

Lin Yao

Ph.D. Candidate

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Education

University of Chicago, USA	<i>2023 – Present</i>
Ph.D. in Geophysical Sciences	
Advisor: Da Yang	
University of California, Davis, USA	<i>2020 – 2023</i>
Ph.D. in Atmospheric Sciences (Transferred)	
Advisor: Da Yang	
Nanjing University, China	<i>2015 – 2019</i>
B.S. in Atmospheric Sciences	
Advisor: Zhe-Min Tan	

Research Interests

My research addresses fundamental questions in weather and climate, with a specific focus on the formation and evolution of large-scale tropical convection, such as convective self-aggregation and the Madden-Julian Oscillation (MJO), in a changing climate. By integrating theory and observations with cloud-resolving models and machine learning, I aim to uncover essential physical mechanisms and new sources of predictability. Additionally, my work extends to the dynamics of extreme weather events and the polar vortex.

Publications

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- [1] **Yao, L.**, D. Yang, J. Duncan, A. Chattopadhyay, P. Hassanzadeh, W. Bhimji, and B. Yu (Under review). Deep Learning the Sources of MJO Predictability: A Spectral View of Learned Features. Preprint.
 - [2] **Yao, L.**, and D. Yang (In preparation). The Role of Equatorial Waves in MJO Predictability in Deep Convolutional Networks.
 - [3] **Yao, L.**, and P. O’Gorman (In preparation). Spatial Distribution of Mean and Extreme Snowfall in North America: Climatology and Trends.
 - [4] **Yao, L.**, W. Kang, G. Flierl, C. Liu, A. Kan, and K. Burns. Baroclinic Instability as a Driver of Polar Vortices on Giant Planets. *WHOI GFD Proceedings Volume 2025*.(Link)
 - [5] Yang, D., **L. Yao**, and W. Hannah (2024). Vertically Resolved Analysis of the Madden-Julian Oscillation Highlights the Role of Convective Transport of Moist Static Energy. *Geophysical Research Letters*. doi:10.1029/2024GL109910
 - [6] **Yao, L.**, and D. Yang (2023). Convective Self-Aggregation Occurs Without Radiative Feedbacks in Warm Climates. *Geophysical Research Letters*. doi:10.1029/2023GL104624
 - [7] **Yao, L.**, D. Yang, and Z.-M. Tan (2022). A Vertically Resolved MSE Framework Highlights the Role of the Boundary Layer in Convective Self-Aggregation. *Journal of the*

Selected Awards

Fellow of the GFD Program at the Woods Hole Oceanographic Institution	2025
<i>Woods Hole Oceanographic Institution</i>	
Outstanding Student Oral Presentation	2024
<i>24th Conference on Atmospheric and Oceanic Fluid Dynamics</i>	
Chinese Government Award for Outstanding Students Abroad	2023
<i>China Scholarship Council</i>	
Outstanding Graduate	2019
<i>Nanjing University</i>	
Outstanding Student	2018
<i>Jiangsu Province (Top 1%)</i>	
International Exchange Scholarship	2018
<i>Nanjing University (Top 1%)</i>	
National Scholarship	2017
<i>Nanjing University (Top 1%)</i>	

Leadership

- Co-host of **the Climate Dynamics Group Weekend Webinar**, 2024–2025. This initiative supports a Chinese community of over 400 students and scientists in climate science world-wide.
- Organizer of **the 2024 Rossbypalooza Summer School** at the University of Chicago. This two-week, project-oriented summer school attracts graduate students and postdocs from atmospheric, oceanic, and planetary sciences, with approximately 40 participants in 2024.
- Organizer of **the 16th Graduate Climate Conference (GCC)** in 2022. This student-run conference brought together around 100 participants. [Link to GCC 2022](#).

Selected Graduate Courses

Fundamentals of Deep Learning; Geophysical Fluid Dynamics; Radiative Transfer and Climate Sensitivity; Topics in Convection and Climate; Dynamical Systems with Applications.

Presentations

- **The Role of Equatorial Waves in MJO Predictability in Deep Convolutional Networks.**
Talk at the 2025 AGU Fall Meeting, New Orleans (2025)
Talk at the 2026 AMS Annual Meeting, Houston (2026)
- **Machine Learning Models Use Large-Scale Information to Predict the Madden-Julian Oscillation.**
Talk at the 24th Conference on Atmospheric and Oceanic Fluid Dynamics, Burlington (2024)
Talk at the 36th Conference on Hurricanes and Tropical Meteorology, Long Beach (2024)
Talk at the EGU24 General Assembly, virtual (2024)
- **Using Interpretable Deep Learning to Forecast the MJO: Emphasizing Large-Scale Patterns.**

Talk at the 2023 AGU Fall Meeting, San Francisco (2023)

- **Convection Can Self-Aggregate in Warm Climates Without Radiative Feedbacks.**

Talk at the 2023 CalGFD, La Jolla (2023)

Poster at the 2023 CFMIP (2023)

- **The Contribution of Radiative Feedback to Convective Self-Aggregation Decreases With Warming.**

Poster at the 2022 AGU Fall Meeting, Chicago (2022)

- **A Vertically Resolved MSE Framework to Study Convective Self-Aggregation Over Diverse Climates.**

Poster at the 16th Graduate Climate Conference, Seattle (2022)

- **Vertical Structures of MSE Variance in Convective Self-Aggregation Over a Range of SSTs.**

Talk at the 35th Conference on Hurricanes and Tropical Meteorology, New Orleans (2022)

- **Boundary-Layer Depth Defined by MSE Variance for Convective Self-Aggregation Over a Range of Climates.**

Talk at the 23rd Conference on Atmospheric and Oceanic Fluid Dynamics, Breckenridge (2022)

- **Vertically-Resolved Moist Static Energy Diagnosis on the Development of Tropical Cyclones.**

Poster at the 2021 AGU Fall Meeting, New Orleans (2021)

Talk at the 15th Graduate Climate Conference, virtual (2021)

- **A Vertically Resolved Moist Static Energy Framework Highlights the Role of the Boundary Layer in Convective Self-Aggregation.**

Talk at the 34th Conference on Hurricanes and Tropical Meteorology, virtual (2021)

Poster at the 2020 AGU Fall Meeting, virtual (2020)

Poster at the 2nd ICTP Summer School, Italy (2019)

Work Experience

Teaching Assistant	<i>2023 – Present</i>
University of Chicago, USA	
Research Assistant	<i>2023 – Present</i>
University of Chicago, USA	
Research Assistant	<i>2020 – 2023</i>
University of California, Davis, USA	
Research Assistant	<i>2020 – 2021</i>
Nanjing University, China	