

Xun (Jerry) Zou

Atmospheric Scientist

Center for Western Weather and Water Extremes

Scripps Institution of Oceanography

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Education

**Ph.D. in Atmospheric Sciences
Minor in Public Policy and
Management**

Aug. 2020

M.S. in Atmospheric Sciences

Dec. 2017

B.S. in Atmospheric Sciences

May 2015

The Ohio State University

Advisors: Dr. David Bromwich and Dr. Alvaro Montenegro

Dissertation: Investigation of Surface Melting in West Antarctica

The Ohio State University

Advisors: Dr. David Bromwich and Dr. Alvaro Montenegro

Nanjing University

Professional

Atmospheric Scientist

Jun. 2023 – Present

Scripps Institution of Oceanography (UCSD)

Center for Western Weather and Water Extremes (CW3E)

Leverage regional climate models, reanalysis datasets, and satellite and ground-based observations to:

- Lead research on atmospheric forcings and their impacts on the Antarctic ice surface, with a focus on extreme weather events.
- Lead investigation of the relationship between atmospheric rivers and mesoscale weather systems in the U.S.
- Collaborate with CW3E machine learning team to investigate atmospheric rivers-associated extreme weather over Antarctica.
- Contribute to CW3E modeling team and Atmospheric Rivers Reconnaissance campaign.

Postdoctoral Scholar

Feb. 2022 – May. 2023

Scripps Institution of Oceanography (UCSD)

Center for Western Weather and Water Extremes (CW3E)

Postdoctoral Scholar

Sep. 2020 – Jan. 2022

The Ohio State University

Byrd Polar and Climate Research Center

**Graduate Research/Teaching
Assistant**

Aug. 2015 – Aug. 2020

The Ohio State University

Atmospheric Sciences Program, Department of Geography

Research Grants

Aug. 2021 – Jul. 2025

National Science Foundation

Title: *Collaborative Research: Cloud Radiative Impact on the Surface Energy Budget of the Antarctic Peninsula (#2229392)*

Role: Institutional PI

Amount: \$349,332 (SIO: \$138,124)

Status: Awarded

Aug. 2024 – Jul. 2027

National Science Foundation

Title: *Collaborative research: Combined impact of Atmospheric Rivers and Foehn warming on the surface warming/melting over West Antarctica (#2331992)*

Role: PI

Amount: \$392,618

Status: Awarded

Sept. 2024 – Aug. 2026

Office of Naval Research

Title: *The Combined Influence of Initial Condition Errors in SWTs and ARs on the AR Forecasts: Applying the Moist Adjoint Error Energy Metric to Diagnose Cases from AR Recon (#N00014-24-1-2754)*

Role: Co-I

Amount: \$582,000

Status: Awarded

Mar. 2025

National Science Foundation

Title: *Unraveling the Impact of Atmospheric Rivers on Extreme Weather and Ice Surfaces in Antarctica*

Role: PI

Amount: \$882,218

Status: Pending

Mar. 2025

The U.S. Department of Energy

Title: *The Impact of Atmospheric Rivers on Clouds and Surface Energy Balance at Southern High Latitudes*

Role: Co-PI

Amount: \$571,264

Status: NOI approved; Full proposal pending

Other Research Resource

Nov. 2024 - Jul. 2027

NCAR HPC Exploratory Allocation

Title: Investigation of Atmospheric Rivers-associated Extreme Weathers over Antarctica via High-resolution Simulations and Machine Learning Models

Role: PI

Amount: 2.24M RUs and 150K GPUs

Status: Awarded

1. **Zou et al. 2025a:** A Case Study of an Exceptional Atmospheric River and Explosively Deepening Cyclone over the US Central Plains in March 2019. *J. Geophys. Res. Atmos.* **130**: e2024JD042309, <https://doi.org/10.1029/2024JD042309>.
2. Wille et al. 2025: Atmospheric rivers in Antarctica. *Nat. Rev. Earth Environ.* <https://doi.org/10.1038/s43017-024-00638-7>.
3. Zhang et al. 2024: Extending the Center for Western Weather and Water Extremes (CW3E) atmospheric river scale to the polar regions. *Cryosphere*, **18**: 5239–5258, <https://doi.org/10.5194/tc-18-5239-2024>.
4. Bromwich et al. 2024: Major artifacts in ERA5 2-m air temperature trends over Antarctica prior to and during the modern satellite era. *Geophys. Res. Lett.*, **51**: e2024GL111907, <https://doi.org/10.1029/2024GL111907>.
5. Bromwich et al. 2024: The YOPP-SH 2022 Winter Targeted Observing Periods. *Bull. Am. Meteorol. Soc.*, **105**: E1662–E1684, <https://doi.org/10.1175/BAMS-D-22-0249.1>.
6. Hansen et al 2024: The importance of cloud properties when assessing surface melting in an offline-coupled firn model over Ross Ice shelf, West Antarctica, *Cryosphere*, **18**: 2897–2916, <https://doi.org/10.5194/tc-18-2897-2024>.
7. Wille et al. 2024: The extraordinary March 2022 East Antarctica “heat” wave. Part I: observations and meteorological drivers. *J. Clim.*, **37**: 757–778, <https://doi.org/10.1175/JCLI-D-23-0175.1>.
8. Wille et al. 2024: The extraordinary March 2022 East Antarctica “heat” wave. Part II: impacts on the Antarctic ice sheet. *J. Clim.*, **37**: 779–799, <https://doi.org/10.1175/JCLI-D-23-0176.1>.
9. **Zou et al. 2023:** Mesoscale and Synoptic Scale Analysis of Narrow Cold Frontal Rainband during a Landfalling Atmospheric River in California in January 2021. *J. Geophys. Res. Atmos.*, **128**: e2023JD039426, <https://doi.org/10.1029/2023JD039426>.
10. Wu et al. 2023: A long short-term memory neural network-based error estimator for three-dimensional dynamically adaptive mesh generation. *Phys. Fluids*, **35**: 106610, <https://doi.org/10.1063/5.0172020>.
11. Gorodetskaya et al. 2023: Record-high Antarctic Peninsula temperatures and surface melt in February 2022: a compound event with an intense atmospheric river. *npj Clim. Atmos. Sci.*, **6**: 202, <https://doi.org/10.1038/s41612-023-00529-6>.
12. **Zou et al. 2023:** Atmospheric River and Foehn Events: Contribution of Shortwave Radiation and Turbulence. *J. Geophys. Res. Atmos.*, **128**: e2022JD038138, <https://doi.org/10.1029/2022JD038138>.
13. Orr et al 2023: Characteristics of surface “melt potential” over Antarctic ice shelves based on regional atmospheric model simulations of summer air temperature extremes from 1979/80 to 2018/19. *J. Clim.*, **36**: 3357–3383, <https://doi.org/10.1175/JCLI-D-22-0386.1>.
14. Cerovečki et al. 2022: Impact of downward longwave radiative deficits on Antarctic sea-ice extent predictability for subseasonal time scales. *Environ. Res. Lett.*, **17**: 084008, <https://doi.org/10.1088/1748-9326/ac7d66>.
15. Bromwich et al. 2022: Observing System Experiments During the YOPP-SH Summer Special Observing Period. *Q. J. Royal Meteorol. Soc.*, **148**: 2194–2218, <https://doi.org/10.1002/qj.4298>.
16. Bromwich et al. 2022: The 16th Workshop on Antarctic Meteorology and Climate and 6th Year of Polar Prediction in the Southern Hemisphere Meeting, *Adv. Atmos. Sci.*, **39**: 536–542, <https://doi.org/10.1007/s00376-021-1384-4>.
17. **Zou et al. 2021:** Major Surface Melting over the Ross Ice Shelf Part I: Foehn Effect. *Q. J. Royal Meteorol. Soc.*, **147**: 2874–2894, <https://doi.org/10.1002/qj.4104>.
18. **Zou et al. 2021:** Major Surface Melting over the Ross Ice Shelf Part II: Surface Energy Balance. *Q. J. Royal Meteorol. Soc.*, **147**: 2895–2916, <https://doi.org/10.1002/qj.4105>.
19. Bromwich et al. 2020: The Year of Polar Prediction in the Southern Hemisphere (YOPP-SH). *Bull. Am. Meteorol. Soc.*, **101**: E1653–E1676, <https://doi.org/10.1175/BAMS-D-19-0255.1>.
20. Zhang et al. 2019: Comparison of three short-term load forecast models in Southern California. *Energy*, **189**: 116358, <https://doi.org/10.1016/j.energy.2019.116358>.
21. Jones et al. 2019: Sixty Years of Widespread Warming in the Southern Mid- and High-Latitudes (1957–2016). *J. Clim.*, **32**: 6875–6898, <https://doi.org/10.1175/JCLI-D-18-0565.1>.

22. **Zou et al. 2019:** West Antarctic Surface Melt Event of January 2016 Facilitated by Foehn Warming. *Q. J. Royal Meteorol. Soc.*, **145**: 687-704, <https://doi.org/10.1002/qj.3460>.
23. **Zou et al. 2016:** Advection errors in an orthogonal terrain-following coordinate: idealized 2-D experiments using steep terrains. *Atm. Sci. Let.*, **17**: 243-250, <https://doi.org/10.1002/asl.650>.
24. Zou et al. 2016: A numerical study on the tropical storm Nangka (2009) based on satellite brightness temperature data assimilation. *Journal of the Meteorological Sciences*, **36**: 366-373, <https://doi.org/10.3969/2015jms.0044>.
25. **Zou et al. 2015:** Effects of High-Impact Weather on Characteristics of Pollutants in Suzhou City. *The administration technique of environmental monitoring*, **1**: 9-13, <https://doi.org/10.3969/j.issn.1006-2009.2015.01.003>.
26. Li et al. 2015: Advection errors in an orthogonal terrain-following coordinate: idealized experiments. *Chin. Sci. Bull.*, **60**: 3144-3152, <https://doi.org/10.1360/N972015-00075>.
27. Wang et al. 2015: Radiosonde Balloon Drift Characteristics and Its Impact on Divergence Calculated through Triangle Method of Three Stations in East China. *J. Appl. Meteor. Sci.*, **26**: 319-327, <https://doi.org/10.11898/1001-7313.20150307>.

Submitted or in preparation:

28. **Bromwich and Zou et al. 2025:** Is Continental Antarctica on the Threshold of Abrupt Climate Change? *Commun. Earth Environ. In review*.
29. Clem et al. 2025: Chapter 7 Meteorology and Climate of Antarctica in A. Taschetto, T. Ndarana, T. Ambrizzi (Eds.), *Meteorology of the Southern Hemisphere. In review*.
30. Bromwich et al. 2024: An Updated Reconstruction of Antarctic Near-Surface Air Temperatures at Monthly Intervals Since 1958, *Earth Syst. Sci. Data Discuss.* [preprint], <https://doi.org/10.5194/essd-2024-353>. *In review*.
31. Rowe et al. 2025: Observations of Clouds and Radiation Over King George Island and Implications for the Southern Ocean and Antarctica. *J. Geophys. Res. Atmos. In review*.
32. Rowe et al. 2025: Comparison of Cloud and Radiation Measurements to Models over the Southern Ocean at Escudero Station, King George Island. *J. Geophys. Res. Atmos. In Prep*.
33. **Zou et al. 2025b:** Antarctica's Uncertain Future and Its Sea Level Impacts on California and Beyond: Oceanic and Atmospheric Forcing - What is the role of Atmospheric Rivers? *Submitted to WIREs Climate Change*.
34. **Zou et al. 2025c:** How do Atmospheric Rivers Impact Föhn-induced Surface Melting over the Antarctic Peninsula? *In Prep*.
35. Lubin et al. 2025. Arctic Amplification Mechanisms Manifest as a Summertime Radiative Cooling Effect Over the North Slope of Alaska. *Submitted to Nature Communication*.

Fellowships & Awards

Selected visiting scholar for KITP program: The Physics of Changing Polar Climate	2025 June
Kavli Institute for Theoretical Physics, University of California-Santa Barbara	
Presidential Fellowship	2019
The Ohio State University	
\$31476 + Tuition waiver	
Student Travel Allowance	2019
15 th Conference on Polar Meteorology and Oceanography	
Fenburr Travel Scholarship for Outstanding Graduate Students	2018
The Ohio State University, \$1000	
Travel Support for Outstanding Graduate Students and Early Career Scientists	2017
12 th Workshop on Antarctic Meteorology and Climate	
2 nd Class Award of Excellent Thesis (top 1%)	2015
Nanjing University	

3 rd Class Scholarship	2014
Nanjing University Environmental Planning & Design Institution, RMB3000	
People's Scholarship	2012
Nanjing University, RMB1000	

Teaching & Mentoring

Mentor, University of California San Diego Responsibilities: Mentor undergraduate and graduate students on Antarctic research projects. Students: <ul style="list-style-type: none"> Anito Marcarelli (UCSD; 2024 Oct to present): UCSD Capstone Program Filip T. Oliver (MiraCosta College; 2024 Feb to Jun): NSF GEOPATHS Program 	2023 - present
Lab instructor, The Ohio State University Course: Physical Geography, Extreme Weather and Climate Responsibilities: Extreme Weather and Climate (Laboratory instructor; 7 out of 8 semesters) <ul style="list-style-type: none"> Refine the lab design. Deliver lecture sessions as needed. Lead the lab session and recitation. Hold weekly office hours and grade homework. Design and monitor exams. Train new laboratory instructors. Physical Geography (Laboratory instructor; 1 out of 8 semesters) <ul style="list-style-type: none"> Create lab manuals. Deliver lecture sessions as needed. Lead the lab session and recitation. Hold weekly office hours and grade homework. 	2015 – 2019 (Spring and Autumn semesters)

Service & Outreach

Coordinator for Global Precipitation EXperiment (GPEX)	2025
Committee member for International Atmospheric River Conference (IARC)	2024
Committee member for Workshop on Antarctic Meteorology and Climate (WAMC)	2023
Conference coordinator for Workshop on Antarctic Meteorology and Climate (WAMC)	2021
Judge for the 2021 Ohio Academy of Science State Science Day	2021
Judge for the 2021 Edward F. Hayes Graduate Research Forum	2021
Reviewer for Journal of Geophysical Research: Atmospheres, Journal of Climate, Cryosphere, Environmental Research Letters, Advances in Atmospheric Sciences, Scientific Reports, and Annals of Glaciology	2020 – Present
Invited member for Antarctic Meteorological Research and Data Center (AMRDC)	2020 – 2023
Advisory Board (AAB)	
Volunteer for Byrd Polar and Climate Research Center	2019 – 2022
Assistant for the Antarctic weather forecast competition	2019
Atmospheric/Climate/Meteorology search committee representative	2016 – 2017

Conferences (Selected)

1. Zou, X., P. M. Rowe, I. Gorodetskaya, D. H. Bromwich, D. Lubin, M. A. Lazzara, Z. Zhang, B. Kawzenuk, A. Orr, N. Hansen, J. M. Cordeira, F. M. Ralph. Atmospheric River and Foehn Warming over the Antarctic Peninsula. *105th AMS annual Meeting*, New Orleans, Louisiana. January 2025.
2. Zou, X., P. M. Rowe, I. Gorodetskaya, D. H. Bromwich, D. Lubin, M. A. Lazzara, Z. Zhang, B. Kawzenuk, A. Orr, N. Hansen, J. M. Cordeira, F. M. Ralph. Atmospheric River and Foehn Warming over the Antarctic Peninsula. *2024 International Atmospheric Rivers Conference*. Presentation. San Diego, California. June 2024.
3. Zou, X., J. M. Cordeira, S. M. Bartlett, and F. M. Ralph. Investigation of an Atmospheric River and Explosive Cyclogenesis over the US Central Plains in March 2019. *2024 International Atmospheric Rivers Conference*. Presentation. San Diego, California. June 2024.
4. Zou, X., P. M. Rowe, I. Gorodetskaya, D. H. Bromwich, D. Lubin, M. A. Lazzara, Z. Zhang, B. Kawzenuk, A. Orr, N. Hansen, J. M. Cordeira, F. M. Ralph. Atmospheric River and Foehn Warming over the Antarctic Peninsula. *19th Workshop on Antarctic Meteorology and Climate*. Presentation. Columbus, Ohio. June 2024.
5. Zou, X., D. H. Bromwich, F. M. Ralph. The Uncertain Future of Antarctica: Impact of Extreme Weather Events, *The 2023 West Antarctic Ice Sheet (WAIS) Workshop*. Cloquet, Minnesota. September 2023.
6. Zou, X., J. M. Cordeira, S. B. Battula, J. J. Rutz, Z. Zhang. Direct and Indirect Relationships Between Atmospheric Rivers and Precipitation in Colorado. *32nd Conference on Weather Analysis and Forecasting (WAF)*, Madison, Wisconsin. July 2023.
7. Zou, X., P. M. Rowe, I. Gorodetskaya, D. H. Bromwich, M. Lazzara, R. R. Cordero, Z. Zhang, B. Kawzenuk, J. M. Cordeira, J. D. Wille, F. M. Ralph, L.-S. Bai. Strong Warming over Antarctic Peninsula during combined Atmospheric River and Foehn Events. *18th Workshop on Antarctic Meteorology and Climate*. Presentation. Madison, Wisconsin. June 2023.
8. Zou, X., S. M. Bartlett, J. M. Corderia, B. Kawzenuk, D. F. Steinhoff, M. Simpson. A Case Study of a Narrow Cold-Frontal Rain Band (NCFR) and Landfalling AR over California in January 2021 using High-Resolution West WRF Simulations. Poster. *103rd AMS annual Meeting*, Denver, Colorado. January 2023.
9. Zou, X., P. Rowe, I.V. Gorodetskaya, R. R. Cordero, J. D. Wille, A. Chyhareva, F. M. Ralph, D. H. Bromwich. *Strong Warming over Antarctic Peninsula during combined Atmospheric River and Foehn Events: Contribution of Shortwave Radiation*. *17th AMS Conference on Polar Meteorology and Oceanography*. Presentation. Madison, Wisconsin. August 2022 (Invited)
10. Zou, X., D. H. Bromwich, A. Montengro, S.-H. Wang, and L.-S. Bai. Major Surface Melting over the Ross Ice Shelf. *16th Conference on Polar Meteorology and Oceanography*. Presentation. Online. June 2021.
11. Zou, X., D. H. Bromwich, L.-S. Bai, and S.-H. Wang. Polar WRF simulations for major surface melt events over the Ross Ice Shelf, Antarctica during austral summer. *15th Conference on Polar Meteorology and Oceanography*. Poster, Boulder, CO, May 2019.
12. Zou, X., J. P. Nicolas, D. H. Bromwich, and S.-H. Wang. Quantification and Analysis of Mechanisms for the Foehn Effect in the January 2016 West Antarctic melt event. *13th Workshop on Antarctic Meteorology and Climate*. Presentation, Madison, WI, July 2018.
13. Zou, X., J. P. Nicolas, D. H. Bromwich. Contribution of Foehn Winds to the January 2016 West Antarctic Melt Event. Polar 2018, *SCAR/IASC Open Science Conference & Open COMNAP Session*. Presentation, Davos, Switzerland, June 2018.
14. Zou, X., J. P. Nicolas, D. H. Bromwich, and S.-H. Wang. Contribution of Foehn Effect to the January 2016 West Antarctic Melt Event. *12th Workshop on Antarctic Meteorology and Climate*. Presentation, Boulder, CO, June 2017.

Skills

Programming: NCL, Python, MATLAB, R, IDL, Fortran, C language

Operating System: Linux and supercomputer system

Numerical Weather Prediction Model: Weather Research and Forecasting Model (WRF), Model for Prediction Across Scales (MPAS)