Early Warning Systems Network (FEWS NET) Seasonal Forecast Review”, delivered to FEWS NET Early Warning Team December 22 2024 and USAID Bureau of Humanitarian Assistance December 23 2024. Published online: <https://fews.net/global/seasonal-forecast-monthly-briefing/december-2024>.

**Breeden, M. L.**, “October 2024 Famine Early Warning Systems Network (FEWS NET) Seasonal Forecast Review”, delivered to FEWS NET Early Warning Team October 17 2024 and USAID Bureau of Humanitarian Assistance October 18 2024. Published online: <https://fews.net/global/seasonal-forecast-monthly-briefing/october-2024>.

## Peer-reviewed Publications

Wang, L., Lu, Jian, **Breeden, M. L.**, Chen, G., Henderson, S. A., Narinesingh, V., Simpson, I. R., Woollings, T., Hu, Y., Lubis, S. W.: ‘Gaps and Ways Forward in Atmospheric Blocking and Extreme Weather Research’, in review at *Nature Comms*.

**Breedon, M. L.**, Hoell, A., Worsnop, R. P., Albers, J. R., Hobbins, M., Robinson, R. M., and Vimont, D. J.: Seasonal Predictability of Vapor Pressure Deficit in the western United States, *Weather Clim. Dynam.*, 6, 1443–1459, <https://doi.org/10.5194/wcd-6-1443-2025>, 2025.

Hoell, A., **Breedon, M.L.**, Worsnop, R.P., Robinson, R., Agel, L., Anderson, W., Barlow, M., Jayanthi, H., McNally, A., Shukla, S., Slinski, K., Verdin, J. and Zaheer, F. (2025), An Unexpected Outcome Followed an Apparent Seasonal Forecast of Opportunity and Prolonged Drought in Southwest Asia. *Int J Climatol*, 45: e8851. <https://doi.org/10.1002/joc.8851>.

**Breedon, M. L.**, Hoell, A., Worsnop, R. P., Albers, J. R., Hobbins, M. T., Robinson, R. M., and Vimont, D. J.: Seasonal Predictability of Vapor Pressure Deficit in the western United States, submitted to *Wea. And Clim. Dyn.* preprint: <https://egusphere.copernicus.org/preprints/2025/egusphere-2025-115/>

**Breedon, M. L.**, Hoell, A., Albers, J. R., and Slinski, K.: The monthly evolution of precipitation and warm conveyor belts during the central southwest Asia wet season, *Weather Clim. Dynam.*, 4, 963–980, <https://doi.org/10.5194/wcd-4-963-2023>, 2023.

Hoell, A., Robinson, R., Agel, L., Barlow, **M.**, **Breedon, M.**, Eischeid, J., McNally, A., Slinski, K., & Quan, X.: Changes to Middle East and Southwest Asia Compound Drought and Heat Since 1999. *Journal of Climate* (published online ahead of print 2023) <https://doi.org/10.1175/JCLI-D-23-0194.1>.

Elsbury, D., Butler, A. H., Albers, J. R., **Breedon, M. L.**, and Langford, A. O.: The response of the North Pacific jet and stratosphere-to-troposphere transport of ozone over western North America to RCP8.5 climate forcing, *Atmos. Chem. Phys.*, 23, 5101–5117, <https://doi.org/10.5194/acp-23-5101-2023>, 2023.

**Breedon, M. L.**, Albers, J. R., A. Hoell: Subseasonal precipitation forecasts of opportunity over southwest Asia, *Wea. Clim. Dynam.*, 3, 1183–1197, <https://doi.org/10.5194/wcd-3-1183-2022>, 2022.

Albers, J. R., Newman, M., Hoell, A., **Breedon, M. L.**, Wang, Y., and Lou, J.: The February 2021 Cold Air Outbreak in the United States: A Subseasonal Forecast of Opportunity, *Bulletin of the American Meteorological Society*, 103(12), E2887-E2904, 2022.

**Breedon, M. L.**, Albers, J. R., Butler, A. H., and Newman, M.: The Spring Minimum in Subseasonal 2-m Temperature Forecast Skill over North America, *Monthly Weather Review*, 150(10), 2617-2628, 2022.

Albers, J. R., Butler, A. H., Langford, A. O., Elsbury, D., **Breedon, M. L.**: Dynamics of ENSO-driven stratosphere-to-troposphere transport of ozone over North America, *Atmos. Chem. Phys.*, 22, 13035–13048, 2022, <https://doi.org/10.5194/acp-22-13035-2022>.

Pettersen, C., Henderson, S. A., Mattingly, K. S., Bennartz, R., and **Breedon, M. L.**: The critical role of Euro-Atlantic blocking in promoting snowfall in central Greenland. *Journal of Geophysical Research: Atmospheres*, 127, e2021JD035776. <https://doi.org/10.1029/2021JD035776>, 2022.

Larson, S. M., Okumura, Y., Bellomo, K., and **Breeden, M. L.**: Destructive Interference of ENSO on North Pacific SST and North American Precipitation Associated with Aleutian Low Variability, *Journal of Climate*, 35(11), 3567-3585, 2022.

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.** and 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.** and 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.** and G. A. McKinley, 2016: Climate Impacts on Multidecadal North Atlantic pCO<sub>2</sub> Variability: 1948-2009. *Biogeosciences*, **13**, 3387-3396. doi:10.5194/bg-13-3387-2016.

### Awards

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

### Select Invited Presentations

‘Seasonal predictability of vapor pressure deficit in the western United States’, 2025 US CLIVAR Summit, Boulder CO, July 2025.

‘The spring minimum in subseasonal 2-meter temperature forecast skill over North America’, United Forecast System Subseasonal-to-seasonal Applications Team Webinar, November 2023.

‘Impact of the MJO on Subseasonal Precipitation Forecasts of Opportunity over Southwest Asia’, AMS Annual Meeting, Denver Co, January 2023.

‘Anticipating Subseasonal Forecasts of Opportunity with a Linear Inverse Model’, Department of Earth and Atmospheric Sciences, University of Nebraska Lincoln, October 2022.

‘Subseasonal Precipitation Forecasts of Opportunity over Southwest Asia’, NOAA Climate and Global Change Summer Institute, Steamboat Springs, CO, July 2022.

‘Exploring Seasonal Changes in 2-meter Temperature Forecasts of Opportunity over North America’, Atmospheric and Oceanic Sciences Department, University of Colorado Boulder, Boulder, Colorado, February 2022.

‘Subseasonal Stratosphere-to-Troposphere Mass Transport Variability over the Pacific-North American region during boreal spring’, American Meteorological Society Annual Meeting, Virtual, January 2022.

‘The Spring Transition of the North Pacific Jet and its Relation to Deep Stratosphere-to-Troposphere Mass Transport over Western North America’, School of Earth and Atmospheric Sciences, Georgia Institute of Technology, Virtual, March 2021.

## Professional Activities and Service

October 2024 – March 2025	<b>Science Advisor</b> for high school student on award-winning poster on Colorado wildfires and precipitation swings: Nora Simmons won the NASA Earth System Science Project Award and placed second place at the Boulder Valley School District Science Fair.
July – August 2024	<b>Member</b> , NOAA PSL Science Day Planning Committee
November 2023	<b>Mentor</b> , PROGRESS mentorship program
2023 – Present	<b>Science Committee Member</b> , US CLIVAR Blocking Workshop
2022	<b>Mentor</b> , CIRES Research Experience for Community College Students Mentorship Program
2021 – Present	<b>Member</b> , NOAA Physical Sciences Laboratory Seminar Committee
2021 – 2022	<b>Mentor</b> , CU Boulder ATOC Mentorship Program
2021 – 2022	<b>Proposal Reviewer</b> , National Science Foundation
2021 – 2022	<b>Member</b> , various PSL hiring committees
2021	<b>Member</b> , Science Committee, Waves2Weather Blocking Workshop
2021	<b>Panelist</b> , NCAR ASP Panel on the Interviewing Process
2020 – 2021	<b>Founding Member and DEI sub-committee Chair</b> , American Geophysical Union Atmospheric Sciences Early Career Committee
2018 – Present	<b>Journal Article Reviewer</b> , <i>Journal of Climate</i> , <i>Geophysical Research Letters</i> , <i>Environmental Research Letters</i> , <i>Journal of the Atmospheric Sciences</i> and others
2018	<b>Sponsored Participant</b> , American Geophysical Union Geoscience Congressional Visits Day, Washington D.C.

2018	<b>Selected Attendee</b> , Earth Science Women's Network Leadership Development Workshop, Boulder, CO
2018 – 2019	<b>Member</b> , 19 <sup>th</sup> Cyclone Workshop Science Committee
2015 – 2017	<b>Local Manager</b> , University of Wisconsin-Madison, WxChallenge National Weather Forecasting Competition
2017	<b>Attendee</b> , Bias Training Workshop, Department of Educational Sciences, University of Wisconsin-Madison
2014 – Present	<b>Member</b> , American Meteorological Society and American Geophysical Union
2014-2017	<b>Chair</b> , Graduate Student Association Welcome Committee, UW-Madison

### Additional Experience

<b>Instructor</b> , Wisconsin Center for Academically Talented Youth Advanced Learning Program, UW-Madison	06/2017 - 07/2017
<b>Sponsored Participant</b> , AMS Summer Policy Colloquium, Washington, D.C.	06/2017
<b>Graduate Teaching Assistant</b> , UW-Madison Course: The Frontal Cyclone (AOS452)	Fall 2015 Fall 2016
<b>Graduate Teaching Assistant</b> , UW-Madison Course: Atmospheric & Oceanic Dynamics II (AOS311)	Spring 2015
<b>Electronics Assistant</b> , University of Wisconsin-Madison Department of Physics	02/2010- 05/2013