

Matthew Bray

University of Oklahoma, School of Meteorology, 120 David L. Boren Blvd. Norman, OK 73072
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Education

- 2026- Ph.D. Candidate in Meteorology
 The University of Oklahoma, Norman, OK
 Advisor: Dr. Steven Cavallo
 NSF Graduate Fellow, Graduate Research Assistant
- 2023 M. S. in Meteorology, 4.0
 The University of Oklahoma, Norman, OK
 Thesis: "Investigating Arctic Cyclone-Tropopause Polar Vortex Interactions
 with Observing System Simulation Experiments"
 Advisor: Dr. Steven Cavallo
 NSF Graduate Fellow
- 2020 B.S. in Meteorology, Summa Cum Laude, 4.0
 B.A. in Mathematics, with Special Distinction
 The University of Oklahoma, Norman, OK
 Minor: History

Work Experience

- 2020- **NSF Graduate Fellow/Graduate Research Assistant**
 The University of Oklahoma School of Meteorology, Norman, OK
 Arctic and Antarctic Atmospheric Research Group
- 2019-2020 **Hollings Scholarship Intern**
 NOAA Earth Systems Research Laboratory
 Global Systems Laboratory and Physical Sciences Laboratory
 Advisors: Dr. Dave Turner and Dr. Gijs de Boer
- 2016-2020 **Undergraduate Research Assistant**
 The University of Oklahoma School of Meteorology, Norman, OK
 Arctic and Antarctic Atmospheric Research Group

Publications

- Bray, M. T.** and S. M. Cavallo, 2026: Relationships between Tropopause Polar Vortex Characteristics and Arctic Cyclone Evolution. *Mon. Wea. Rev.*, **15**, 1759-1785, doi: 10.1175/MWR-D-25-0304.1.
- Rivière, G. and Coauthors (including **M. T. Bray**), 2024: The THINICE Field Campaign: Interactions between Arctic Cyclones, Tropopause Polar Vortices, Clouds, and Sea Ice in Summer. *Bull. Amer. Meteor. Soc.*, **105**, E2330–E2354, doi: 10.1175/BAMS-D23-0143.1.
- Bray, M. T.** and S. M. Cavallo, 2024: Investigating Arctic Cyclone–Tropopause Polar Vortex Interactions with Idealized Observing System Simulation Experiments. *Mon. Wea. Rev.*, **152**, 1445–1467, doi: 10.1175/MWR-D-23-0215.1.
- Bray, M. T.** and S. M. Cavallo, 2022: Characteristics of Long Track Tropopause Polar Vortices. *Wea. Climate Dyn.*, **3**, 251–278, doi: 10.5194/wcd-3-251-2022.
- Bray, M. T.**, S. M. Cavallo, and H. B. Bluestein, 2021: Examining the Relationship between Tropopause Polar Vortices and Tornado Outbreaks. *Wea. Forecasting*, **36**, 1799–1814, doi: 10.1175/WAF-D-21-0058.1.
- Bray, M. T.**, D. D. Turner, and G. de Boer, 2021: Evaluation of the Rapid Refresh Numerical Weather Prediction Model Over Arctic Alaska. *Wea. Forecasting*, **36**, 1061–1077, doi: 10.1175/WAF-D-20-0169.1.

Presentations

- Bray, M. T.** and S. M. Cavallo, 2025: “Coupled Characteristics of Arctic Cyclones and Tropopause Polar Vortices in the Community Earth System Model v2.” *American Geophysical Union Annual Meeting 2025*, New Orleans, LA. Oral Presentation.
- Bray, M. T.** and S. M. Cavallo, 2025: “Arctic Cyclones, Tropopause Polar Vortices, and Sea Ice in the Community Earth System Model v2.” *American Meteorological Society 18th Conference on Polar Meteorology and Oceanography*, Denver, CO. Oral Presentation.
- Bray, M. T.** and S. M. Cavallo, 2024: “Arctic Cyclones and Tropopause Polar Vortex Linkages in the Community Earth System Model v2.” *20th Cyclone Workshop*, Saint-Sauveur, QC, Canada. Oral Presentation.

Bray, M. T. and S. M. Cavallo, 2023: "Investigating Arctic Cyclone-Tropopause Polar Vortex Interactions with Observing System Simulation Experiments." *American Meteorological Society 32nd Conference on Weather Analysis and Forecasting (WAF)/28th Conference on Numerical Weather Prediction (NWP)/20th Conference on Mesoscale Processes*, Madison, WI. Oral Presentation.

Bray, M. T. and S. M. Cavallo, 2022: "Investigating Interactions between Arctic Cyclones and Tropopause Polar Vortices through Observing System Simulation Experiments." *American Meteorological Society 17th Conference on Polar Meteorology and Oceanography*, Madison, WI. Oral Presentation.

Bray, M. T., S. M. Cavallo, and H. B. Bluestein, 2022: "Examining the Relationship between Tropopause Polar Vortices and Tornado Outbreaks." *102nd American Meteorological Society Annual Meeting; 31st Conference on Weather Analysis and Forecasting (WAF)/27th Conference on Numerical Weather Prediction (NWP)*, Virtual. Oral Presentation.

Bray, M. T. and S. M. Cavallo, 2021: "Characteristics of Long Track Tropopause Polar Vortices." *16th Conference on Polar Meteorology and Oceanography*, Virtual, American Meteorological Society. Oral Presentation.

Bray, M. T., D. D. Turner, and G. de Boer, 2020: "Evaluating the Rapid Refresh Numerical Weather Prediction Model in the Arctic." *100th American Meteorological Society Annual Meeting; 30th Conference on Weather Analysis and Forecasting (WAF)/26th Conference on Numerical Weather Prediction (NWP)*, Boston, MA. Poster Presentation.

Technical Skills

Programming Languages: Python (including matplotlib, cartopy, pandas, xarray, scipy, seaborn, scikit-learn), Shell Scripting (Bash, C-Shell), LaTeX, R, MATLAB (limited), HTML/CSS/PHP (limited), FORTRAN (limited)

Software: Windows, MacOS, Unix/Linux, High-Performance Computing Clusters (NCAR Cheyenne/ Derecho/Casper, OU-Arctic Server, OU OSCER), Python Machine Learning (scikit-learn), Microsoft Office Suite, Adobe Illustrator

NWP Models and DA Software: Model for Prediction Across Scales (MPAS), Data Assimilation Research Testbed (DART), Community Earth System Model (CESM), Community Atmosphere Model (CAM), Rapid Radiative Transfer Model (RRTM), Weather Research and Forecasting Model (WRF; limited)

Field Project Experience

Lead forecaster and Real-Time Forecast Graphics, NURTURE Campaign Winter 2026.

Forecaster and daily planning, RALI-THINICE Campaign August 2022.

Forecaster, THINICE Campaign August 2021.

Professional Service

Journal Article Peer Reviewer: *Monthly Weather Review, Journal of Climate*

Awards and Honors

2021 Outstanding Student Oral Presentation Award, AMS Polar 2021

2020 National Science Foundation Graduate Research Fellowship

Letzeiser Honor Roll (top 26 graduating seniors at the University of Oklahoma)

Mark & Kandi McCasland Award for Outstanding Undergraduate Research

Outstanding Student Conference Poster Award, AMS 2020 Annual Meeting

Dr. Kenneth Crawford Award in Synoptic Meteorology

Dean's Award for Honors College Leadership

Outstanding Academic Achievement Award - Senior in the School of Meteorology

2019 College of Atmospheric and Geographic Sciences Outstanding Senior First Alternate

Outstanding Academic Achievement Award - Junior in the School of Meteorology

2018 NOAA Ernest F. Hollings Scholar

2016 National Merit Scholar

American Meteorological Society Freshman Undergraduate Scholar