Sen Zhao

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RESEARCH INTERESTS

Climate variability, dynamics, and predictability; Climate impacts and change; multi-scale interactions of the Earth system; El Niño-Southern Oscillation; Climate modeling; Seasonal forecast; Wave dynamics and atmospheric teleconnections; Paleoclimate

EDUCATION

Ph.D. *Meteorology*, Institute of Atmospheric Physics, Chinese Academy of Sciences 2016
B.S. *Atmospheric Sciences*, Lanzhou University (Graduated with Honors) 2011

PROFESSIONAL APPOINTMENTS

University of Hawai‘i at Mānoa, Honolulu, HI, USA 11/2021 – Present
Assistant Researcher at School of Ocean and Earth Science and Technology (SOEST)

University of Hawai‘i at Mānoa, Honolulu, HI, USA 09/2016 – 10/2021
Postdoctoral Fellow at Department of Atmospheric Sciences. Mentor: Fei-Fei Jin

Institute of Atmospheric Physics Chinese Academy of Sciences, Beijing, China 09/2011 – 09/2016
Research Assistant at State Key Laboratory of Numerical Modeling for Atmospheric Sciences and Geophysical Fluid Dynamics (LASG). Advisor: Jianping Li

OTHER PROFESSIONAL POSITION

Associate Editor for ***npj Climate and Atmospheric Science (Nature partner journal)*** 05/2025 – Present

GRANTS

- **NSF grant** (2024-2027), *Dynamics and predictability of coastal El Nino events, and implications for ENSO diversity*, C. Karamperidou (lead PI) and **S. Zhao (co-PI)**, budget $644,460.
- **NOAA MAPP grant** (2023–2026), *Developing Dynamically Constrained Projections of ENSO Activity and Associated Coastal Hazards – An Application to the Hawaiian and US-Affiliated Pacific Islands*. F.-F. Jin (lead PI), M. Stuecker, N. Li, A. Wittenberg, J. Boucharel., Z. Yang, **S. Zhao (Co-I)**.
- **DOE grant (**pending), *Quantifying and Understanding Ocean Biogeochemistry-ENSO/TIW Interactions & Feedbacks in Earth System Models*, F.-F. Jin (lead PI), M. Stuecker, F. M. Hoffman, A. Wittenberg, **S. Zhao (Co-I).**

SELECTED SCHOLARSHIPS, HONORS AND AWARDS

- **National Scholarship** (2013), Ministry of Education of China, No. 50257
- **Outstanding Student Leader** (2012, 2013, 2014), University of the Chinese Academy of Sciences
- **Outstanding Student** (2012, 2013, 2014, 2015), University of the Chinese Academy of Sciences
- **Outstanding Graduate** (2011), Lanzhou University
- **China National Encouragement Scholarship** (2008, 2010)
- **Contemporary Undergraduate Mathematical Contest in Modeling Award** (2009)**,** National Second Prize and Special Prize of Gansu Province**,** CSIAM
- **First Class Scholarship of Lanzhou University** (2009)

PUBLICATIONS

ORCID: 0000-0002-5597-1109 Google Scholar *(citations 2150+, H-index 24)*

Peer-reviewed book chapter

- Jin F.-F., H.-C. Chen, **S. Zhao**, M. Hayashi, C. Karamperidou, M. F. Stuecker, R. Xie, and L. Geng (2020): Simple ENSO Models. In: Santoso A, Cai W, McPhaden MJ (eds) El Niño Southern Oscillation in a Changing Climate, 119-151. (SOEST News)

Peer-reviewed journal articles

52. Iwakiri, T., J.-S. Kug, F.-F. Jin, **S. Zhao**, S.-I. An, G.-I. Kim, and D. Park (2025): Abrupt shift of El Niño periodicity under CO2 mitigation. ***Proceedings of the National Academy of Sciences***, 122 (25), e2426048122. (PNAS Showcases)

51. **Zhao, S.**, N. Li, F.-F. Jin, K. F. Cheung, Z. Yang (2025): Contrast and Predictability of Island-scale El Niño Influences on Hawaii Wave Climate, ***Geophys. Res. Lett.***, 52, e2024GL113127.

50. Vialard, J., F.-F. Jin, M. J. McPhaden, A. Fedorov, W. Cai, S.-I. An, D. Dommenget, X. Fang, M. F. Stuecker, C. Wang, A. Wittenberg, **S. Zhao**, F. Liu, S.-K. Kim, Y. Planton, T. Geng, M. Lengaigne, A. Capotondi, N. Chen, L. Geng, S. Hu, T. Izumo, J.-S. Kug, J.-J. Luo, S. McGregor, B. Pagli, P. Priya, S. Stevenson, and S. Thual (2025): The El Niño Southern Oscillation (ENSO) Recharge Oscillator Conceptual Model: Achievements and Future Prospects, ***Reviews of Geophysics***, *63(1),* e2024RG000843. (Editor's Vox)

49. Kajakokulan, P., A. Santoso, and **S. Zhao** (2025): Asymmetric response of Sri Lanka Northeast Monsoon rainfall to El Niño/La Niña, ***Climate Dyn.***, 63, 101.

48. Zhao, S.-Y., R. Fu, **S. Zhao**, F.-F. Jin, and H. Wang (2025): Cross-equatorial Extension of the Pacific-South American Wave Train Enabled by Southeastern South American Rainfall, ***Climate Dyn.***, 63 (1), 5.

47. Gunnarson, J. L., M. F. Stuecker, and **S. Zhao** (2024): Drivers of Future Extratropical Sea Surface Temperature Variability Changes in the North Pacific. ***npj Climate and Atmospheric Science***, 7(1), 1-11.

46. **Zhao, S.**, F.-F. Jin, M. F. Stuecker, P. R. Thompson, J.-S. Kug, M. J. McPhaden, M.A. Cane, A. T. Wittenberg, and W. Cai (2024): Explainable El Niño Predictability from Climate Mode Interactions. ***Nature***, 630(8018), 891-898. (**ESI Highly Cited Paper**, **ESI Hot Paper**, NSF Stories, NOAA MAPP News, UH News, SOEST News, Meteored UK News, EurekAlert!)

45. Tang, X., J. Li, Y. Zhang, Y. Li, and **S. Zhao** (2023): Synergistic Effect of El Niño and Negative Phase of North Atlantic Oscillation on Winter Precipitation in the Southeastern United States. ***J. Climate***, 36(6), 1767–1791.

44. Shi, F., H. Goosse, J. Li, Q. Yin, F. Ljungqvist, T. Lian, C. Sun, L. Wang, Z. Wu, J. Li, **S. Zhao**, C. Xu, W. Liu, T. Liu, T. Nakatsuka, and Z. Guo (2022): Interdecadal to multidecadal variability of East Asian summer monsoon over the past half millennium. ***J. Geophys. Res.: Atmos.*** , 127 (30), e2022JD037260.

43. Shi, F., C. Sun, A. Guion, Q. Yin, **S. Zhao**, T. Liu, and Z. Guo (2022): Roman Warm Period and Late Antique Little Ice Age in an Earth System Model Large Ensemble. ***J. Geophys. Res.: Atmos.*** , 127(16), e2021JD035832.

42. **Zhao, S.**, and C. Karamperidou (2022): Competing Effects of Eastern and Central-Western Pacific Winds in the Evolution of the 2017 Extreme Coastal El Niño. ***Geophys. Res. Lett.,*** 49(15), e2022GL098859.

41. Li, X., Z.-H. Hu, **S. Zhao**, R. Ding, and B. Zhang (2022): On the asymmetry of the tropical Pacific thermocline fluctuation associated with ENSO recharge and discharge. ***Geophys. Res. Lett.,*** 49(11), e2022GL099242.

40. Tang X., J. Li, H. Zhang, and **S. Zhao** (2022): Representation of Rossby wave propagation and its effect on the teleconnection between the Indian summer monsoon and extratropical rainfall in the Met Office Unified Model. ***Climate Dyn.***, 58 (3), 907-924

39. **Zhao, S.**, F.-F. Jin, and M. F. Stuecker (2021): Understanding Lead Times of Warm-Water-Volumes to ENSO Sea Surface Temperature Anomalies. ***Geophys. Res. Lett.,*** 48(19), e2021GL094366.

38. Chen H.-C., F.-F. Jin, **S. Zhao**, A. T. Wittenberg, and S. Xie (2021): ENSO Dynamics in the E3SM-1-0, CESM2, and GFDL-CM4 Climate Models. ***J. Climate,*** 34 (23), 9365-9384.

37. **Zhao, S.,** F.-F. Jin, X. Long, and M. Cane (2021): On the Breakdown of ENSO's Relationship with Thermocline Depth in the Central-Equatorial Pacific. ***Geophys. Res. Lett.,*** 48(9), e2020GL092335.

36. Zhou, X., Q. Chen, Z. Wang, M. Xu, **S. Zhao**, Z. Cheng, and F. Feng (2020): Longer duration of the weak stratospheric vortex during extreme El Niño events linked to spring Eurasian coldness. ***J. Geophys. Res.: Atmos.,*** 125(16), e2019JD032331.

35. Liu, T., J. Li, Q. Wang, **S. Zhao** (2020): Influence of the Autumn SST in the Southern Pacific Ocean on Winter Precipitation in the North American Monsoon Region. ***Atmosphere***, 11(8), 844.

34. Tseng, Y., R. Ding, **S. Zhao**, Y. Kuo, and Y. Liang (2020): Could the North Pacific Oscillation Be Modified by the Initiation of East Asian Winter Monsoon? ***J. Climate***, *33,* 2389–2406.

33. Xue, A., F.-F. Jin, W. Zhang, J. Boucharel, **S. Zhao**, and X. Yuan (2020): Delineating the Seasonally Modulated Nonlinear Feedback onto ENSO from Tropical Instability Waves. ***Geophys. Res. Lett.***, *47*(7), e2019GL085863.

32. **Zhao, S.**, M. F. Stuecker, F.-F. Jin, J. Feng, H. Ren, W. Zhang, and J. Li (2020): Improved Predictability of the Indian Ocean Dipole using a Stochastic-Dynamical Model compared to the North American Multi-model Ensemble Forecast. ***Wea. Forecasting***, 35(2), 379–399.

31. Zhang Y., J. Li, **S. Zhao**, F. Zheng, J. Feng, Y. Li, Y. Xu (2020): Indian Ocean tripole mode and its associated atmospheric and oceanic processes. ***Climate Dyn.***, 55(5), 1367-1383.

30. Feng, J., J. Li, F.-F. Jin, Z. Liu, and **S. Zhao** (2019): Effect of El Niño on the Response Ratio of Hadley Circulation to Different SST Meridional Structures. ***Climate Dyn.***, *53,* 3877–3891.

29. **Zhao, S.**, F.-F. Jin, and M. F. Stuecker (2019): Improved Predictability of the Indian Ocean Dipole Using Seasonally Modulated ENSO Forcing Forecasts. ***Geophys. Res. Lett.,*** 46(16), 9980–9990.

28. Wang, Q., J. Li, Y. Li, J. Xue, **S. Zhao**, Y. Xu, Y. Wang, Y. Zhang, D. Dong, and J. Zhang (2019): Modulation of tropical cyclone tracks over the western North Pacific by intra-seasonal Indo-western Pacific convection oscillation during the boreal extended summer. ***Climate Dyn.***, *52*(1-2), 913–927.

27. **Zhao, S.,** J. Li, Y. Li, F.-F. Jin, and J. Zheng (2019): Interhemispheric Influence of Indo-Pacific Convection Oscillation on Southern Hemisphere Rainfall through Southward Propagation of Rossby Waves. ***Climate Dyn.,*** 52(5), 3203–3221.

26. Shi, F., H. Goosse, F. Klein, **S. Zhao**, T. Liu, and Z. Guo (2019): Monopole mode of precipitation in East Asia modulated by the South China Sea over the last four centuries. ***Geophys. Res. Lett.***, *46*(24), 14713–14722.

25. Li, Y., J. Feng, J. Li, and **S. Zhao** (2018): The Circle Diagram in the Group Velocity Domain for Rossby Wave under the Horizontally Non-Uniform Flow. ***SOLA***, *14,* 121–125.

24. Li, Y., J. Li, F. Kucharski, J. Feng, **S. Zhao**, and J. Zheng (2018): Two Leading Modes of the Interannual Variability in South American Surface Air Temperature during Austral Winter. ***Climate Dyn.***, *51*(5-6), 2141–2156.

23. Liu, T., J. Li, Y. Li, **S. Zhao**, F. Zheng, J. Zheng, and Z. Yao (2018): Influence of the May Southern Annular Mode on the South China Sea Summer Monsoon. ***Climate Dyn.***, *51*(11-12), 4095–4107.

22. Feng, J., J. Li, F.-F. Jin, **S. Zhao**, and J. Zhu (2018): Relationship between the Hadley circulation and different tropical meridional SST structures during boreal summer. ***J. Climate***, *31*(16), 6575–6590.

21. Stuecker, M. F., C. M. Bitz, K. C. Armour, C. Proistosescu, S. M. Kang, S.-P. Xie, D. Kim, S. McGregor, W. Zhang, **S. Zhao**, W. Cai, Y. Dong, and F.-F. Jin (2018): Polar Amplification Dominated by Local Forcing and Feedbacks. ***Nature Climate Change***, *8*(12), 1076–1081. (Nature News & Views, EurekAlert!, SOEST News)

20. Xue, J., J. Li, C. Sun, **S. Zhao**, J. Mao, D. Dong, Y. Li, and J. Feng (2018): Decadal-Scale Teleconnection between South Atlantic SST and Southeast Australia Surface Air Temperature in Austral Summer. ***Climate Dyn.***, *50*(7-8), 2687–2703.

19. Zhou, X., J. Li, F. Xie, R. Ding, Y. Li, **S. Zhao**, J. Zhang, and Y. Li (2018): The Effects of the Indo-Pacific Warm Pool on the Stratosphere. ***Climate Dyn.***, *51*(11-12), 4043–4064.

18. Huyan, L., J. Li, **S. Zhao**, C. Sun, D. Dong, T. Liu, and Y. Zhao (2017): The Impact of Layer Perturbation Potential Energy on the East Asian Summer Monsoon. ***J. Climate***, *30*(17), 7087–7103.

17. Tian, W., Y. Li, F. Xie, J. Zhang, M. P. Chipperfield, W. Feng, Y. Hu, **S. Zhao**, X. Zhou, Y. Yang, and X. Ma (2017): The relationship between lower-stratospheric ozone at southern high latitudes and sea surface temperature in the East Asian marginal seas in austral spring. ***Atmos. Chem. Phys.***, *17*(11), 6705–6722.

16. Xie, F., J. Li, J. Zhang, W. Tian, Y. Hu, **S. Zhao**, C. Sun, R. Ding, J. Feng, and Y. Yang (2017): Variations in North Pacific Sea Surface Temperature Caused by Arctic Stratospheric Ozone Anomalies. ***Environ. Res. Lett.***, *12*(11), 114023.

15. Shi, F., **S. Zhao**, Z. Guo, H. Goosse, and Q. Yin (2017): Multi-proxy reconstructions of May–September precipitation field in China over the past 500 years. ***Clim. Past***, *13*(12), 1919–1938.

14. Stuecker, M. F., A. Timmermann, F.-F. Jin, Y. Chikamoto, W. Zhang, A. T. Wittenberg, E. Widiasih, and **S. Zhao** (2017): Revisiting ENSO/Indian Ocean Dipole Phase Relationships. ***Geophys. Res. Lett.***, *44*(5), 2481–2492. (AGU Editor's Highlight)

13. Feng, J., J. Li, F.-F. Jin, **S. Zhao**, and F. Xie (2017): The responses of the Hadley circulation to different meridional SST structures in the seasonal cycle. ***J. Geophys. Res.: Atmos.***, *122*(15), 7785–7799.

12. Qin, J., R. Ding, Z. Wu, J. Li, and **S. Zhao** (2017): Relationships between the extratropical ENSO precursor and leading modes of atmospheric variability in the Southern Hemisphere. ***Adv. Atmos. Sci.***, *34*(3), 360–370.

11. Ding, R., J. Li, Y.-h. Tseng, K.-J. Ha, **S. Zhao**, and J.-Y. Lee (2016): Interdecadal change in the lagged relationship between the Pacific–South American pattern and ENSO. ***Climate Dyn.***, *47*(9-10), 2867–2884.

10. Yang, F., N. Wang, F. Shi, F. C. Ljungqvist, **S. Zhao**, and T. Liu (2016): The spatial distribution of precipitation over the West Qinling region, China, AD 1470–2000. ***Palaeogeogr. Palaeoclimatol. Palaeoecol.***, *443,* 278–285.

9. Zheng, F., J. Li, Y. Li, **S. Zhao**, and D. Deng (2016): Influence of the Summer NAO on the Spring-NAO-Based Predictability of the East Asian Summer Monsoon. ***J. Appl. Meteor. Climatol.***, *55*(7), 1459–1476.

8. Zheng, J., Q. Wu, Y. Guo, and **S. Zhao** (2016): The Impact of Summertime North Indian Ocean SST on Tropical Cyclone Genesis over the Western North Pacific. ***SOLA***, *12,* 242–246.

7. Kazmi, D. H., J. Li, C. Ruan, **S. Zhao**, and Y. Li (2016): A Statistical Downscaling Model for Summer Rainfall over Pakistan. ***Climate Dyn.***, *47*(7–8), 2653–2666.

6. **Zhao, S.,** J. Li, and C. Sun (2016): Decadal Variability in the Occurrence of Wintertime Haze in Central Eastern China Tied to the Pacific Decadal Oscillation. ***Sci. Rep.,*** 6, 27424. (Top 100 read Scientific Reports articles in 2016)

5. Shi, F., Q. Ge, B. Yang, J. Li, F. Yang, F. C. Ljungqvist, O. Solomina, T. Nakatsuka, N. Wang, **S. Zhao**, C. Xu, K. Fang, M. Sano, G. Chu, Z. Fan, N. P. Gaire, and M. U. Zafar (2015): A Multi-Proxy Reconstruction of Spatial and Temporal Variations in Asian Summer Temperatures over the Last Millennium. ***Climatic Change***, *131*(4), 663–676.

4. Zhu, G., W. Lin, **S. Zhao**, and Y. Cao (2015): Spatial and temporal variation characteristics of ocean waves in the South China Sea during the boreal winter. ***Acta Oceanol. Sin.***, *34*(1), 23–28.

3. Sun, C., J. Li, and **S. Zhao** (2015): Remote Influence of Atlantic Multidecadal Variability on Siberian Warm Season Precipitation. ***Sci. Rep.***, *5,* 16853.

2. Li, Y., J. Li, F.-F. Jin, and **S. Zhao** (2015): Interhemispheric Propagation of Stationary Rossby Waves in a Horizontally Nonuniform Background Flow. ***J. Atmos. Sci.***, *72*(8), 3233–3256.

1. **Zhao, S.,** J. Li, and Y. Li (2015): Dynamics of an Interhemispheric Teleconnection across the Critical Latitude through a Southerly Duct during Boreal Winter. ***J. Climate***, *28*(19), 7437–7456.

Non-Refereed Articles

- **Zhao, S.** and F.-F. Jin (2024): A minimalistic model achieves long-range explainable El Nino forecasts with high accuracy, ***Nature***, Research Briefings, https://doi.org/10.1038/d41586-024-02335-3

Thesis

- **Zhao, S.,** 2016: *Theory of Cross-Equatorial Propagation of Planetary Wave in Horizontally Non-Uniform Basic Flow and Its Applications in Atmospheric Teleconnections,* PhD Dissertation, University of Chinese Academy of Sciences
- **Zhao, S.,** 2011: *Evaluation of WRF microphysics and cumulus schemes in simulating Hurricane Katrina*, Undergraduate thesis, Lanzhou University

Submitted/In Revision

- Stuecker M., **S. Zhao (co-first author)**, A. Timmermann, R. Ghosh, T. Semmler, S.-S. Lee, J.-Y. Moon, F.-F. Jin and T. Jung: Global climate mode resonance due to rapidly intensifying El Niño-Southern Oscillation, *in revision*
- Mei, Z., S. Lin, …, **S. Zhao**,…: Identifying key convection sensitive oceanic regions to weaken the ENSO Spring Predictability Barrier, *submitted.*
- Liu, F., J. Vialard, …, **S. Zhao**, …: ENSO cycles mostly after extreme El Niño events. *submitted*.
- Feng, J., J.-X. Li, F.-F. Jin, **S. Zhao**, J. Li: Anthropogenic forcing drives equatorward migration of heatwave locations across continents. *in revision*.
- Boucharel, J., R. Almar, F.-F. Jin, **S. Zhao**, M. Stuecker, B. Dewitte: Skillful seasonal predictions of coastal risks from climate modes interactions. *submitted*.
- Xue, H., F. Shi, J. Li, **S. Zhao**, F.-F. Jin, X. Zhang, L. Geng, W. Liu, Q. Yin, Z. Guo (2024). Pronounced El Niño response to tropical western Pacific volcanic eruptions over the past millennium. *In revision.*

In Preparation

- Kim, S.-K., **S. Zhao**, et al.: The Community Recharge Oscillator Model. In preparation for *Geoscientific Model Development*.
- **Zhao, S.**, P. R. Thompson, F.-F. Jin: Influence of ENSO on the compounding effect of sea level and ocean waves.
- **Zhao, S.,** F.-F. Jin: A Robust Assessment of the Bjerknes-Wyrtki-Jin Indices for ENSO Linear Stability and Periodicity.

PRESENTATIONS

Oral Conference and Workshop Presentations

- Towards Explainable El Nino Predictions and Understanding Climate Model Biases, *Pan-CLIVAR Meeting 2025*, Bali, Indonesia, 22-26 September 2025 (*incoming online talk*)
- Conditional ENSO Predictability from Equatorial Pacific and Pan-Tropical States, *Wyrtki Symposium 2025*, Honolulu, HI, 12-14 March 2025
- A Minimalistic Model Achieves Long-range Explainable ENSO Forecasts with High Accuracy, *AGU24 Meeting*, Washington, D.C., 9-13 December 2024
- Competing Effects of Eastern and Central-Western Pacific Winds in the Evolution of the 2017 Extreme Coastal El Niño and Implication for El Niño Diversity, *IRCC-KIST-IPRC Joint Workshop on Climate Change and Prediction*, East West Center, Honolulu, 01/2023
- Understanding Lead Times of Warm-Water-Volumes to ENSO Sea Surface Temperature Anomalies, *SIO-UH Oahu Workshop on Ocean-Atmosphere Interactions and Climate Predictability,* Honolulu, 03/2022
- Dynamics and Implications for ENSO's Subsurface Ocean Temperature Vertical Dipole Anomalies in the Central Equatorial Pacific, *Ocean Science Meeting 2022*, Honolulu, 02/2022
- Improved Predictability of the Indian Ocean Dipole Using Seasonally Modulated ENSO Forcing, *AOGS 15th Annual Meeting*, Honolulu, June 03–08, 2018

- Decadal Variability in the Occurrence of Wintertime Haze in Central Eastern China Tied to the Pacific Decadal Oscillation, *AOGS 15th Annual Meeting*, Honolulu, June 03–08, 2018

Invited Talks and Seminars

- Advances in Understanding of ENSO's Relationship with Equatorial Pacific Thermocline, *Climate Dynamics Group Seminar*, *visual*, 05/2022
- Advancing Understanding of ENSO's Relationship with Equatorial Pacific Thermocline, *Atmospheric Sciences Seminar*, *University of Hawai'i at Mānoa*, Honolulu, 09/2021

Poster Presentations

- Contrasting Island-scale El Niño Influences on Hawaii Wave Climate, *AGU24 Meeting*, Washington, D.C., 9-13 December 2024
- A robust assessment of the Bjerknes-Wyrtki-Jin indices for ENSO growth rate and periodicity, *AGU Fall Meeting 2019*, San Francisco, USA, December 9–13, 2019
- Interhemispheric influence of the Indo-Pacific convection oscillation on Southern Hemisphere rainfall, *AOGS 13th Annual Meeting*, Beijing, China, July 31–August 5, 2016
- Interhemispheric influence of the Indo-Pacific convection oscillation on Southern Hemisphere rainfall, *The 13th General Circulation Model Simulations of the East Asian Climate (EAC) workshop*, Beijing, China, March 24–25, 2016
- The Hemispheric Propagation of Stationary waves in Atmosphere, *EGU General Assembly 2013*, Vienna, Austria, April 7–12, 2013
- The Hemispheric Propagation of Stationary waves in Atmosphere, *ICDM Workshop 2012*, Kunming, China, August 6–9, 2012

TEACHING AND MENTORING

Instructor/Co-Instructor

- *Recharge Oscillator Practical: Simulations and Forecasting,* ENSO Winter School 2025*,* UH Mānoa, March 15-23, 2025
- *Introduction to Atmospheric Dynamics* (ATMO 303), UH Mānoa, fall 2024, Instructors: Jingxia Zhao, Sen Zhao, Licheng Geng
- *Dynamics of El Niño–Southern Oscillation Phenomenon* (ATMO 752), UH Mānoa, spring 2019, Instructor: Fei-Fei Jin

Guest Lecturer

- *Large-Scale Ocean-Atmosphere Interaction* (OCN 666 / ATMO 666*)*, UH Mānoa, spring 2025, Instructors: Niklas Schneider, Malte Stuecker
- *Applied Atmospheric Dynamics* (ATMO 402), UH Mānoa, spring 2020, Instructor: Fei-Fei Jin
- *Applied Atmospheric Dynamics* (ATMO 402), UH Mānoa, spring 2019, Instructor: Fei-Fei Jin

Informally Mentored Students

- Pocheng Chen, UH Mānoa Atmospheric Sciences
- Jacob Gunnarson, UH Mānoa Oceanography
- Xinyi Yang, UH Mānoa Atmospheric Sciences
- Huihong Xue, Institute of Geology and Geophysics Chinese Academy of Sciences (now Université Catholique de Louvain)

PROFESSIONAL SERVICES AND ACTIVITIES

Associate Editor for npj Climate and Atmospheric Science

Member/Contributor

- *CLIVAR* working group: ENSO conceptual models (2022 – Present)

Organizing Committee

- ***Chair* and *Convener***, AGU25 session OS011 - *El Niño-Southern Oscillation and Pantropical Climate Interactions: Mechanisms, Predictability, Impacts, and Projections*, New Orleans, Louisiana, 15-19 December 2025 *(incoming)*
- ***Chair* and *Co-Convener***, AGU24 session OS015 - *El Niño-Southern Oscillation and Pantropical Climate Interactions: Mechanisms, Predictability, Impacts, and Projections*, Washington, D.C., 9-13 December 2024

Referees for international journals

- *Nature, Nature Geoscience, Proceedings of the National Academy of Sciences, Science Advances, npj Climate and Atmospheric Science, Communications Earth & Environment, Geophysical Research Letters, Journal of Climate, Climate Dynamics, Atmospheric Chemistry and Physics, Environmental Research Letters, Journal of Geophysical Research-Atmosphere, Journal of Geophysical Research-Oceans, Journal of the Atmospheric Sciences, Scientific Reports, Deep-Sea Research Part I, Atmosphere, Theoretical and Applied Climatology, Progress in Oceanography, Scientific Online Letters on the Atmosphere, Agronomy Journal, Earth and Space Science, Frontiers of Earth Science*

Scientific Societies

- American Geophysical Union (AGU), Asia Oceania Geosciences Society (AOGS), European Geosciences Union (EGU)

DEVELOPED MODELS AND TOOLKITS

- **Operational XRO ENSO forecast** adopted in **IRI ENSO Predictions Plume** since September 2024. The plume is maintained by the International Research Institute for Climate and Society (IRI) at Columbia University
- **An extended nonlinear recharge oscillator model (XRO)**. The XRO exhibits skillful ENSO forecasts better than global climate models and comparable to the most skillful AI ENSO models.
- **A simple stochastic-dynamical IOD prediction system**. The system exhibits generally higher skill and longer lead times for predicting IOD events than current operational forecast systems.
- **An intermediate tropical ocean model (iTOM).** This is a linear continuously stratified ocean model extended to all tropical oceans with a more realistic coastline and a space dependent background stratification, show improved performance than the Zebiak-Cane type ocean model.
- **Rossby wave ray and phase tracing.** A software package for investigating the Rossby wave propagation and its phase evolution in a horizontally non-uniform basic flow.

SKILLS

Modeling using Earth System Models (NCAR CESM and GFDL models)

- CESM1/2 OGCM POP2 momentum and buoyancy fluxes forced experiments
- CESM1/2 Fully coupled and slab-ocean experiments
- CESM AGCM SST/SIC sensitivity experiments and aqua-planet experiments
- GFDL CM2.1/CESM pacemaker experiments

Modeling using Intermediate and Simple Models

- Linear Baroclinic Models
- Zebiak-Cane Coupled Model
- Intermediate tropical ocean model
- SPEEDY
- Gill-Matsuno Model
- Shallow Water Model for Global Ocean
- Barotropic Model
- Recharge Oscillator Model

Machine Learning Methods

- Deep learning with Convolutional Neural Network (CNN)

Coding

- Python, Fortran, Matlab, CDO, NCO, NCL, Ferret, Gnuplot, R, Linux Shells, LATEX, C++

Languages

- English, Mandarin (native)

Last updated: August 5, 2025