

# Jiang Zhu

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## RESEARCH INTERESTS

- ◇ Climate sensitivity and feedbacks
- ◇ Role of ocean circulation in climate change
- ◇ ENSO variability in the past and future
- ◇ Simulation and interpretation of geochemical tracers
- ◇ Global climate change and abrupt climate change

## EDUCATION

- ◇ Ph.D., Atmospheric and Oceanic Sciences May 2017  
University of Wisconsin-Madison, Madison, WI, USA  
Advisor: *Prof. Zhengyu Liu*
- ◇ M.S. Atmospheric and Oceanic Sciences Jun 2011  
Peking University, Beijing, China  
Advisor: *Prof. Haijun Yang*
- ◇ B.S. Atmospheric Sciences Jun 2008  
Peking University, Beijing, China

## RESEARCH EXPERIENCE

- ◇ Project Scientist I, National Center for Atmospheric Research May 2020–present  
Projects: Simulation of past and future climates using CESM
- ◇ Postdoctoral Research Fellow, University of Michigan June 2017–May 2020  
Projects: Climate sensitivity and feedback processes of Earth's past and future; Simulation of water isotopes and implications for past climate; Paleoclimate data assimilation for the Paleocene–Eocene Thermal Maximum and the last deglaciation
- ◇ Graduate Research Assistant, University of Wisconsin-Madison Aug 2011–May 2017  
Projects: Interpretation and modeling of water isotopes; ENSO variability in the past and future; Holocene temperature conundrum; Abrupt climate changes and the large-scale ocean circulation
- ◇ Visiting Scholar, National Center for Atmospheric Research Jan 2014–Jan 2015  
Projects: Development and validation of the isotope-enabled Community Earth System Model

## RESEARCH GRANTS

- ◇ 2020–2023 Constraining the Physics that Regulate Equilibrium Climate Sensitivity through Simulation of LGM and Eocene Paleoclimates. NSF P2C2, \$384,686 to University of Michigan (with Chris Poulsen at UMich).

## PUBLICATIONS

38. He, C., Liu, Z., Otto-Bliesner, B. L., Brady, E. C., Zhu, C., Tomas, R., Clark, P. U., **Zhu, J.**, ... Bao, Y. (2021). Hydroclimate footprint of pan-Asian monsoon water isotope during the last deglaciation. *Science Advances*, 7(4), eabe2611. doi:10.1126/sciadv.abe2611
37. **Zhu, J.**, Otto-Bliesner, B., Brady, E., Poulsen, C.J., Tierney, J.E., Lofverstrom, M., DiNezio, P. (2021). Assessment of equilibrium climate sensitivity of the Community Earth System Model version 2 through simulation of the Last Glacial Maximum. *Geophysical Research Letters*, e2020GL091220. doi:10.1029/2020GL091220
36. **Zhu, J.**, & Poulsen, C. J. (2021). Last Glacial Maximum (LGM) climate forcing and ocean dynamical feedback and their implications for estimating climate sensitivity. *Clim. Past*, 17(1), 253–267. doi:10.5194/cp-17-253-2021
35. Du, X., Hendy, I., Hinnov, L., Brown, E., **Zhu, J.**, Poulsen, C. J. (2021). High-resolution interannual precipitation reconstruction of Southern California: Implications for Holocene ENSO evolution. *Earth Planet. Sci. Lett.*, 554, 116670. doi:10.1016/j.epsl.2020.116670
34. Windler G., Tierney J., **Zhu, J.**, & Poulsen, C. J. (2020). Unravelling glacial hydroclimate in the Indo-Pacific Warm Pool: perspectives from water isotopes. *Paleoceanography and Paleoclimatology*, 35(12), e2020PA003985. doi:10.1029/2020PA003985.
33. **Zhu, J.**, & Poulsen, C. J. (2020). On the temperature dependence of equilibrium climate sensitivity and cloud feedback in the Community Atmosphere Models. *Geophysical Research Letters*, 47(18), e2020GL089143. doi:10.1029/2020GL089143
32. Tierney, J. E., Poulsen, C. J., Montañez, I. P., Bhattacharya, T., Feng, R., Ford, H. L., Hönisch, B., Inglis, G. N., Petersen, S. V., Sago, N., Tabor, C. R., Thirumalai, K., **Zhu, J.**, Burls, N. J., Foster, G. L., Goddérís, Y., Huber, B. T., Ivany, L. C., Kirtland Turner, S., ... Zhang, Y. G. (2020). Past climates inform our future. *Science*, 370(6517), eaay3701. doi:10.1126/science.aay3701 (*news release*)
31. Tierney J., **Zhu, J.**, King, J., Malevich, S. B., Hakim, G. J., & Poulsen, C. J. (2020). Glacial cooling and climate sensitivity revisited. *Nature*, 584(7822), 569–573. doi:10.1038/s41586-020-2617-x (*news release*)
30. Wang, Y., Hendy, I., **Zhu, J.** (2020) Expansion of the Southern California oxygen minimum zone during the early- to mid-Holocene due to reduced ventilation of the Northeast Pacific. *Quaternary Science Reviews*. 238, 106326. doi:10.1016/j.quascirev.2020.106326
29. Liu, Y., Wu, Y., Lin, Z., Zhang, Y., **Zhu, J.**, & Yi, C. (2020). Simulated Impact of the Tibetan Glacier Expansion on the Eurasian Climate and Glacial Surface Mass Balance during the Last Glacial Maximum. *Journal of Climate*. 33(15), 6491–6509. doi:10.1175/JCLI-D-19-0763.1
28. He, C., Liu, Z., **Zhu, J.**, Zhang, J., Gu, S., Otto-Bliesner, B. L., ... Sun, J. (2020). North Atlantic subsurface temperature response controlled by effective freshwater input in “Heinrich” events. *Earth and Planetary Science Letters*. 539, 116247. doi:10.1016/j.epsl.2020.116247
27. **Zhu, J.**, Poulsen, C. J., Otto-Bliesner, B. L. (2020) High climate sensitivity in CMIP6 model not supported by paleoclimate. *Nature Climate Change*. 10, 378–379. doi:10.1038/s41558-020-0764-6 (*news release*)
26. **Zhu, J.**, Poulsen, C. J., Otto-Bliesner, B. L., Liu, Z., Brady, E. C., & Noone, D. C. (2020). Simulation of early Eocene water isotopes using an Earth system model and its implication for past climate reconstruction. *Earth and Planetary Science Letters*, 537, 116114. doi:10.1016/j.epsl.2020.116164

25. Lunt, D. J., Bragg, F., Chan, W. L., Hutchinson, D. K., Ladant, J. B., Niezgodzki, I., Steinig, S., Zhang, Z., **Zhu, J.**, Abe-Ouchi, A., de Boer, A. M., Coxall, H. K., Donnadiou, Y., Knorr, G., Langebroek, P. M., Lohmann, G., Poulsen, C. J., Sepulchre, P., Tierney, J., Valdes, P. J., Dunkley Jones, T., Hollis, C. J., Huber, M., & Otto-Bliesner, B. L. (2020). DeepMIP: Modelled large-scale features and model-data comparison for the early Eocene climatic optimum (EECO). *Climate of the Past*, 1-27. doi:10.5194/cp-2019-149
24. **Zhu, J.**, & Poulsen, C. J. (2019) Quantifying the cloud particle-size feedback in an Earth system model. *Geophysical Research Letters*, 46, 10910–10917. doi:10.1029/2019GL083829
23. **Zhu, J.**, Poulsen, C. J., & Tierney, J. E. (2019). Simulation of Eocene extreme warmth and high climate sensitivity through cloud feedbacks. *Science Advances*, 5(9), eaax1874. doi:10.1126/sciadv.aax1874 (*news release*)
22. Brady, E. C., Stevenson, S., Bailey, D., Liu, Z., Noone, D., Nusbaumer, J., . . . **Zhu, J.** (2019). The connected isotopic water cycle in the Community Earth System Model version 1. *Journal of Advances in Modeling Earth Systems*, 11, 2547–2566. doi:10.1029/2019MS001663
21. Thompson, A. J., Skinner, C. B., Poulsen, C. J., & **Zhu, J.** Modulation of mid-Holocene African rainfall by dust aerosol direct and indirect effects. *Geophysical Research Letters*, 46(7), 3917–3826. doi:10.1029/2018GL081225
20. Thibodeau, B., Not, C., **Zhu, J.**, Schmittner, A., Noone, D., Tabor, C., ...Liu, Z. (2018). Last century warming over the Canadian Atlantic shelves linked to weak Atlantic Meridional Overturning Circulation. *Geophysical Research Letters*, 45(22), 12–376. doi:10.1029/2018GL080083
19. Lu, Z., Liu, Z., **Zhu, J.**, & Cobb, K. M. (2018). A Review of Paleo El Niño-Southern Oscillation. *Atmosphere*, 9(4), 130. doi:10.3390/atmos9040130
18. Liu, Y., Zhang, M., Liu, Z., Xia, Y., Huang, Y., Peng, Y., & **Zhu, J.** (2018). A Possible Role of Dust in Resolving the Holocene Temperature Conundrum. *Scientific Reports*, 8(1), 4434. doi:10.1038/s41598-018-22841-5
17. Tabor, C. R., Otto-Bliesner, B. L., Brady, E. C., Nusbaumer, J., **Zhu, J.**, Erb, M. P., ...Noone, D. (2018). Interpreting Precession-Driven  $\delta^{18}\text{O}$  Variability in the South Asian Monsoon Region. *Journal of Geophysical Research: Atmospheres*, 123(11), 5927–5946. doi:10.1029/2018JD028424
16. **Zhu, J.**, Liu, Z., Brady, E. C., Otto-Bliesner, B. L., Marcott, S. A., Zhang, J., ...Noone, D. (2017). Investigating the direct meltwater effect in terrestrial oxygen-isotope paleoclimate records using an isotope-enabled Earth system model. *Geophysical Research Letters*, 44(24), 12501–12510. doi:10.1002/2017GL076253
15. **Zhu, J.**, Liu, Z., Brady, E., Otto-Bliesner, B., Zhang, J., Noone, D., ...Tabor, C. (2017). Reduced ENSO variability at the LGM revealed by an isotope-enabled Earth system model. *Geophysical Research Letters*, 44(13), 6984–6992. doi:10.1002/2017GL073406
14. Liu, W., Xie, S.-P., Liu, Z., & **Zhu, J.** (2017). Overlooked possibility of a collapsed Atlantic Meridional Overturning Circulation in warming climate. *Science Advances*, 3(1), e1601666. doi:10.1126/sciadv.1601666 (*news release*)
13. Lu, Z., Liu, Z., & **Zhu, J.** (2016). Abrupt intensification of ENSO forced by deglacial ice-sheet retreat in CCSM3. *Climate Dynamics*, 46(5–6), 1877–1891. doi:10.1007/s00382-015-2681-3
12. Guan, J., Liu, Z., Wen, X., Brady, E., Noone, D., **Zhu, J.**, & Han, J. (2016). Understanding the temporal slope of the temperature-water isotope relation during the deglaciation using isoCAM3: The slope equation.

11. Wen, X., Liu, Z., Wang, S., Cheng, J., & **Zhu, J.** (2016). Correlation and anti-correlation of the East Asian summer and winter monsoons during the last 21,000 years. *Nature Communications*, 7, 11999. doi:10.1038/ncomms11999
10. **Zhu, J.**, Liu, Z., Zhang, J., & Liu, W. (2015). AMOC response to global warming: dependence on the background climate and response timescale. *Climate Dynamics*, 44(11), 3449–3468. doi:10.1007/s00382-014-2165-x
9. Liu, W., Lu, J., Leung, L. R., Xie, S. P., Liu, Z., & **Zhu, J.** (2015). The de-correlation of westerly winds and westerly-wind stress over the Southern Ocean during the Last Glacial Maximum. *Climate Dynamics*, 45(11–12), 3157–3168. doi:10.1007/s00382-015-2530-4
8. **Zhu, J.**, Liu, Z., Zhang, X., Eisenman, I., & Liu, W. (2014). Linear weakening of the AMOC in response to receding glacial ice sheets in CCSM3. *Geophysical Research Letters*, 41(17), 6252–6258. doi:10.1002/2014GL060891
7. Liu, Z., **Zhu, J.**, Rosenthal, Y., Zhang, X., Otto-Bliesner, B. L., Timmermann, A., ...Timm, O. E. (2014). The Holocene temperature conundrum. *Proceedings of the National Academy of Sciences*, 111(34), E3501–E3505. doi:10.1073/pnas.1407229111 (*news release*)
6. Nace, T. E., Baker, P. A., Dwyer, G. S., Silva, C. G., Rigsby, C. A., Burns, S. J., ... **Zhu, J.** (2014). The role of North Brazil Current transport in the paleoclimate of the Brazilian Nordeste margin and paleoceanography of the western tropical Atlantic during the late Quaternary. *Palaeogeography, Palaeoclimatology, Palaeoecology*, 415, 3–13. doi:10.1016/j.palaeo.2014.05.030
5. Huang, B., **Zhu, J.**, & Yang, H. (2014). Mechanisms of Atlantic Meridional Overturning Circulation (AMOC) variability in a coupled ocean-atmosphere GCM. *Advances in Atmospheric Sciences*, 31(2), 241–251. doi:10.1007/s00376-013-3021-3
4. Liu, Z., Carlson, a. E., He, F., Brady, E. C., Otto-Bliesner, B. L., Briegleb, B. P., ...**Zhu, J.** (2012). Younger Dryas cooling and the Greenland climate response to CO<sub>2</sub>. *Proceedings of the National Academy of Sciences*, 109(28), 11101–11104. doi:10.1073/pnas.1202183109 (*news release*)
3. **Zhu, J.**, & Yang, H. (2012). Response of the Atlantic Thermohaline Circulation to Changes of Atmospheric Green House Gases. *Acta Scientiarum Naturalium Universitatis Pekinensis*, 48(2), 231–238. (*in Chinese with English abstract*)
2. Yang, H., & **Zhu, J.** (2011). Equilibrium thermal response timescale of global oceans. *Geophysical Research Letters*, 38(14), L14711. doi:10.1029/2011GL048076
1. Qian, W., **Zhu, J.**, Wang, Y., & Fu, J. (2009). Regional relationship between the Jiang-Huai Meiyu and the equatorial surface-subsurface temperature anomalies. *Chinese Science Bulletin*, 54(1), 113–119. doi:10.1007/s11434-008-0410-6

## INVITED PRESENTATIONS

- ◇ **Brown University**, DEEPS Colloquia, Providence, RI : Constraining equilibrium climate sensitivity through simulation of past extreme climates. October, 2020.
- ◇ **University of California, Davis**, Atmospheric Science Seminar, Davis, CA: Constraining equilibrium climate sensitivity through Simulation of Past Extreme Climates. October, 2020.

- ◇ **AGU Fall Meeting 2019**, San Francisco, CA: Constraining equilibrium climate sensitivity through simulation of Eocene extreme warmth. December, 2019.

#### OTHER SELECTED PRESENTATIONS

- ◇ **Zhu, J.**, Otto-Bliesner, B., Brady, E., Poulsen, C.J., Tierney, J.E., Lofverstrom, M., DiNezio, P., “Assessing equilibrium climate sensitivity of the Community Earth System Model version 2 through simulation of the Last Glacial Maximum”. AGU Fall Meeting. Dec. 2020. San Francisco, USA. (*ORAL*)
- ◇ **Zhu, J.**, C. Poulsen, “LGM climate forcing and ocean dynamical feedback and their implications for estimating climate sensitivity”. Paleoclimate Modelling Intercomparison Project PMIP2020. October 2020. Nanjing, China. (*ORAL*)
- ◇ **Zhu, J.**, C. Poulsen, “Can we directly estimate ECS using reconstructions of the LGM?”. CESM Workshop. June 2020. Boulder, USA. (*ORAL*)
- ◇ **Zhu, J.**, C. Poulsen, B. Otto-Bliesner, and J. Tierney, “Constraining equilibrium climate sensitivity through simulation of past warm and cold climates”. CESM Paleoclimate Working Group Meeting. February 2020. Boulder, USA. (*ORAL*)
- ◇ **Zhu, J.** and C. Poulsen, “On the temperature dependence of equilibrium climate sensitivity and cloud feedback”. AGU Fall Meeting. Dec. 2019. San Francisco, USA. (*POSTER*)
- ◇ **Zhu, J.**, C. Poulsen, J. Tierney, and P. DiNezio, “Investigating the Holocene ENSO variability through isotope-enabled modeling and model-data comparisons”. Water Isotopes and Climate Workshop. October 2019. Boulder, USA. (*ORAL*)
- ◇ **Zhu, J.** and C. Poulsen, “Modeling water isotopes during the PETM and the implications for global temperature and hydrological changes”. Terrestrial and Coastal Climates of the Paleocene Eocene Thermal Maximum. September 2019. Santa Cruz, USA. (*ORAL*)
- ◇ **Zhu, J.** and C. Poulsen, “Constraining future warming from past climates”. Aspen Global Change Institute workshop on ‘The Future of Past Climate’. May 2019. Aspen, USA. (*ORAL*)
- ◇ **Zhu, J.**, C. Poulsen, and J. Tierney, “Simulation of Eocene extreme warmth and high climate sensitivity through cloud feedbacks”. CESM Paleoclimate Working Group Meeting. February 2019. Boulder, USA. (*ORAL*)
- ◇ **Zhu, J.**, C. Poulsen, and J. Tierney, “Simulating Eocene extreme warmth and high climate sensitivity through low-cloud feedbacks”. AGU Fall Meeting. Dec. 2018. Washington, D.C., USA. (*ORAL*)
- ◇ **Zhu, J.**, C. Poulsen, Z. Liu, E. Brady, B. Otto-Bliesner, and D. Noone, “Modeling the oxygen isotope in the early Eocene hothouse climate using an isotope-enabled Earth system model”. Goldschmidt Conference. August 2018. Boston, USA. (*POSTER*)
- ◇ **Zhu, J.**, C. Poulsen, “Simulating the Eocene hothouse climate using the water isotope-enabled Community Earth System Model (CESM1.2)”. DeepMIP Conference. July 2018. Bristol, UK. (*ORAL*)
- ◇ **Zhu, J.**, Z. Liu, E. Brady, B. Otto-Bliesner, S. Marcott, J. Zhang, X. Wang, J. Nusbaumer, T. Wong, A. Jahn, and D. Noone, “Investigating the direct meltwater effect in terrestrial oxygen-isotope records using an isotope-enabled Earth system model”. CESM Paleoclimate Working Group Meeting. March 2018. Austin, USA. (*ORAL*)

- ◇ **Zhu, J.**, Z. Liu, E. Brady, B. Otto-Bliesner, S. Marcott, J. Zhang, X. Wang, J. Nusbaumer, T. Wong, A. Jahn, and D. Noone, “Investigating the direct meltwater effect in terrestrial oxygen-isotope records using an isotope-enabled Earth system model”. AGU Fall Meeting. Dec. 2017. New Orleans, USA. (*ORAL*)
- ◇ **Zhu, J.**, Z. Liu, B. Otto-Bliesner, E. Brady, D. Noone, J. Zhang, R. Tomas, A. Jahn, J. Nusbaumer, and T. Wong. “Reduced ENSO Variability at the LGM Revealed by an Isotope-enabled Earth System Model”. CESM PaleoClimate Working Group Meeting. March 2017. Boulder, USA. (*ORAL*)
- ◇ **Zhu, J.**, Z. Liu, B. Otto-Bliesner, E. Brady, D. Noone, J. Zhang, R. Tomas, A. Jahn, J. Nusbaumer, and T. Wong. “Reduced ENSO Variability at the LGM Revealed by an Isotope-enabled Earth System Model”. AGU Fall Meeting. Dec. 2016. San Francisco, USA. (*ORAL*)
- ◇ **Zhu, J.**, Z. Liu, B. Otto-Bliesner, E. Brady, D. Noone, J. Zhang, R. Tomas, A. Jahn, J. Nusbaumer, and T. Wong. “Reduced ENSO Variability at the LGM Revealed by an Isotope-enabled Earth System Model”. CLIVAR Open Science Conference. Sep. 2016. Qingdao, China. (*ORAL*)
- ◇ **Zhu, J.**, Z. Liu, X. Zhang, I. Eisenman, and W. Liu. “Linear Weakening of the AMOC in Response to Lowering Ice-sheet Topography in CCSM3”. High-Resolution Proxies of Paleoclimate Workshop. May 2015. Madison, USA. (*POSTER*)
- ◇ **Zhu, J.**, Z. Liu, J. Zhang, and W. Liu. “AMOC response to global warming: dependence on the background climate and response timescale”. Annual CESM Workshop. Jun. 2014. Breckenridge, USA. (*POSTER*)
- ◇ **Zhu, J.**, Z. Liu, X. Zhang, I. Eisenman, and W. Liu. “Transient weakening of the AMOC to a receding glacial ice sheet in CCSM3 and its physical mechanisms”. Annual CESM Workshop. Jun. 2014. Breckenridge, USA. (*ORAL*)

## HONORS/AWARDS

- ◇ Student Travel Grant, 2016 AGU Fall Meeting Dec. 2016
- ◇ Graduate Student Travel Award, AOS, UW-Madison Oct. 2016
- ◇ International Travel Grant, CLIVAR Open Science Conference Sep. 2016
- ◇ Honorable Mention, AOSS Community Poster Reception, UW-Madison Apr. 2015
- ◇ Reid Bryson Graduate Scholarship, CCR, UW-Madison Mar. 2015
- ◇ Merit student, Peking University Dec. 2009
- ◇ Outstanding Freshman Scholarship, Peking University Sep. 2004

## TEACHING EXPERIENCE

- ◇ Certificate in *Postdoctoral Short Course on College Teaching in Science and Engineering*, University of Michigan Jan. 2019 – Apr. 2019
- ◇ Teaching Assistant of *Introduction of Atmospheric Science*, School of Physics, Peking University Sep. 2009 – Jan. 2010
- ◇ Teaching Assistant of *Descriptive Physical Oceanography*, School of Physics, Peking University Sep. 2008 – Jan. 2009

## PROFESSIONAL SERVICES

- ◇ **Peer Review for:** Nature Climate Change, Nature Geoscience, Science Advances, Nature Communications, Scientific Data, Geophysical Research Letters, Journal of Advances in Modeling Earth Systems, Journal of Geophysical Research–Oceans, Journal of Geophysical Research–Atmospheres, Journal of Climate, Climate Dynamics, Earth System Dynamics, Quaternary Science Reviews, Climate of the Past, Paleoceanography and Paleoclimatology, Atmosphere, Climate, Water, Sustainability
- ◇ **Proposal Review for:** National Science Foundation
- ◇ **Convener of:** 2018 Goldschmidt Conference Session 08a: Understanding Past and Present Climate with Water Isotopes

## PROFESSIONAL AFFILIATIONS

American Geophysical Union

updated January, 2021