

# Honghai Zhang

Earth and Atmospheric Sciences  
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## Current Position

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| Assistant Professor<br>University of Houston | 2022-present |
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## Employment

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|---|-----------|
| Associate Research Scientist<br>LDEO, Columbia University             | 2020-2022 |
| Postdoctoral Researcher<br>LDEO, Columbia University                  | 2018-2020 |
| Postdoctoral Research Associate<br>Princeton University and GFDL/NOAA | 2015-2018 |

## Education

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| Ph.D., Meteorology and Physical Oceanography<br>University of Miami<br>Advisor: Amy Clement<br>Dissertation: The Meridional Mode: Dependence on the Mean Climate State   | 2010-2015 |
| M.S., Physical Oceanography<br>Ocean University of China<br>Advisor: Lixin Wu<br>Thesis: Predicting North Atlantic Sea Surface Temperature Variability on the basis of the First-Mode Baroclinic Rossby Wave Model | 2007-2010 |
| B.S., Marine Science<br>Ocean University of China  | 2003-2007 |

## Honors and Awards

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| The Frank J. Millero Prize                                 | 2013       |
| NCAR Advanced Study Program/Graduate Student Visitor Award | 2013       |
| Shandong Province Outstanding Master Thesis                | 2011       |
| Outstanding Graduate                                       | 2007       |
| Scholarship for Scientific and Technical Innovation        | 2006       |
| Outstanding Student Honor                                  | 2004, 2005 |
| National Scholarship                                       | 2004       |

## Grants

NSF #1934363, PI: **H. Zhang**, Co-PI: R. Seager and S. Xie, Interhemispheric and Zonal Asymmetries of the ITCZ. \$625,151, 02/01/2020-01/31/2023

In preparation for NSF, PI: **H. Zhang**, Co-PI: M. Ting, R. Seager and J. He, A new role of the tropical oceans in regional precipitation across the globe.

## Peer-reviewed Publications

Di Lorenzo, E., coauthors and **H. Zhang**, 2022: Modes and Mechanisms of Pacific Decadal-Scale Variability. *Annu. Rev. Mar. Sci.*, accepted.

<https://doi.org/10.1146/annurev-marine-040422-084555>

**Zhang, H.**, R. Seager and S. Xie, 2022: How does sea surface temperature drive the Intertropical Convergence Zone in the southern Indian Ocean? *J. Climate*, **35**, 5415–5432. <https://doi.org/10.1175/JCLI-D-21-0870.1>

**Zhang, H.**, R. Seager, J. He, H. Diao and S. Pascal, 2021: Quantifying Atmosphere and Ocean origins of North American Precipitation Variability. *Clim Dyn* **56**, 4051-4076, <https://doi.org/10.1007/s00382-021-05685-0>

Seager, R., N. Henderson, M. Cane, **H. Zhang** and J. Nakamura, 2021: Atmosphere-ocean dynamics of persistent cold states of the tropical Pacific Ocean. *J. Climate*, **34**, 5195-5214, <https://doi.org/10.1175/JCLI-D-20-0694.1>

**Zhang, H.**, 2020: Tropical Pacific intensifies June extreme rainfall over Southwestern United States/Northwestern Mexico. *Clim Dyn* **55**, 721–737. <https://doi.org/10.1007/s00382-020-05291-6>

Klavans, J. M., Clement, A. C., Murphy, L. N., & **Zhang, H.**, 2020: Identifying the externally forced Atlantic Multidecadal Variability signal through Florida rainfall. *Geophysical Research Letters*, **47**, e2020GL088361.

Delworth, T., **H. Zhang** and coauthors, 2020: SPEAR - the next generation GFDL modeling system for seasonal to multidecadal prediction and projection. *JAMES*, accepted, DOI:10.1029/2019MS001895

Seager, R., M. Cane, N. Henderson, D.-E. Lee, R. Abernathy, and **H. Zhang**, 2019: Strengthening tropical Pacific zonal sea surface temperature gradient consistent with

- rising greenhouse gases. *Nature Climate Change*, **9**, 517–522, <https://doi.org/10.1038/s41558-019-0505-x>.
- Pascale, S., B. Pohl, S. Kapnick and **H. Zhang**, 2019: On the Angola Low interannual variability and its role for modulating ENSO effects in southern Africa, *J. Climate*, **32**, 4783–4803, <https://doi.org/10.1175/JCLI-D-18-0745.1>.
- Zhang, H.** and T. Delworth, 2018: Robustness of Anthropogenically Forced Decadal Precipitation Changes Projected for the 21<sup>st</sup> Century. *Nat. Commun.*, **9**, 1150, doi:10.1038/s41467-018-03611-3.
- He, J., B. Kirtman, B. J. Soden, G. A. Vecchi, **H. Zhang**, and M. Winton, 2018: Impact of ocean eddy resolution on the sensitivity of precipitation to CO2 increase. *Geophys. Res. Lett.*, **45**, 7194–7203. <https://doi.org/10.1029/2018GL078235>
- Zhang, H.** and T. Delworth, 2017: Detectability of Decadal Anthropogenic Hydroclimate Changes Over North America. *J. Climate.*, **31**, 2579–2597, doi:10.1175/JCLI-D-17-0366.1.
- Zhang, H.**, T. Delworth, F. Zeng, G. Vecchi, K. Paffendorf and L. Jia., 2016: Detection, Attribution and Projection of Regional Rainfall Changes On (Multi-) Decadal Time Scales: A Focus on Southeastern South America. *J. Climate*, **29**, 8515-8534, doi: <http://dx.doi.org/10.1175/JCLI-D-16-0287.1>.
- Zhang, H.**, A. Clement and B. Medeiros, 2015: The Meridional Mode in an Idealized Aquaplanet Model: Dependence on the Mean State. *J. Climate*, **29**, 2889-2905, doi: 10.1175/JCLI-D-15-0399.1.
- Zheng, X., A. Li, S. Kao, W. Cai, G. Kuhn, H. Yan, S. Wan, **H. Zhang**, F. Jiang, C. Johnson, 2015: Synchronicity of the Kuroshio Current and climate system variability since the Last Glacial Maximum. *Earth Planet. Sci. Lett.*, **452**, 247-257, doi: <http://dx.doi.org/10.1016/j.epsl.2016.07.028>
- Zhang, H.**, C. Deser, A. Clement and R. Tomas, 2014: Equatorial Signatures of the Pacific Meridional Modes: Dependence on the Mean Climate State. *Geophys. Res. Lett.*, **41**, 568–574, doi:10.1002/2013GL058842.
- Zhang, H.**, A. Clement and P. DiNezio, 2014: The South Pacific Meridional Mode: A Mechanism for ENSO-like Variability. *J. Climate*, **27**, 769–783. doi: <http://dx.doi.org/10.1175/JCLI-D-13-00082.1>.
- Zhang, H.** and L. Wu, 2010: Predicting North Atlantic Sea Surface Temperature Variability on the basis of the First-Mode Baroclinic Rossby Wave Model. *J. Geophys. Res.*, **115**, C09030, doi:10.1029/2009JC006017.

## Papers in Review, Revision or Preparation

- Zhang, H.**, 2022: The time insensitivity of atmospheric control on North American precipitation. *in preparation*

## Other Publications

- Di Lorenzo, E., **H. Zhang**, A. Clement, B. Anderson, and A. Fedorov, 2013: Extra-tropical Precursors of ENSO Flavors. *U.S. CLIVAR VARIATIONS*, Vol. **11**, No. 2, 14-18.

## Teaching Experience

- Teaching assistant for Environmental Statistics (#204), undergraduate course, spring, 2011  
Instructor: Kevin Leaman
- Teaching assistant for Introduction to Atmospheric Science (MPO#551), graduate course, fall, 2011  
Instructor: Amy Clement

## Model Development

- Developed an idealized model configuration (aquaplanet slab ocean) for NCAR Community Earth System Model (CESM), working with Brian Medeiros and Mariana Vertenstein, 2013 (released in CESM version 2.0)
- Developed a diagnostic package to compute eddy transport for GFDL Forecast-oriented Low Ocean Resolution (FLOR) model
- Developing a linear dynamic model for the tropical ocean-atmosphere coupled system, working with Richard Seager, Naomi Henderson and Mark Cane

## Selected Presentations

- 2020 AGU Fall meeting (virtual poster): Tropical Pacific intensifies June extreme rainfall over Southwestern United States/Northwestern Mexico.
- 2018 AMS annual meeting (**talk**): Detectability of Decadal Anthropogenic Hydroclimate Changes over North America. Austin, TX
- 2017 AGU Fall meeting (**talk**): Detectability of Decadal Anthropogenic Hydroclimate Changes over North America. New Orleans, LU
- Departmental **talk** (invited): Robustness of Decadal Anthropogenic Precipitation Changes Projected for the 21<sup>st</sup> Century. Yale University, New Haven, November, 2017
- CLIVAR Open Science Conference: The Meridional Mode in an Idealized Aquaplanet Model: Dependence on the Mean State (**talk**, among 6 talks selected out of ~200 submissions); Detection, Attribution and Projection of Regional Rainfall Changes On (Multi-) Decadal Time Scales: A Focus on Southeastern South America (Poster). Qingdao, September, 2016
- Departmental **talk** (invited): The Meridional Mode in an Idealized Aquaplanet Model: Dependence on the Mean State. Lamont-Doherty Earth Observatory, Columbia University, March, 2016
- Departmental **talk**: The South Pacific Meridional Mode: A Mechanism for ENSO-like Variability and A Potential Precursor for ENSO. Scripps Institute of Oceanography, September, 2014
- 19th CESM Annual Workshop: Thermally Coupled Variability in CAM4 Coupled With Aquaplanet Slab Ocean. Breckenridge, June, 2014 (**talk**)
- US CLIVAR ENSO Diversity Workshop: The South Pacific Meridional Mode: A Mechanism for ENSO-like Variability. Boulder, February, 2013 (**talk**)
- 92th AMS Annual Meeting: Mechanisms of ENSO-like Variability in the Absence of Dynamical Coupling. New Orleans, January, 2012 (Poster)

## Academic Activities

- Co-mentoring an internship student (Clair Miles) from Stanford University, June-September, 2016  
Project title: Modeling the Future of Drought Across the United States
- Mentoring an internship student (Blas Minarro) from Maritime and Science Technology High School, Miami, Florida, September, 2013-May, 2014  
Project title: Analyzing the Long-Term Climate in Miami
- Representing Princeton University at the New Jersey Ocean Fun Days (an outreach event run by NJ Sea Grant Consortium) to conduct experiments (ice melting rate in fresh versus sea water) and explain sciences to the public, May, 2016
- Four-month summer internship (Graduate Student Visitor) at National Center for Atmospheric Research (NCAR) working with Clara Deser, April-August, 2013
- Reviewer for  
Journals: Science, Nature Communications, Journal of Applied Meteorology and Climatology, Journal of Climate, Climate Dynamics, Journal of Geophysical Research-Atmospheres, Journal of Geophysical Research-Oceans, Geophysical Research Letters, Chinese Journal of Oceanology and Limnology;  
Funding agencies: National Science Foundation

## Field Work

- Research cruise: mooring recovery in Florida Bay, R/V Walton Smith, August, 2014
- Research cruise: the second Open Ocean Investigation in the Western Pacific (National 973 Program), R/V Ke Xue Yi Hao, in charge of RCM11, COMPACT-TD and CTD, July, 2009
- Research cruise: the joint investigation of the ecosystem in the Yellow River Estuary, in charge of RBR-620, June, 2009
- Research cruise: the first Open Ocean Investigation in the Western Pacific (National 973 Program), R/V Dong Fang Hong 2, in charge of RCM11, COMPACT-TD and CTD, September, 2008
- Research cruise: the ecosystem investigation of the Yellow River Estuary, in charge of RBR-420, April, 2008
- Research cruise: coastal observation internship in Jiaozhou Bay, R/V Fishing 3, June, 2006
- Research cruise: marine investigation internship in the Yellow Sea, R/V Dong Fang Hong 2, June, 2005

## Professional Membership

- Member of American Geophysical Union, 2010-present
- Member of American Meteorological Society, 2010-present