TONG BO

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EDUCATION

MIT – WHOI Joint Program. Ph.D., Civil & Environmental & Oceanographic Engineering 2018 – 2023

Peking University. B.S., Theoretical and Applied Mechanics 2014 – 2018

University of Pittsburgh. Exchange student, Mechanical Engineering 2017

RESEARCH INTERESTS

I study coastal and estuarine fluid dynamics using a combination of computational and observational methods. My research focuses on flow processes associated with complex roughness elements in the coastal ocean, including topographic features and vegetation. I aim to understand the impacts of these processes on oceanic boundary layer turbulence, salinity and temperature dynamics, and material transport, as well as their implications for the development of sustainable solutions.

RESEARCH EXPERIENCE

Postdoctoral Scholar, UCLA. 2023/05 –
Supervisors: Profs. James C. McWilliams and Marcelo Chamecki

Graduate Research Assistant, MIT – WHOI Joint Program. 2018/08 – 2023/04
Advisor: Dr. David K. Ralston
Thesis: Impacts of Channel Curvature on Drag, Mixing, and Stratification in Estuaries

Undergraduate Research Assistant, Peking University. 2016/03 – 2018/07
Advisor: Prof. Yue Yang

Undergraduate Research Assistant, University of Oxford. 2017/06 – 2017/09
Advisor: Prof. Richard F. Katz

PUBLICATIONS

1. **Bo, T.**, Ralston, D. K., Geyer, W. R., & McWilliams, J. C. (2024). On the role of small estuaries in retaining buoyant particles. *PNAS*, 121 (35), e2401498121. [doi]
2. **Bo, T.**, McWilliams, J. C., Frieder, C. A., Davis, K. A., & Chamecki, M. (2024). Nutrient replenishment by turbulent mixing in suspended macroalgal farms. *Geophysical Research Letters*, 51, e2024GL109128. [doi]
3. **Bo, T.**, McWilliams, J. C., Yan, C., & Chamecki, M. (2024). Langmuir turbulence in suspended kelp farms. *Journal of Fluid Mechanics*, 985, A11. [doi]

4. **Bo, T.**, Ralston, D. K., Garcia A. M. P., & Geyer, W. R. (2024). Surface convergence and mixing in an estuary with complex topography. *Journal of Physical Oceanography*, 54(3), 653-677. [doi]
5. **Bo, T.**, Ralston, D. K., & Geyer, W. R. (2023). Sources of drag in estuarine meanders: momentum redistribution, bottom stress enhancement, and bend-scale form drag. *Journal of Physical Oceanography*, 53(7), 1629-1650. [doi]
6. **Bo, T.** & Ralston, D. K. (2022). Frontogenesis, mixing, and stratification in estuarine channels with curvature. *Journal of Physical Oceanography*, 52(7), 1333-1350. [doi]
7. **Bo, T.**, Ralston, D. K., Kranenburg, W. M., Geyer, W. R., & Traykovski, P. (2021). High and variable drag in a sinuous estuary with intermittent stratification. *Journal of Geophysical Research: Oceans*, 126(10), e2021JC017327. [doi]
8. **Bo, T.** & Ralston, D. K. (2020). Flow separation and increased drag coefficient in estuarine channels with curvature. *Journal of Geophysical Research: Oceans*, 125(10), e2020JC016267. [doi]
9. **Bo, T.**, Katz, R. F., Shorttle, O., & Rudge, J. F. (2018). The melting column as a filter of mantle trace-element heterogeneity. *Geochemistry, Geophysics, Geosystems*, 19(12), 4694-4721. [doi]

HONORS & AWARDS

MIT GSC Conference Grant, MIT	2022
CERF 2021 Participation Award, Coastal and Estuarine Research Federation	2021
Michael J. Kowalski Fellowship, MIT-WHOI Joint Program	2018 – 2019
Outstanding Graduate Award, Peking University	2018
Innovation and Entrepreneurship Training Program, Ministry of Education of China	2016 – 2017
Excellence in Scientific Research, Peking University	2017
Wusi Scholarship, Peking University	2017
Undergraduate Practice Opportunity Scholarship (UPOS), Peking University	2016 and 2017
Leo KoGuan Scholarship, Peking University	2016
Merit Student of Peking University, Peking University	2015 and 2016
GCL Scholarship, Peking University	2015

TEACHING EXPERIENCE

Teaching Assistant (2019) for Transport Processes in the Environment [MIT 1.061/1.61]. Lecturer: Prof. Heidi Nepf.

Teaching Assistant (2019) for Environmental Fluid Transport Processes and Hydrology Laboratory [MIT 1.106]. Lecturer: Prof. Heidi Nepf.

Teaching Assistant (2016) for Neural Prosthesis Engineering [Peking University Globex Program]. Lecturer: Prof. Sung June Kim.

FIELD WORK

Bathymetric surveys, North River, MA, US — Dec 2021, Apr 2022
- Collaborated with Dr. Peter Traykovski

Understanding the importance of topographic complexity for estuarine dispersion and mixing, North River, MA, US — Sep – Nov 2021
- Collaborated with Dr. W. Rockwell Geyer

Understanding the marsh-channel exchange, North River, MA, US — Nov 2019
- Collaborated with Dr. W. Rockwell Geyer

INVITED TALKS

UCLA, Atmospheric and Oceanic Sciences, 271 Seminar — 11/30/2023
- Frontogenesis, mixing, and stratification in estuarine meanders

Caltech, Division of Geological and Planetary Sciences — 08/28/2023
- Enhanced mixing and decreased stratification in estuarine meanders

MIT, Department of Civil and Environmental Engineering, Parsons Seminar — 04/14/2023
- Increased drag in estuaries with meandering channels

Oregon State University, College of Earth, Ocean, and Atmospheric Sciences, POA Seminar — 02/21/2023
- Frontogenesis, mixing, and stratification in estuaries with curvature

Peking University, School of Physics, Department of Atmospheric and Oceanic Sciences — 02/02/2023
- Frontogenesis, mixing, and stratification in meandering estuaries

NOAA, Coastal Marine Modeling Branch, Coastal Ocean Modeling Science Seminar — 11/01/2022
- Salinity fronts and enhanced mixing in estuaries with channel curvature

Leibniz Institute for Baltic Sea Research Warnemünde – IOW — 10/04/2022
- Salinity fronts, mixing, and stratification in sinuous estuarine channels

TU Delft, Faculty of Civil Engineering and Geosciences — 09/30/2022
- Sources of drag in estuarine meanders

MIT, Department of Civil and Environmental Engineering, EFM Meeting — 02/28/2022
- The influence of complex topography on estuarine salinity dynamics: meanders and vertical mixing

WHOI, Applied Ocean Physics and Engineering Department, COFDL Talk — 02/18/2022
- Bend-scale salinity fronts and enhanced vertical mixing in estuarine channels with curvature

MIT, Department of Civil and Environmental Engineering, EFM Meeting — 11/01/2019
- Increased drag coefficient in meandering estuaries

SELECTED PRESENTATIONS

Bo, T., McWilliams, J. C., & Chamecki, M. (2024). Generation of Langmuir turbulence by various suspended macroalgal farm configurations. Ocean Sciences Meeting. [Poster]

Bo, T. (2023). Increased drag and enhanced mixing in estuarine meanders. CalGFD Meeting, Scripps Institution of Oceanography, UC San Diego. [Invited Keynote Talk]

Bo, T., Ralston, D. K., & Geyer, W. R. (2023). Sources of drag in estuarine meanders: bottom stress enhancement and bend-scale form drag. Coastal Ocean Dynamics Gordon Research Seminar. [Talk]

Bo, T., Ralston, D. K., Garcia, A. M. P., & Geyer, W. R. (2023). Surface convergence fronts and mixing in an estuary with complex topography. Coastal Ocean Dynamics Gordon Research Conference. [Poster]

Bo, T. & Ralston, D. K. (2022). Increased Momentum Loss by Secondary Circulation and Flow Separation in Estuarine Meanders. AGU Fall Meeting 2022. [Talk]

Bo, T. & Ralston, D. K. (2022). Enhanced bottom stress in tidal meanders. Fluvial and Tidal Coastal Networks Workshop, University of Padova. [Talk]

Bo, T. & Ralston, D. K. (2022). Bend-scale salinity fronts and enhanced vertical mixing in estuarine channels with curvature. Ocean Sciences Meeting (OSM) 2022. [Talk]

Bo, T. & Ralston, D. K. (2021). Curvature-induced mixing and decreased stratification in sinuous estuarine channels. Coastal and Estuarine Research Federation (CERF) Conference 2021. [Talk]

Bo, T. & Ralston, D. K. (2020). High Drag and Flow Separation in Curved Estuarine Channels. AGU Fall Meeting 2020. [Poster]

OUTREACH & SERVICE

Reviewer for:
Journal of Physical Oceanography, Journal of Geophysical Research: Oceans, Journal of Geophysical Research: Earth Surface, Flow, Physics of Fluids, Frontiers in Marine Science, Journal of Hydraulic Research.

MIT-WHOI, COFDL Student Meeting, organizer	Jul 2022 – May 2023
MIT-WHOI, JP Applicant Support & Knowledgebase, mentor	Sep – Dec 2022
WHOI, Joint Student Workshop on Ecological Fluid Mechanics, presenter	Oct 2022
MIT-WHOI, JCAOSE Student Annual Presentation, organizer	Aug 2022
WHOI, Proposal Writing Workshop	Jun 2022
MIT-WHOI, JP Open House, student volunteer	Feb 2022
University of Bordeaux, Summer School on Estuarine Physics, presenter	Aug 2020
MIT, MIT Water Summit	Nov 2019
MIT, Teaching Assistant Workshop	Aug 2019
First Place Team (Gold Medal), IEEE International Conference on Robotics and Automation: Soft Material Robot Challenge, Soft Component Technologies Challenge	May 2018

Peking University, Research Experience Sharing Sessions, presenter	Jun 2018
University of Cambridge, Bullard Laboratories, invited visitor	Aug 2017
University of Pittsburgh, CMBE Conference, student assistant	May 2017
University of Pittsburgh, Repair the World Events, student volunteer	Mar 2017