

Sen Zhao

Department of Atmospheric Sciences, University of Hawai'i at Mānoa
2525 Correa Road, HIG 350, Honolulu, HI 96822, USA
Email: zhaos@hawaii.edu | Homepage: <https://senzhaos.netlify.app/>

RESEARCH INTERESTS

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

Associate Researcher at School of Ocean and Earth Science and Technology (SOEST)	10/2025 – Present
Assistant Researcher at School of Ocean and Earth Science and Technology (SOEST)	11/2021 – 09/2025
Postdoctoral Fellow at Department of Atmospheric Sciences. Mentor: Fei-Fei Jin	09/2016 – 10/2021

Institute of Atmospheric Physics Chinese Academy of Sciences, Beijing, China

Research Assistant at State Key Laboratory of Numerical Modeling for Atmospheric Sciences and Geophysical Fluid Dynamics (LASG). Advisor: Jianping Li	09/2011 – 09/2016
--	-------------------

OTHER PROFESSIONAL POSITION

Associate Editor for <i>npj Climate and Atmospheric Science (Nature partner journal)</i>	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](https://orcid.org/0000-0002-5597-1109)

[Google Scholar](https://scholar.google.com/citations?user=...) (citations 2200+, 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

54. 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 (2025): [Global climate mode resonance due to rapidly intensifying El Niño-Southern Oscillation](#), *Nature Communications*, 16, 9013. ([ScienMag](#), [SOEST News](#), [IBS News](#), [EurekAlert!](#)).
53. Feng, J., J.-X. Li, F.-F. Jin, **S. Zhao**, J. Li (2025): [Anthropogenic forcing drives equatorward migration of heatwave locations across continents](#). *Nature Communications*, 16, 8197. ([ScienMag](#))
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

- Mei, Z., S. Lin, ..., S. **Zhao**, ...: [Identifying key convection sensitive oceanic regions to weaken the ENSO Spring Predictability Barrier](#), *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](#), *in revision*.
- 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*.
- Liu, F., J. Vialard, ..., S. **Zhao**, ...: [ENSO cycles mostly after extreme El Niño events](#). *submitted*.
- Kim, S.-K., S. **Zhao**, A. Fedorov, F.-F. Jin, S.-I. An, M. Stuecker, C. Liu, L. Geng. *submitted*.
- Wang, Y., M.-J. Widlansky, M. F. Stuecker, S. **Zhao**, F.-F. Jin, [ENSO Predictability from Combined Wyrтки and Hasselmann Memory in a Cyclostationary Linear Inverse Model](#). *submitted*
- Hayashi, M., T. Yokohata, H. Shiogama, T. Ogura, F.-F. Jin, S. **Zhao**, M. F. Stuecker, [Unraveling Non-Monotonic Responses of the El Niño–Southern Oscillation to Post-2100 Global Warming](#), *submitted*.

In Preparation

- Kim, S.-K., S. **Zhao**, et al. : [Community Recharge Oscillator \(CRO\) v1.0: an open-source Python and MATLAB package for solving, parameter fitting, and practical applications of the ENSO recharge oscillator](#). *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-Wyrтки-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, 24 September 2025 (*online talk*)
- Conditional ENSO Predictability from Equatorial Pacific and Pan-Tropical States, *Wyrтки 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

Curriculum Vitae – Dr. Sen Zhao

- 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 Panropical 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 Panropical 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: October 16, 2025