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Education

2017 – 2021 **Ph.D., The Ohio State University**, Atmospheric Sciences
Thesis title: *Deciphering the deglacial evolution of water isotope and climate across the Northern Hemisphere*

2015 – 2017 **Ph.D. student, University of Wisconsin-Madison**, Atmospheric Sciences (followed advisor to OSU)

2013 – 2015 **M.S., Nanjing University of Information Science and Technology**, Meteorology

2009 – 2013 **B.S., Nanjing University of Information Science and Technology**, Meteorology

Professional Experience

2025 – · · · · **Asst. Prof.** Department of Marine and Environmental Sciences, Northeastern University.

2024 – 2024 **PostDoc.** Department of Physical Oceanography, Woods Hole Oceanographic Institution.

2021 – 2024 **PostDoc.** Rosenstiel School of Marine and Atmospheric Science, University of Miami.

Teaching Experience

2023, 2024 Introduction to the Physics of Climate, ATM 307, University of Miami, Guest Lecturer

2022 Climate Change, ATM 653, University of Miami, Guest Lecturer

Introduction to the Physics of Climate, ATM 307, University of Miami, Guest Lecturer

2019 Dynamic Meteorology II, ASP 5952, The Ohio State University, Guest Lecturer

2017 Dynamic Meteorology I, ASP 5951, The Ohio State University, Guest Lecturer

Academic Mentorship

2022 – 2024 Yitao Liu (graduate@NUIST, co-mentor), Dipole hydroclimate change in Northern Hemisphere midlatitudes during the Holocene.

2023 – 2024 Charlie Ogle (undergraduate@RSMAS, co-mentor), Python programming and Seasonality of AMV-related impacts

2025 – · · · · Feiyu Huang (graduate@Northeastern, mentor), Responses of Atlantic Multidecadal Variability to climate change

Jiaguo Tan (graduate@Shanghai Jiaotong Univ, co-mentor), East Asian monsoon variability across timescales during the last deglaciation

Project Mentor Tyler Fenske (Master@RSMAS), The relationship between AMV and AMOC in CMIP6 models; Ensemble simulation of ocean model hierarchy

Jaquelyn E Panaro (undergraduate@RSMAS), The response of westerly jet in the Red Sea region to the Volcanic eruption during the last millennium

Awards and Achievements

2023 **Woods Hole Oceanographic Institution Postdoctoral Fellowship**, WHOI

Lamont-Doherty Postdoctoral Fellowship, Columbia University (declined)

2022 **Early Career Scientist Best Poster Award**, Clivar Climate Dynamics Panel Annual Workshop.

2021 **E. Willard & Ruby S. Miller Fellowship**, The Ohio State University.

2019 **E. Willard & Ruby S. Miller Fellowship**, The Ohio State University.

2015 **National Scholarship for Graduate students**, Nanjing University of Information Science and Technology.

2014 **Best Student Poster Award**, 31st Annual Meeting of the China Meteorological Society

others **Travel support for ForceSMIP Workshop**, NCAR, CO, 2023.

Travel fellowship for Model Hierarchies Workshop, Standford, CA, 2022.

Services and Activities

Committee Member

- Fresh Eyes on CMIP: Infrastructure and Technical Subgroup for CMIP7

(Co)convener & Chair

- AGU-2022: Advancing Speleothem Paleoclimate Research: Geochemical Toolkits, Proxy-Climate Quantification and Isotope-Enabled Climate Models
- AGU-2023: Decadal to Centennial Climate Variability in the Atlantic: Mechanisms, Impacts, and Prediction (Primary Convener)
- AGU-2024: Atlantic Climate Variability and Change: Mechanisms, Predictability, and Impacts

Guest Editor

- Proceedings of the National Academy of Sciences

Reviewer

- NSF proposal, Geophysical Research Letters, Journal of Climate, Climate Dynamics, JGR: Atmospheres, Paleoceanography and Paleoclimatology, Quaternary Science Reviews, Quaternary Research, Critical Reviews in Environmental Science and Technology, Nature Climate Change, PNAS Nexus

Judge

- 2025 Northeastern MES-Graduate Research Symposium
- 2023 RSMAS-Research Poster Contest
- 2022 AGU-Outstanding Student Presentation Awards Program

Mentor

- 2025 WHOI academic interview workshop
- 2023-2024 AGU-mentoring365 Program
- 2023 Climatematch Academy: Computational Tools for Climate Science

Open Source Software

- Founder and Developer for xMCA, XCESM

Media Releases

2023 Human emissions drive changes in North Atlantic Ocean temperatures, West African rainfall, hurricanes.

2022 Earth's Warming Hole Not Indication of Abrupt Climate Change Event, Study Finds.

2019 Climate change reshaping how heat moves around globe—Shifts in ocean, atmosphere heat transfer important to watch, researchers say.

Publications

Under Review

[4] Clement, A., Cane, M., Klavans, J., **He**, **C.**, & Murphy, L. (2025). A signal-to-noise problem in model simulation of decadal climate modes. *Journal of Climate*.

[3] **He**, **C.**, Clement, A., Cane, M., Gonzalez, A., Kwon, Y.-O., Shi, J.-R., … Murphy, L. (2025). Climate models exaggerate the impact of greenhouse gases on recent interhemispheric temperature contrast and tropical climate. *Nature Communications*.

[2] **He**, **C.**, Patrizio, C., Kwon, Y.-O., & Bellomo, K. (2025). North Atlantic sea surface temperature variability: Impacts, mechanisms, and challenges. *WIREs Climate Change*.

[1] Liu, Y., **He**, **C.**, Cheng, J., & Sun, Y. (2025). Amoc weakening controls d18o but not rainfall in north china during deglacial abrupt events. *Geophysical Research Letters*.

Published

[39] Gu, S., Liu, Z., Zhao, N., Chen, T., Yu, J., Zhang, J., … **He**, **C.** et al. (2025). Reduced antarctic bottom water overturning rate during the early last deglaciation inferred from radiocarbon records. *Nature Communications*, *16*(1), 7777.

[38] Hu, A., Richter, I., Okumura, Y., Burls, N., Keenlyside, N., Parfitt, R., … **He**, **C.** et al. (2025). Unraveling the complexity of global climate dynamics: Interactions among el niño–southern oscillation, atlantic meridional overturning circulation, and tropical basins across different timescales. *Ocean-Land-Atmosphere Research*, *4*.

[37] Jing, Z., Liu, Z., Zhang, S., Wen, Q., **He**, **C.**, Bao, Y., & Yu, W. (2025). Precipitation oxygen isotope variability across timescales in east asia records two sub-processes of summer monsoon system. *Communications Earth & Environment*, *6*(1), 513.

[36] McMonigal, K., Larson, S. M., Gervais, M., Klavans, J. M., **He**, **C.**, Cane, M. A., … Bellomo, K. (2025). Fingerprints of amoc decline are sensitive to external and mechanistic forcing. *Geophysical Research Letters*, *52*(12), e2025GL116307.

[35] Obase, T., Menviel, L., Abe-Ouchi, A., Vadsaria, T., Ivanovic, R., Snoll, B., … **He**, **C.** et al. (2025). Multi-model assessment of the deglacial climatic evolution at high southern latitudes. *Climate of the Past*, *21*(8), 1443–1463.

[34] Shan, K., Song, F., Lin, Y., Chu, W., **He**, **C.**, Chu, P.-S., … Yu, X. (2025). How does globally accumulated tropical cyclone energy vary in response to a changing climate? *Science Bulletin*, *70*(6), 943–950.

[33] Xue, S., Zhang, H., Griffiths, M. L., **He**, **C.**, Liu, Y., Huang, J., … Zhou, J. et al. (2025). A high-resolution multiproxy speleothem record of eastern china hydroclimate variation during last glacial maximum. *Quaternary Science Reviews*, *350*, 109152.

[32] Buizert, C., Sowers, T. A., Niezgoda, K., Blunier, T., Gkinis, V., Harlan, M., … **He**, **C.** et al. (2024). The greenland spatial fingerprint of dansgaard–oeschger events in observations and models. *Proceedings of the National Academy of Sciences*, *121*(44), e2402637121.

[31] Cadd, H., Williams, A. N., Saktura, W. M., Cohen, T. J., Mooney, S. D., **He**, **C.**, … Turney, C. S. (2024). Last glacial maximum cooling induced positive moisture balance and maintained stable human populations in australia. *Communications Earth & Environment*, *5*(1), 52.

[30] Gu, S., Liu, Z., Ng, H. C., Lynch-Stieglitz, J., McManus, J. F., Spall, M., … **He**, **C.** et al. (2024). Open ocean convection drives enhanced eastern pathway of the glacial atlantic meridional overturning circulation. *Proceedings of the National Academy of Sciences*, *121*(45), e2405051121.

[29] Liu, Z., Gu, S., Zou, S., Zhang, S., Yu, Y., & **He**, **C.** (2024). Wind-steered eastern pathway of the atlantic meridional overturning circulation. *Nature Geoscience*, *17*(4), 353–360.

[28] Parish, M., Russell, J., Konecky, B., Du, X., **He**, **C.**, Bijaksana, S., & Vogel, H. (2024). Changes in indo-pacific warm pool hydroclimate and vegetation during the last deglaciation. *Quaternary Science Reviews*, *336*, 108755.

[27] Shan, K., Song, F., Lin, Y., Chu, W., **He**, **C.**, Chu, P.-S., … Yu, X. (2024). How does global accumulated tropical cyclone energy vary in response to a changing climate? *Science Bulletin*.

[26] Snoll, B., Ivanovic, R., Gregoire, L., Sherriff-Tadano, S., Menviel, L., Obase, T., … **He**, **C.** et al. (2024). A multi-model assessment of the early last deglaciation (pmip4 ldv1): A meltwater perspective. *Climate of the Past*, *20*(4), 789–815.

[25] Zhu, C., Sanchez, S., Liu, Z., Clark, P. U., **He**, **C.**, Wan, L., … Zhang, S. et al. (2024). Enhanced ocean heat storage efficiency during the last deglaciation. *Science Advances*, *10*(38), eadp5156.

[24] Bao, Y., Liu, Z., & **He**, **C.** (2023a). Dipole response of millennial variability in tropical south american precipitation and δ 18 o p during the last deglaciation: Part i: Rainfall response. *Journal of Climate*, *36*(14), 4691–4707.

[23] Bao, Y., Liu, Z., & **He**, **C.** (2023b). Dipole response of millennial variability in tropical south american precipitation and δ18op during the last deglaciation. part ii: δ18op response. *Journal of Climate*, *36*(14), 4709–4721.

[22] **He**, **C.**, Clement, A. C., Kramer, S. M., Cane, M. A., Klavans, J. M., Fenske, T. M., & Murphy, L. N. (2023). Tropical atlantic multidecadal variability is dominated by external forcing. *Nature*, *622*(7983), 521–527.

[21] Liu, Z., **He**, **C.**, Yan, M., Buizert, C., Otto-Bliesner, B., Lu, F., & Zeng, C. (2023). Reconstruction of past antarctic temperature using present seasonal δ 18 o-inversion layer temperature: Unified slope equations and applications. *Journal of Climate*, 1–53.

[20] Buckingham, F., Carolin, S., Partin, J., Adkins, J., Cobb, K., Day, C., … **He**, **C.** et al. (2022). Termination 1 millennial-scale rainfall events over the sunda shelf. *Geophysical Research Letters*, e2021GL096937.

[19] **He**, **C.**, Clement, A. C., Cane, M. A., Murphy, L. N., Klavans, J. M., & Fenske, T. M. (2022). A north atlantic warming hole without ocean circulation. *Geophysical Research Letters*, e2022GL100420.

[18] Wen, Q., Liu, Z., Zhu, J., Yan, M., **He**, **C.**, Han, J., … Liang, Y. (2022). Local insolation drives afro-asian monsoon at orbital-scale in holocene. *Geophysical Research Letters*, *49*(6), e2021GL097661.

[17] Zhu, C., Zhang, J., Liu, Z., Otto-Bliesner, B. L., **He**, **C.**, Brady, E. C., … Zhu, C. et al. (2022). Antarctic warming during heinrich stadial 1 in a transient isotope-enabled deglacial simulation. *Journal of Climate*, *35*(22), 3753–3765.

[16] Buizert, C., Fudge, T., Roberts, W. H., Steig, E. J., Sherriff-Tadano, S., Ritz, C., … **He**, **C.** et al. (2021).

Antarctic surface temperature and elevation during the last glacial maximum. *Science*, *372*(6546), 1097–1101.

[15] Du, X., Russell, J. M., Liu, Z., Otto-Bliesner, B. L., Gao, Y., Zhu, C., … **He**, **C.** (2021). Deglacial trends in indo-pacific warm pool hydroclimate in an isotope-enabled earth system model and implications for isotope-based paleoclimate reconstructions. *Quaternary Science Reviews*, *270*, 107188.

[14] **He**, **C.**, Liu, Z., Otto-Bliesner, B. L., Brady, E. C., Zhu, C., Tomas, R., … Severinghaus, J. P. (2021). Abrupt heinrich stadial 1 cooling missing in greenland oxygen isotopes. *Science Advances*, *7*(25), eabh1007.

[13] **He**, **C.**, Liu, Z., Otto-Bliesner, B. L., Brady, E. C., Zhu, C., Tomas, R., … Jin, Y. (2021). Deglacial variability of south china hydroclimate heavily contributed by autumn rainfall. *Nature communications*, *12*(1), 1–9.

[12] **He**, **C.**, Liu, Z., Otto-Bliesner, B., Brady, E., Zhu, C., Tomas, R., … Gu, S. et al. (2021). Hydroclimate footprint of pan-asian monsoon water isotope during the last deglaciation. *Science Advances*, *7*(4), eabe2611.

[11] Jin, Y., Liu, Z., **He**, **C.**, & Zhao, Y. (2021). On the formation mechanism of the seasonal persistence barrier. *Journal of Climate*, *34*(2), 479–494.

[10] Li, L., Liu, Z., Lynch-Stieglitz, J., **He**, **C.**, Gu, S., Zhang, J., & Otto-Bliesner, B. (2021). Testing methods for reconstructing glacial antarctic circumpolar current transport in an isotope-enabled climate model. *Paleoceanography and Paleoclimatology*, *36*(10), e2020PA004183.

[9] Li, L., Liu, Z., Zhu, C., **He**, **C.**, & Otto-Bliesner, B. (2021). Shallowing glacial antarctic intermediate water by changes in sea ice and hydrological cycle. *Geophysical Research Letters*, *48*(16), e2021GL094317.

[8] Tabor, C., Lofverstrom, M., Oster, J., Wortham, B., de Wet, C., Montañez, I., … **He**, **C.** et al. (2021). A mechanistic understanding of oxygen isotopic changes in the western united states at the last glacial maximum. *Quaternary Science Reviews*, *274*, 107255.

[7] **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.

[6] **He**, **C.**, Liu, Z., & Hu, A. (2019). The transient response of atmospheric and oceanic heat transports to anthropogenic warming. *Nature Climate Change*, *9*(3), 222–226.

[5] Jin, Y., Liu, Z., Lu, Z., & **He**, **C.** (2019). Seasonal cycle of background in the tropical pacific as a cause of enso spring persistence barrier. *Geophysical Research Letters*, *46*(22), 13371–13378.

[4] Song, B., Zhi, X., Pan, M., Hou, M., **He**, **C.**, & Fraedrich, K. (2019). Turbulent heat flux reconstruction in the north pacific from 1921 to 2014. *Journal of the Meteorological Society of Japan. Ser. II*.

[3] Liu, Z., **He**, **C.**, & Lu, F. (2018). Local and remote responses of atmospheric and oceanic heat transports to climate forcing: Compensation versus collaboration. *Journal of Climate*, *31*(16), 6445–6460.

[2] Liu, Z., Yang, H., **He**, **C.**, & Zhao, Y. (2016). A theory for bjerknes compensation: The role of climate feedback. *Journal of Climate*, *29*(1), 191–208.

[1] **He**, **C.**, Zhi, X., You, Q., Song, B., & Fraedrich, K. (2015). Multi-model ensemble forecasts of tropical cyclones in 2010 and 2011 based on the kalman filter method. *Meteorology and Atmospheric Physics*, *127*(4), 467–479.

Presentations

Seminars

A Systematic Sea Surface Temperature Bias in CMIP6 Models: Causes, Impacts, and Implications

- [2025] The University of Texas at Arlington, Department of Earth and Environmental Sciences.
- [2024] Climate Dynamics Group formed by members from Princeton University, Rutgers University, University of Miami, and Old Dominion University.
- [2024] Woods Hole Oceanographic Institution.

Recent tropical Atlantic multidecadal climate variability is married to external forcings

- [2024] Tulane University, Department of Earth and Environmental Sciences.
- [2024] Northeastern University, Marine & Environmental Sciences.
- [2023] IOWA State University, Department of Geological and Atmospheric Sciences
- [2023] University of Miami, RSMAS
- [2023] Paleoclimate forum (zoom)
- [2023] Zhejiang University, School of Earth Sciences
- [2023] University at Albany, Atmospheric Sciences Research Center
- [2023] Ocean University of China, Deep-Sea Multidisciplinary Research Center
- [2023] Verisk Analytics-AER
- [2022] NOAA-AOML

Deciphering the last deglacial evolution of Asian monsoon and its associated water isotope

- [2021] University of Miami, RSMAS
- [2021] University of Bern
- [2021] NOAA-GFDL
- [2021] Nanjing University of Information Science & Technology

North Atlantic subsurface temperature controlled by effective freshwater input in "Heinrich" events

- [2020] Woods Hole Oceanographic Institution

The transient response of atmospheric and oceanic heat transports to anthropogenic warming

- [2020] China University of Geosciences, Wuhan
- [2019] Ohio State University, Byrd Polar and Climate Research Center

Conference and others

2023

- (invited) Recent tropical Atlantic Multidecadal Climate Variability is mostly driven by external forcings, 4th Summer School on Theory, Mechanisms and Hierarchical Modeling of Climate Dynamics: Atlantic Variability and Tropical Basin Interactions at Interannual to Multi-Decadal Time Scales
- Recent tropical Atlantic Multidecadal Climate Variability is mostly driven by external forcings, NOAA Climate Variability & Predictability (CVP) - Decadal Variability and Predictability, and CESM annual workshop
- (invited) A North Atlantic warming hole without ocean circulation, NCAR Climate Variability & Change Working Group (CVCWG) winter meeting

Presentations (continued)

2022
- Recent Atlantic Multidecadal Variability and its tropical impacts are driven by external forcings (poster), AGU-2022, AMS-2023
- A North Atlantic warming hole without ocean circulation (poster), AGU-2022
- Recent Atlantic Multidecadal Variability and its tropical impacts are driven by external forcings (poster), Clivar Climate Dynamics Panel Annual Workshop 2022
- A North Atlantic warming hole without ocean circulation, 2nd Model Hierarchy Workshop
- Deglacial variability of south china hydroclimate heavily contributed by autumn rainfall, INQUA T5-0/PMIP workshop
- The role of the atmosphere in the North Atlantic warming hole (poster), 2022 US AMOC Science Team Meeting

2021
- A description of iTRACE, PMIP-30th Anniversary
- Deglacial variability of South China hydroclimate heavily contributed by autumn rainfall, AGU
- Abruptheinrich stadial 1 cooling missing in greenland oxygen isotopes, Workshop - Water Isotopes: From Weather to Climate
- Abruptheinrich stadial 1 cooling missing in greenland oxygen isotopes, CESM workshop, NCAR

2019
- Oceans role in the transient response of atmospheric and oceanic heat transports to anthropogenic warming, AGU

2018
- Update of ITraCE for the last deglaciation, CESM workshop, NCAR
- Responses of Atmospheric and Oceanic Heat Transports to Climate Forcing: Compensation versus Collaboration, AGU

Open-source Scientific Projects

xMCA

61 Stars and 23 Forks

- xMCA is a python package developed to conduct Maximum Covariance Analysis in temporal and spatial data analysis;
- Leveraging the technique of PCA, xMCA enables users to reduce the dimension of high-dimension climate data and detect covariability in different fields.

XCESM

18 Stars and 6 Forks

- XCESM is a python package to diagnose climate variability in CESM

GCMAverager

- GCMAverger is a lightweight python package designed to post-process massive outputs from general circulation model(GCM) using parallel computing. It is able to extract time-series variables in parallel and calculate seasonal, annual, and decadal averages in the data.

CMSD

- CMSD, Climate Model Simulation Dashboard, is a python package that is developed to monitor a long-lasting iTRACE simulation that produces 1PB (1000 TB) data on Cheyenne;
- Leveraging the **GCMAverager**, CMSD extracts variables from the simulation in parallel;

Open-source Scientific Projects (continued)

- The extracted variables are post-processed by *xarray*, and eventually visualized in an interactive dashboard constructed by *Plotly*.

Radiocarbon Cycle

- A prototype of the radiocarbon cycle is developed in the CESM-CAM5, coupling the corresponding modules in the ocean and land models.
- Some preliminary results could be found here: