Xing Zhou

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RESEARCH INTERESTS

My research integrates regional ocean models (e.g., FVCOM, CROCO), biogeochemical modules (e.g., PISCES), biophysical models (e.g., Ichthyop), and advanced AI techniques to investigate regional-scale ecosystem dynamics and biogeochemistry in lakes and oceans. I focus on questions related to sustaining healthy aquatic environments and promoting ecosystem sustainability (e.g., algal blooms, emerging contaminant pollution, ichthyoplankton dynamics, and the impacts of climate change and human interventions). My previous research has primarily focused on the Great Lakes and the northern Gulf of Mexico.

EDUCATION

- **Ph.D. in Atmospheric Science**
  Michigan Technological University   2017 –2023
  Research focused on Great Lakes ecosystem modeling
  Dissertation title: *Using Hydrodynamic and Biophysical Models to Study the Mechanisms Mediating Algal Blooms in the Great Lakes*
  Advisor: *Dr. Pengfei Xue*
- **Bachelor of Atmospheric Science**
  Lanzhou University   2013-2017

ACADEMIC EMPLOYMENTS

- **Postdoctoral Fellow**
  Georgia Institute of Technology   2023-Present
  Advisor: *Dr. Annalisa Bracco*
- **Graduate Research Assistant**
  Michigan Technological University   2017-2023

TEACHING & MENTORING

Teaching
- Teaching Assistant & Co-Lecturer, *Climate Models (EAS 8803)*, Georgia Tech, 2024
- Co-Lecturer, *Introduction to Oceanography (EAS 4300)*, Georgia Tech, 2025; Guest Lecture 2024

Mentoring
- Gabe Lobdell (Undergraduate, University of Georgia, Summer REU, 2025)
- Mireya Ramirez (Undergraduate, Georgia Tech, 2024, PURA Award)
- Aya Kanawati (Undergraduate, Georgia Tech, Spring 2024)

GRANTS & FUNDING

- Co-PI – *Modeling the Dispersal and Connectivity of Marine Larvae with GenAI Agents*. Co-funded by Microsoft and two GeorgiaTech research institutes (the Brook Byers Institute for Sustainable Systems and the Institute for Data Engineering and Science). $50,000 + $50,000 Microsoft Azure credit (09/2024–07/2025). (*Served as Co-PI in accordance with Georgia Tech policy that generally does not allow postdoctoral researchers to serve as lead PI, but I conceived, initiated, and led the project.*). PI: A. Bracco; Co-PIs: X. Zhou, R. Wu, J. Abernethy.

PUBLICATIONS

Published

1) **Zhou, X.,** Xiao, S., Ramirez, M., & Bracco, A. (2025). Modeling river and urban related microplastic pollution off the southern United States. *npj Emerging Contaminants*, *1*(1), 9.
2) Xue, P., Huang, C., Zhong, Y., Notaro, M., Kayastha, M. B., **Zhou, X.**, ... & Kemp, E. (2025). Enhancing winter climate simulations of the Great Lakes: insights from a new coupled lake–ice–atmosphere (CLIAv1) system on the importance of integrating 3D hydrodynamics with a regional climate model. *Geoscientific Model Development*, 18(13), 4293-4316.
3) Gardner, S. T., Rowe, M. D., Xue, P., **Zhou, X**, Alsip, P. J., Bunnell, D. B., ... Höök, T. O. (2024). Climate-influenced phenology of larval fish transport in a large lake. *Limnology and Oceanography Letters.*
4) **Zhou, X.**, Lopera, L., Roa-Varón, A., Bracco, A. (2024). Modeling the larval dispersal and connectivity of Red Snapper (*Lutjanus campechanus*) in the Northern Gulf of Mexico. *Progress in Oceanography*, 224, 103265.
5) **Zhou, X**.,Chaffin, J. D., Bratton, J. F., Verhamme, E. M., Xue, P. (2023). Forecasting microcystin concentrations in Lake Erie using a Eulerian tracer model. *Journal of Great Lakes Research*, 49(5), 1029-1044.
6) **Zhou, X.,** Rowe, M.D., Liu, Q., Xue, P. (2023). Comparison of Eulerian and Lagrangian transport models for harmful algal bloom forecast in Lake Erie. *Environmental Modelling & Software*, 162, 105641.
7) **Zhou, X.,** Auer, M. T., Xue, P. (2021). Open lake phosphorus forcing of *Cladophora* growth: Modeling the dual challenge in great lakes trophic state management. *Water*, 13(19), 2680.
8) Chaffin, J. D., Bratton, J. F., Verhamme, E. M., Bair, H. B., Beecher, A. A., Binding, C. E., ... **Zhou, X**. (2021). The Lake Erie HABs Grab: A binational collaboration to characterize the western basin cyanobacterial harmful algal blooms at an unprecedented high-resolution spatial scale. *Harmful Algae*, 108, 102080.
9) Xue, P., Schwab, D. J., **Zhou, X**., Huang, C., Kibler, R., Ye, X. (2018). A hybrid Lagrangian-Eulerian particle model for ecosystem simulation. *Journal of Marine Science and Engineering*, 6(4), 109.

Under Review

1) **Zhou, X.,** Xue, P., Rowe, M. D., Alsip P. J., ... Gardner S. T. Modeling Study of Phytoplankton Responses in Lake Michigan to a Changing Climate. *Limnology and Oceanography*. (under review)
2) **Zhou, X.,** †Novi, L., †Hay, M. E., Montoya, J. P., Aliu, A., Realff, M. J., & Bracco, A. Evolving drivers of the GASB: From physical forcing to ecological control. *Nature Communications* (under review). (†Co–first authors)

In preparation

1) **Zhou, X.,** Bracco, A., Ito, T., Reinhard, C. T. Numerical assessment of hypothetical large-scale river-based alkalinity modification scenarios in the northern Gulf of Mexico. In preparation for *Earth's future*.
2) **Zhou, X.,** Wang, G., Wu, R., Bracco, A., & Abernethy, J. IchthyopAgent: A generative AI-agent based Lagrangian tool for modeling ichthyoplankton dynamics: development and application. In preparation for *Environmental Modelling & Software*

PRESENTATIONS (presenter underlined)

1) <u>Bracco, A.</u>, Lopera, L., **Zhou, X**., & Herrera, S. Ecosystem Connectivity in the Northern Gulf: From Corals to Fish. *Benthic Ecology Meeting 2025*, Mobile, AL, April 1–4. (Talk)
2) <u>**Zhou, X**</u>., Wu, R., Wang, G., Bracco, A., Abernethy, J. (2025). Modeling the Dispersal and Connectivity of Marine Larvae with GenAI Agents. *ASLO 2025 Aquatic Science Meeting*, Charlotte, NC, Mar 26-31. (Talk)

3) Ramirez, M., **Zhou, X**., Xiao, S., Bracco, A. (2025). Investigating the Fate of Microplastic Pollution in the Northern Gulf of Mexico and its impact on Marine Habitats. *ASLO 2025 Aquatic Science Meeting*, Charlotte, NC, Mar 26-31. (Poster)
4) **Zhou, X**., Bracco, A., Ito, T., Reinhard, C. (2024) The Impact of Submesoscale Processes on Carbon Dynamics in the Gulf of Mexico during Large-Scale Alkalinity Modification. *AGU fall meeting*, Washington, D.C, Dec 09-13, 2024. (Poster)
5) **Zhou, X**., Xue, P., Rowe, M. D., Alsip P. J., ... Gardner S. T. (2024). Impacts of Climate Change on Phytoplankton Dynamics in Lake Michigan: a Biophysical Modeling Study. *ASLO*, Madison, WI, Jun 2-7,2024. (Talk)
6) **Zhou, X**., Bracco, A., Lopera, L., & Roa-Var'on, A. (2024). Red Snapper (*Lutjanus Campechanus*) Larval Dispersal and Connectivity in the Northern Gulf of Mexico: A High-Resolution Modeling Study. *Ocean science meeting 2024*, New Orleans, Louisiana, Feb 18-23,2024, (Talk)
7) **Zhou, X**., Xue, P., Rowe, M. D., Alsip P. J., ... Gardner S. T. (2022). Impact of mixing regime shift on phytoplankton, and invasive mussel in Lake Michigan under a warming climate: a biophysical modeling study. *AGU fall meeting*, Chicago, Illinois, Dec 12-16, 2022. (Talk)
8) **Zhou, X**., Xue, P., Chaffin, J., Bratton, J., & Verhamme, E. (2022). Incorporation of microcystin production improves lake erie cyanobacterial bloom toxin forecasts. *In Joint Aquatic Sciences Meeting 2022*. Grand Rapids, Michigan, May 14-20,2022. (Talk)
9) **Zhou, X**., Xue, P., Liu, Q., & Rowe, M. D. (2021). Intercomparison of three HAB transport models in short-term forecasting of Lake Erie CHABs event. *In 26th Biennial CERF Conference*, Online, 1–4 and 8–11 November 2021. (Talk)
10) **Zhou, X.**, Xue, P., & Auer, M. T. (2020). Offshore P-forcing of *Cladophora* growth in the Lake Michigan nearshore: a one-dimensional modeling approach. *International Association for Great Lakes Research*, Online, June 9–11, 2020. (Poster)
11) Xue, P., Ye, X., **Zhou, X**., & Huang, C. (2018). A hybrid Lagrangian-Eulerian particle model for ecosystem simulation in Sandusky Bay. *Estuaries and Coastal Modeling*, Seattle, Washington, June 25-28, 2018. (Talk)
12) Kibler, R., Huang, C., **Zhou, X**., & Xue, P. (2018). Using a property-carrying particle model for ecosystem simulation: A case study of Sandusky Bay. *International Association for Great Lakes Research*, Toronto, Canada. June 18-22, 2018. (Talk)

HONORS AND AWARDS

- Judith Curry Award, Georgia Institute of Technology — 2024
- Dean's award for outstanding scholarship, Michigan Technological University — 2023
- GLRC Student Research Grant, Michigan Technological University — 2020
- Visiting student in Texas Tech University awarded by China Scholarship Council — 2015

PROFESSIONAL SERVICE

- **Editorial Board Member:** *npj Emerging Contaminants*
- **Proposal Reviewer:** NASA Research Initiation Awards (RIA24)
- **Journal Reviewer:** *Frontiers in Marine Science*, *Progress in Oceanography*, *PLOS ONE*, *Communications Earth & Environment*, *Journal of Hydrology*, *Journal of Hazardous Materials*, *Environmental Science & Technology*
- **Session Convener & Co-chair:** "Leveraging Biophysical Models to Understand and Mitigate Climate Change Impacts on Aquatic Ecosystems (SS20)," ASLO 2025 Aquatic Sciences Meeting

Outreach & Community Engagement

- Co-hosted interview with Freedom Middle School Robotics Program students on marine biology applications (2024)
- Served as Postdoctoral Representative in faculty hiring processes, School of Earth and Atmospheric Sciences, Georgia Institute of Technology (2024)

MEDIA RECOGNITION

- NCCOS news: Gulf of Mexico Red Snapper Larval Model Suggests Managing Fishery as Two Stocks (https://coastalscience.noaa.gov/news/gulf-of-mexico-red-snapper-larval-model-suggests-managing-fishery-as-two-stocks/)
- CMCC news: Research reveals how microplastics threaten Gulf of Mexico marine life (https://www.cmcc.it/article/research-reveals-how-microplastics-threaten-gulf-of-mexico-marine-life)