

# Yu Du

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## RESEARCH INTERESTS

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- Mesoscale Dynamics
- Severe Weather
- Low Level Jet, Gravity Waves and Cold Pool
- Diurnal Cycle of Rainfall
- Sea Breeze
- Mesoscale Numerical Modeling and Forecasting

## PROFESSIONAL POSITIONS

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- **2022–present** Professor, Sun Yat-sen University
- **2017–2022** Associate professor, Sun Yat-sen University
- **2015–2017** Research scientist in meteorology, IBM Research
- **2013–2015** Visiting scholar, National Center for Atmospheric Research  
(Supervisor: Richard Rotunno)
- **2012–2013** Visiting Scholar, University of Hawaii at Manoa,  
(Supervisor: Yi-leng Chen)

## EDUCATION BACKGROUND

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- **2010–2015** Peking University, Ph.D. in Meteorology  
(Supervisor: Qinghong Zhang)
- **2006–2010** Beijing Normal University, B.S. in Physics

## TEACHING

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- Dynamic meteorology – National First-Class Undergraduate Program
- Radar meteorology

## AWARDS AND HONORS

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- **2024** Major Scientific Advances in Heavy Rainfall (2020–2024), Chinese Meteorological Society
- **2019–2023** Outstanding teacher in School of Atmospheric Sciences, Sun Yat-sen University
- **2023** Second Prize in the 3rd National Higher Education Teachers' Teaching Innovation

### Competition

- **2023** Top Prize of Guangzhou Division of National Higher Education Teaching Innovation Competition for University Teachers
- **2022** Top Prize of Teaching Competition for Teachers at Sun Yat-sen University
- **2022** Guangdong Provincial Meteorological Science and Technology Outstanding Youth Award
- **2020** National Excellent Youth
- **2018** China Association of Science and Technology "Young Talent Support Project"
- **2015** Outstanding Ph.D. graduate in Beijing
- **2015** President's Ph.D. Scholarship of Peking University
- **2014** Yibing Xie Award for Youth in Meteorological Science

### Grants

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1. 2025–2028 National Natural Science Foundation of China General Project: *The Effects of Complex Terrain on the Activity Characteristics of Convectively Generated Gravity Waves and Their Roles in the Occurrence and Development of Convection* (480,000 RMB, Principal Investigator)
2. 2024–2027 National Key Research and Development Program Key Special Project for "Prevention and Control of Major Natural Disasters and Public Safety": *Mechanisms of Underling Surface and Boundary Layer Processes on Heavy Precipitation* (Principal Investigator)
3. 2025–2027 Natural Science Foundation from Guangdong Basic and Applied Basic Research Foundation Meteorological Joint Fund: *Impacting Mechanism and Predictability of Frontal Convective Gravity Waves on Warm-sector Rainfall in South China* (150,000 RMB, Principal Investigator)
4. 2024–2027 Natural Science Foundation from Guangdong Basic and Applied Basic Research Foundation General Project: *The Interaction between Cold Pools and Low-Level Jets along the South China Coast and Its Impact on the Occurrence and Development of Severe Convection* (150,000 RMB, Principal Investigator)
5. 2022–2024 National Natural Science Foundation of China Excellent Youth Project: *Dynamics of Low-Level Jets* (2 million RMB, Principal Investigator)
6. 2021–2024 National Natural Science Foundation of China General Project: *Propagation Characteristics of Global Coastal Precipitation Diurnal Variations and Their Connections with Gravity Waves and Density Currents* (580,000 RMB, Principal Investigator)
7. 2019–2022 National Natural Science Foundation of China General Project: *Influence Mechanisms of Two Types of Low-Level Jets on Pre-Flood Season Heavy Rainfall in Southern China* (630,000 RMB, Principal Investigator)
8. 2020–2022 Guangzhou Basic and Applied Research Project (200,000 RMB, Principal Investigator)
9. 2018–2020 China Association for Science and Technology Youth Talent Lifting Project (450,000 RMB, Principal Investigator)
10. 2017–2020 Sun Yat-sen University "Hundred Talents Program" Talent Introduction Project (300,000 RMB, Principal Investigator)
11. 2019–2020 Key Cultivation Project for Young Teachers of Central Universities (300,000

RMB, Principal Investigator)

12. 2019–2021 Jointly Funded Scientific Research Project by National Natural Science Foundation of China and Macao Science and Technology Development Fund: *Dynamics and Prediction of Multi-Scale Convective Weather Processes in the Pearl River Estuary* (Co-PI)
13. 2018–2021 National Key Research and Development Program Key Special Project for Natural Disaster Monitoring, Warning, and Prevention: *Multi-Scale Mechanisms and Prediction Theories and Methods for Heavy Rainfall* (Core Member)

## REFEREED PUBLICATIONS (# indicates corresponding author)

1. Fang, J., and **Y. Du**<sup>#</sup>, 2022: A Global Survey of Diurnal Offshore Propagation of Rainfall, *Nature Communications.*, 13, 7437. [\[High impact journal article\]](#)
2. **Du, Y.**<sup>#</sup>, and S. Yang, 2025: The Relationship Scenarios Between Boundary Layer Jet and Coastal Heavy Rainfall during the Pre-Summer Rainy Season of South China, *J. Meteor. Res.*, **39**(1), 26 – 40, doi: 10.1007/s13351-025-4138-x.
3. Yang, S., **Y. Du**<sup>#</sup>, B. Han<sup>#</sup>, C. Wu, and H. Kong, 2025: Microphysical Characteristics of Tropical Cyclone Choiwan (2021) Outer Rainbands Derived from Polarimetric Radar Observations on a Research Vessel. *Geophys. Res. Lett.*, 52, e2024GL112557.
4. **Du, Y.**<sup>#</sup>, R. Rotunno, Z. Chen, H. Yang, 2024: A Linear Theory for Periodic Convectively Forced Gravity Waves, *J. Atmos. Sci.*, 81, 1271–1288.
5. Yang H., **Y. Du**<sup>#</sup>, Z. Chen, and J. Fang, 2024: Could Developing Frontal Rainfall Influence Warm-sector Rainfall? *Geophys. Res. Lett.* 51, e2024GL110430.
6. Zhou X., **Y. Du**<sup>#</sup>, J. Wei<sup>#</sup>, Z. Chen, H. Yang, 2024: Statistical characteristics of Wavelike Banded Convection Associated with Ducted Gravity Waves over Southern China, *Geophys. Res. Lett.*, 51, e2024GL112027.
7. Zhang, X., Y. Luo, and **Y. Du**<sup>#</sup>, 2024: Observation of Boundary-Layer Jets in the Northern South China Sea by a Research Vessel, *Remote Sensing*, 16, 3872.
8. Chen Z. and **Y. Du**<sup>#</sup>, 2024: The Influence of Topography on the Diurnal Rainfall Propagation in the Bay of Bengal, *J. Atmos. Sci.*, 81, 1019 – 1032.
9. Yang H., and **Y. Du**<sup>#</sup>, 2024: Difference between Upshear and Downshear Propagating Waves Associated with the Development of Squall lines, *Mon. Wea. Rev.*, 152, 1399 – 1420.
10. Hailong, Shu, Fan Zhang<sup>#</sup>, **Yu Du**<sup>#</sup>, Yue Wang, Huichuang Guo, Zhen Song, Qinghong Zhang. 2024: Characteristics and Formation Mechanisms of Low-Level Jets in Northeastern China. *Adv. Atmos. Sci.*
11. Yuanping He, Shaojia Fan<sup>#</sup>, Yiming Wang, Yiming Liu, Xiao Lu, Haolin Wang, Cheng He, Chuying Mai, **Yu Du**<sup>#</sup>, 2024: Influence of boundary layer jets on the vertical distribution of ozone in Guangdong, China, *Science of The Total Environment*, 927, 171874.
12. Zhang, J., Bai, L., Li, Z., **Du, Y.**, & Zhang, S, 2024: High-Frequency Microbarograph-Observed Pressure Variations Associated with Gust Fronts during an Extreme Rainfall Event. *Remote Sensing*, 16(1), 101.
13. Sun, R., Lu, X., Gao, M., **Du, Y.**, Lin, H., Wright, C., ... & Yin, K, 2024: The impacts of shipping emissions on lightning: Roles of aerosol-radiation-interactions and aerosol-cloud-interactions. *Environmental Research Letters*. 19(3), 034038.
14. Xin, R., Li, X. X.<sup>#</sup>, **Du, Y.**, Li, M., & Chew, L. W. (2024). Simulation of a cold spell in Guangdong-Hong Kong-Macao Greater Bay Area with WRF: Sensitivity to PBL schemes. *Atmospheric Research*, 310, 107640.
15. **Du, Y.**<sup>#</sup>, 2023: Offshore migration of summer monsoon low-level jet on a diurnal scale. *Geophys. Res. Lett.*, 50, e2023GL103840.
16. Yang, H., **Y. Du**<sup>#</sup>, and J. Wei, 2023: Generation of Multiple Gravity Wave Couplets from Convection. *J. Atmos. Sci.*, 80, 2323-2343.
17. Mai, C., **Y. Du**<sup>#</sup>, and M. Li, 2023: Processes of Colliding Cold Pools Derived from a 356-m High Shenzhen Met-Tower during an Extremely Heavy Rainfall Event. *Mon. Wea. Rev.*, 151, 1571-1585
18. Shen Y. and **Y. Du**<sup>#</sup>, 2023: Sensitivity of boundary layer parameterization schemes in a marine boundary layer jet and associated precipitation during a coastal warm-sector heavy rainfall event. *Front. Earth Sci.* 10:1085136. doi: 10.3389/feart.2022.1085136.

19. Luo, Y., and **Y. Du**<sup>#</sup>, 2023: The Roles of Low-level Jets in "21·7" Henan Extremely Persistent Heavy Rainfall Event. *Adv. Atmos. Sci.*, 40, 350-373. [\[ESI highly cited paper\]](#)
20. Su, L.<sup>#</sup>, X. Sun, **Y. Du**, J. Fung, and G. Chen<sup>#</sup>, 2023: The roles of local convergences in the convection initiation of a record-breaking rainfall event at the coastal Pearl River Delta in South China. *J. Geophys. Res. Atmos.*, 128(3), e2022JD037234.
21. Liu, X., G. Chen<sup>#</sup>, S. Zhang, and **Y. Du**, 2023: Formation of low-level jets over southern China in the meiyu season. *Adv. Atmos. Sci.*, 40(10), 1–18.
22. **Du, Y.**<sup>#</sup>, Y. Shen, and G. Chen, 2022: Influence of Coastal Marine Boundary Layer Jets on Rainfall in South China. *Adv. Atmos. Sci.*, 39, 782-801.
23. Mai, C., and **Y. Du**<sup>#</sup>, 2022: Mesoscale Moisture Transport in Determining the Location of Daytime Convection Initiations Clustered in Time and Space over Southern China. *J. Geophys. Res. Atmos.*, 127(11), e2021JD036098.
24. Guo, Y., **Y. Du**<sup>#</sup>, R. Lu, X. Feng, J. Li, Y. Zhang, Z. Mai, 2022: The Characteristics of Mesoscale Convective Systems Generated over the Yunnan-Guizhou Plateau during the Warm Season. *International Journal of Climatology*, 42(14), 7321-7341.
25. Zhu, B., **Y. Du**<sup>#</sup>, Gao, Z. 2022: Influences of MJO on the Diurnal Variation and Associated Offshore Propagation of Rainfall near Western Coast of Sumatra. *Atmosphere*, 13, 330.
26. Ruppert, J.H. <sup>#</sup>, S. Koch, X. Chen, **Y. Du**, A. Seimon, Y. Qiang Sun, J. Wei, L. Bosart, 2022: Mesoscale Gravity Waves and Midlatitude Weather: A Tribute to Fuqing Zhang. *Bulletin of the American Meteorological Society*, 103, E129-E156.
27. **Du, Y.**<sup>#</sup>, F. Zhang, Y. Q. Sun, J. Wei, and X. Li, 2021: Practical and Intrinsic Predictability of Wave-Convection Coupled Bands over Southern China. *J. Geophys. Res. Atmos.*, 126(22), e2021JD034882 [\[Cover article\]](#)
28. Han, B., **Y. Du**<sup>#</sup>, C. Wu, and X. Liu, 2021: Microphysical Characteristics of the Coexisting Frontal and Warm-sector Heavy Rainfall in South China. *J. Geophys. Res. Atmos.*, 126(21), e2021JD035446
29. Li, X., and **Y. Du**<sup>#</sup>, 2021: Statistical Relationships Between Two Types of Heavy Rainfall and Low-Level Jets in South China. *J. Climate*, 34, 8549-8566.
30. Chen, G. <sup>#</sup>, **Y. Du**, and Z. Wen, 2021: Seasonal, interannual, and interdecadal variations of the East Asian summer monsoon: A diurnal-cycle perspective. *J. Climate*, 34 (11), 4403–4421.
31. **Du, Y.**<sup>#</sup>, G. Chen, B. Han, C. Mai, L. Bai and M. Li, 2020a: Convection initiation and growth at the coast of South China. Part I: Effect of the marine boundary-layer jet. *Mon. Wea. Rev.*, 148, 3847-3869.
32. **Du, Y.**<sup>#</sup>, G. Chen, B. Han, L. Bai and M. Li, 2020b: Convection initiation and growth at the coast of South China. Part II: Effects of the terrain, coastline and cold pools. *Mon. Wea. Rev.*, 148, 3871-3892.
33. Shen, Y., **Y. Du**<sup>#</sup>, and G. Chen, 2020: Ensemble sensitivity analysis of heavy rainfall associated with three MCSs coexisting over southern China. *J. Geophys. Res. Atmos.*, 125(2), e2019JD031266.
34. Kong, Hoiio, Q. Zhang<sup>#</sup>, **Y. Du**<sup>#</sup>, and F. Zhang, 2020: Characteristics of Coastal Low-level Jets over Beibu Gulf, China, During the Early Warm Season. *J. Geophys. Res. Atmos.*, 125(2) e2019JD31918.
35. Li, Z., Y. Luo<sup>#</sup>, **Y. Du**, and J. Chan, 2020: Statistical characteristics of pre-summer rainfall over South China and associated synoptic conditions. *J. Meteor. Soc. Japan.*, 98, 213-233.
36. Luo, Y. <sup>#</sup>, Sun, J., Li, Y., Xia, R., **Du, Y.**, ... & CHEN, H. 2020: Science and Prediction of Heavy Rainfall over China: Research Progress since the Reform and Opening-Up of New China. *J. Meteor. Res.*, 34(3), 427-459.
37. **Du, Y.**<sup>#</sup>, R. Rotunno, and F. Zhang, 2019: Impact of vertical wind shear on gravity wave propagation in the land-sea breeze circulation at the equator. *J. Atmos. Sci.*, 76,3247–3265.
38. **Du, Y.**<sup>#</sup> and G. X. Chen, 2019: Climatology of low-level jets and their impact on rainfall over southern China during early-summer rainy season. *J. Climate.*, 32, 8813–8833.
39. **Du, Y.**<sup>#</sup> and F. Zhang, 2019: Banded Convective Activity Associated with Mesoscale Gravity Waves over Southern China. *J. Geophys. Res. Atmos.*, 124, 1912-1930.
40. **Du, Y.** <sup>#</sup> and G. X. Chen, 2019: Heavy Rainfalls Associated with Double Low-level Jets over Southern China. Part II: Convection initiation. *Mon. Wea. Rev.*, 147, 543-565. [\[ESI highly cited paper\]](#)
41. Zeng, W., G. Chen<sup>#</sup>, **Y. Du**, and Z. Wen, 2019: Diurnal variations of low-level winds and rainfall response to large-scale circulations during a heavy rainfall event. *Mon. Wea. Rev.*, 147, 3981–4004.
42. **Du, Y.**<sup>#</sup> and R. Rotunno, 2018: Diurnal Cycle of Rainfall and Winds near the South Coast of China. *J. Atmos. Sci.*, 75, 2065–2082.
43. **Du, Y.**<sup>#</sup> and G.X. Chen, 2018: Heavy Rainfalls Associated with Double Low-level Jets over Southern China. Part I: Ensemble-based Analysis. *Mon. Wea. Rev.*, 146, 3827-3844.
44. Tu, C-C, Y-L, Chen<sup>#</sup>, P-L, Lin, and **Y. Du**, 2018: Characteristics of the Marine Boundary Layer Jet over the

- South China Sea during the Early Summer Rainy Season of Taiwan. *Mon. Wea. Rev.*, 147, 457-475.
45. Zhang, F., Q. Zhang<sup>#</sup>, **Y. Du**, and H. Kong, 2018: Characteristics of coastal low-level jets in the Bohai Sea, China during the early warm season. *J. Geophys. Res. Atmos.*, 123, 13763-13774.
46. **Du, Y.** and R. Rotunno<sup>#</sup>, 2015: Thermally Driven Diurnally Periodic Wind Signals off the East Coast of China. *J. Atmos. Sci.*, 72, 2806-2821.
47. **Du, Y.**, R. Rotunno<sup>#</sup>, Q.H., Zhang 2015: Analysis of WRF-simulated Diurnal Boundary-Layer Winds in Eastern China using a Simple 1D Model. *J. Atmos. Sci.*, 72, 714-727.
48. **Du, Y.**, Y.-L. Chen<sup>#</sup> and Q. Zhang, 2015: Numerical simulations of the Boundary Layer Jet off the southeastern coast of China. *Mon. Wea. Rev.*, 143, 1212-1231.
49. **Du, Y.** and R. Rotunno<sup>#</sup>, 2014: A Simple Analytical Model of the Nocturnal Low-level Jet over the Great Plains of the United States. *J. Atmos. Sci.*, 71, 3674-3683.
50. **Du, Y.**, Q. H. Zhang<sup>#</sup>, Y. L. Chen, Y. Y. Zhao, and X. Wang, 2014: Numerical simulations of spatial distributions and diurnal variations of low-level jets in China during early summer. *J. Climate.*, 27, 5747-5767.
51. Zhao Y, Zhang Q<sup>#</sup>, **Du Y**, et al. 2013: Objective analysis of circulation extremes during the 21 July 2012 torrential rain in Beijing. *Acta Meteorologica Sinica.*, 27, 626-635.
52. **Du, Y.**, Q. H. Zhang<sup>#</sup>, Y. Yue, and Y. M. Yang, 2012: Characteristics of low-level jets in Shanghai during the 2008 – 2009 warm seasons as inferred from Wind Profiler Radar Data. *J. Meteor. Soc. Japan.*, 90, 891-903.

## PROFESSIONAL ATCIVITIES

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- 2022–present, Editor, Advances in Atmospheric Sciences
- 2024–present, Associate editor, Journal of the Atmospheric Sciences
- 2019–present, Associate editor, Monthly Weather Review
- 2021–present, Member of CNC-WWRP and the chair of the working group of Communication and Education
- 2023–present, Member of CNC-IAMAS
- 2023–present, AOGS, Atmospheric Science Secretary
- 2023–present, Co-Chief Scientist of Key Innovation Team of China Meteorological Administration (Tropical Meteorology)
- 2023–present, Program committee member of ICMCS