DANDAN TAO

Research Scientist
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Research Interest

- Tropical cyclone axisymmetric theories on intensity and structure
- Inner core dynamics of tropical cyclones and its related mesoscale convective processes
- Environmental influence, e.g. vertical wind shear, sea surface temperature and dry air, on the predictability of tropical cyclones

Education

2010-2015: Ph.D. in Meteorology, Pennsylvania State University, University Park
Dissertation: "Dynamics and Predictability of Tropical Cyclones Under Vertical Wind Shear"
Committee chair: Dr. Fuqing Zhang
2006-2010: B.S. in Atmospheric Sciences, Peking University, Beijing

Professional Experiences

Research Experiences
2018 August – present: Research Scientist I, Colorado State University, Fort Collins
2015 May – 2018 July: ADAPT center assistant, Pennsylvania State University, University Park
2015 May – 2018 July: Post-doctoral Scholar, Pennsylvania State University, University Park

Teaching Experiences
2017 Jan-May: Co-lecturer for *Dynamic Meteorology*, Department of Meteorology, PSU
2011 Jan-May: Teaching Assistant for *Numerical Weather Prediction*, Department of Meteorology, PSU
2015 May – 2018 June: Co-advising visiting students in the group

Journal Publications

1. **Tao, D.**, K. Emanuel, F. Zhang, R. Rotunno, M. Bell, and R.G. Nystrom, 2019: Evaluation of the assumptions in the steady-state tropical cyclone self-stratified outflow

using three-dimensional convection-allowing simulations. *Journal of the Atmospheric Sciences*, **76**, 2995-3009.

2. **Tao, D.**, and F. Zhang, 2019: Evolution of dynamic and thermodynamic structures before and during rapid intensification of tropical cyclones: sensitivity to vertical wind shear. *Monthly Weather Review*, **147**, 1171-1191.
3. Liu, S., **D. Tao**, K. Zhao, M. Minamide, and F. Zhang, 2018: Dynamics and Predictability of Rapid Intensification of Super Typhoon Usagi (2013). *Journal of Geophysical Research - Atmosphere*, **123**, 7462-7481.
4. Cohen Y., N. Harnik, E. Heifetz, D. S. Nolan, **D. Tao,** and F. Zhang, 2017: On the Violation of Gradient Wind Balance at the top of Tropical Cyclones. *Geophysical Research Letters*, **44**, 8017-8026.
5. Zhang, F., **D. Tao**, Y. Q. Sun, and J. D. Kepert, 2017: Dynamics and predictability of secondary eyewall formation in sheared tropical cyclones. *Journal of Advances in Modeling Earth Systems (JAMES)*, **9**, 89-112.
6. **Tao, D**., and F. Zhang, 2015: Effects of Vertical Wind Shear on the Predictability of Tropical Cyclones: Practical versus Intrinsic Limit. *Journal of Advances in Modeling Earth Systems (JAMES)*, **7**, 1534-1553.
7. **Tao, D**., and F. Zhang, 2014: Effect of environmental shear, sea-surface temperature and ambient moisture on the formation and predictability of tropical cyclones: an ensemble-mean perspective. *Journal of Advances in Modeling Earth Systems (JAMES)*, **6**, 384-404.
8. Zhang, F., and **D. Tao**, 2013: Effects of Vertical Wind Shear on the Predictability of Tropical Cyclones. *Journal of the Atmospheric Sciences*, **70**, 975-983.

Book chapters

1. Zhang, F., C. Melhauser, **D. Tao**, Y. Q. Sun, E. B. Munsell, Y. Weng and J. A. Sippel, 2015: Predictability of Severe Weather and Tropical Cyclones at the Mesoscales. Dynamics and Predictability of Large-scale, High-impact Weather and Climate Events (eds, J. Li, R. Swinbank, H. Volkert and R. Grotjahn). Cambridge University Press.

Conference and Seminar Presentations

Tao, D., M. Bell, R. Rotunno and P. J. Van Leeuwen, *"Why do the maximum intensities in modeled tropical cyclones vary under the same environmental conditions?"*, December 2019, AGU Fall Meeting

Tao, D., and F. Zhang, M. Bell, R. Rotunno and K. Emanuel, *"Predictability and Dynamics of Tropical Cyclones under Different Environmental Conditions"*, September 2019, Seminar in The School of Atmospheric Sciences, Nanjing University

Tao, D., M. Bell, R. Rotunno and P. J. Van Leeuwen, *"Tropical Cyclone Intensity, Structure and Associated Rainfall"*, September 2019, Second Joint Project Meeting of WWRP Projects organized by World Meteorological Organization

Tao, D., K. Emanuel, F. Zhang, R. Rotunno, M. Bell and R.G. Nystrom, *"Evaluation of self-stratification assumptions in steady-state tropical cyclone outflow using 3-D simulation"*, December 2018, Second ADAPT Symposium on Advanced Understanding, Monitoring and Prediction of Weather, Climate and Environmental systems

Tao, D., and F. Zhang, *"Dynamic and Thermodynamic Structures of TCs near Rapid Intensification in Isentropic Coordinate"*, December 2018, AGU Fall Meeting

Tao, D., and F. Zhang, *"Effect of Sea-Surface Temperature and Ambient Moisture on the Formation and Predictability of Tropical Cyclones Under Vertical Wind Shear: An Ensemble Predictability Perspective"*, April 2018, American Meteorological Society 33th Conference on Hurricanes and Tropical Meteorology

Tao, D., and F. Zhang, *"Thermodynamic and Dynamic Processes before RI Onset for Sheared TCs"*, June 2017, 8th Northeast Tropical Meteorology Workshop

Tao, D., and F. Zhang, *"Predictability and dynamics of secondary eyewall formation in sheared tropical cyclones"*, April 2016, American Meteorological Society 32th Conference on Hurricanes and Tropical Meteorology

Tao, D., and F. Zhang, *"Effects of Vertical Wind Shear on the Predictability of Tropical Cyclones: Practical versus Intrinsic Limit"*, August 2015, American Meteorological Society 16th Conference on Mesoscale Processes

Tao, D., and F. Zhang, *"Predictability and dynamics of tropical cyclones: sensitivity to environmental shear, sea-surface temperature and moisture"*, March 2014, American Meteorological Society 31th Conference on Hurricanes and Tropical Meteorology

Tao, D., and F. Zhang, *"Effects of Vertical Wind Shear on the Predictability of Tropical Cyclones"*, May 2013, Northeast Tropical Conference

Tao, D., and F. Zhang, *"Impact of vertical wind shear on the Predictability and Dynamics of Tropical Cyclones"*, May 2012, Peking University Department of Atmospheric and Oceanic Sciences Seminar

Tao, D., and F. Zhang, *"Impact of vertical wind shear on the Predictability of Tropical Cyclones"*, April 2012, American Meteorological Society 30th Conference on Hurricanes and Tropical Meteorology

Honor and awards

2015 Group Achievement Award in leading the Penn State's participation of Hurricane and Severe Storm Sentinel, National Aeronautics and Space Administration (NASA) "*for outstanding achievements of the Hurricane and Severe Storm Sentinel (HS3) airborne mission to investigate the factors influencing hurricane intensity change.*"
2010 Pennsylvania State University Funds for Excellence in Graduate Recruitment
2009 Peking University Founder Scholarship
2009 Peking University Learning Excellent Prize

News Highlights:
2016 Earth & Space Science News: Wind Shear Measures Help Predict Tropical Cyclones (Link: https://eos.org/research-spotlights/wind-shear-measures-help-predict-tropical-cyclones)

Other Activities

Since 2012: Reviewer of manuscripts for *Monthly Weather Review*, *Journal of Atmospheric Science*, *Journal of Meteorological Research*, and *Meteorology and Atmosheric Physics*
2016 May: coordinator of the 7th EnKF Data Assimilation workshop
2016 May: coordinator of Symposium on Advanced Assimilation and Uncertainty Quantification in BigData Research for Weather, Climate and Earth System Monitoring and Prediction
2016 May: coordinator of 2016 SPARC Gravity Wave Symposium