

Wenda Zhang

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Education

Doctor of Philosophy: Marine Science

Stony Brook University

Advisor: Prof. Christopher L. P. Wolfe

2017 - 2022

Stony Brook, NY, U.S.

Bachelor of Science: Marine Science

Ocean University of China

2013 - 2017

Qingdao, China

Research Interests

Ocean mesoscale eddies, and their impact on mixing, large-scale ocean circulations and climate; parameterization of mesoscale processes in ocean climate models, geophysical fluid dynamics; Lagrangian transport and mixing; idealized models.

Appointments

Postdoctoral Research Associate

Host: Dr. Stephen M. Griffies

2022-present

Princeton University

- Studying the vertical structure of mesoscale and submesoscale ocean eddies in idealized models, and developing parameterizations of this structure for use in global climate and prediction models.
- Implementing and improving the mesoscale kinetic energy backscatter parameterization in climate simulations of GFDL Modular Ocean Model (MOM6).

Research Assistant

Advisor: Prof. Christopher L. P. Wolfe

2018-2022

Stony Brook University

- Quantified potential vorticity (PV) transport due to coherent eddies and identified the relation between the PV diffusivity and dispersion of coherent eddies in a two-layer quasigeostrophic model.
- Analyzed the vertical structure of the mesoscale tracer diffusivity in an idealized ocean configuration of the MITgcm.

Undergraduate Researcher

Supervisor: Prof. Xueen Chen

2016 - 2017

Ocean University of China

- Diagnosed the energy transfer between mesoscale eddies and mean flows through barotropic and baroclinic pathways in the South China Sea based on the Global Hybrid Coordinate Ocean Model (HYCOM) hindcasts.

Publications

In Progress

- Griffies, S. M., Adcroft, A., Beadling, R. L., Bushuk, M., Chang, C. Y., Drake, H. F., ..., **Zhang, W.**, Zhao, M. (2024). The GFDL-CM4X climate model hierarchy, Part I: model description and thermal properties. *Submitted to Journal of Advances in Modeling Earth Systems*
- Griffies, S. M., Adcroft, A., Beadling, R. L., Bushuk, M., Chang, C. Y., Drake, H. F., ..., **Zhang, W.**, Zhao, M. (2024). The GFDL-CM4X climate model hierarchy, Part II: case studies. *Submitted to Journal of Advances in Modeling Earth Systems*
- Zhang, Z., Chang J., Zhang X., and **Zhang W.**, 2025: Mixed transitional layer instability: A mechanism for deep-penetrating submesoscale processes in the subtropical upper ocean. *Under revision in Journal of Physical Oceanography*
- **Zhang, W.**, A. Adcroft, E. Yankovsky, S.M. Griffies, R.W. Hallberg, 2024: A scale-dependent vertical structure for mesoscale energy backscatter parameterizations. *In preparation for Journal of Advances in Modeling Earth Systems*
- **Zhang, W.**, S.M. Griffies, J. Steinberg, R.W. Hallberg, 2024: Stratification constrains the horizontal scale of ocean mesoscale eddies. *In preparation for Journal of Physical Oceanography*.

Peer Reviewed (corresponding author *)

- Lobo, M., Griffies, S.M. and **Zhang, W.***, 2024. Vertical structure of baroclinic instability in a three-layer quasi-geostrophic model over a sloping bottom. *Journal of Physical Oceanography*
- **Zhang, W.***, S.M. Griffies, R.W. Hallberg, Y. Kuo, and C.L.P. Wolfe, 2024: The role of surface potential vorticity in the vertical structure of mesoscale eddies in wind-driven ocean circulations. *Journal of Physical Oceanography*, DOI: <https://doi.org/10.1175/JPO-D-23-0203.1>

- **Zhang, W.***, C.L.P. Wolfe, 2024: Inferring tracer diffusivity from coherent mesoscale eddies. *Journal of Advances in Modeling Earth Systems*, 16, e2023MS004004. <https://doi.org/10.1029/2023MS004004>
- **Zhang, W.***, C.L.P. Wolfe, 2022: On the vertical structure of oceanic mesoscale tracer diffusivities. *Journal of Advances in Modeling Earth Systems*, 14, e2021MS002891. <https://doi.org/10.1029/2021MS002891>
- **Zhang, W.***, C.L.P. Wolfe, R. Abernathey, 2020: Role of surface-layer coherent eddies in potential vorticity transport in quasi-geostrophic turbulence driven by eastward shear. *Fluids*, 5(1), p.2, doi: [10.3390/fluids5010002](https://doi.org/10.3390/fluids5010002)

Invited Presentations

"Scale- and flow-aware subgrid closure for mesoscale eddies in ocean climate models"

University of Tokyo and Japan Agency for Marine-Earth Science and Technology (JAMSTEC)

January 2025

"The role of surface potential vorticity in the vertical structure of mesoscale eddies"

NOAA Coastal Ocean Modeling Seminars, online

July 2024

Conference Presentations

- "Sensitivity of the kinetic energy backscatter parameterization to its vertical structure in eddy-permitting ocean simulations", CLIVAR Ocean Model Development Panel and COMMODORE Workshop, Boulder, CO, September 2024 (**poster presentation**)
- "Sensitivity of the kinetic energy backscatter parameterization to its vertical structure in eddy-permitting ocean simulations", Climate Process Team: Ocean Transport and Eddy Energy Annual Meeting, Providence, RI, August 2024 (**oral presentation**)
- "The role of surface potential vorticity in the vertical structure of mesoscale eddies in wind-driven ocean circulations", 24th Conference on Atmospheric and Oceanic Fluid Dynamics, Burlington, VT, June 2024 (**oral presentation**)
- "A scale-dependent vertical structure for energy backscatter parameterizations", EGU conference, Vienna, Austria, April 2024 (**oral presentation**)
- "The role of surface potential vorticity in the vertical structure of mesoscale eddies", Ocean Sciences Meeting, New Orleans, LA, February 2024 (**oral presentation**)
- "A scale-dependent vertical structure for mesoscale energy backscatter parameterizations", CESM Ocean Model Working Group Meeting, Virtual, February 2024 (**oral presentation**)
- "Scale-dependent vertical structure of eddy kinetic energy in an adiabatic ocean model", Climate Process Team: Ocean Transport and Eddy Energy Annual Meeting, Woods Hole, MA, May 2023 (**oral presentation**)
- "Scale-dependent vertical structure of eddy kinetic energy in an idealized isopycnal ocean model", CESM Ocean Model Working Group Meeting, Virtual, February 2023 (**oral presentation**)
- "Inferring tracer diffusivity from coherent mesoscale eddies", 23rd Conference on Atmospheric and Oceanic Fluid Dynamics, Breckenridge, CO, June 2022 (**poster**)
- "On the vertical structure of oceanic mesoscale tracer diffusivities", Climate Process Team: Ocean Transport and Eddy Energy Annual Meeting, Boulder, CO, April 2022 (**oral presentation**)
- "What determines the vertical structure of mesoscale tracer diffusivity?", Ocean Sciences Meeting, Virtual, March 2022 (**oral presentation**)
- "Vertical structure of tracer diffusivity in an idealized basin circulation model", CESM Ocean Model Working Group Meeting, Virtual, February 2021 (**oral presentation**)
- "Diffusive versus nondiffusive properties of coherent ocean eddies", Ocean Sciences Meeting, San Diego, CA, February 2020 (**eLightning presentation**)
- "Role of coherent eddies in potential vorticity transport in two-layer quasigeostrophic turbulence", 22nd Conference on Atmospheric and Oceanic Fluid Dynamics, Portland, ME, June 2019 (**oral presentation**)

Professional Services

Conference Session Primary Chair

2024 Ocean Sciences Meeting, Session PL41A & PL53A: Multiscale Eddy Dynamics and Tracer Transport: Bridging Observations, Theory, and Modeling

New Orleans, LA

February 2024

Conference Session Co-Chair

2025 Xiamen Symposium on Marine Environmental Sciences, Session 35: Eddy variability in the ocean and atmosphere: dynamics, parameterization and prediction

Xiamen, China

January 2025

Journal Reviewer

Reviewer for Journal of Physical Oceanography, Journal of Advances in Modeling Earth Systems, Journal of Geophysical Research - Oceans, Climate Dynamics

2022 - Present

Teaching Experience

Teaching Assistant

Oceanography (MAR 104)
Physics for Environmental Studies (ENS 119)

Stony Brook University
Fall 2017 and Fall 2018
Spring 2018 and Spring 2021

Awards and Honors

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| 2020 | Maze-Landau Travel Award , Stony Brook University |
| 2019 | Distinguished Travel Award , Stony Brook University |
| 2019 | IACS Travel Award , Stony Brook University |
| 2016 | The Outstanding Student Award , Ocean University of China |
| 2016 | The Scholarship Award for Participation in Social Activities , Ocean University of China |
| 2015 | The First-Class Scholarship Award for Excellence in Academic Work , Ocean University of China |
| 2015 | Second Prize in Physics Competition of Chinese College Students (non-physics major) , Chinese Physical Society |
| 2014 | First Prize in Mathematics Competition of Chinese College Students (non-mathematics major) , Chinese Mathematical Society |

Volunteer Services

NJ Ocean Fun Days
Volunteer

Island Beach State Park
May 2023

Workshop for Boys and Girls Club
Volunteer

Mercer County, NJ
March 2023

Qingdao Red Cross Society
Volunteer

Qingdao, China
June-July 2013

Programming Skills

Programming Python, Matlab
Computer Language Fortran