YIXUAN SONG

Postdoctoral Research Fellow
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Graduate School of Oceanography
University of Rhode Island
215 South Ferry Road
Narragansett, RI 02882

EDUCATION

Pennsylvania State University *University Park, PA*
Ph.D., Mechanical Engineering May 2023
Dissertation: Determination of Marine Aggregate Fragmentation Strength through Laboratory and Field Methods
Advisor: Dr. Matthew J. Rau

University of Southern California *Los Angeles, CA*
M.S., Mechanical and Aerospace Engineering May 2018
Master's Project: Numerical Simulations on Permeability of Porous Structures
Advisor: Dr. Mitul Luhar

Shanghai Jiao Tong University *Shanghai, China*
B.S., Mechanical Engineering Aug 2016
Studied at the University of Michigan–Shanghai Jiao Tong University Joint Institute (UMJI)

RESEARCH FOCUS

Autonomous Instrumentation & Sensing
Quantitative Imaging & Experimental Diagnostics
Experimental Fluid Mechanics
Particle–Flow Interactions & Transport

POSITIONS HELD

Postdoctoral Research Fellow Jun 2023–Present
University of Rhode Island *Narragansett, RI*
Working with Dr. Melissa Omand, Graduate School of Oceanography

Graduate Research/Teaching Assistant Aug 2018–May 2023
Pennsylvania State University *University Park, PA*

Graduate Teaching Assistant & Grader Jan 2017–May 2018
University of Southern California *Los Angeles, CA*

Engineering Intern Dec 2015–May 2016
Fiat Chrysler Automobiles *Shanghai, China*

PEER-REVIEWED PUBLICATIONS

8. **Y. Song**, M. Omand, C. A. Durkin, M. L. Estapa, D. K. Steinberg (2026). Diel Dynamics of Zooplankton Fecal Pellet Flux Revealed by Integrated in situ Imaging Observations and Modeling. *Limnology and Oceanography Letters*, 11(4), e70148. doi.org/10.1002/lol2.70148

7. **Y. Song**, M. Omand, C. Durkin, M. Estapa, K. Buesseler (2025). GelCam: Visualizing Sinking Particle Flux via a Polyacrylamide Gel-Based Sediment Trap. *Limnology and Oceanography: Methods*, 23(10), 715–728. doi.org/10.1002/lom3.10724

6. K. Ziervogel, J. A. Sweet, **Y. Song**, L. Bretherton, M. Rau, A. Quigg, U. Passow (2025). Sink or break: Oil increases resistance of phytoplankton aggregates to fragmentation. *Limnology and Oceanography Letters*, 10(1), 73–81.
doi.org/10.1002/lol2.10454

5. **Y. Song**, A. Burd, M. Rau (2023). Deformation of marine snow enables its disaggregation in simulated oceanic shear. *Frontiers in Marine Science*, 10, 1224518.
doi.org/10.3389/fmars.2023.1224518

4. **Y. Song**, M. Rau (2022). A novel method to study the fragmentation behavior of marine snow aggregates in controlled shear flow. *Limnology and Oceanography: Methods*, 20(10), 618–632.
doi.org/10.1002/lom3.10509

3. **Y. Song**, M. Rau (2020). Disruption Behavior of Aggregates in a Rotating/Oscillating Cylindrical Tank and Implications for Particle Transport in the Ocean. *Fluids Engineering Division Summer Meeting*, V002T04A010.
doi.org/10.1115/FEDSM2020-20237

2. **Y. Song**, M. Rau (2020). Viscous fluid flow inside an oscillating cylinder and its extension to Stokes' second problem. *Physics of Fluids*, 32(4), 043601.
doi.org/10.1063/1.5144415

1. **Y. Song**, M. Rau (2019). Characterization of Aggregate Disruption Using Organic Marine Particles and Particle Tracking Measurements in Rotating/Oscillating Aggregation Tanks. *ASME–JSME–KSME Joint Fluids Engineering Conference 2019*, V005T05A066.
doi.org/10.1115/AJKFluids2019-5499

Preprints and Manuscripts in Preparation

3. M. Omand, **Y. Song**, C. Thomas, M. Sprague, E. Sousa, G. Fischer. MINION: A Low-Cost Autonomous Lagrangian Platform for In Situ Ocean Observation. *Manuscript in preparation.*

2. **Y. Song**, M. Omand, C. Thomas, S. Edirisinghe, M. Estapa, N. Haëntjens, C. Durkin, F. Lecaros, S. O'Neil. Assessment of in situ open-face particle flux cameras and implications for autonomous onboard analysis. *Manuscript in preparation.*

1. **Y. Song**, M. Omand, M. Estapa, E. D'Asaro, C. Durkin, C. Lee, D. Siegel. Episodic particle export revealed by combining imaging and optics, including the first deployment of an open-faced flux camera ("SnoCam") *Under review.*
doi.org/10.22541/essoar.15011391/v1

PRESENTATIONS

Conference and Workshop Presentations

17. **Y. Song**, M. Omand, (2026). Visualizing Ocean Particle Flux with Low-Cost Imaging Systems. *Workshop on Low-Cost Ocean Instrumentation*, Woods Hole Oceanographic Institution, Woods Hole, MA.

16. **Y. Song**, M. Omand, C. A. Durkin, M. L. Estapa, D. K. Steinberg (2026). Resolving Diel Fecal Pellet Flux with in situ Imaging and a Migration–Sinking Model. *ASLO-SIL 2026 Joint Meeting*, Montreal, Quebec, Canada.

15. M. Estapa, C. Durkin, S. Edirisinghe, N. Haëntjens, P. Kelly, F. Lecaros, M. Omand, S. O'Neil, **Y. Song** (2026). Can imaging sediment traps predict differences in the remineralization depths of sinking POC and PON? *Ocean Sciences Meeting*, Glasgow, Scotland.

14. **Y. Song**, M. Omand, C. Durkin, M. Estapa, K. Buesseler (2024). Quantifying the carbon flux through sediment trap time-lapse imaging with a Lagrangian particle tracking method. *Ocean*

Sciences Meeting, New Orleans, LA.

13. **Y. Song**, M. Rau, A. Burd (2024). Role of deformation in disaggregation and adhesive strength within laboratory-made marine snow aggregates. *Ocean Sciences Meeting*, New Orleans, LA.
12. **Y. Song**, A. Burd, M. Rau (2023). Particle aggregate deformation and its role in disaggregation due to hydrodynamic shear. *APS Division of Fluid Dynamics Meeting*, Washington, DC.
11. K. Larrieu, **Y. Song**, M. Rau, A. Forrest, G. Schladow (2023). Suspended Particulate Matter Aggregation in a Large, Oligotrophic, Freshwater Lake. *AGU Fall Meeting*, San Francisco, CA.
10. E. Davies, A. Nimmo-Smith, R. Nepstad, T. Nordam, U. Brönner, A. Steinvik, S. Giering, M. Masoudi, Z. Liu, P. Hélaouët, K. Cursons, M. Rau, **Y. Song**, A. Mostaani, K. Barstein, D. Buscombe (2023). PyOPIA: A Python Ocean Particle Image Analysis toolbox. *Particles in Europe*, Heraklion, Crete, Greece.
9. **Y. Song**, A. Burd, M. Rau (2022). Deformation and fragmentation behaviors of phytoplankton and plastic particle aggregates. *APS Division of Fluid Dynamics Meeting*, Indianapolis, IN.
8. **Y. Song**, A. Burd, M. Rau (2022). The effect of phytoplankton species on morphology and strength of laboratory-cultured marine snow aggregates. *Ocean Sciences Meeting*, virtual.
7. M. Rau, **Y. Song** (2022). How we are combining novel in situ strength measurements and sampling with detailed laboratory investigations to clarify the complexities of marine snow disaggregation. *Ocean Sciences Meeting*, virtual.
6. **Y. Song**, A. Burd, M. Rau (2021). Study of shear-induced deformation and fragmentation of laboratory-cultured marine aggregates. *APS Division of Fluid Dynamics Meeting*, Phoenix, AZ.
5. **Y. Song**, A. Burd, M. Rau (2021). Experimental study of the morphology and breakage of laboratory-cultured marine snow particles. *Aquatic Sciences Meeting*, virtual.
4. **Y. Song**, M. Rau (2020). Experimental characterization of the breakup strength of marine diatom aggregates in oscillatory shear flow. *APS Division of Fluid Dynamics Meeting*, virtual.
3. **Y. Song**, M. Rau (2020). Disruption Behavior of Aggregates in a Rotating/Oscillating Cylindrical Tank. *Fluids Engineering Division Summer Meeting*, virtual.
2. M. Rau, **Y. Song**, S. Ackleson (2020). A Path Towards Modeling Marine Particle Disaggregation through in situ Measurements of Fragmentation Strength. *Ocean Sciences Meeting*, San Diego, CA.
1. **Y. Song**, M. Rau (2019). Characterization of a rotating/oscillating tank for studying particle aggregation. *Fluids Engineering Division Summer Meeting*, San Francisco, CA.

Posters

7. S. Edirisinghe, C. Durkin, N. Haëntjens, F. Lecaros, E. Offerdahl, M. Omand, S. O'Neil, **Y. Song**, M. Estapa (2026). Insights into particle flux attenuation using in situ imaging (SnoCam+) and sediment traps. *Ocean Sciences Meeting*, Glasgow, Scotland.
6. **Y. Song**, M. Omand, C. Durkin, M. Estapa, K. Buesseler (2024). GelCam: Visualizing Episodic Sinking Particle Flux via a Polyacrylamide Gel-Based Sediment Trap. *Ocean Carbon and Biogeochemistry Summer Workshop*, Woods Hole, MA.
5. M. Estapa, S. Edirisinghe, C. Durkin, N. Haëntjens, F. Lecaros, M. Omand, S. O'Neil, W. Slade, **Y. Song** (2024). Optical and imaging sensors for marine snow. *Ocean Optics XXVI*, Las Palmas de Gran Canaria, Spain.
4. S. Edirisinghe, **Y. Song**, E. Sousa, P. Roberts, N. Haëntjens, M. Omand, C. Durkin, M. Estapa (2024). SnoCam+: An open-source, trap-deployable imaging system for sinking particles in the ocean. *Ocean Sciences Meeting*, New Orleans, LA.
3. **Y. Song**, M. Rau (2020). Shear-Generating Roller Tanks for Studying Marine Snow Disaggregation.

Ocean Sciences Meeting, San Diego, CA.

2. **Y. Song**, M. Rau (2019). Characterization of aggregate disruption using organic marine particles in rotating/oscillating aggregation tanks. *The College of Engineering Research Symposium*, University Park, PA.

1. M. Rau, **Y. Song**, S. Ackleson (2018). Understanding marine aggregate disruption dynamics with novel in situ breakup measurements. *AGU Fall Meeting*, Washington, DC.

Invited Talks and Seminars

3. Experimental Study on Shear-Induced Fragmentation of Marine Snow Aggregates and Perspectives on in situ Lagrangian Tracking. *Physical Oceanography Seminar*, Ocean University of China, Qingdao, China. September 12, 2025.

2. Breaking Down and Sinking Through: Mechanisms and Fluxes of Marine Snow. *WHOI Physical Oceanography Seminar*, Woods Hole Oceanographic Institution, Woods Hole, MA. June 10, 2025.

1. The effect of phytoplankton species on morphology and strength of laboratory-cultured marine snow aggregates. *Fluid Dynamics Research Consortium*, Pennsylvania State University, University Park, PA. January 20, 2022.

AWARDS

EMERGE Scholarship, Marine Technology Society	2025
Kulakowski Travel Award, Penn State	2019
Undergraduate Student Award, SJTU	2014, 2015
Merit Student, SJTU	2014
First Prize in Physics Olympiad, Jiangsu, China	2010, 2011
First Prize in Mathematics Olympiad, Jiangsu, China	2011

FIELD & VESSEL OPERATIONS

Research Scientist 2025
One 7-day cruise, New England Slope, R/V *Endeavor*.

Research Scientist 2024
Seven single-day cruises, Monterey Bay, CA, R/V *Paragon*.

Research Scientist 2022
One 12-day cruise, Gulf of Maine, R/V *Hugh R. Sharp*, OCE-1948283.

Research Scientist 2022
Two single-day cruises, Lake Tahoe, CA, R/V *Bob Richards*.

TEACHING

Teaching Assistant & Guest Lecturer 2019
Pennsylvania State University
Heat Transfer (ME 410)

Teaching Assistant 2018
University of Southern California
Aircraft Structures Analysis (AME 529)

PROFESSIONAL MEMBERSHIPS

American Physical Society, American Geophysical Union, Association for the Sciences of Limnology and Oceanography, American Society of Mechanical Engineers, The Oceanography Society, Marine Technology Society.

ACADEMIC SERVICE

Peer Review

Limnology and Oceanography, Limnology and Oceanography: Methods, IEEE Journal of Oceanic Engineering, Journal of Geophysical Research: Oceans, Physics of Fluids, IEEE Transactions on Industrial Informatics, Proceedings of the Royal Society A.

Reviewer for the NSF Biological Oceanography Program.

Research Community

Ocean Sciences Meeting Student Presentation Evaluation Program, *New Orleans, LA* 2024
Presentation & Poster Reviewer

Geosciences Education & Mentorship Support 2023–2025
Mentor

Ocean Sciences Meeting, *virtual* 2022
Student Coordinator

Aquatic Sciences Meeting, *virtual* 2021
Student Coordinator

School and University Service

URI Graduate School of Oceanography Physical Oceanography Seminar, Narragansett, RI 2024–2025
Coordinator

The College of Engineering Research Symposium, University Park, PA 2020
Presentation Judge

The College of Engineering Research Symposium, University Park, PA 2019
Poster Judge