Weiyi Tang

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University of South Florida, Florida, USA

Education

2014.8 – 2019.5 PhD in Oceanography and Biogeochemistry, Duke University, USA

Thesis: Exploring the Spatial Distribution of Marine Nitrogen Fixation through Statistical Modeling, High-Resolution Observations and Molecular Level Characterization

(Advisor: Dr. Nicolas Cassar)

2010.9 – 2014.6 B.S. Chemical Oceanography, Xiamen University, China

Thesis: N_2 fixation products in both particulate and dissolved components

(Advisor: Dr. Shuh Ji Kao)

Research Interests

Biogeochemical cycling of nitrogen and carbon; nitrogen fixation; nitrification; denitrification; N_2O production and consumption; nitrogen biogeochemical modeling; marine productivity; net community production; marine microbial ecology; impact of wildfires and heatwaves on marine ecosystem

Awards, Fellowships and Honors

2019 – 2021 Harry H. Hess Postdoctoral Fellow in Department of Geosciences, Princeton University

2018 – 2019 Duke Interdisciplinary Studies: Graduate Student Training Enhancement Grants (GSTEG)

2018 – 2019 Duke Graduate School: The International Dissertation Research Travel Award

2016 – 2017 Minigrant of Sea Grant in North Carolina

2015 – 2016 Link Foundation Ocean Engineering & Instrumentation Ph.D. Fellowship

2014.5 Best Presentation, Marine Science Training Project for undergraduates supported by National Natural Science Foundation of China.

Professional Experience

2024.8 – present	Assistant Professor, University of South Florida
2019.9 – 2024.7	Postdoctoral Research Associate, Princeton University (Advisor: Dr. Bess Ward) Research areas: N cycling in the Chesapeake Bay, and nitrification in the global ocean
2019.6 – 2019.8	Postdoctoral Research Associate, Duke University
2019 Spring	Graduate Teaching Assistant in Weather and Climate (EOS365, undergraduate level course), Duke University
2018.3 – 2018.6	Visiting Research Student, National Oceanography Centre in Southampton, UK (Host: Dr. Julie Robidart) Research project: molecular characterization and quantification of diazotrophs in the North Atlantic Ocean
2014.8 – 2019.5	Graduate Research Assistant, Duke University

Publications

1. Frey, C., **Tang, W.**, Ward, B. B., & Lehmann, M. F. (2024). Sample preservation methods for nitrous oxide concentration and isotope ratio measurements in aquatic environments. ***Limnology and Oceanography: Methods***. https://doi.org/10.1002/lom3.10638
2. **Tang, W.**, Talbott, J., Jones, T., & Ward, B. B. (2024). Variable contribution of wastewater treatment plant effluents to downstream nitrous oxide concentrations and emissions. ***Biogeosciences***, *21*(14), 3239-3250. https://doi.org/10.5194/bg-21-3239-2024
3. **Tang, W.**, Fortin, S. G., Intrator, N., Lee, J. A., Kunes, M. A., Jayakumar, A., & Ward, B. B. (2024). Determination of site-specific nitrogen cycle reaction kinetics allows accurate simulation of in situ nitrogen transformation rates in a large North American estuary. ***Limnology and Oceanography***. https://doi.org/10.1002/lno.12628
4. **Tang, W.**, Ward, B. B., Beman, M., Bristow, L., Clark, D., Fawcett, S., Frey, C., Fripiat, F., Herndl, G. J., Mdutyana, M., Paulot, F., Peng, X., Santoro, A. E., Shiozaki, T., Sintes, E., Stock, C., Sun, X., Wan, X. S., Xu, M. N., and Zhang, Y. (2023): Database of nitrification and nitrifiers in the global ocean, **Earth Syst. Sci. Data**, 15, 5039–5077, https://doi.org/10.5194/essd-15-5039-2023.
5. Wan, X. S., Sheng, H. X., Liu, L., Shen, H., **Tang, W.**, Zou, W., ... & Kao, S. J. (2023). Particle-associated denitrification is the primary source of N2O in oxic coastal waters. ***Nature Communications***, *14*(1), 8280. https://doi.org/10.1038/s41467-023-43997-3
6. Shao, Z., Xu, Y., Wang, H., Luo, W., Wang, L., Huang, Y., … **Tang, W.**, … & Luo, Y.-W (2023). Global oceanic diazotroph database version 2 and elevated estimate of global oceanic N_2 fixation, **Earth Syst. Sci. Data**, 15, 3673–3709, https://doi.org/10.5194/essd-15-3673-2023.
7. Niebergall, A. K., Traylor, S., Huang, Y., Feen, M., Meyer, M. G., McNair, H. M., ... **Tang, W.**, … & Cassar, N (2023). Evaluation of new and net community production estimates by multiple ship-based and autonomous observations in the Northeast Pacific Ocean. ***Elementa: Science of the Anthropocene***. https://doi.org/10.1525/elementa.2021.00107

8. **Tang, W.**, Jayakumar, A., Sun, X., Tracey, J. C., Carroll, J., Wallace, E., et al. (2022). Nitrous oxide consumption in oxygenated and anoxic estuarine waters. ***Geophysical Research Letters***, 49, e2022GL100657. https://doi.org/10.1029/2022GL100657
9. **Tang, W.**, Tracey, J. C., Carroll, J., Wallace, E., Lee, J. A., Nathan, L., ... & Ward, B. B. (2022). Nitrous oxide production in the Chesapeake Bay. ***Limnology and Oceanography***, *67*(9), 2101-2116. https://doi.org/10.1002/lno.12191
10. Zhang, F., Wen, Z., Wang, S., **Tang, W.**, Luo, Y., Kranz, S., Hong, H., Shi, D. (2022). Phosphate limitation intensifies negative effects of ocean acidification on globally important nitrogen fixing cyanobacterium. ***Nature Communications***. 13. https://doi.org/10.1038/s41467-022-34586-x
11. **Tang, W.**, Llort, J., Weis, J., Perron M., Basart, S., Li, Z., Sathyendranath, S., Jackson, T., Sanz Rodriguez, E., Proemse, B., Bowie, A., Schallenberg, C., Strutton, P., Matear, R., & Cassar, N. (2021). Widespread phytoplankton blooms triggered by 2019-2020 Australian wildfires. ***Nature***, 597(7876), 370-375. https://doi.org/10.1038/s41586-021-03805-8
12. Siegel, D. A., Cetinić, I., Graff, J. R., Lee, C. M., Nelson, N., Perry, M. J., ... **Tang, W.**, … & Zhang, X. (2021). An operational overview of the EXport Processes in the Ocean from RemoTe Sensing (EXPORTS) Northeast Pacific field deployment. ***Elementa: Science of the Anthropocene***, *9*(1). https://doi.org/10.1525/elementa.2020.00107
13. Wang, S., **Tang, W.**, Delage, E., Gifford, S., Whitby, H., González, A. G., ... & Cassar, N. (2021). Investigating the microbial ecology of coastal hotspots of marine nitrogen fixation in the western North Atlantic. ***Scientific Reports***, 11(1), 1-14. https://doi.org/10.1038/s41598-021-84969-1
14. **Tang, W.**, Garcia, E. C., Berthelot, H., Polyviou, D., Wang, S., Baylay, A., Whitby, H., Planquette, H., Mowlem, M., Robidart, J. and Cassar, N (2020). New insights into the distribution of diazotrophs and nitrogen fixation revealed by high-resolution sampling and sensing methods. ***The ISME Journal***. 14(10), 2514-2526. https://doi.org/10.1038/s41396-020-0703-6
15. **Tang, W.** and Cassar, N. (2019). Data-driven modeling of the distribution of diazotrophs in the global ocean. ***Geophysical Research Letters***. 46(21), 12258-12269. https://doi.org/10.1029/2019GL084376
16. **Tang, W.**, Li. Z. and Cassar, N. (2019). Machine learning estimates of global marine nitrogen fixation. ***JGR: Biogeosciences***. *124*, 717– 730. https://doi.org/10.1029/2018JG004828
17. **Tang, W.**, Wang, S., Fonseca-Batista, D., Dehairs, F., Gifford, S., González, A. G., …& Cassar, N. (2019). Revisiting the distribution of oceanic N_2 fixation and estimating diazotrophic contribution to marine production. ***Nature Communications***. *10*(1), 831. https://doi.org/10.1038/s41467-019-08640-0
18. Cassar, N., **Tang, W.**, Gabathuler, H., & Huang, K. (2018). Method for High Frequency Underway N_2 Fixation Measurements: Flow-Through Incubation Acetylene Reduction Assays by Cavity Ring Down Laser Absorption Spectroscopy (FARACAS). ***Analytical Chemistry***, *90*(4), 2839-2851. https://doi.org/10.1021/acs.analchem.7b04977
19. Simonin, M., Colman, B. P., **Tang, W.**, Judy, J. D., Anderson, S. M., Bergemann, C. M., ... & Bernhardt, E. S. (2018). Plant and microbial responses to repeated $Cu(OH)_2$ nanopesticide exposures under different fertilization levels in an agro-ecosystem. ***Frontiers in Microbiology***, *9*, 1769. https://doi.org/10.3389/fmicb.2018.01769

Manuscripts in Progress

1. **Tang, W.**, Tracey, J., Intrator, N., Kunes, M., Lee, J., Wan, X., Jayakumar, A., Ward, B. B. Deoxygenation and warming stimulate nitrous oxide production in estuarine waters. In review.

2. **Tang, W.**, Fortin, S. G., Intrator, N., Kunes, M., Lee, J., Jayakumar, A., Ward, B. B. Oxygen sensitivity of denitrification in aquatic environments. In prep.
3. **Tang, W.**, Fortin, S. G., Intrator, N., Kunes, M., Lee, J., Jayakumar, A., Ward, B. B. Oxygen sensitivity of ammonia oxidation in aquatic environments. In prep.
4. **Tang, W.**, Paulot, F., Stock, C., Dunne J., Ward, B. B. Observation-constrained estimates of nitrification distribution in the global ocean. In prep.
5. Gu, S., Lin, Y., Berthelot, H., Eren, M., **Tang, W.,** Robidart, J., Ducklow, H., Cassar, N. Sedimentary diazotroph contribution to measurable N_2 fixation in Antarctic waters. In revision.

Funding

1. Validating, improving, and assessing marine nitrification under climate change in GFDL's Earth System Model 4 (ESM4). Cooperative Institute for Modeling the Earth System. PI: Bess B. Ward; Post Doc: Weiyi Tang; GFDL collaborators: Fabien Paulot, Charles Stock, John P. Dunne. 2020-2022

Presentations and Posters

2023.7.30– 8.3	**Tang, W.,** Fortin, S., Intrator, N., Lee, J., Kunes, M., Jayakumar, A., Ward, B. Nitrogen recycling and removal in the seasonally hypoxic Chesapeake Bay. The Eighth International Conference on Nitrification and Related Processes (ICoN8). Princeton, NJ, USA.
2023.6.5	**Tang, W.,** Tracey, J., Intrator, N., Kunes, M., Lee, J., Wan, X., Jayakumar, A., Ward, B. Deoxygenation and warming stimulate nitrous oxide production in the Chesapeake Bay. ASLO 2023 Aquatic Sciences Meeting. Palma de Mallorca. Spain. Presented by Bess Ward on behalf of Weiyi Tang
2022.7.7 – 7.10	**Tang, W.** Autonomous observations of phytoplankton bloom by biogeochemical Argo floats. Invited presentation at 19th Chinese-American Kavli Frontiers of Science Symposium. Irvine, CA, USA.
2022.6.27	**Tang, W.** The impact of Australian wildfires on phytoplankton productivity in the Southern Ocean. Invited virtual talk at Climate Geochemistry Seminar in Max Planck Institute for Chemistry (MPIC).
2022.3.4	**Tang, W.**, Paulot, F., Stock, C., Dunne, J., Ward, B. Observation-constrained estimate of nitrification distribution in the global ocean. Oral presentation at virtual 2022 Ocean Sciences Meeting.
2022.3.19	**Tang, W.** & Ward, B. Synthesis of Nitrification and Nitrifiers Observations in the

	Global Ocean. Town Hall session at virtual 2022 Ocean Sciences Meeting.
2021.11.24	**Tang, W.** The impact of Australian wildfires on phytoplankton productivity in the Southern Ocean. Invited virtual talk at Ecology Seminar in Scripps Institution of Oceanography. UC San Diego.
2021.6.25	**Tang, W.**, Tracey, J., Carroll, J., Wallace, E., Lee, J., Edling, S., Nathan, L., Sun, X., Jayakumar, A., Ward., B. Environmental controls on estuarine N_2O cycling at the global and regional scales. Oral presentation at 2021 ASLO virtual meeting.
2021.4.19	**Tang, W.**, Paulot, F., Stock, C., Dunne, J., Ward, B. Marine nitrification under climate change. Invited talk in Atmospheric and Oceanic Sciences, Princeton University and Geophysical Fluid Dynamics Laboratory, Princeton, NJ, USA.
2020.2.19	**Tang, W.**, Mulholland, M., Granger, J., Moisander, P. A global database of diazotrophs and N_2 fixation in the world's ocean. Town Hall session at 2020 Ocean Sciences Meeting, San Diego, CA, USA.
2020.2.17	**Tang, W.** & Cassar, N. Data-driven modeling of the distribution of diazotrophs in the global ocean. Oral presentation at 2020 Ocean Sciences Meeting, San Diego, CA, USA.
2019.6.24 – 6.27	**Tang, W.** & Cassar, N. Data-driven modeling of the distribution of diazotrophs in the global ocean. Poster presentation at 2019 OCB summer workshop, Woods Hole, MA, USA.
2019.3.29	**Tang, W**. New insights into marine nitrogen fixation via high-resolution observations and statistical models. Invited talk in the Department of Geosciences, Princeton University, Princeton, NJ, USA.
2018.6.25 – 6.28	**Tang, W.**, Li, Z. and Cassar, N. Machine learning estimates of nitrogen fixation in the world's oceans. Poster presentation at 2018 OCB summer workshop, Woods Hole, MA, USA.
2018.6.25 – 6.28	Wang, S., **Tang, W.**, Whitby, H., González, A. G., Planquette, H., Gifford, S. Johnson, Z. and Cassar, N. Variability in North Atlantic marine microbial communities in relation to patterns of nutrient availability, nitrogen fixation, and net community production. Poster presentation at 2018 OCB summer workshop,

	Woods Hole, MA, USA.
2018.2.14	**Tang, W.**, Wang, S., Fonseca-Batista, D., Dehairs, F., Gifford, S., González, A. G., Planquette, H., Sarthou, G., Gallinari, M. and Cassar, N. Contrasting distribution of N_2 fixation in open and coastal oceans. Oral presentation in 2018 Ocean Science Meeting, Portland, Oregon, USA.
2014 9.29 – 10.2	Palmer-LTER meeting, Williamsburg, VA, USA.
2014.1	**Tang, W.**, and S.J. Kao. Measuring particulate and dissolved products of marine N_2 fixation in the northern South China Sea. Poster presentation in the 1st Xiamen Symposium on Marine Environmental Sciences (XMAS-I), Xiamen, China.

Scientific Cruises and Fieldwork

2023.11 - 2023.12	Measure nitrification and N_2O cycling in the Eastern Tropical South Pacific Ocean, assess the interactions between nitrogen and sulfur cycling, measure carbon fixation rates, R/V Roger Revelle. Chief Scientist: Bess B. Ward (Princeton)
2022.8	Organize the cruise and lead a team of graduate students to prepare for the cruise and to explore the sensitivity of nitrogen cycling processes to oxygen including nitrification, denitrification and anammox and the response of microbial community to changes in oxygen in the Chesapeake Bay, R/V Hugh Sharp. Chief Scientist: Amal Jayakumar (Princeton)
2021.8	Organize the cruise and lead a team of graduate students to prepare for the cruise and to explore the changes of nitrification, denitrification, anammox, N_2O production and consumption under projected climate change including deoxygenation and warming in the Chesapeake Bay, R/V Hugh Sharp. Chief Scientist: Amal Jayakumar (Princeton)
2020.8	Organize the cruise and lead a team of both undergraduate and graduate students to prepare for the cruise and to explore the distribution of nitrification, N_2O production and consumption in the Chesapeake Bay, R/V Hugh Sharp. Chief Scientist: Amal Jayakumar (Princeton)
2019.10	Ammonia oxidation, N_2O production and consumption in the Chesapeake Bay, R/V Hugh Sharp. Chief Scientist: Amal Jayakumar (Princeton)

2018.8	Continuous measurements of net community production via O_2/Ar using Equilibrator Inlet Mass Spectrometer, molecular sampling for characterizing microbial community structure, and O_2 measurements by Winkler titrations to calibrate BioArgo floats and Seagliders in the northeastern Pacific during EXPORTS cruise, R/V Sally Ride. Chief Scientists: Norm Nelson (UCSB) and Mary Jane Perry (UMaine)
2017.7	Deployment of the updated underway method for continuous N_2 fixation measurements and high frequency collection of molecular samples in the western North Atlantic, R/V Atlantic Explorer. Chief Scientist: Nicolas Cassar (Duke)
2016.8	Underway N_2 fixation measurements and deployment of a towfish system (GeoFish) for trace metal sampling in the Sargasso Sea, R/V Atlantic Explorer, Chief Scientist: Nicolas Cassar (Duke)
2015.8	Test of underway N_2 fixation measurement system in Sargasso Sea, R/V Atlantic Explorer, Chief Scientist: Nicolas Cassar (Duke)
2014.4	Response of marine phytoplankton to atmospheric deposition; N_2 Fixation, primary production and nitrate uptake incubations, R/V Dong Fang Hong 2, Chief Scientist: Peiliang Li (Ocean University of China)
2012.7	Denitrification measurements of water column and sediments in Pearl River and northern South China Sea continuum, R/V Tian Long, Chief Scientist: Biyan He (Jimei University and Xiamen University)

Teaching and Mentoring Experiences

Teaching Assistant for

2022 Spring	Biological Oceanography, Princeton University
2019 Spring	Weather and Climate, Duke University

Undergraduate students supervised

2024.6 – 2023.8	Celia Murphy-Braunstein, Princeton University
	Marlan Zha, Princeton University
	Oleksandr Mykhantso, Princeton University

High Meadows Environmental Institute (HMEI) Internship Program: Analysis of nutrient samples (ammonium, nitrite, nitrate) collected in the eastern tropical South Pacific; DNA and RNA extraction, analysis of nitrate nitrogen isotopes using denitrifier method to determine nitrite oxidation rates.

2023.6 – 2023.8 Lindsay Pagaduan, Princeton University

High Meadows Environmental Institute (HMEI) Internship Program: Analysis of nutrient samples collected in the subpolar North Atlantic; Preparation for Eastern Tropical South Pacific cruise

2022.7 – 2022.12 Elizabeth Wallace, Princeton University alumnus

Research Internship: The distribution and transport of nitrous oxide (N_2O) in the subpolar North Atlantic

2022.2 – 2022.6 Kyle Singh, University of Pennsylvania

Research Internship: The distribution and cycling of nitrogen nutrients in the Chesapeake Bay

2020.10 – 2021.5 William Ueberroth, Princeton University

Senior Thesis: Environmental Controls on N_2O Concentration and Emissions in Global Estuaries

2019.11 – 2021.5 Levy Nathan, Princeton University

Junior Thesis: Investigating Spatial and Temporal Patterns of Water Parameters in the Chesapeake Bay

Senior Thesis: A Dive into the Chesapeake Bay: An Investigation of the Parameters Shaping Nitrous Oxide Distribution

2020.6 – 2020.8 Sean Edling, Princeton University

High Meadows Environmental Institute (HMEI) Internship Program: Synthesis and Meta-analysis of N_2O Observations in the Global Estuaries

Outreach and Service

2023.7.30	Organizer of Early Career & Graduate Student Workshop in The Eighth International Conference on Nitrification and Related Processes (ICoN8). Princeton, NJ, USA.
2019.10 – present	Member of the Princeton Postdoctoral Council. Hosting professional and social events for postdoctoral community at Princeton University. e.g., organizing monthly welcome events for new postdocs.
2016-2017	Volunteering in STEM Days events for K-12 students at the Museum of Life and Science in Durham. e.g., Participating in the Wetlands Activity and introducing the concept of water pH or acidity and explaining the effects of changing environment like pH on organisms living in the wetlands to over 1000 students.

Professional Memberships

2016 – present The Oceanography Society

Review for

National Science Foundation, The Royal Society, Nature Climate Change, Nature Communications, The ISME Journal, Global Biogeochemical Cycles, Frontiers in Marine Sciences, Ocean Dynamics, Atmosphere-Ocean, Journal of Geophysical Research: Ocean, Limnology and Oceanography Letters, Biogeosciences, Remote Sensing of Environment, Geophysical Research Letters, Environmental Microbiology, Earth System Data Science, Marine Pollution Bulletin, Communication Biology