

Tian Zhao, Ph.D.

Postdoctoral Fellow, Mississippi River Delta Transition Initiative ([MissDelta](#))

Department of River-Coastal Science and Engineering, Tulane University

tzhao6@tulane.edu | tianzhao@alum.mit.edu | [Google Scholar](#) | [LinkedIn](#) | [ORCID](#)

RESEARCH INTERESTS

- Turbulent flows · Sediment Transport · Ecohydraulics · Ecomorphodynamics · Environmental Fluid Mechanics · River and Coastal Protection and Restoration
- Laboratory Experiments · Field Studies · Numerical Modeling

EDUCATION

Massachusetts Institute of Technology (MIT), Cambridge, MA, USA 09/2018 – 09/2024

Ph.D., Civil and Environmental Engineering (CEE) GPA: 5.0/5.0

Advisor: Dr. Heidi Nepf

Dissertation: "[The Impact of Vegetation Morphology on Turbulence and Bedload Transport](#)"

Nanjing University (NJU), Nanjing, Jiangsu, China 09/2013 – 07/2017

B.Sc., Geographical Sciences (with Honors), Minor: Oceanographic Sciences GPA: 4.5/5.0

Advisors: Dr. Qian Yu and Dr. Shu Gao

ACADEMIC APPOINTMENTS

Postdoctoral Fellow, River-Coastal Science & Engineering, Tulane University 08/2025 – present

Graduate Research Assistant, MIT CEE 09/2018 – 09/2024

Research Assistant, Key Laboratory of Coast and Island Development, NJU 09/2016 – 06/2018

RESEARCH EXPERIENCE

Tulane University, New Orleans, LA, USA

Postdoctoral Fellow, Mississippi River Delta Transition Initiative 08/2025 – present

Supervisor: Dr. Mead Allison

- Quantifying floc properties and dynamics in a salt wedge in the Lower Mississippi River.
- Developing parameterization of vegetation geometry (e.g., flexibility and submergence) for numerical hydrodynamic and morphodynamic models.
- Proposed thesis project for a master's mentee: *Reconstruction and parameterization of vegetation geometry in the Birdsfoot Delta using drone-LiDAR imagery*

Massachusetts Institute of Technology, Cambridge, MA, USA

Graduate Research Assistant, Nepf Environmental Fluid Mechanics Lab 09/2018 – 09/2024

Advisor: Dr. Heidi Nepf

- Quantified the generation and transport of turbulence in canopies of submerged (e.g., seagrasses) and emergent (e.g., cordgrasses and mangroves) aquatic vegetation with different geometry parameters (stem diameter, vegetation clustering, and degree of submergence) using flume experiments and numerical modeling.
- Developed a one-dimensional Reynolds-averaged Navier-Stokes (RANS) model in MATLAB to describe and predict near-bed turbulence in vegetated channels as a function of vegetation geometry (canopy density, submergence, and flexibility), enabling projection of erosion and sedimentation trends in field conditions and providing guidance for coastal protection and restoration projects.

Nanjing University, Nanjing, Jiangsu, China

Research Assistant, Key Laboratory of Coast and Island Development 09/2016 – 06/2018

Advisors: Dr. Qian Yu and Dr. Shu Gao

- Simulated the growth and evolution of an idealized delta in Jiangsu in Delft3D with varied boundary conditions (river discharge, wave condition, tidal forcing, and sediment input).
- Led three routine field trips to coastal marshes in Jiangsu for comprehensive coastline and hydrodynamic monitoring. Installed tripod observation systems to measure flow velocity and turbidity.

Last Updated: March 2026

Tian Zhao 1/3

Collected and analyzed water, sediment, and plant samples. Conducted RTK-based marsh elevation profiling and ArcGIS mapping.

PUBLICATIONS

- **Zhao, T., & Nepf, H.** (2024). Turbulence and bedload transport in submerged vegetation canopies. *Water Resources Research*, 60, e2024WR037694. [doi:10.1029/2024WR037694](https://doi.org/10.1029/2024WR037694)
- **Zhao, T., & Nepf, H. M.** (2021). Turbulence dictates bedload transport in vegetated channels without dependence on stem diameter and arrangement. *Geophysical Research Letters*, 48, e2021GL095316. [doi:10.1029/2021GL095316](https://doi.org/10.1029/2021GL095316)
- Shan, Y., **Zhao, T.**, Liu, C., & Nepf, H. (2020). Turbulence and bed load transport in channels with randomly distributed emergent patches of model vegetation. *Geophysical Research Letters*, 47, e2020GL087055. [doi:10.1029/2020GL087055](https://doi.org/10.1029/2020GL087055)

FELLOWSHIPS AND GRANTS

- Coastal Science Assistantship Program, Louisiana Sea Grant, *Multi-Scale LiDAR Assessment of Aquatic Vegetation Geometry for Hydrodynamic and Morphodynamic Modeling in the Lower Mississippi River* (PI, ~\$90k. Co-PI: M. Allison) 08/2026 – 06/2029
- MathWorks Fellowship (\$48k + tuition, 87 Fellows Institute-wide) 09/2023 – 08/2024
- MIT Teaching Development Fellowship (\$2k, 21 Fellows Institute-wide) 09/2022 – 08/2023
- MIT CEE Ippen Travel Fund (\$1k each) 12/2020, 12/2022
- MIT Linde (1962) Presidential Fellowship (\$32k + tuition, 120 most outstanding new students) 09/2018 – 05/2019

INVITED TALKS

- Coastal & Ocean Processes Section, Virginia Institute of Marine Science 12/2025
- Department of River-Coastal Science and Engineering, Tulane University 09/2025

PRESENTATIONS

- **Zhao, T.** (2024). The Impact of Vegetation Morphology on Turbulence and Bedload Transport. **Dissertation Defense**, Parsons Laboratory, MIT, July 2024, Cambridge, MA, USA and Online.
- **Zhao, T., & Nepf, H. M.** (2022). Turbulence and Bedload Sediment Transport in Submerged Vegetation Canopies. **Oral Presentation (Honorable Mention)**, EP32B-01, AGU Fall Meeting 2022, December 2022, Chicago, IL, USA.
- **Zhao, T.** (2022). How does vegetation influence wetland stability? Lessons from laboratory studies. **Oral Presentation**, The 10th Annual MIT CEE Research Day: Climate Solutions and Integration of Sustainability at Scale, April 2022, Cambridge, MA, USA.
- **Zhao, T., & Nepf, H. M.** (2021). Laboratory Investigation of Bedload Sediment Transport in Submerged Vegetation. **ePoster**, EP25C-1335, AGU Fall Meeting 2021, December 2021, New Orleans, LA, USA.
- **Zhao, T., & Nepf, H. M.** (2020). The Influence of Vegetation-Generated Turbulence on Bedload Sediment Transport: Role of Stem Diameter. **Oral Presentation**, EP057-01, AGU Fall Meeting 2020, December 2020, Online.

TEACHING, MENTORING, AND SERVICE

Teaching Experience

Teaching Assistant, 1.61/1.061(A) *Transport Processes in the Environment*
1.106 *Environmental Fluid Transport Processes and Hydrology Laboratory*

Department of Civil and Environmental Engineering, MIT

Fall 2021, Spring 2022, Fall 2022

- Held weekly office hours and monthly recitations, taught MATLAB coding, developed new quiz problems and lab sessions, graded problem sets and lab reports, and provided oral and written feedback for 27 students.
- Awarded MIT CEE Maseeh Annual Award for Excellence as a Teaching Assistant.

Panelist, *Experienced TA Panel*, MIT TA Days

Teaching + Learning Lab, MIT

Summer 2022, Spring 2023

- Advised >100 new graduate teaching assistants in the School of Engineering at MIT on facilitating office hours and giving feedback.

Teaching Assistant, 070704C01 *Marine Sediment Dynamics*

School of Geography and Ocean Science, NJU

Spring 2017, Spring 2018

- Wrote a textbook in collaboration with the lecturer (Dr. Qian Yu). Published in 2024 as *Principles of Marine Sediment Dynamics* (in Chinese).
- Developed the course website, gave lectures on sediment transport, and trained 25 students to set up and operate common instruments for coastal sediment transport investigations.

Teaching Training and Recognition

MIT Research Mentoring Certificate

01/2024

MIT Grant Writing Training Certificate

01/2024

MIT CEE Maseeh Annual Award for Excellence as a Teaching Assistant (1 recipient/year)

05/2023

MIT Kaufman Teaching Certificate (MIT's flagship program)

05/2022

Mentoring

- Ishii, J. (2023). *The influence of current and ripple development on seagrass transplant survival*. M. Eng. Thesis. Department of Civil and Environmental Engineering, MIT.
- Porter, R. (2022). *Wake characteristics associated with logjams to inform river restoration*. M. Eng. Thesis. Department of Civil and Environmental Engineering, MIT.

Service

- Journal Reviewer (in Alphabetical Order)
Environmental Fluid Mechanics, Geo-Marine Letters, Journal of Fluid Mechanics, Journal of Geophysical Research: Earth Surface, Journal of Hydrology, Journal of Irrigation and Drainage Engineering, Scientific Reports, Water Resources Research
- Volunteer Instructor, Girls in STEM at Tulane 10/2025
Led an Emriver stream table demonstration (3 groups, 15 students) on river/delta evolution and gray vs. nature-based protection strategies.
- Teaching Development Fellow, MIT CEE 09/2022 – 08/2023
Supported more than 10 teaching assistants as a liaison from MIT Teaching + Learning Lab by organizing events, coordinating peer observations, and developing teaching resources.
- Volunteer Instructor, Cambridge Science Festival, MIT Museum 10/2022
Set up model seawalls and mangrove stands in a tabletop flume and demonstrated how nature-based solutions dissipate waves and improve coastal resilience using hands-on wave paddles.
- Class Leader of Geographical Science 2013, Nanjing University 09/2014 – 06/2017
Provided liaison between 16 fellow students and the department.

SKILLS

Academic

Data analysis
Numerical methods
Turbulent flows
Transport processes
Coastal engineering

Technical

Flow measurement and modeling (ADV, ADCP, Delft3D)
Programming (MATLAB, Python, C)
Surveying (RTK, total station, OBS, RBR, LISST)
Mapping (ArcGIS, ENVI)
Office suite (Microsoft Office, Adobe Creative Cloud)