Ming Zhao
Senior Physical Scientist
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Education

- Ph.D., Atmospheric Science, University of British Columbia, 2003
- M.S., Meteorology, Nanjing Institute of Meteorology, 1993
- B.S., Meteorology, Nanjing Institute of Meteorology, 1990

Employment

- Senior Physical Scientist, GFDL/NOAA, Princeton, New Jersey, USA, 03/2022-present
- Physical Scientist, GFDL/NOAA, Princeton, New Jersey, USA, 11/2016-03/2022
- Project Scientist III, UCAR, GFDL/NOAA, Princeton, NJ, USA, 2013-2016
- Project Scientist II, UCAR, GFDL/NOAA, Princeton, NJ, USA, 2007-2013
- Associate Research Scholar, Princeton University, GFDL/NOAA, Princeton, NJ, USA, 2006-2007
- Research Associate, Princeton University, GFDL/NOAA, Princeton, NJ, USA, 2004-2006
- Post-doctoral Fellow, Canadian Centre for Climate Modelling and Analysis (CCCma), Victoria, University of Victoria, Canada, 2003-2004
- Meteorologist, Shanghai Meteorological Center, Shanghai, China, 1993-1998

Professional Experience and Responsibilities

- Member of US CLIVAR Process Study and Model Improvement Panel (2022-present)
- Member of AMS Committee on Tropical Meteorology and Tropical Cyclones (2018-present)
- Co-lead of NOAA CPO MAPP Climate Sensitivity Task Force (2020-present)
- Member of NOAA CPO MAPP Model Diagnostics Task Force (2015-present)
- Member of writing team for NOAA's Precipitation Grand Challenge Strategic Plan (2020)
- Member of NCEP Unified Modeling Strategic Implementation Plan Working Group on Physics (2017)
- Member of NOAA CPO MAPP Climate Model Development Task Force (2014-2017)
- Member of NOAA CPO MAPP Climate Prediction Task Force (2012-2015)
- Member of NOAA CPO MAPP CMIP5 Task Force (2011-2014)
- Core member of the U.S. CLIVAR Hurricane Working Group (2011-2014)
- Member of GFDL Research Council (2018-Present)
- Member of GFDL Outstanding Paper nomination committee (2020-Present)
- Co-lead (2013-2015) and lead (2015-2018) of GFDL Model Development Team (MDT) Atmospheric Working Group (AWG) for developing GFDL new generation global atmospheric model AM4 (2013-2018)
- Co-lead of GFDL Model Development Team (MDT) Coupled Working Group (CWG) for developing GFDL new generation coupled physical climate model CM4 (2013-2019)
- Co-lead of GFDL Cloud and Climate Initiative (2013-present)
- Lead developer for GFDL Global High Resolution Atmospheric Model (HiRAM) (2007-2011)
- Core developer for GFDL Global Atmospheric Model version 3 (AM3) (2007-2011)
- Advisor and co-advisor of six postdocs
- Member of two PhD committees at AOS Princeton University
- Session organizer and co-chair, 35th AMS Conference on Hurricanes and Tropical Meteorology, New Orleans, USA, May 9 - 13, 2022
- Session co-convenor and co-chair, CMIP6 Climate Model Evaluation, 2021 AGU Fall meeting
- Session co-convenor and co-chair, CMIP6 Climate Model Evaluation, 2020 AGU Fall meeting
- Session co-convenor and co-chair, CMIP6 Climate Model Evaluation, 2019 AGU Fall meeting

- Session chair, Climate Change I & II, 33rd AMS Conference on Hurricanes and Tropical Meteorology, April 16 - 20, 2018 Ponte Vedra, Florida, 2018
- Session chair, Climate III, 31st American Meteorological Society (AMS) Conference on Hurricanes and Tropical Meteorology, San Diego, USA, March 30 - April 04, 2014
- Session chair, Precipitation in a Changing Climate, Joint CFMIP (Cloud Feedback Model Intercomparison Project) / EUCLIPSE (European Union CLoud Inter-comparison, Process Study & Evaluation project) Meeting on Cloud Processes and Climate Feedbacks, Hamburg, Germany, June 10-14, 2013
- Review panelist for NASA and DOE Grant Proposal
- Reviewer for National Science Foundation Grant Proposal, NOAA Climate Program Office Funding Proposal
- Reviewer for *Nature Climate Change, Nature Communications, Bulletin of the American Meteorological Society, Journal of Climate, Journal of Atmospheric Sciences, Journal of Geophysical Research, Geophysical Research Letters, Journal of Advances in Modeling Earth Systems, Climate Dynamics, Climate Change, Quarterly Journal of the Royal Meteorological Society, Journal of the Meteorological Society of Japan, Dynamics of Atmospheres and Oceans, International Journal of Climatology, Advances in Atmospheric Sciences*
- Member of American Geophysical Union
- Member of American Meteorological Society

Awards and Recognition

- Recipient of 2018 NOAA OAR Outstanding Scientific Paper Award (Climate category) (This award recognizes the preeminent science that OAR employees and affiliates publish through rigorous peer review processes. Awards are under three categories corresponding to NOAA's mission goals in Climate, Oceans and Great Lakes, and Weather. There was one paper awarded under each category in December 2018)
- Ranked #618 among the Reuters hot 1000 list of the world's top climate scientists in 2020. https://www.reuters.com/investigates/special-report/climate-change-scientists-list/
- American Geophysical Union's (AGU) 2022 Atmospheric Sciences Ascent Award for growing research accomplishments and leadership in climate model development
- 2022 NOAA OAR Employee Of the Year Award for exemplary scientific leadership in the development and utilization of high-resolution climate models for studying extreme weather and extreme precipitation under climate change
- 2022 NOAA Administrator's Award for advancing the understanding of the Earth System by developing and applying NOAA's state-of-the-art Coupled Carbon-Chemistry-Climate model

Total Refereed Publications:

- **158 papers, H-index: 54, total citation: 10804 based on Web of Science as of 11/10/2024**
- **ResearchID: https://www.webofscience.com/wos/author/record/C-6928-2014**
- **Google Scholar: https://scholar.google.com/citations?user=Fs21qjcAAAAJ&hl=en**
- **ORCID: https://orcid.org/0000-0003-4996-7821**
- **GFDL bibliography: https://www.gfdl.noaa.gov/bibliography/results.php?author=1158**

Selected publications based on areas of research (including the citations as of 10/15/2021)

Selected publications on global atmospheric and coupled climate model development

1. **Zhao, Ming**, I. M. Held, S-J Lin, and G. A. Vecchi, 2009: Simulations of global hurricane climatology, inter-annual variability, and response to global warming using a 50km resolution

GCM. *Journal of Climate*, 22(24), DOI: 10.1175/2009JCLI3049.1. **(Citation: 435 times Web of Science; 613 times Google Scholar; This is the GFDL HiRAM model documentation paper)**

2. **Zhao, Ming**, J-C Golaz, I. M. Held, and 42 co-authors, 2018a: The GFDL Global Atmosphere and Land Model AM4.0/LM4.0 - Part I: Simulation Characteristics with Prescribed SSTs. *Journal of Advances in Modeling Earth Systems*. DOI:10.1002/2017MS001208. **(Citation: 82 times Web of Science; 102 times Google Scholar)**
3. **Zhao, Ming**, J-C Golaz, I. M. Held, and 42 co-authors, 2018b: The GFDL Global Atmosphere and Land Model AM4.0/LM4.0 - Part II: Model Description, Sensitivity Studies, and Tuning Strategies. *Journal of Advances in Modeling Earth Systems*. DOI:10.1002/2017MS001209. **(Citation: 101 times Web of Science; 122 times Google Scholar)**
4. Held, I. M., and co-authors including **Ming Zhao**, 2019: Structure and Performance of GFDL's CM4.0 Climate Model. *Journal of Advances in Modeling Earth Systems*, 11(11), DOI:10.1029/2019MS001829 **(Citation: 81 times Web of Science; 107 times Google Scholar)**
5. Dunne, J. P., and co-authors including **Ming Zhao** 2020: The GFDL Earth System Model version 4.1 (GFDL-ESM 4.1): Overall coupled model description and simulation characteristics. *Journal of Advances in Modeling Earth Systems*, 12(11), DOI:10.1029/2019MS002015. **(Citation: 48 times Web of Science; 66 times Google Scholar)**
6. Delworth, T. L., and co-authors including **Ming Zhao**, 2020: SPEAR – the next generation GFDL modeling system for seasonal to multidecadal prediction and projection. *Journal of Advances in Modeling Earth Systems*, 12(3), DOI:10.1029/2019MS001895. **(Citation: 20 times Web of Science; 25 times Google Scholar)**
7. Horowitz, L. W., and co-authors including **Ming Zhao**, 2020: The GFDL Global Atmospheric Chemistry-Climate Model AM4.1: Model Description and Simulation Characteristics. *Journal of Advances in Modeling Earth Systems*, 12(10), DOI:10.1029/2019MS002032. **(Citation: 16 times Web of Science; 24 times Google Scholar)**
8. Lin, M, LW Horowitz, **Ming Zhao**, L Harris, P Ginoux, JP Dunne, S Malyshev, E Shevliakova, H Ahsan, ST Garner, F Paulot, A Pouyaei, SJ Smith, Y Xie, N Zadeh, and L Zhou, 2024: The GFDL variable-resolution global chemistry-climate model for research at the nexus of US climate and air quality extremes. *Journal of Advances in Modeling Earth Systems*, 16(4), DOI:10.1029/2023MS003984.
9. Guo, H, Y Ming, S Fan, L Zhou, L Harris, and Ming Zhao, 2021: Two-moment bulk cloud microphysics with prognostic precipitation in GFDL's Atmosphere Model AM4.0: configuration and performance. *Journal of Advances in Modeling Earth Systems*, 13(6), DOI:10.1029/2020MS002453.
10. Chu, W, Y. Lin, and **Ming Zhao**, 2021: Implementation and evaluation of a double-plume convective parameterization in NCAR CAM5, DOI: https://doi.org/10.1175/JCLI-D-21-0267.1
11. Donner, Leo J., and co-authors including **Ming Zhao**, 2011: The dynamical core, physical parameterizations, and basic simulation characteristics of the atmospheric component AM3 of the GFDL Global Coupled Model CM3. *Journal of Climate*, 24(13), DOI:10.1175/2011JCLI3955.1. **(Citation: 684 times Web of Science; 901 times Google Scholar)**

Selected publications on tropical cyclones and climate connections

1) **Zhao, Ming**, and I. M. Held, 2012: TC-permitting GCM simulations of hurricane frequency response to sea surface temperature anomalies projected for the late 21st century. *Journal of*

Climate, 25(8), DOI: 10.1175/JCLI-D-11-00313.1. **(Citation: 87 times Web of Science; 113 times Google Scholar)**

2) **Zhao, Ming**, I. M. Held, and S-J Lin, 2012: Some counter-intuitive dependencies of tropical cyclone frequency on parameters in a GCM. *Journal of the Atmospheric Sciences*, 69(7), DOI: 10.1175/JAS-D-11-0238.1. **(Citation: 76 times Web of Science; 95 times Google Scholar)**
3) **Zhao, Ming**, I. M. Held, and G. A. Vecchi, 2010: Retrospective forecasts of the hurricane season using a global atmospheric model assuming persistence of SST anomalies. *Monthly Weather Review*, 138(10), DOI:10.1175/2010MWR3366.1. **(Citation: 70 times Web of Science; 110 times Google Scholar)**
4) **Zhao, Ming**, and I. M. Held, 2010: An analysis of the effect of global warming on the intensity of Atlantic hurricanes using a GCM with statistical refinement. *Journal of Climate*, 23(23), DOI: 10.1175/2010JCLI3837.1. **(Citation: 62 times Web of Science; 82 times Google Scholar)**
5) **Zhao, Ming**, I. M. Held, S-J Lin, and G. A. Vecchi, 2009: Simulations of global hurricane climatology, inter-annual variability, and response to global warming using a 50km resolution GCM. *Journal of Climate*, 22(24), DOI: 10.1175/2009JCLI3049.1. **(Citation: 435 times Web of Science; 613 times Google Scholar)**
6) Held, I. M. and **Ming Zhao**, 2011: The response of tropical cyclone statistics to an increase in CO2 with fixed sea surface temperatures. *Journal of Climate*, 24(20), DOI:10.1175/JCLI-D-11-00050.1. **(Citation: 83 times Web of Science; 127 times Google Scholar)**
7) Lin, Y., **Ming Zhao**, and M. Zhang, 2015: Tropical cyclone rainfall area controlled by relative sea surface temperature. *Nature Communications,* 6, 6591, DOI:10.1038/ncomms7591. **(Citation:76 times Web of Science; 99 times Google Scholar)**
8) Murakami, H., T. L. Delworth, W. F. Cooke, **Ming Zhao**, B. Xiang, and P-C Hsu, 2020: Detected climatic change in global distribution of tropical cyclones. *Proceedings of the National Academy of Sciences,* 117(20), DOI:10.1073/pnas.1922500117. **(Citation: 24 times Web of Science, 38 times Google Scholar)**
9) Walsh, Kevin J., and co-authors including **Ming Zhao**, 2015: Hurricanes and climate: the U.S. CLIVAR working group on hurricanes. *Bulletin of the American Meteorological Society*, 96(6), DOI:10.1175/BAMS-D-13-00242.1. **(Citation: 107 times Web of Science; 145 times Google Scholar)**
10) Vecchi, G. A., **Ming Zhao**, H. Wang, G. Villarini, A. Rosati, A. Kumar, I. M. Held, and R. G. Gudgel, 2011: Statistical-dynamical predictions of seasonal North Atlantic hurricane activity. *Monthly Weather Review*, 139(4), DOI:10.1175/2010MWR3499.1. **(Citation: 106 times Web of Science; 143 times Google Scholar)**
11) Knutson, T. R., J. J. Sirutis, **Ming Zhao**, R. E. Tuleya, M. A. Bender, G. A. Vecchi, G. Villarini, and D. Chavas, 2015: Global Projections of Intense Tropical Cyclone Activity for the Late Twenty-First Century from Dynamical Downscaling of CMIP5/RCP4.5 Scenarios. *Journal of Climate*, 28(18), DOI:10.1175/JCLI-D-15-0129.1. **(Citation: 197 times Web of Science; 323 times Google Scholar)**
12) Knutson, T. R., J. J. Sirutis, G. A. Vecchi, S. T. Garner, **Ming Zhao**, H-S Kim, M. A. Bender, R. E Tuleya, I. M. Held, and G. Villarini, 2013: Dynamical downscaling projections of 21st century Atlantic hurricane activity: CMIP3 and CMIP5 model-based scenario. *Journal of Climate*, 26(17), DOI:10.1175/JCLI-D-12-00539.1. **(Citation:202 times Web of Science; 301 times Google Scholar)**

13) Li, T., M. Kwon, and **<u>Ming Zhao</u>**, 2010: Global warming shifts Pacific tropical cyclone location. *Geophysical Research Letters*, 37, L21804, DOI:10.1029/2010GL045124. **(Citation: 72 times Web of Science; 105 times Google Scholar)**
14) Camargo, S. J., M. K. Tippett, A. Sobel, G. A. Vecchi, and **<u>Ming Zhao</u>**, 2014: Testing the performance of tropical cyclone genesis indices in future climates using the HIRAM model. *Journal of Climate*, 27(24), DOI:10.1175/JCLI-D-13-00505.1. **(Citation: 78 times Web of Science; 100 times Google Scholar)**
15) Villarini, G., D. A. Lavers, E. Scoccimarro, **<u>Ming Zhao</u>**, M. F. Wehner, G. A. Vecchi, T. R. Knutson, and K. A. Reed, 2014: Sensitivity of Tropical Cyclone Rainfall to Idealized Global Scale Forcings. *Journal of Climate*, 27(12), DOI:10.1175/JCLI-D-13-00780.1. **(Citation: 69 times Web of Science; 90 times Google Scholar)**
16) Shaevitz, D. and co-authors including **<u>Ming Zhao</u>**, 2014: Characteristics of tropical cyclones in high-resolution models in the present climate. *Journal of Advances in Modeling Earth Systems*, 6(4), DOI:10.1002/2014MS000372. **(Citation: 79 times Web of Science; 98 times Google Scholar)**
17) Kim, H.-S., G. A. Vecchi, T. R. Knutson, W. G. Anderson, T. L. Delworth, A. Rosati, F. Zeng, and **<u>Ming Zhao</u>**, 2014: Tropical Cyclone Simulation and Response to CO2 Doubling in the GFDL CM2.5 High-Resolution Coupled Climate Model. *Journal of Climate*, 27(21), DOI:10.1175/JCLI-D-13-00475.1. **(Citation: 81 times Web of Science; 101 times Google Scholar)**
18) Vecchi, G. A., S. Fueglistaler, I. M. Held, T. R. Knutson, and **<u>Ming Zhao</u>**, 2013: Impacts of atmospheric temperature trends on tropical cyclone activity. *Journal of Climate*, 26(11), DOI:10.1175/JCLI-D-12-00503.1. **(Citation: 67 times Web of Science; 103 times Google Scholar)**
19) Scoccimarro, E., S. Gualdi, G. Villarini, G. A. Vecchi, **<u>Ming Zhao</u>**, K. Walsh, and A. Navarra 2014: Intense Precipitation Events Associated with Landfalling Tropical Cyclones in response to a Warmer Climate and increased CO2. *Journal of Climate*, 27(12), DOI:10.1175/JCLI-D-14-00065.1. **(Citation: 55 times Web of Science; 79 times Google Scholar)**
20) Horn, M, K. Walsh, **<u>Ming Zhao</u>**, S. J. Camargo, E. Scoccimarro, H. Murakami, H. Wang, and A. Ballinger, A. Kumar, D. A. Shaevitz, J. A. Jonas, K. Oouchi 2014: Tracking Scheme Dependence of Simulated Tropical Cyclone Response to Idealized Climate Simulations. *Journal of Climate*, 27(24), DOI:10.1175/JCLI-D-14-00200.1. **(Citation: 55 times Web of Science; 70 times Google Scholar)**

Selected publications on clouds, cloud feedbacks, and climate sensitivity

1. **<u>Zhao, Ming</u>**, 2024: Cloud radiative effects associated with daily weather regimes. *Geophysical Research Letters*, 51(10), DOI:10.1029/2024GL109090.
2. **<u>Zhao, Ming</u>**, 2022: An investigation of the effective climate sensitivity in GFDL's new climate models CM4.0 and SPEAR. *J. Climate*. DOI: https://doi.org/10.1175/JCLI-D-21-0327.1
3. **<u>Zhao, Ming</u>**, J-C Golaz, I. M. Held, V. Ramaswamy, S-J Lin, Y. Ming, P. Ginoux, B. Wyman, L. J. Donner, D. Paynter and H. Guo, 2016: Uncertainty in model climate sensitivity traced to representations of cumulus precipitation microphysics. *Journal of Climate*, 29, 543-560. DOI: 10.1175/JCLI-D-15-0191.1 **(Citation: 82 times Web of Science; 100 times Google Scholar, NOAA OAR Outstanding Paper Award)**

4. **Zhao, Ming**, 2014: An investigation of the connections among convection, clouds, and climate sensitivity in a global climate model. *Journal of Climate*, 27(5), DOI: 10.1175/JCLI-D-13-00145.1. **(Citation: 65 times Web of Science; 83 times Google Scholar)**
5. Zhang, B, **Ming Zhao**, and Z Tan, 2023: Using a Green's Function approach to diagnose the pattern effect in GFDL AM4 and CM4. Journal of Climate, 36(4), DOI:10.1175/JCLI-D-22-0024.11105–1124.
6. Zhang, B, **Ming Zhao**, H He, BJ Soden, Z Tan, B Xiang, and C Wang, 2023: The dependence of climate sensitivity on the meridional distribution of radiative forcing. Geophysical Research Letters, 50(18), DOI:10.1029/2023GL105492.
7. Bloch-Johnson, J, M Rugenstein, MJ Alessi, C Proistosescu, **Ming Zhao**, Bosong Zhang, Andrew I L Williams, Jonathan M Gregory, Jason N S Cole, Yue Dong, Margaret L Duffy, Sarah M Kang, and Chen Zhou, February 2024: The Green's Function Model Intercomparison Project (GFMIP) protocol. *Journal of Advances in Modeling Earth Systems*, 16(2), DOI:10.1029/2023MS003700.
8. N. J. Lutsko, S. C. Sherwood, and **Ming Zhao**, 2021: Precipitation Efficiency and Climate Sensitivity, a chapter in *Clouds and Climate Monograph,* Geophysical Monograph Series.
9. Winton, M., A. Adcroft, J. P. Dunne, I. M. Held, E. Shevliakova, **Ming Zhao**, H. Guo, W. J. Hurlin, J. P. Krasting, T. R. Knutson, D. J. Paynter, L. G. Silvers, and R. Zhang, 2020: Climate Sensitivity of GFDL's CM4.0. *Journal of Advances in Modeling Earth Systems*, 12(1), DOI:10.1029/2019MS001838. **(Citation: 10 times Web of Science; 13 times Google Scholar)**
10. Paulot, F., D. J. Paynter, M. Winton, P. Ginoux, **Ming Zhao**, and L. W. Horowitz, 2020: Revisiting the impact of sea salt on climate sensitivity. *Geophysical Research Letters*, 47(3), DOI:10.1029/2019GL085601. **(Citation: 6 times Web of Science; 6 times Google Scholar)**
11. Naud, C M, J Jeyaratnam, J F Booth, Ming Zhao, and A Gettelman, 2020: Evaluation of modeled precipitation in oceanic extratropical cyclones using IMERG. *Journal of Climate*, 33(1), DOI:10.1175/JCLI-D-19-0369.1. **Citation: 3 times Web of Science; 3 times Google Scholar)**
12. Naud, C. M., J. F. Booth, J. Jeyaratnam, L. J. Donner, C. J. Seman, **Ming Zhao**, H. Guo, and Y. Ming, 2019: Extratropical Cyclone Clouds in the GFDL climate model: diagnosing biases and the associated causes. *Journal of Climate*, 32(20), DOI:10.1175/JCLI-D-19-0421.1. **(Citation: 4 times Web of Science; 4 times Google Scholar)**
13. Silvers, L. G., D. J. Paynter, and **Ming Zha**o, 2018: The Diversity of Cloud Responses to Twentieth Century Sea Surface Temperatures. *Geophysical Research Letters*, 45(1), DOI:10.1002/2017GL075583. **(Citation: 15 times Web of Science; 15 times Google Scholar)**
14. Xiang, B., **Ming Zhao**, I. M. Held, and J.-C. Golaz, 2017: Predicting the severity of spurious "double ITCZ" problem in CMIP5 coupled models from AMIP simulations. *Geophysical Research Letters*, 44(3), DOI:10.1002/2016GL071992. **(Citation: 43 times Web of Science; 57 times Google Scholar)**
15. Webb, M J., and co-authors including **Ming Zhao**, 2015: The impact of parametrized convection on cloud feedback. *Philosophical Transactions of the Royal Society of London, A*, 373, DOI:10.1098/rsta.2014.0414. **(Citation: 51 times Web of Science; 57 times Google Scholar)**
16. Zhang, M, and co-authors including **Ming Zhao**, 2013: CGILS: Results from the first phase of an international project to understand the physical mechanisms of low cloud feedbacks in single column models. *Journal of Advances in Modeling Earth Systems*, 5(4), DOI:10.1002/2013MS000246. **(Citation: 88 times Web of Science; 103 times Google Scholar)**
17. Teixeira, J. and co-authors including **Ming Zhao**, 2011: Tropical and sub-tropical cloud transitions in weather and climate prediction models: the GCSS/WGNE Pacific Crosssection Intercomparison

(GPCI). *Journal of Climate*, 24(20), DOI:10.1175/2011JCLI3672.1. **(Citation: 88 times Web of Science; 115 times Google Scholar)**

18. Golaz, J.-C., M. Salzmann, L. J. Donner, L. W. Horowitz, Y. Ming, and **Ming Zhao**, 2011: Sensitivity of the aerosol indirect effect to subgrid variability in the cloud parameterization of the GFDL Atmosphere General Circulation Model AM3. *Journal of Climate*, 24(13), DOI:10.1175/2010JCLI3945.1. **(Citation: 78 times Web of Science; 109 times Google Scholar)**
19. Wyant, M C., C S Bretherton, J T Bacmeister, J T Kiehl, I M Held, **Ming Zhao**, S A Klein, and B J Soden, 2006: A comparison of low-latitude cloud properties and their response to climate change in three AGCMs sorted into regimes using mid-tropospheric vertical velocity. *Climate Dynamics*, 27(2-3), DOI:10.1007/s00382-006-0138-4. **(Citation: 93 times Web of Science; 99 times Google Scholar)**

Selected publications on other extreme weather, MJO, intraseasonal variability and predictions

1. **Zhao, Ming**, and T R Knutson, 2024: Crucial role of sea surface temperature warming patterns in near-term high-impact weather and climate projection. *npj Climate and Atmospheric Science*, 7, 130, DOI:10.1038/s41612-024-00681-7.
2. **Zhao, Ming**, 2021: A study of AR-, TS-, and MCS-associated precipitation and extreme precipitation in present and warmer climates. *J. Climate*. DOI:10.1175/JCLI-D-21-0145.1.
3. **Zhao, Ming**, 2020: Simulations of atmospheric rivers, their variability and response to global warming using GFDL's new high resolution general circulation model. *Journal of Climate*, 33(23), DOI:10.1175/JCLI-D-20-0241.1. **(Citation: 4 times Web of Science; 8 times Google Scholar)**
4. Dong, W, **Ming Zhao**, Zhihong Tan, and V Ramaswamy, 2024: Atmospheric rivers over eastern US affected by Pacific/North America pattern. *Science Advances*, 10(4), DOI:10.1126/sciadv.adj3325.
5. Dong, W, **Ming Zhao**, Yi Ming, JP Krasting, and V Ramaswamy, 2023: Simulation of United States mesoscale convective systems using GFDL's new high-resolution general circulation model. *Journal of Climate*, 36(19), DOI:10.1175/JCLI-D-22-0529.16967-6990.
6. Emanuele, GS, **Ming Zhao**, and K Hodges, 2023: Poleward intensification of midlatitude extreme winds under warmer climate. *npj Climate and Atmospheric Science*, 6, 219, DOI:10.1038/s41612-023-00540-x.
7. Dong, W., **Ming Zhao**, Y. Ming, and V. Ramaswamy, 2021: Representation of tropical mesoscale convective systems in a general circulation model: Climatology and response to global warming. *Journal of Climate*, 34(14), DOI:10.1175/JCLI-D-20-0535.1.
8. Yin, J. and **Ming Zhao**, 2021: Influence of the Atlantic meridional overturning circulation on the U.S. extreme cold weather. *Communications Earth and Environment*, 2, 218, DOI:10.1038/s43247-021-00290-9.
9. Xiang, B., and co-authors including **Ming Zhao**, 2021: S2S Prediction in GFDL SPEAR: MJO diversity and teleconnections, *Bulletin of the American Meteorological Society*. DOI:10.1175/BAMS-D-21-0124.1.
10. Yin, J., S. M. Griffies, M. Winton, **Ming Zhao**, and L. Zanna, 2020: Response of storm-related extreme sea level along the US Atlantic coast to combined weather and climate forcing. *Journal of Climate*, 33(9), DOI:10.1175/JCLI-D-19-0551.1. **(Citation: 5 times Web of Science; 7 times Google Scholar)**

11. Zhu, Y, T. Li, **Ming Zhao**, and T. Nasuno, 2019: Interaction between MJO and High Frequency Waves over Maritime Continent in Boreal Winter. *Journal of Climate*, 32(13), DOI:10.1175/JCLI-D-18-0511.1. **(Citation: 4 times Web of Science; 9 times Google Scholar)**
12. Jiang, X., A. F. Adames, **Ming Zhao**, D. E. Waliser, and E. Maloney, 2018a: A unified moisture mode framework for seasonality of the Madden-Julian Oscillation. *Journal of Climate,* 31(11), DOI:10.1175/JCLI-D-17-0671.1. **(34 citations Web of Science, 43 times Google Scholar)**
13. Jiang, X., B. Xiang, **Ming Zhao**, T. Li, S-J Lin, Z. Wang, and J-H Chen, 2018b: Intraseasonal tropical cyclogenesis prediction in a global coupled model system. *Journal of Climate,* 31(15), DOI:10.1175/JCLI-D-17-0454.1. **(13 citations Web of Science, 17 times Google Scholar)**
14. Jiang, X., **Ming Zhao**, E. D. Maloney, and D. E. Waliser, 2016: Convective moisture adjustment time-scale as a key factor in regulating model amplitude of the Madden-Julian Oscillation. *Geophysical Research Letters,* 43(19), DOI:10.1002/2016GL070898. **(46 citations Web of Science, 35 times Google Scholar)**
15. Xiang, B., **Ming Zhao**, X. Jiang, S-J Lin, T. Li, X. Fu, and G. A. Vecchi, 2015a: The 3-4 week MJO prediction skill in a GFDL coupled model. *Journal of Climate,* 28(13), DOI:10.1175/JCLI-D-15-0102.1. **(58 citations Web of Science; 76 times Google Scholar)**
16. Xiang, B., S-J Lin, **Ming Zhao**, G. A. Vecchi, T. Li, X. Jiang, L. Harris, and J-H Chen, 2015b: Beyond weather time scale prediction for hurricane Sandy and super typhoon Haiyan in a global climate model. *Monthly Weather Review,* 143(2), DOI:10.1175/MWR-D-14-00227.1. **(38 citations Web of Science; 52 times Google Scholar)**
17. Jiang, X., **Ming Zhao**, and D. E. Waliser, 2012: Modulation of tropical cyclones over the eastern Pacific by the intra-seasonal variability simulated in an AGCM. *Journal of Climate*, 25(19), DOI:10.1175/JCLI-D-11-00531.1. **(Citation: 68 times Web of Science; 68 times Google Scholar)**

Selected publications on studies of convection, clouds, and climate using idealized model hierarchy

1. **Zhao, Ming**, and P. H. Austin, 2005: Life cycle of numerically simulated shallow cumulus clouds. Part I: Transport. *Journal of the Atmospheric Sciences*, 62(5), 1269-1290. **(Citation: 56 times Web of Science; 75 times Google Scholar)**
2. **Zhao, Ming**, and P. H. Austin, 2005: Life cycle of numerically simulated shallow cumulus clouds. Part II: Mixing dynamics. *Journal of the Atmospheric Sciences*, 62(5), 1291-1310. **(Citation: 61 times Web of Science; 87 times Google Scholar)**
3. Held, I. M., **Ming Zhao**, and B. Wyman, 2007: Dynamic radiative-convective equilibria using GCM column physics. *Journal of the Atmospheric Sciences*, 64(1), 228-238. **(Citation: 58 times Web of Science; 77 times Google Scholar)**
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3. Maloney, E. and co-authors including **Ming Zhao** 2014: North American Climate in CMIP5 Experiments: Part III: Assessment of 21st Century Projections. *Journal of Climate*, 27(6), DOI:10.1175/JCLI-D-13-00273.1. **(Citation: 180 times Web of Science; 272 times Google Scholar)**
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A brief description of my major accomplishments at GFDL (as of 2021)

1) **Development of GFDL's global high resolution atmospheric model HiRAM and studies of hurricane-climate connections**

   I was the lead developer of GFDL's HiRAM, which has led to a major advancement in GFDL's capability in simulating tropical cyclones (TCs), their historical variability, and future change in a changing climate (Zhao et al. 2009). HiRAM is one of the GFDL models participating in CMIP5.

HiRAM helped motivate the formation of the US CLIVAR Hurricane Working Group for a multi-institutional investigation of hurricane-climate connections using high-resolution GCMs. HiRAM also helped motivate the development of GFDL's subseasonal to seasonal prediction system for tropical cyclones, MJO, and other extreme weather. I have published 5 lead-author papers using HiRAM and many co-authored papers, which are well-cited in the literature. In particular, the HiRAM documentation paper (Zhao et al. 2009) has been cited 435 (613) times based on Web of Science (Google Scholar). HiRAM has been used worldwide and has impacted many later works on TC-climate connections, TC seasonal predictions, global modeling of TC activities, TC intraseasonal variability. HiRAM simulation work contributed significantly to the GFDL Group Gold Medal awarded by the Department of Commerce in 2011 "for sustained high-quality research, scientific assessment and leadership resulting in an improved understanding of the impact of anthropogenic climate change on past and future hurricane activity".

2) **Development of GFDL's latest generation global atmospheric model AM4, and coupled physical climate model CM4**

I have co-led (2013-2015) and led (2015-2018) the GFDL Model Development Team (MDT) Atmospheric Working Group (AWG) for developing AM4 and co-led (2013-2019) the MDT Coupled Working Group (CWG) for developing CM4. This includes developing strategic plans, organizing meetings, analyzing and discussing model results, suggesting and creating new configurations and versions of AM4, developing and integrating new moist physics parameterizations, and diagnosing and addressing critical issues that surfaced during the AM4 development. My efforts on CM4 focused on reducing CM4's biases in SSTs, ENSO, double ITCZ, as well as the global SST response to historical and present-day radiative forcing. One of the central goals was to reduce AM4/CM4 biases in simulations of climate through improved atmospheric moist physics. AM4 has been documented in Zhao et al. (2018a,b) and CM4 has been documented in Held et al. (2019). AM4 is a foundation for all new generation GFDL models including CM4, the Earth System Model (ESM4), and the latest GFDL subseasonal-seasonal to decadal prediction system (SPEAR). AM4, CM4, and ESM4 have participated in CMIP6. SPEAR has been running real-time for short-time climate prediction, and it has replaced the earlier GFDL prediction systems and contributed to the North American Multi-Model Ensemble.

3) **Development of convection parameterization scheme and improvement for TC and MJO predictions**

As a core developer of GFDL AM3, I implemented, further developed, and optimized the University of Washington Shallow Cumulus Scheme (UWShCu) and unified the plume model between UWShCu and Donner's deep scheme to improve the model's consistency and efficiency. My efforts led to a substantial improvement in AM3 simulation of climate. AM3 was awarded a Group Gold Medal by the DOC in 2012. During my development of HiRAM, I have further adapted UWShCu for representing both shallow and deep convection [See Zhao et al. (2009) Appendix for my modifications to UWShCu scheme as well as a simple statistical cloud scheme]. During my development of AM4/CM4, I have further developed the convection scheme by including an additional deep plume to represent deep convection (Zhao et al. 2016, Zhao et al. 2018b). The new double plume convection (DPC) scheme emphasizes the importance of a non-intrusive convection parameterization, which allows a smoother transition between parameterized convection and explicit (large-scale) clouds and is responsible for many of the recent GFDL models' improvements in simulating tropical transients such as MJO, tropical cyclones, and mesoscale convective systems. It also improves model simulations of mean precipitation, clouds, and cloud radiative effects. The DPC scheme has been used in not only the latest GFDL climate and earth system models (CM4, ESM4) but also GFDL's latest prediction systems (SPEAR). When running in forecast mode, the DPC scheme has also been shown to substantially improve the models' retrospective forecasts of MJO and TC genesis (e.g., Xiang et al. 2021, Xiang et al. 2015a, Xiang et al. 2015b) at intra-seasonal scale. The DPC scheme has recently been adopted in a version of NCAR's CAM5 model (Chu et al. 2021).

4) **Studies of clouds, cloud feedbacks, and climate sensitivities and co-leading GFDL Cloud Climate Initiative (CCI)**
Since 2013, I have been co-leading the GFDL CCI. During this period, I have led three lead-author papers and many co-authored papers. Zhao (2014) identified key physical processes (cumulus mixing and precipitation microphysics) and provided key diagnostic quantities (precipitation efficiency or cloud detrainment efficiency) in GCMs to understand the effects of convection on clouds and cloud feedbacks. This paper has motivated many later studies, including a chapter entitled "Precipitation efficiency and climate sensitivity" in the AGU Clouds and Climate Monograph Series (Lutsko et al. 2021). Zhao et al. (2016) further used a version of AM4 with changes only in the treatment of convective microphysics to demonstrate that convective precipitation microphysics (one of the most uncertain processes in GCM parameterizations) alone can profoundly affect cloud feedbacks and climate sensitivity, and its impact can be understood through precipitation efficiency. This paper received the 2018 NOAA OAR Outstanding Scientific Paper Award, and it helped motivate the NOAA CPO MAPP Climate Sensitivity Task Force, for which I am one of the co-leads. Most recently, Zhao (2021a) has led an investigation of the equilibrium climate sensitivity (ECS) in GFDL's latest climate models, CM4 and SPEAR. Using a series of coupled and uncoupled simulations, Zhao identified and quantified three major processes that have led to an increase in CM4's ECS compared to earlier-generation GFDL models. These processes include changes in vegetation, sea-ice concentrations, and SST warming patterns. This paper demonstrated the limitations of the traditional Cess approach (i.e., uniform SST warming) in studies of cloud feedbacks and climate sensitivity and provided a modified framework in understanding cloud feedbacks and climate sensitivity using atmosphere-only models.

5) **Studies of other high-impact weather [e.g., atmospheric rivers (AR), mesoscale convective systems (MCS); extreme cold weather; and storm-related extreme sea level] and their response to global warming**
For the past few years, I have expanded my TC-climate studies to include other high-impact weather. For example, Zhao (2020) focused on atmospheric rivers (ARs), their variability, and change in warmer climates. It demonstrated the superior quality of the GFDL high-resolution AM4 simulations of present-day AR statistics and variability. Most previous studies of AR responses to global warming used a fixed threshold of integrated vapor transport (IVT) for detecting ARs and thus produced a large increase in the frequency of AR conditions in warmer climates. However, Zhao (2020) argued it is necessary to use an IVT threshold that accounts for the impact of global warming-induced moisture increases on the IVT threshold, and as a result, Zhao (2020) produced much less increase in AR frequency, but a much larger increase in AR intensity with warming. This paper was highlighted in the January 2021 issue of BAMS in the Papers of Note section. Zhao (2021b) used satellite observations, reanalysis data, and high-resolution AM4 to quantify for the first time the collective role of AR, TS, and MCS in producing global and regional mean and extreme precipitation. The study not only demonstrates the model's capability in simulating storm-associated precipitation and extreme precipitation but also reveals the changing character of storm-associated extreme precipitation in a warmer climate. This work has important implications for future flash flood-driven disasters and water resource management. In addition to the above two single-author papers, I have co-authored several other papers on weather-climate connections including an investigation of

high-resolution AM4-simulated MCS climatology, variability, and response to global warming (Dong et al. 2020), a study of the effects of ocean circulation on US extreme cold weather (Yin and Zhao 2021), and a study of storm-related extreme sea level along the US Atlantic Coast (Yin et al. 2020).

6) **Studies of tropical convection, clouds, and climate by developing and/or utilizing a model hierarchy**
I have developed/utilized many idealized models to study convection, clouds, and climate. They include large-eddy-simulation (LES) models (e.g., Zhao and Austin 2005a,b), single-column models (SCMs, e.g., Zhao and Austin 2003), doubly periodic dynamical radiative-convective equilibrium (DRCE) models using GCM physics with (Held and Zhao 2008) and without ambient rotation (Held et al. 2007), aquaplanet models (APM, e.g. Kang et al. 2008, Medeiros et al. 2008, Merlis et al. 2013, 2016), uncoupled global atmospheric models (AGCMs, e.g., Zhao 2014, Zhao et al. 2016), and fully coupled global climate models (CGCMs, e.g., Zhao 2021) to explore convection, clouds and their relationship to the large-scale environment. My work and the idealized models I developed have motivated and helped many graduate students and postdocs at GFDL and Princeton University to use the idealized modeling frameworks for their research and development.

Full refereed publication list:

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11. Dogar, Muhammad M., Leon Hermanson, Adam A Scaife, Daniele Visioni, **Ming Zhao**, Ibrahim Hoteit, Hans-F Graf, Muhammad Ahmad Dogar, Mansour Almazroui, and Masatomo Fujiwara, 2023: A review of El Niño Southern Oscillation linkage to strong volcanic eruptions and post-volcanic winter warming. *Earth Systems and Environment*, 7, DOI:10.1007/s41748-022-00331-z15-42.
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Book Chapter:

Lutsko, N. J., S. C. Sherwood, and **Ming Zhao**, 2021: Precipitation Efficiency and Climate Sensitivity, a chapter in *Clouds and Climate Monograph,* Geophysical Monograph Series, (In press).

Non-refereed Publication:

Zhao, Ming, Isaac M Held, and Gabriel A Vecchi, et al., September 2013: Robust direct effect of increasing atmospheric CO2 concentration on global tropical cyclone frequency: a multi-model inter-comparison. *U.S. CLIVAR Variations*, 11(3), 17-23.

Presentations:

- **Zhao, Ming** **(invited)** 2022: An Investigation of the Effective Climate Sensitivity in GFDL's New Climate Models CM4.0 and SPEAR, *AGU Fall Meeting 2022, December 12-16, 2022*
- **Zhao, Ming** **(invited)** 2022: A study of AR-, TS-, and MCS-associated precipitation and extreme precipitation in present and warmer climates, Stony Brook University, School of Marine and Atmospheric Sciences (SoMAS) Seminar, Aug 31, 2022
- **Zhao, Ming** 2022: A study of AR-, TS-, and MCS-associated precipitation and extreme precipitation in present and warmer climates, 3rd Pan-GASS meeting understanding and modeling atmospheric processes, Monterey, CA, USA, *July 25-29, 2022*
- **Zhao, Ming** 2022: A study of AR-, TS-, and MCS-associated precipitation and extreme precipitation in present and warmer climates, 35th Conference on Hurricanes and Tropical Meteorology, New Orleans, LA, USA, *May 9-13, 2022*
- **Zhao, Ming (invited)** 2022: A study of AR-, TS-, and MCS-associated precipitation and extreme precipitation in present and warmer climates, EarthCARE Modeling Workshop 2022, *February 16-18, 2022*
- **Zhao, Ming** 2021: A study of AR-, TS-, and MCS-associated precipitation and extreme precipitation in present and warmer climates, *AGU Fall Meeting 2021, Virtual Conference,*

December 13-17, 2021

- **Zhao, Ming** 2021: Simulations of atmospheric rivers, their variability, and response to global warming using GFDL's new high-resolution general circulation model, *The 2021 US Climate Modeling Summit*, *Virtual Conference, June 28-30, 2021*
- **Zhao, Ming** 2020: A study of precipitation extremes and their climate connections using a phenomena-based method, *AGU Fall Meeting 2020, Virtual Conference, December 1-17, 2020*
- **Zhao, Ming** (**invited**) 2020: A model study of precipitation and its extremes using a weather phenomena based method, *NOAA-DOE Precipitation Processes and Predictability Virtual Workshop, November 30-December 2, 2020*
- **Zhao, Ming** 2019: Simulations of atmospheric rivers using GFDL's new generation high-resolution global climate model. *AGU Fall Meeting 2019, San Francisco, December 9-13, 2019*
- **Zhao, Ming** 2019: New generation atmospheric model AM4 and Cloud-Climate Initiative. *2019 GFDL External Science Review, Princeton, New Jersey, Oct. 29-31, 2019*
- **Zhao, Ming** (**invited**) 2019: GFDL New Generation Atmospheric Model AM4 Simulation Characteristics with Prescribed SSTs, *2019 Joint US-Japan Workshop on Climate Change and Variability, Honolulu, Hawaii, March 5-6, 2019*
- **Zhao, Ming** 2019: Simulations of the MJO in GFDL's new generation GCMs and a mechanism study using fully closed moist static energy budget, *The 2019 US Climate Modeling Summit, NASA Goddard Space Flight Center, Greenbelt, MD 20771, April 3-4, 2019*
- **Zhao, Ming** and S-J Lin 2018: A study of convective clouds and their feedbacks in an idealized radiative convective equilibrium using GFDL non-hydrostatic atmospheric model with horizontal resolutions of 1-24km, *AGU Fall Meeting 2018, Washington DC, December 10-14, 2018*
- **Zhao, Ming** (**invited**) 2018: A Study of Convective Clouds in Radiative Convective Equilibrium Simulated by GFDL FV3 Based Cloud Resolving Model, *Understanding and Modeling the Earth's Climate - a symposium in honor of Isaac Held, Princeton, New Jersey, October 29-31, 2018*
- **Zhao, Ming** 2018: A Study of Convective Clouds in Radiative Convective Equilibrium Simulated by GFDL FV3 Based Cloud Resolving Model, *The 2018 CFMIP meeting on Clouds, Precipitation, Circulation, and Climate Sensitivity, Boulder, Colorado, Oct 16-19, 2018*
- **Zhao, Ming** (**invited**) 2017: GFDL New Generation Atmospheric Model AM4 Simulation Characteristics and Key Processes, *The US-China Coupled Model Inter-comparison Workshop, Beijing, China, August 23-25, 2017*
- **Zhao, Ming** (**invited**) 2016: Bias Reduction as Guidance for Developing Convection and Cloud Parameterization in GFDL AM4/CM4, *AGU Fall Meeting 2016, San Francisco, Dec. 12-16, 2016*
- **Zhao, Ming** (**invited**) 2016: Simulations of the MJO in GFDL's New Generation GCMs and a Mechanism Study Using Fully Closed Moist Static Energy Budget, *AGU Fall Meeting 2016, San Francisco, December 12-16, 2016*
- **Zhao, Ming** 2015: Uncertainty in model climate sensitivity traced to representations of cumulus precipitation microphysics. *Cloud Feedback Model Inter-comparison Project (CFMIP) meeting on cloud processes and climate feedbacks. 8-11 June, 2015, Monterey, California, USA.*
- **Zhao, Ming (invited)** 2015: Development of the atmospheric component of the next generation GFDL climate model. *30st annual meeting of the World Meteorological Organization's Working Group for Numerical Experimentation (WGNE), co-sponsored by the World Climate Research Program (WCRP) and the World Meteorological Organization (WMO) Commission for Atmospheric Sciences (CAS), 23-26 March 2015, College Park, Maryland, USA.*
- **Zhao, Ming (invited)** 2015: Global modeling of tropical cyclone activities and response to global warming using a 50km resolution GFDL HIRAM. *Workshop on High resolution Climate Simulation, Projection, and Application, 19-21 January, Taipei, Taiwan*
- **Zhao, Ming** 2014: Bias reduction as guidance for developing cumulus parameterization in AM4.

GFDL External Science Review, Princeton, New Jersey, USA, 20-22 May, 2014

- **Zhao, Ming** **(invited)** 2014: Convection parameterization in GFDL GCMs and new development towards next generation CM4. *1st International Symposium on Climate and Earth System Modeling, 26-27 April, 2014, Nanjing, China.*
- **Zhao, Ming** **(invited)** 2014: Global modeling of tropical cyclones and their connections to climate. *International Workshop on Climate System Modeling, Hawaii, USA, 10-11 March 2014*
- **Zhao, Ming** 2014: An investigation of the connections between convection, clouds and climate sensitivity in a global climate model. *31st Conference on Hurricanes and tropical Meteorology, San Diego, California, USA, 31 March – 4 April, 2014*
- **Zhao, Ming** 2014: Robust direct effect of increasing atmospheric CO2 concentration on global tropical cyclone frequency – a multi-model inter-comparison. *31st Conference on Hurricanes and tropical Meteorology, 31 March – 4 April, 2014, San Diego, California, USA.*
- **Zhao, Ming** 2014: An investigation of the connections between convection, clouds and climate sensitivity in a global climate model. *94st American Meteorology Society Annual Meeting, 2-6 February, 2014, Atlanta, Georgia, USA.*
- **Zhao, Ming** 2013: An investigation of the connections between convection, clouds and climate sensitivity in a global climate model. *The joint meeting for Cloud Feedback Model Inter-comparison Project (CFMIP) and European Union Cloud Inter-comparison, Process Study and Evaluation Project (EUCLIPSE), 10-14 June 2013, Hamburg, Germany.*
- **Zhao, Ming** 2013: Response of global tropical cyclone frequency to a doubling of CO2 and uniform SST warming – a multi-model inter-comparison. *U.S. CLIVAR Hurricane Workshop, 5-7 June 2013, Princeton, New Jersey, USA.*
- **Zhao, Ming** 2013: An investigation of the connections between convection, clouds and climate sensitivity in a global climate model. *6th Northeast Tropical Workshop, 29-31 May, 2013, Rensselaerville, New York, USA.*
- **Zhao, Ming**, I.M. Held, S-J Lin 2012: Some counter-intuitive dependencies of tropical cyclone frequency on parameters in a GCM. *1st Pan-Global Atmosphere System Studies (GASS) Conference, 10-14 September 2012, Boulder, Colorado, USA.*
- **Zhao, Ming** and I.M. Held, 2012: TC-permitting GCM simulations of hurricane frequency response to sea surface temperature anomalies projected for the late 21st century. AMS 30th Conference on Hurricanes and Tropical Meteorology. *15-20 April 2012, Ponte Vedra Beach, Florida, USA.*
- **Zhao, Ming**, 2012: Shallow cumulus convection and its parameterizations in AM3. *GFDL Summer School Lectures. 18 July 2012, Princeton, New Jersey, USA.*
- **Zhao, Ming** (**invited**) 2012, TC-permitting GCM simulations of global hurricane climatology, variability and response to warming projected for the late 21st century, *Department Seminar, Atmospheric, Ocean and Space Sciences, University of Michigan, 15 March, 2012.*
- **Zhao, Ming**, 2012: Results from GFDL HiRAM simulations. *US-CLIVAR Hurricane Working Group Workshop, 27-28 January 2012, New Orleans, LA, USA.*
- **Zhao, Ming** and I.M. Held, 2012: TC-permitting GCM simulations of hurricane frequency response to sea surface temperature anomalies projected for the late 21st century. 24th Conference on Climate Variability and Change. *92nd AMS Annual Meeting, 22-26 January 2012, New Orleans, LA, USA.*
- **Zhao, Ming**, 2011: High resolution AGCM simulations of hurricane frequency response to sea surface temperature anomalies projected for the late 21st century. *GFDL's Climate Modeling and Research Symposium. 17 October, GFDL, Princeton, USA.*
- **Zhao, Ming** and I.M. Held, 2011: TC-permitting GCM simulations of hurricane frequency response to sea surface temperature anomalies projected for the late 21st century. *5th Northeast*

Tropical Workshop. 17-19 May 2011, MIT, Massachusetts, USA.

- **Zhao, Ming** (**invited**) 2011, Simulations of global hurricane climatology, variability and response to global warming using a high resolution AGCM, *School of Engineering and Applied Science (SEAS) Colloquium in Climate Science, Columbia University, 7 April, 2011, New York City, USA.*
- **Zhao, Ming** (**invited**) 2010: An Analysis of GCM simulated storm intensity variability and change using a statistical refinement. *American Geophysical Union 2010 Fall Meeting, 13-17 December, 2010, San Francisco, USA.*
- **Zhao, Ming** (**invited**) 2010: Simulations of global hurricane climatology, variability and response to global warming using a 50km resolution GCM. *American Geophysical Union 2010 Fall Meeting, 13-17 December, 2010, San Francisco, USA.*
- **Zhao, Ming**, I.M. Held, S-J Lin, G. Vecchi 2010: Simulation of global hurricane climatology, variability, and response to global warming using a new global high resolution atmospheric model. *AMS 29th Conference on Hurricanes and Tropical Meteorology, 10-14 May 2010, Tucson, USA.*
- **Zhao, Ming**, I.M. Held, S-J Lin, G. Vecchi 2009: Simulation of Global Hurricane Climatology, Variability, and Response to Global Warming using a Global High Resolution Atmospheric Model. *MOCA 2009: the IAMAS, IAPSO and IACS Joint Assembly, 19-29 July 2009, Montreal, Canada.*
- **Zhao, Ming**, 2009: Hurricane Climate Connection in a high resolution GCM. NCAR ECSA Junior Faculty Forum on Future Scientific Directions: *Connecting Weather and Climate in Theory, Models and Observations, 14-16 July 2009, NCAR, Boulder, Colorado, USA.*
- **Zhao, Ming**, I.M. Held, S-J Lin, G. Vecchi 2009: Modeling global hurricane climatology, variability, and response to global warming. *2009 GFDL External Science Review, 30 June - 2 July 2009, Princeton, New Jersey, USA.*
- **Zhao, Ming** (**invited**) 2008: Sensitivity of GCM simulated clouds to cumulus mixing, convective cloud microphysics and its implications for cloud feedback to climate sensitivity. *The 4th Pan-GEWEX Cloud System Study (GCSS) Meeting on: Advances in Modeling and Observing Clouds and Convection, 2-6 June 2008, Meteo-France, Toulouse, France.*
- **Zhao, Ming** 2006: GFDL AM2 cloud sensitivity to details in convection and cloud parameterizations, a GPCI case study. *Joint GCSS-GPCI/BLCI-RICO Workshop, 18-21 September 2006, Goddard Institute for Space Science, NASA, New York City, USA.*
- **Zhao, Ming** 2005: University of Washington Shallow Cumulus Convection (UWShCu) Scheme in GFDL AM2 - preliminary results. Atmospheric Climate Process Team Annual Meeting, 29-30 November 2005, GFDL, Princeton, New Jersey, USA.
- **Zhao, Ming**, I.M. Held and B. Wyman 2005: The role of cloud radiative forcing in an idealized Walker circulation. The International Association of Meteorology and Atmospheric Sciences (IAMAS) Conference, 2-11 August 2005, Beijing, China.
- **Zhao, Ming**, 2004: Current status on column diagnostics and modeling work at GFDL. Atmospheric Climate Process Team Annual Meeting, 21-23 October 2004, Seattle, Washington, USA.
- **Zhao, Ming** and P.H. Austin, 2003: Trade-wind cumulus transport and the cloud size distribution. Gordon Research Conference 2003: Solar Radiation and Climate, 13-18 July 2003, Colby-Sawyer College, New London, USA.
- **Zhao, Ming** and P.H. Austin, 2003: Trade-wind cumulus cloud parameterization in large scale models: results from large eddy simulations. 37th CMOS Conference, 2-5 June 2003, Ottawa, Canada.
- **Zhao, Ming** and P.H. Austin, 2002: Life cycle of numerically simulated shallow cumulus clouds, Modeling Clouds and Climate Workshop. December 2002, Toronto, Canada.
- **Zhao, Ming** and P.H. Austin, 2002: A diagnostic study of episodic mixing models of shallow

cumulus clouds. AMS 15th Symposium on Boundary Layers and Turbulence, 15-19 July 2002, Wageningen, Netherlands.

- **Zhao, Ming** and P.H. Austin, 2002: A diagnostic study of buoyancy-sorting parameterizations of shallow cumulus convection, GCSS-ARM Workshop on the Representation of Cloud Systems in Large-Scale Models, 20-24 May 2002, Kananaskis, Alberta, Canada.
- **Zhao, Ming** and P.H. Austin, 2001: Sensitivity studies of boundary-sorting representation of shallow cumulus parameterizations. 2001 Climate Conference, 20-24 August, 2001, Utrecht, Netherlands.
- **Zhao, Ming** and P. H. Austin, 2000: Sensitivity studies of buoyancy-sorting parameterizations in Canadian GCM Single Column Model. 34th CMOS Conference, 29 May-1 June, 2000, Victoria, BC, Canada.