

**Zhengyu Liu**

## Curriculum Vitae

Max Thomas Professor of Climate Dynamics  
 Atmospheric Science Program, Department of Geography  
 The Ohio State University, 154 N. Oval Mall, Columbus, OH 43210  
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**Education**

Ph.D., Physical Oceanography, MIT (Advisor: J. Pedlosky)	1991
M.S., Dynamic Meteorology, Chinese Academy of Science	1985
B.S., Applied Mathematics, Nanjing Institute of Meteorology, China	1982

**Professional Appointments**

2017-	Professor, Byrd Polar and Climate Research Center, The Ohio State University
2017-	Max Thomas Professor of Climate Dynamics, The Ohio State University
2002-2017	Professor, University of Wisconsin-Madison
2002-2011	Director, Center for Climatic Research, UW-Madison
1999-2001	Associate Director, Center for Climatic Research, UW-Madison
1998-2001	Associate Professor, University of Wisconsin-Madison
1993-1998	Assistant Professor, University of Wisconsin-Madison
1991-1993	Postdoctoral Fellow, Princeton University
1985-1987	Lecturer of Meteorology, Graduate School, Chinese Academy of Sciences

**Research Interests**

Ocean-atmosphere-land interactions and climate dynamics  
 Dynamics of oceanic circulation  
 Paleoclimate modeling  
 Earth system modeling

**Honors**

Milutin Milanković Medal for Climate Change, the European Geosciences Union, 2025  
 Bert Bolin Award/Lecture for Global Environmental Change, American Geophysical Union, 2022  
 Fellow, American Association for the Advancement of Science, 2020  
 Fellow, American Meteorological Society, 2012  
 Fellow, American Geophysical Union, 2010  
 Vilas Associate Award-UW-Madison, 2000-2003  
 Young Investigator Award /Office of Naval Research, 1995  
 NOAA Postdoctoral Fellowship on Climate Change, 1991

**Other Scholarly Activities**

Panel Member/Moderator, National Academies Paleoclimate Workshop, 2021  
 Panel Member, Growing Convergence Research/NSF, 2021  
 Panel Member, Cyberinfrastructure for Sustained Scientific Innovation, 2020  
 Panel Member, Modeling, Analysis and Prediction/NASA, 2017, 2018, 2020  
 Advisory Committee, Chinese Quaternary Science Society, 2016-  
 Associate Editor, Transaction of Atmospheric Sciences, 2015-  
 Associate Editor, Earth Environmental Sciences, 2014-  
 Associate Editor, Journal of Meteorological Research, 2014-  
 Advisory Committee, Chinese Climate Modeling Consortium, 2012-2018

Chinese Ministry of Education, 1000-talent scholar, Peking University, 2011  
 Advisory Committee, Earth Environmental Institute, Chinese Academy of Sciences, 2010-  
 Visiting scientist, GFDL/NOAA, 2009  
 Senior visiting scientist, MPI/Hamburg/Germany, 2008-2009  
 Faculty fellowship award, NCAR, 1995,1996, 2002, 2008  
 Member, Grand Challenge Task force, DOE, 2008  
 Member, Post-ESH working group, 2007  
 Member, NSF paleo-proxy working group, 2005  
 Co-chair, CCSM paleoclimate working group, 2005-2008  
 Member, U.S. CLIVAR-Pacific steering committee, 2004  
 Member, Tropical past climate working group, 2003  
 Senior Visiting Professor Award, The University of Tokyo, Japan, 2002  
 Chinese Ministry of Education, Yangtze scholar, Ocean University of China, 2001  
 Member, Marine Earth System History steering committee, 2001  
 Member, Shallow STC and Climate working group, 2000  
 Honorary Professor, Institute of Environmental Sciences, Chinese Academy of Sciences, 00-  
 Excellent Overseas Chinese Scientist Award, Chinese NSF, 2000  
 Vilas Associate Professor, UW-Madison, 1999  
 Member, U.S. PAGE/CLIVAR working group, 1999  
 Member, Graduate School Research Committee, UW-Madison, 1999-2002  
 Member, Steering Committee, Asian Partnership Program/UW-Madison, 1999-2004  
 Visiting Scientist, IPRC, University of Hawaii, 1999  
 Member, Advisory Panel of NCAR Supercomputing, 1998-00

### **Student Advising**

#### Ph.D students

Boyin Huang, E. Bayler, S. Shin, D. Lee, Yafang Zhong, Wei Liu, Yun Liu, Feng He, Guangshen  
 Chen, Xiaojie Zhu, Na Wen, Jiayu Zhang, Fuyao Wang, Jiang Zhu, Lianhua Zhu, Feiyu Lu, Sifan  
 Gu, Shan Li, Zhenyao Lu, Chengfei He, Jian Guan, Jing Han, Yishuai Jin, Chenyu Zhu, Yuchu  
 Zhao, Sheng Wu, Xiong Deng, Jingzhe Sun, Yu Gao, Tianying Liu, Karen Russ, Yuntao Bao,  
 Lingwei Li, Peng Gu, Jinbo Du, Kefan Chen, Andrew George, Abhijeet Mishra, Qiyao Hou, Megan  
 King, Yanmin Qin, Danyao Wu

#### M.S. students

K. Sirtangnan, Liping Zhang, S. Ashutosh, W. Lewis, A. Lennan, Lihua Wang, T. Casal, E.  
 Hokonson, E. Ong, J-P, Agenti, Xinrong Wu, Xuefeng, Zhang, M. Wehrenberg, Kuniaki Inoue,  
 Yan Yu, Yun Hang, Haran Liu, Jinxuan Zhu, Lingwei Li, Wilton Aguiar

#### Postdoc advisees

S. Borisov, Y. Golubev, Lixin Wu, S. Vavrus, Weimin Xu, Dongxiao Wang, T. Inui, Haijun Yang,  
 M. Stephens, Hui Wang, Qiong Zhang, Xiaodong Liu, Li Li, M. Notaro, Jun Cheng, S. Kalpan, Yu  
 Liu, R. Booth, Yi Wang, Guangshen Chen, Shu Wu, Xinyao Ron, Libin Yan, Zhifu Wang, Shuang  
 Yang, Jian Guan, Yishuai Jin, Chenyu Zhu, Qin Wen, Zhaowei Jing, Yuntao Bao, Tianying Liu

### **Citation Information**

Source: Web of Science (as of April 2024)

Total publications: 425

H-index: 79

Total citations: 24,056 (22,393 without self-citation),

Total citing articles: 15,847 (15,493 without self-citation)

Source: Google Scholar Citation (as of Dec, 2024)

Citations: 27607 (All), 13574 (Since 2019)

hi-index: 83 (All), 58 (Since 2019)

i10-index: 314 (All), 233 (Since 2019)

### **Courses Taught**

#### Univ. Wisconsin-Madison

AOS171: Global Climate Change

AOS528: Past Climate Changes

AOS611: Geophysical Fluid Dynamics II: Large-Scale Dynamics

AOS660: Introduction to Physical Oceanography.

AOS761: Dynamics of General Oceanic Circulation.

AOS760: Ocean-Atmosphere Interaction and Global Climate Variability

AOS801: Advanced Topics in Ocean Dynamics

AOS801: Data Assimilation and Weather/Climate Prediction

AOS900: Seminar in Classical Problems in Meteorology

AOS901: Seminar in Advanced Dynamics

AOS910: Seminar in Global Climate

AOS960: Seminar in Oceanography

#### The Ohio State University

ASP5952: Dynamic Meteorology I

ASP5951: Dynamic Meteorology II

GEOG8902: Combining Data and Model: Data Assimilation

GEOG8901: Global Climate Change

GEOG8901: Ocean and Climate

**Publications** (first author as my student/postdoc with \*)**2024**

- Liu, Z.**, S. Gu, S. Zou, S. Zhang, Y. Yu and C. He, 2024: Wind steered Eastern Pathway of Atlantic Meridional Overturning Circulation. *Nat. Geos.*, 10.1038/s41561-024-01407-3.
- Zhu, C\*., S. Sanchez, **Z. Liu**, P. Clark, C. He, L. Wan, J. Lu, C. Zhu, L. Li, S. Zhang and L. Cheng: 2024: Enhanced ocean heat storage efficiency during the last deglaciation. *Sci. Adv.* **10**, eadp5156.
- Gu S\*., **Z. Liu**, H. C. Ng, J. Lynch-Stieglitz, J. F. McManus, M. Spall, A. Jahn, C. He, L. Li, M. Yan, L. Wu and S. Zou. 2024: Intensified AMOC Eastern Interior Pathway of Glacial North Atlantic Intermediate Water. *Proc. Nat. Acad. Sci.*, **121**, e2405051121, [doi:10.1073/pnas.2405051121](https://doi.org/10.1073/pnas.2405051121)
- Gu, P\* and **Z. Liu**, 2024: Inferring Climate Forcing from the Sea Surface Temperature-Surface Heat Flux relation for SST-coupled oscillatory variability. *Geophys. Res. Lett.* **51**, doi:10.1029/2024GL108552
- Gu, P\*, **Z. Liu**, T. Delworth, 2024: Strong oceanic forcing on decadal surface temperature variability over global ocean. *Geophys. Res. Lett.* **51**, e2023GL107401, doi:10.1029/2023GL107401
- Gu, P\* and **Z. Liu**, 2024: Inferring Climate Forcing from the Sea Surface Temperature-Surface Heat Flux relation for SST-coupled oscillatory variability. *Geophys. Res. Lett.*, doi:10.1029/2024GL108552
- Chen, H., Y. Jin, **Z. Liu**, D. Sun, X. Chen, M. J. McPhaden, A. Capotondi and X. Lin, 2024 Central-Pacific El Niño-Southern Oscillation less predictable under greenhouse warming. *Nature Comm.*, 10.1038/s41467-024-48804-1
- Wen, Q\*., **Z. Liu**, J. Liu, S. Clemens, Z. Jiang, Y. Wang, G. Lv, M. Yan, L. Ning, L. Yuan and Y. Gao, 2023: Contrasting Responses of Arabian Sea Upwelling and Indian Summer Monsoon Rainfall to Orbital Forcing. *Comm. Earth & Env.*, 10.1038/s43247-024-01572-8
- Wen, Q\*, **Z. Liu**, Z. Jing, S. Clemens, Y. Wang, M. Yan, L. Ning and J. Liu: 2024: Grand Dipole Response of Asian Summer Monsoon to Orbital Forcing. *npj Clim. & Atmos. Sci.*, 10.1038/s41612-024-00749-4
- Sun, H., L. Lei, **Z. Liu**, L. Ning, Z-M Tan, 2024: A Hybrid Gain Analog Offline EnKF for Paleoclimate Data Assimilation. *J. Adv. Modeling Earth Systems*, e2022MS003414
- Liu, T\*., **Z. Liu**, Y. Zhao and S. Zhang, 2024: Strong extratropical impact on observed ENSO events assessed in GFDL CM2.1 Model. *J. Clim.* **37**, 943-962.
- Li, L\*., **Z. Liu**, L. Wang and J. Lu, 2023: Mechanisms of Global Ocean Ventilation Age Change during the Last Deglaciation. *Climate of Past*, <https://doi.org/10.5194/cp-20-1161-2024>
- Ning L., W. Hu, **Z. Liu**, J. Liu, F. Wu, M. Yan, L. Jiang, L. Lei, F. Xing, H. Sun, K. Chen, Y. Qin, W. Sun, Q. Wen and B. Li, 2024: Reconstructing tropical monthly sea surface temperature variability by assimilating coral proxy datasets. *npj Clim. & Atmos. Sci.* **7**, 261, <https://doi.org/10.1038/s41612-024-00816-w>
- Zheng, Y., **Z. Liu**, W. Zheng and H. Liu, 2024: The Northern Hemisphere Mid-Latitudes as a Key Region for Reconciling the Holocene Temperature Conundrum. *Quat. Sci. Rev.* **347**, [10.1016/j.quascirev.2024.109090](https://doi.org/10.1016/j.quascirev.2024.109090)

**2023**

- Liu, Z.**, Y. Bao, L. G. Thompson, E. Mosley-Thompson, T. Clay, G. J. Zhang, M. Yan, M. Lofverstrom, I. Montanez and J. Oster, 2023: Tropical mountain ice core  $\delta^{18}\text{O}$ : A Goldilocks indicator of global temperature change. *Science Advance* **9**, eadi6725, 10.1126/sciadv.adi6725

- Liu, Z.**, P. Gu and T. Delworth, 2023: Strong red noise ocean forcing on Atlantic Multidecadal Variability assessed from surface heat flux: theory and application. *J. Clim.* **36**, 53-80, 10.1175/JCLI-D-22-0063.1.
- Liu, Z.**, C. He, M. Yan, C. Buizert, B. L. Otto-Bliesner, F. Lu and C. Zeng, 2023: Reconstructing past Antarctic temperature using present seasonal  $\delta^{18}O$ -inversion layer temperature: Unified Slope Equations and application. *J. Clim.*, **36**, 2933-2957, 10.1175/JCLI-D-22-0012.1
- Liu, Z.**, 2023: Instability of Atlantic Meridional Overturning Circulation: observations, modeling and relevance to present and future. *Atmosphere*, **14**, 1011, 10.3390/atmos14061011
- Liu, Z.**, 2023: Evolution of Atlantic Meridional Overturning Circulation since the Last Glaciation: Model simulations and relevance to present and future. *Philosophical Transactions A*, **381**, 22022190, 10.1098/rsta.2022.0190.
- Zhu, C. \*, **Z. Liu**, S. Zhang and L. Wu: 2023: Likely accelerated anthropogenic AMOC weakening emerged in optimal salinity fingerprint. *Na. Comm.*, 10.1038/s41467-023-36288-4
- Zhan, Z., H. Pang, S. Wu, **Z. Liu**, W. Zhang, T. Xu, H. Liu, H. Cheng and S. Hou, 2023: Determining key upstream rainout and convection zones affecting  $\delta^{18}O$  in water vapor and precipitation based on 10-year continuous observations in the East Asian Monsoon region. *Earth & Planetary Sci Lett.*, 10.1016/j.epsl.2022.117912.
- Du, X., J. M. Russell, **Z. Liu**, B. L. Otto-Bliesner, Y. Gao, C. Zhu, D. W. Oppo, M. Mohtadi, V. V. Galy, Y. Yan, Y. Rosenthal, N. Dubois, E. Schefuß and J. Arbuszewski, 2023: North Atlantic cooling triggered a zonal mode over the Indian Ocean during Heinrich Stadial 1. *Sci. Adv.*, 10.1126/sciadv.add4909
- Bao, Y.T.\*, **Z. Liu** and C. He, 2023: Dipole response of millennial variability in tropical South American precipitation and  $\delta^{18}O$  during the last deglaciation. Part I: rainfall response. *J. Clim.*, 10.1175/JCLI-D-22-0172.1
- Bao, Y.T.\*, **Z. Liu** and C. He, 2023: Dipole response of millennial variability in tropical South American precipitation and  $\delta^{18}O$  during the last deglaciation. Part II:  $\delta^{18}O_p$  response. *J. Clim.*, 10.1175/JCLI-D-22-0289.1.
- Yan, M., **Z. Liu**, J. Han, C. Zeng, L. Ning and J. Liu, 2023: Relationship of East Asian summer and winter monsoon at obliquity timescale. *J. Clim.*, **36**, 3993-4003, 10.1175/JCLI-D-22-0587.1
- Liu, T.\*, **Z. Liu**, Y. Zhao and S. Zhang, 2023: Subtropical impact on tropical double-ITCZ bias in the GFDL CM2.1 model. *J. Clim.*, **36**, 3833-3847
- Lei Y., X. Yue, **Z. Liu** and C. Tian, 2023: Dipole response of early-summer rainfall in eastern China to 1.5°C and 2.0°C global warming. *Int. J. of Clim.*, 10.1002/joc.7879.
- Lu L., S. Zhang, Y. Jiang, X. Yu, M. Li, Y. Chen, P. Chang, G. Danabasoglu, **Z. Liu**, C. Zhu, X. Lin and L. Wu, 2023: An Improved Coupled Data Assimilation System with a CGCM Using Multi-Timescale High-Efficiency EnOI-Like Filtering. *J. Clim.*, 10.1175/JCLI-D-22-0558.1
- Lan, J., J. Cheng, S. Chawchai, X. Liu, et al. **Z. Liu**, 2023: Fundamental shift from summer to winter of Holocene rainfall regime in the tropics. *Geophys. Res. Lett.*, 10.1029/2023GL102909
- Xue J., L. Ning, **Z. Liu**, Y. Qin, K. Chen, M. Yan, J. Liu, L. Wang, C. Li, 2023: The combined influences of Solar Radiation and PDO on Precipitation over Eastern China during the last millennium, *Clim. Dyn.* **60**, 1137-1150
- Wang L., L. Ning, K. Chen, M. Yan, J. Liu, **Z. Liu**, Y. Qin, J. Xue, C. Li, 2023: Influence and mechanism of solar radiation intensity on the interdecadal variability of strong Meiyu events during historical periods. *Science China Earth Sciences* **66**, 408-412
- Qin Y. \*, L. Ning, L. Li, J. Liu, M. Yan, **Z. Liu**, G. Lv, L. Yuan, K. Chen, W. Sun, Q. Wen, L. Wang, C. Li, Future risk of decadal megadrought events over eastern China based on IPO-constrained precipitation. *Clim. Dyn.*, [10.1007/s00382-023-07018-9](https://doi.org/10.1007/s00382-023-07018-9)

Wen, Q. \*, C. Zhu, L. Ning, D. Chen, M. Liu, J. Liu and Z. Liu, 2023: Separating Direct Heat Flux Forcing and Freshwater Feedback on AMOC Change Under Global Warming. *Geophys. Res. Lett.*, *50*, e2023GL105478, 10.1029/2023GL105478

## 2022

Bova, S., Y. Rosenthal, **Z. Liu**, M. Yan, A. J. Broccoli, S. P. Godad, C. Zeng and W. Zheng 2022: Response to Laepple et al. – SAT method precludes the reconstruction of interglacial thermal maxima. *Nature*, **607**, 10.1038/s41586-022-04832-9

Jin, Y., **Z. Liu** and W. Duan, 2022: The different relationships between ENSO spring Persistence Barrier and Predictability Barrier. *J. Clim.*, **35**, 6207-6218

Cheng, J, H. Wu and **Z. Liu**, 2022: Reply to: Relative tree cover does not indicate a lagged Holocene forest response to monsoon rainfall. *Nat. Comm.*, <https://doi.org/10.1038/s41467-022-33959-6>

Chen K. \*, L. Ning, **Z. Liu**, J. Liu, M. Yan, W. Sun, C. Jin, and Z. Shi, 2022: Nonlinear responses of droughts over China to volcanic eruptions at different drought phases. *Geophys. Res. Lett.*. 10.1029/2021GL096454

Chen, K. \*, L. Ning, **Z. Liu**, J. Liu, M. Yan and W. Sun, 2022: Modulating and Resetting Impacts on AMO by Volcanic Eruptions. *J. Geophys. Res.-Atmos.*, <https://doi.org/10.1029/2021JD036246>

Qin, Y., L. Ning, L. Li, **Z. Liu**, J. Liu, M. Yan, K. Chen, J. Xue, L. Wang and C. Li, 2022: Assessing the modern multi-decadal scale aridification over the Northern China from a historical perspective. *J. Geophys. Res.-Atmos.*, 10.1029/2021JD035622

Zhang, M., Y. Liu, J. Zhu, Z. Wang and **Z. Liu**, 2022: Impact of Dust on climate and AMOC during the Last Glacial Maximum Simulated by CESM1.2. *Geophys. Res. Lett.*, e2021GL096672

Buckingham, F., S. A. Carolin, J.W. Partin, J.F. Adkins, K.M. Cobb, C.C. Day, Q. Ding, C. He, **Z. Liu**, B. Otto-Bliesner, W.H.G. Roberts, S. Lejau and J. Malang, 2022: Termination 1 Millennial-scale Rainfall Events over the Sunda Shelf. *Geophys. Res. Lett.*, [doi.org/10.1029/2021GL096937](https://doi.org/10.1029/2021GL096937)

Wen, Q. \*, **Liu, Z.**, Zhu, J., Yan, M., He, C., Han, J., et al., 2022: Local insolation drives Afro-Asian monsoon at orbital scale in Holocene. *Geophysical Research Letters*, *49*, e2021GL097661. doi.org/10.1029/2021GL097661

Wen, Q. \*, H. Yang and **Z. Liu**, 2022: Possible Thermal Effect of Tibetan Plateau on the Atlantic Meridional Overturning Circulation. *Geophys. Res. Lett.*, *49*, e2021GL095771. [doi.org/10.1029/2021GL095771](https://doi.org/10.1029/2021GL095771)

Wen Q. \*, M. Yan, **Z. Liu** and J. Liu, 2022: Responses of East Asian winter monsoon-Australian summer monsoon to Local and Remote orbital forcing during Holocene. *Geophys. Res. Lett.*, [doi.org/ 10.1029/2022GL098865](https://doi.org/10.1029/2022GL098865)

Sun H., L. Lei, **Z. Liu**, L. Ning and Z-M Tan, 2022: An Analog Offline EnKF for Paleoclimate Data Assimilation. *J. Adv. Modeling Earth Systems*, 10.1029/2021MS002674

Zhang, W., H. Wu, Q. Li, **Z. Liu** and J. Cheng, 2022: Large training dataset is crucial for analogue-based precipitation reconstruction during the early Holocene. *Science Bulletin*, **67**, 1118-1121

Zanowski, H., A. Jahn, S. Gu, **Z. Liu** and T. Marchitto, 2022: Decomposition of deglacial Pacific radiocarbon age controls using an isotope-enabled ocean mode. *Paleoceanography and Paleoclimatology*, 10.1029/2021PA004363

Wu, S. \*, **Z., Liu**, J. Du and Y. Liu, 2022: Change of Global Ocean Temperature and Decadal Variability under 1.5 °C Warming in FOAM. *J. Mar. Sci. Eng.*, **10**, 1231. 10.3390/jmse10091231



- Zhang, H., **Z. Liu**, E. Constantinescu and R. Jacob, 2022: Stability Analysis of Coupled Advection-Diffusion Models with Bulk Interface Condition. *J. Scientific Computing*, 10.1007/s10915-022-01983-9.
- Liu, T.\* , **Z. Liu**, Y. Zhao and S. Zhang, 2022: Investigating extratropical influence on the equatorial Atlantic zonal bias with regional data assimilation. *J. Clim.*, **35**, 6,101-6,117
- Pan, M., X. Zhi, **Z. Liu**, S. Zhu and Y. Lyu, 2022: Statistical calibrations to improve the 2–5-year prediction skill for SST over the North Atlantic. *Meteor. & Atmos. Phys.*, 10.1007/s00703-022-00888-4
- Zhu, C.\* , J. Zhang, **Z. Liu**, B. L. Otto-Bliesner, C. He, E. C. Brady, R. Tomas, Q. Wen, Q. Li and C. Zhu, 2022: Antarctic warming during Heinrich Stadial 1 in a transient isotope-enabled deglacial simulation. *J. Clim.* **35**, 3753-3765
- You Q, Z. Jiang, W. Guo, X. Yue, Y. Liu, J. Cao, W. Li, F. Wu, Z. Cai, H. Zhu, T. Li, **Z. Liu**, J. He, D. Chen, N. Pepin, P. Zhai 2023: Climate changes in East Asia at global warming of 1.5°C and 2°C. *npj Climate and Atmospheric Science* **5**, 80, [10.1038/s41612-022-00303-0](https://doi.org/10.1038/s41612-022-00303-0)
- Cheng H., Y. Xu, X. Dong, J. Zhao, H. Li, J. Baker, A. Sinha, C. Spötl, H. Zhang, W. Du, B. Zong, X. Jia, G. Kathayat, D. Liu, Y. Cai, X. Wang, N. M. Strikis, F. W. Cruz, A. S. Auler, A. K. Gupta, R. K. Singh, S. Jaglan, S. Dutt, **Z. Liu** , R. L. Edwards, 2022: Onset and termination of Heinrich Stadial 4 and the underlying climate dynamics. *Comm. Earth & Environment*, 10.1030/s43247-021-003046

## 2021

- He C.\* , **Z. Liu**, B. L. Otto-Bliesner, E. C. Brady, C. Zhu, R. Thomas, P. U. Clark, J. Zhu, A. Jahn, S. Gu, J. Zhang, J. Nusbaumer, D. Noone, H. Cheng, Y. Wang, M. Yan and Y. Bao, 2021: The hydroclimate footprint accompanying pan-Asian monsoon water isotope evolution during the last deglaciation. *Sci. Adv.* 10.1126/sciadv.abe2611
- Bova S., Y. Rosenthal, **Z. Liu**, S. Godal and M. Yan, 2021: Seasonal origin for the Holocene and last interglacial thermal maximum. *Nature* **589**, 548-553, 10.1038/s41586-020-03155-x
- Bova, S. Y. Rosenthal, **Z. Liu**, M. Yan, A. J. Broccoli, S. P. Godad and C. Zeng, 2021: Reply to MA: Concerns on roles of polar sea-ice variability. *Nature* **600**, 10.1038/s41586-021-03931-3
- He, C.\* , **Z. Liu**, B. L. Otto-Bliesner, E.C. Brady, C. Zhu, R. Tomas, C. Buizert and J. Severinghaus, 2021: Abrupt Heinrich Stadial 1 Cooling Missing in Greenland Oxygen Isotopes. *Sci. Adv.*, 10.1126/sciadv.abh1007
- He C.\* , **Z. Liu**, B. L. Otto-Bliesner, E.C. Brady, C. Zhu, R. Tomas, S. Gu, J. Han and Y. Jin, 2021: South China hydroclimate variability heavily contributed by autumn rainfall during the last deglaciation. *Nat Commun.* **12**, 5875. 10.1038/s41467-021-26106-0.
- Buizert C., T.J. Fudge, W. H. G. Roberts, E. J. Steig, S. Sherriff-Tadano, C. Ritz, E. Lefebvre, J. Edwards, K. Kawamura, I. Oyabu, H. Motoyama, E. C. Kahle, T. R. Jones, A. Abe-Ouchi, T. Obase, C. Martin, H. Corr, J. P. Severinghaus, R. Beaudette, J. A. Epifanio, E. J. Brook, K. Martin, J. Chappellaz, S. Aoki, T. Nakazawa, T. A. Sowers, R. Alley, J. Ahn, M. Sigl, M. Severi, N. W. Dunbar, A. Svensson, J. Fegyveresi, C. He, **Z. Liu**, J. Zhu, B. Otto-Bliesner, V. Y. Lipenkov, T. Kameda, M. Kageyama and J. Schwander: 2021: Antarctic-wide surface temperature and elevation during the Last Glacial Maximum. *Science* **372**, 1097-1101. 10.1126/science.abd2897
- Jin Y.\* and **Z. Liu**, 2021: On the formation mechanism of seasonal persistence barrier. *J. Clim.* **34**, 479-494.
- Jin Y.\* and **Z. Liu**, 2021: A theory of Spring Persistence Barrier on ENSO. Part II: Persistence barriers in SST and ocean heat content. *J. Clim.* **34**, 5555–5564, 10.1175/JCLI-D-20-0820.1
- Jin, Y.\* , **Z. Liu**, M. McPhaden, 2021: A Theory of Spring Persistence Barrier on ENSO. Part III: The role of Tropical Pacific Ocean Heat Content. *J. Clim.* **34**, 8567-8577

- Wen, Q.\*, C. Zhu, Z. Han, H. Yang and **Z. Liu**, 2021: Can the topography of Tibetan Plateau affect the Antarctic Bottom Water. *Geophys. Res. Lett.*, 10.1029/2021GL092448.
- Wen Q.\*, Z. Han, H. Yang, J. Cheng, **Z. Liu** and J. Liu, 2021: Influence of Tibetan Plateau on the North American Summer Monsoon Precipitation. *Clim. Dyn.*, 10.1007/s00382-021-05857-y
- Zhang H., X. Zhang, Y. Cai, A. Sinha, C. Spötl, J. Baker, G. Kathayat, Y. Tian, J. Lu, Z. Wang, J. Zhao, X. Jia, W. Du, Y. Ning, Z. An, R. L. Edwards, **Z. Liu** and H. Cheng, 2021: A data-model comparison pinpoints Holocene spatiotemporal pattern of East Asian summer monsoon. *Quat. Sci. Rev.* **261**, 10.1016/j.quascirev.2021.106911
- Wang, P.\*, Y. Jin and **Z. Liu**, 2021: Diurnal predictability barrier for weather forecast. *Mon. Wea. Rev.* **149**, 1715-1723
- Liu Z.**, B. L. Otto-Bliesner, P. U. Clark, J. Lynch-Stieglitz, J. and M. Russell, 2021: SynTRACE-21: Synthesis of Transient Climate Evolution of the last 21,000 years. *PAGES newsletter*, 10.22498/pages.29.1.13.
- Gu, S.\*, **Z. Liu**, D. W. Oppo, J. Lynch-Stieglitz, A. Jahn, J. Zhang, K. Lindsay and L. Wu: 2021: Remineralization dominating the  $\delta^{13}\text{C}$  decrease in the mid-depth Atlantic during the last deglaciation. *Earth & Planetary Sci. Lett.* **571**, 10.1016/j.epsl.2021.117106
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