May 22$^{\text{th}}$, 2024

Georgy Manucharyan

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EDUCATION

Ph.D., Atmosphere Oceans & Climate Dynamics (with *Distinction*), 2014
Department of Geology & Geophysics, Yale University, New Haven, CT, USA.

B.S., Applied Physics and Mathematics (with *Honors*), 2007
Department of Aerophysics and Space Research,
Moscow Institute of Physics and Technology, Dolgoprudny, Russia.

ACADEMIC POSITIONS

- Associate Professor, University of Washington, School of Oceanography   09/2024 – present
- Assistant Professor, University of Washington, School of Oceanography   09/2019 – 09/2024

Research directions: Mesoscale and Submesoscale Ocean Turbulence, Geophysical Fluid Dynamics, Deep Learning, Floe-Scale Sea Ice Dynamics, Ice-Ocean Interactions, Remote Sensing.

- Foster and Coco Stanback Postdoctoral Fellow, California Inst. of Technology   2015–2019
Research topic: *"Meso- and Sub-Mesoscale Ocean Dynamics Under Sea Ice"*
Mentor: Andrew Thompson (Caltech).

- Weston Howland Jr. Postdoctoral Scholar, Woods Hole Oceanographic Institution 2014-2015
Research topic: *"Beaufort Gyre Dynamics"*
Mentor: Michael Spall (WHOI).

- Graduate Research Fellow, Yale University   2008–2014
PhD thesis:*"The Role of Upper-Ocean Mixing in Large-Scale Ocean and Climate Dynamics"*
M. Phil thesis: *"Oceanic Response to Tropical Cyclones"*
Advisor: Alexey Fedorov (Yale University).

PUBLICATIONS

Google Scholar

Led or co-lead by
student*
postdoc

- Martin*, S. A., **Manucharyan, G. E.,** & Klein, P. (2024). Deep Learning Improves Global Satellite Observations of Ocean Eddy Dynamics. *Geophysical Research Letters*, (under review). <u>Contributions</u>: Conceptualization, Analysis, Methods, Writing.

- Prend, C.J., MacGilchrist, G.A., **Manucharyan, G.E.**, Pang, R.Q., Moorman, R., Thompson, A.F., Griffies, S.M., Mazloff, M.R., Talley, L.D. and Gille, S.T. (2024), Ross Gyre variability modulates oceanic heat supply toward the West Antarctic continental shelf. *Communications Earth & Environment*, 5(1), pp.1-10. <u>Contributions</u>: Conceptualization, Analysis.

- Shrestha, K., **Manucharyan, G.E.** and Nakayama, Y. (2024), Submesoscale variability and basal melting in ice shelf cavities of the Amundsen Sea, *Geophysical Research Letters*, 51(3), p.e2023GL107029. <u>Contributions</u>: Conceptualization, Analysis, Methods, Writing.

- Montemuro, B. P., and **Manucharyan, G. E.** (2023), SubZero: a Discrete Element Sea Ice Model That Simulates Floes as Evolving Concave Polygons, *Journal of Open Source Software*, 8(88), 5039. <u>Contributions</u>: Conceptualization, Analysis, Methods.

- Solodoch, A., Stewart, A. L., McC. Hogg, A., & **Manucharyan, G. E.** (2023). Machine Learning-Derived Inference of the Meridional Overturning Circulation From Satellite-Observable

Variables in an Ocean State Estimate. *Journal of Advances in Modeling Earth Systems*, 15(4), e2022MS003370. <u>Contributions</u>: Conceptualization, Analysis.

- Martin*, S. A., **Manucharyan, G. E.**, & Klein, P. (2023). Synthesizing Sea Surface Temperature and Satellite Altimetry Observations Using Deep Learning Improves the Accuracy and Resolution of Gridded Sea Surface Height Anomalies. *Journal of Advances in Modeling Earth Systems*, 15(5), e2022MS003589. <u>Contributions</u>: Conceptualization, Analysis, Methods, Writing.

- **Manucharyan, G. E.**, & Montemuro, B. P. (2022). SubZero: A Sea Ice Model with an Explicit Representation of the Floe Life Cycle. *Journal of Advances in Modeling Earth Systems*, 14, e2022MS003247. <u>Contributions</u>: Conceptualization, Analysis, Methods, Writing.

- Dijkstra, H.A., **Manucharyan, G. E.**, & Moon, W. (2022). Eddy memory in weakly nonlinear two-layer quasi-geostrophic ocean flows. *European Physical Journal Plus*, 137, 1162. <u>Contributions</u>: Conceptualization, Analysis.

- **Manucharyan, G. E.**, & Stewart, A. L. (2022). Stirring of interior potential vorticity gradients as a formation mechanism for large subsurface-intensified eddies in the Beaufort Gyre. *Journal of Physical Oceanography*, 52(12), 3349-3370. <u>Contributions</u>: Conceptualization, Analysis, Methods, Writing.

- **Manucharyan, G. E.**, Lopez-Acosta, R., & Wilhelmus, M. M. (2022). Spinning ice floes reveal intensification of mesoscale eddies in the western Arctic Ocean. *Scientific Reports*, 12(1), 1-13. <u>Contributions</u>: Conceptualization, Analysis, Methods, Writing.

- **Manucharyan, G. E.**, & Thompson, A. F. (2022). Heavy footprints of upper-ocean eddies on weakened Arctic sea ice in marginal ice zones. *Nature Communications*, 13(1), 1-10. <u>Contributions</u>: Conceptualization, Analysis, Methods, Writing.

- Chen, N., Fu, S., & **Manucharyan, G. E.** (2022). An efficient and statistically accurate Lagrangian data assimilation algorithm with applications to discrete element sea ice models. *Journal of Computational Physics*, 455, 111000. <u>Contributions</u>: Conceptualization, Analysis.

- Shrestha, K. & **Manucharyan, G. E.** (2022). Parameterization of submesoscale mixed layer restratification under sea ice, *Journal of Physical Oceanography*, 52(3), 419-435. <u>Contributions</u>: Conceptualization, Analysis, Methods, Writing.

- W. Moon, **Manucharyan, G. E.**, & H. Dijkstra (2022) Baroclinic instability and large-scale wave propagation on planetary-scale atmosphere, *Quarterly Journal of the Royal Meteorological Society*, 809-825. <u>Contributions</u>: Conceptualization, Analysis.

- N. Chen, Fu, S. & **Manucharyan, G. E.** (2021). Lagrangian Data Assimilation and Parameter Estimation of a Simple Sea Ice Discrete Element Model, *Journal of Advances in Modeling Earth Systems*, 13(10). <u>Contributions</u>: Conceptualization, Analysis.

- W. Moon, **Manucharyan, G. E.**, & H. A. Dijkstra (2021). Eddy memory as an explanation of intraseasonal periodic behaviour in baroclinic eddies, *Quarterly Journal of the Royal Meteorological Society*, 147, 2395–2408. <u>Contributions</u>: Conceptualization, Analysis, Writing.

- A. Kubryakov, Kozlov, I. & **Manucharyan, G. E.** (2021). Large mesoscale eddies in the Western Arctic Ocean from satellite altimetry measurements, *Journal of Geophysical Research: Oceans*, 126(5). <u>Contributions</u>: Analysis, Writing.

- **George*, T.M.**, **Manucharyan, G.E.**, & Thompson, A.F. (2021), Deep learning to infer eddy heat fluxes from sea surface height patterns of mesoscale turbulence, *Nature Communications*, 12, 800. <u>Contributions</u>: Conceptualization, Analysis, Methods, Writing.

- **Kenigson*, J. S.**, Gelderloos, R., & **Manucharyan, G. E.** (2021). Vertical Structure of the Beaufort Gyre Halocline and the Crucial Role of the Depth-Dependent Eddy Diffusivity, *Journal of Physical Oceanography*, 51(3), 845-860. <u>Contributions</u>: Conceptualization, Analysis, Methods, Writing.

- **Manucharyan, G. E.**, Siegelman, L., & Klein, P. (2021), A deep learning approach to spatiotemporal sea surface height interpolation and estimation of deep currents in geostrophic ocean turbulence. *Journal of Advances in Modeling Earth Systems*, 13, e2019MS001965. <u>Contributions</u>: Conceptualization, Analysis, Methods, Writing.

- Kozlov, I. E., Plotnikov, E. V., & **Manucharyan, G. E.** (2020). Brief Communication: Mesoscale and submesoscale dynamics in the marginal ice zone from sequential synthetic aperture radar observations. *The Cryosphere*, 14(9), 2941-2947. <u>Contributions</u>: Conceptualization, Analysis, Writing.

- Armitage, T.W.K., **Manucharyan, G.E.**, Petty A.A., et al. (2020), Enhanced eddy activity in the Beaufort Gyre in response to sea ice loss, *Nature Communications*,11, 761. <u>Contributions</u>: Conceptualization, Analysis, Methods, Writing.

- Nakayama, Y., **Manucharyan, G.E.**, et al. (2019), Pathways of ocean heat towards Pine Island and Thwaites grounding lines, *Scientific Reports*, Nov 22, 9(1):1-9. <u>Contributions</u>: Conceptualization, Analysis, Writing.

- Proshutinsky, A., et al. including **Manucharyan, G.E.** (2019), Analysis of the Beaufort Gyre Freshwater Content in 2003–2018, *Journal of Geophysical Research: Oceans*,124. <u>Contributions</u>: Analysis, Writing.

- Kozlov, I.E., Artamonova, A.V., **Manucharyan, G. E.,** and Kubryakov, A.A., (2019), Eddies in the Western Arctic Ocean from spaceborne SAR observations over open ocean and marginal ice zones, *Journal of Geophysical Research: Oceans*, 124, 6601–6616. <u>Contributions</u>: Conceptualization, Analysis, Writing.

- **Manucharyan, G. E.,** and Isachsen P. E. (2019), Critical role of continental slopes in halocline and eddy dynamics of the Beaufort Gyre, *Journal of Geophysical Research: Oceans*, 124, no. 4. <u>Contributions</u>: Conceptualization, Analysis, Methods, Writing.

- Zhao, M., Timmermans, M.-L., Krishfield, R., & **Manucharyan, G. E.** (2018), Partitioning of kinetic energy in the Arctic Ocean's Beaufort Gyre. *Journal of Geophysical Research: Oceans*, 123, 4806–4819. <u>Contributions</u>: Analysis, Writing.

- Ardhuin, F. et al. including **Manucharyan, G.E.** (2018), Measuring currents, ice drift, and waves from space: the Sea surface KInematics Multiscale monitoring (SKIM) concept, *Ocean Science*, 14.3, 337–354. <u>Contributions</u>: Methods.

- **Manucharyan G.E.** & A.F. Thompson (2017), Submesoscale sea ice-ocean interactions in marginal ice zones, *Journal of Geophysical Research: Oceans*, 122, 9455–9475. <u>Contributions</u>: Conceptualization, Analysis, Methods, Writing.

- **Zhu*, P.**, **Manucharyan, G.E.** , Thompson, A.F., Goodman, J.C. & Vance, S.D. (2017), The influence of meridional ice transport on Europa's ocean stratification and heat content, *Geo-

physical Research Letters, 44, 5969–5977. <u>Contributions</u>: Conceptualization, Analysis, Methods, Writing.

● **Manucharyan G.E.**, A.F. Thompson, & M.A. Spall, (2017), Eddy-Memory mode of multi-decadal variability in residual-mean ocean circulations with an application to the Beaufort Gyre, *Journal of Physical Oceanography*, 47, 855–866. <u>Contributions</u>: Conceptualization, Analysis, Methods, Writing.

● **Manucharyan G.E.**, M.A. Spall, & A.F. Thompson (2016), A theory of the wind-driven Beaufort Gyre variability, *Journal of Physical Oceanography*, 46, 3263-3278. <u>Contributions</u>: Conceptualization, Analysis, Methods, Writing.

● **Manucharyan G.E.** & M.A. Spall (2016), Wind-driven freshwater buildup and release in the Beaufort Gyre constrained by mesoscale eddies, *Geophysical Research Letters*, 43(1),pp 273–282. <u>Contributions</u>: Conceptualization, Analysis, Methods, Writing.

● **Manucharyan G.E.** & C.P. Caulfield (2015), Entrainment and mixed-layer dynamics of a surface-stress-driven stratified fluid, *Journal of Fluid Mechanics*, 765, pp 653–667. <u>Contributions</u>: Conceptualization, Analysis, Methods, Writing.

● **Manucharyan G.E.** & A.V. Fedorov (2014), Robust ENSO across a wide range of climates, *Journal of Climate*, 27, 5836–5850. <u>Contributions</u>: Conceptualization, Analysis, Methods, Writing.

● **Manucharyan G.E.**, W. Moon, F. Sévellec, A.J. Wells, J.-Q. Zhong, & J.S. Wettlaufer (2014), Steady turbulent density currents on a slope in a rotating fluid, *Journal of Fluid Mechanics*, 746, pp 405–436. <u>Contributions</u>: Conceptualization, Analysis, Methods, Writing.

● **Manucharyan G.E.** & M.-L. Timmermans (2013), Generation and separation of mesoscale eddies from surface ocean fronts, *Journal of Physical Oceanography*, 43, 2545–2562. <u>Contributions</u>: Conceptualization, Analysis, Methods, Writing.

● **Manucharyan G.E.**, C.M. Brierley, & A.V. Fedorov (2011), Climate impacts of intermittent upper ocean mixing induced by tropical cyclones, *Journal of Geophysical Research*, 116, C11038. <u>Contributions</u>: Conceptualization, Analysis, Methods, Writing.

● **Manucharyan G.E.** (2010), Dynamics of the Mixed Layers in Stratified Shear Flows, WHOI GFD Summer School, Ann. Proc. Vol. 2010, pp 240–259 [NOT peer-reviewed]. <u>Contributions</u>: Conceptualization, Analysis, Methods, Writing.

	UW, Computing for the Environment, *"Deep Learning for Massive Compression of Climate Model Simulations and Data"*, PI: G.E. Manucharyan, Co-I: S. Wang (UW), **$55K**.	2022
	NASA, OSTST, *"Exploring the plausibility and limitations of SSH interpolation with deep learning"* PI: G.E. Manucharyan, **$653K to UW.**	2021–2025
	NASA, FINESST, *"Inferring ocean energy transfers in submesoscale currents using high-resolution satellite sea ice observations"* FI: Kitty Wang, PI: G.E. Manucharyan, **$135K to UW**.	2020–2023
	ONR MURI, *"Mathematics and Data Science for Improved Physical Modeling and Prediction of Arctic Sea Ice"*, PI: D. Giannakis (Dartmouth), $7.5M, of which **$1M to UW**.	2019-2023
	NSF, OCE *"Submesoscale Sea Ice-Ocean Interactions in Marginal Ice Zones"*, PIs: A.F. Thompson (Caltech) and G.E. Manucharyan, $540K, of which **$480K to UW**.	2018-2020
	NSF, XSEDE, computing grant, *"The role of the continental slope in the wind-driven eddy dynamics of the Beaufort Gyre"*, **$26.5K**.	2016

TRAINING & DEVELOPMENT	**• Geophysical Fluid Dynamics** GFD Summer School at WHOI – Fellow Research topic: *"Dynamics of the Mixed Layers in Stratified Sheared Flows"* Mentor: Colm-cille Caulfield (University of Cambridge).	2010
	• Field Experience CLIVAR Carbon and Hydrographic Oceanography Cruise, R/V Melville (PO2, leg 2), Chief Scientist: Sabine Mecking (University of Washington).	2013
	• Leadership *"New Generation of Polar Scientists Leadership Symposium"*, Catalina Island, CA	2015
	"Marine Geoscience Leadership Symposium", Consortium for Ocean Leadership, Washington D.C.	2015

FELLOWSHIPS & AWARDS	National Science Foundation (NSF) CAREER Award.	2024
	Foster and Coco Stanback Postdoctoral Fellowship, California Institute of Technology.	2014
	Weston Howland Jr. Postdoctoral Scholarship, Woods Hole Oceanographic Institution.	2014
	Philip M. Orville Prize *"For recognition of outstanding research and scholarship in the Earth Sciences"*, Yale University.	2014
	Elias Loomis Prize for *"Excellence in Studies of Physics of the Earth"*, Yale University.	2011
	Charlton Dows Cooksey Jr. Memorial Fellowship, Yale University.	2010–2012
	Geophysical Fluid Dynamics Fellowship, Woods Hole Oceanographic Institution.	2010
	Bateman Fellowship, Yale University.	2008

TEACHING EXPERIENCE	**•University of Washington, Seattle, WA** [Course Instructor]	
	Introduction To Field Oceanography, OCEAN 220	2024
	Introduction To Fluid Dynamics, OCEAN 511 A and ATM S 505 A	2023
	Geophysical Fluid Dynamics II, OCEAN 513	2023
	Physics Across Oceanography: Fluid Mechanics And Waves, OCEAN 285	2022

Physics Across Oceanography: Fluid Mechanics And Waves Laboratory, OCEAN 286	2022
Introduction To Field Oceanography, OCEAN 220	2022
Introduction To Fluid Dynamics, OCEAN 511 A and ATM S 505 A	2021
Geophysical Fluid Dynamics II, OCEAN 513	2021
Topics In Physical Oceanography, OCEAN 569	2021
Special Topics In Oceanography, OCEAN 240	2020
Introduction To Field Oceanography, OCEAN 220	2020
Physics Across Oceanography: Fluid Mechanics And Waves, OCEAN 285	2020
Integrative Oceans, OCEAN 210	2020

●**Yale University, New Haven, CT** [Graduate TA and/or Guest Lecturer]

Physical Oceanography	2010,11,13,14
Introduction to Concepts in Geology & Geophysics	2013
Asymptotic Methods	2012
Physics of Weather and Climate	2012
Atmosphere, Ocean, and Environmental Change	2009

● **Physics & Technology Evening High School, MIPT, Russia**

Advanced Mathematics – Lecturer	2007–2008
Physics, Mathematics – Correspondence School Grader	2004–2005

MENTORING

● **Graduate Students at UW**

Scott Martin, Altimetry and Deep Learning, KE cascade, Frontal Dynamics	2021–
Yang Wang, Submesoscale dynamics diagnosed from satellite sea ice observations	2019–23

● **Postdoctoral Scientists at UW**

Channing Prend, Submesoscale dynamics in Southern Ocean marginal ice zones	2022–24
Brandon Montemuro, Development of a floe-resolving sea ice model, SubZero	2019–24
Kalyan Shrestha, Parameterization of submesoscale restratification under sea ice	2019–22

● **Graduate Student Committee at UW**

Cassia Cai, Physical Oceanography	2021–
Georges Kanaan, Biological Oceanography	2021–23
Ryan Eastmann, Atmospheric Science	2020-21
Maleen Kidiwela, Marine Geology and Geophysics	2019–
Ethan Campbell, Physical Oceanography	2019–24
Samuel Brenner, Physical Oceanography	2019–22

● **Undergraduate Students at UW**

Roy An, Temporal evolution of ocean fronts	2024
Cody Cruz, Beaching probabilities of surface drifters as proxies for plastic waste	2023-24
Kayla Robertson, Connectivity patterns between global ocean and coastal areas	2023-24
Lisa Li, Diagnosing eddy memory kernels in mesoscale turbulence	2022
Robin Chartrand, Satellite image analysis of sea ice and ocean filaments	2022-24
Yuna Liu, Discrete element sea ice modeling	2022
Yaoning Yu, Reconstruction of under-ice ocean currents using ML	2022
Murray Kang, Reconstruction of under-ice ocean currents using ML	2022
Camille Viviani, Floe size distribution in Nares Strait	2022-23
James Kunetz, Science communication and writing	2021
Snehal Shokeen, GFD lab experiments using "optical altimetry"	2020

● **High school interns**

Aaron Rashid, International Community School, Kirkland, WA.   2024
Segmentation of ocean fronts.

Nilesh Sathyanarayanan, Skyline High School in Sammamish, WA.   2023-24
Science communication on sea ice dynamics. Machine learning of QG equations

Bohan Yao, UW Robinson Center Transition School.   2022
Evolution of shapes of interacting clusters of ideal vortices.

• Summer Undergraduate Interns

Dylan Epsteingross (Princeton), SST interpolation at hourly timescales   2023
Maya Avida (Princeton), Short-term prediction of mesoscale ocean turbulence   2023
Krista M. Matuska (UW), Role of sea ice in inertial oscillations   2023
Anna Luna Fisher Lopez (Stanford), Ice-ocean interactions in the Southern Ocean   2023
Hugh Shields (Princeton), Modeling pancake ice formation mechanisms.   2023

• Graduate and Undergraduate Summer School Students

Tom George, Caltech SURF, Estimation of eddy heat fluxes with Deep Learning   2018
Jessica Kenigson, GFD Summer School at WHOI, Beaufort Gyre halocline   2017
Robert Fajber, GFD Summer School at WHOI, Seing the ocean through sea ice   2017
Peiyun Zhu, Caltech SURF, Salinity-driven meridional circulation in Europa's ocean   2016

• Students Mentored Remotely

Shivam Jha, B.S., Indian Inst. of Tech., Dhanbad, Ocean dynamics in sea ice leads   2022
Shuai Meng, M.S., U. Penn., ML reconstruction of the Southern Ocean overturning   2021
Rosalinda Lopez-Acosta, Ph.D., UC Riverside, Ocean dynamics and sea ice floes   2019-21

LEADERSHIP & SERVICE	• NSF Collaborations in Artificial Intelligence and Geosciences (CAIG) Panel — 2024
	• UW Office of Research Cyberinfrastructure Governance Board, Hyak Voting Member 2023-25
	• Director Search Committee, UW School of Oceanography — 2024
	• MGG Faculty Search Committee, UW School of Oceanography — 2024
	• Faculty Council, UW School of Oceanography — 2024
	• AGU Annual Meeting, Session Chair for *"Sea Ice Processes"* — 2023,24
	• Creator and organizer of the **Data Science in Oceanography** undergraduate summer program at the School of Oceanography, University of Washington. — 2022-24
	• DEI Committee, UW School of Oceanography — 2022
	• MGG Faculty Search Committee, UW School of Oceanography — 2021-22
	• Creator and organizer of the **Modeling the Granular Nature of Sea Ice** workshop — 2021
	• NASA Physical Oceanography Panel — 2020
	• Organizer and chair of sessions at Ocean Sciences Meetings — 2018,20,22
	• Peer reviewed proposals for NASA, NSF, and publications for — 2011-present Journal of Geophysical Research: Oceans, Geophysical Research Letters, Journal of Fluid Mechanics, Journal of Physical Oceanography, Ocean Science, Nature Communications, Journal of Advances in Modeling Earth Systems, Journal of Climate, and many more...
	• Colloquium Committee, Department of Geology & Geophysics, Yale University. — 2012-14

• Co-creator of the Geophysical Fluid Dynamics Independent Research Group –   2010–2013
a volunteer collaboration of students and postdocs at Yale University conducting
novel theoretical and experimental research in geophysical fluid dynamics

CONFERENCES Ocean Sciences Meeting, New Orleans, LA   2024
& WORKSHOPS Titles: "Oceanic Fluid Dynamics and Music" (presenting), "Response of Submesoscale Variability
Under Sea Ice to Wind Bursts and Mesoscale Strain" (presenting), "The Role of Islands in the
Summer Breakup of Sea Ice Arches in Nares Strait", "Spatiotemporal variability of submesoscale
dynamics in Southern Ocean marginal ice zones", "New Estimation of Global Mesoscale Surface
Currents with Enhanced Resolution Through a Deep Learning Synthesis of Satellite Observa-
tions", "Joint Variability of Air-Sea Carbon and Oxygen Fluxes in the High-Latitude Southern
Ocean", "Spatiotemporal Deep Learning for Interpolation of Sea Surface Temperature", "Model-
ing inertial oscillations of Arctic sea ice", "Inferring ocean eddy energetics leveraging Lagrangian
observation of ice floes in the Beaufort Gyre".

AGU Annual Meeting, San Francisco, CA   2023
Session Chair for *"Sea Ice Processes"*. Titles: "SSH Estimation Using Deep Learning", "Inferring
Ocean Eddy Characteristics Leveraging Lagrangian Observation of Ice Floes in the Beaufort
Gyre", "Modeling the Intermittent Jamming of Sea Ice Floes Due to the Presence of Islands in
Nares Strait"

AGU Fall Meeting, Chicago, IL   2022
Title: *Enhancement of Basal Melting by Submesoscale Eddies in Ice Shelf Cavities
of the Amundsen Sea.*

Isaac Newton Institute of Mathematical Sciences   2022
Title: *SubZero: Sea Ice Modeling with an Explicit Representation of the Floe Life Cycle.*

Ocean Sciences Meeting, not in Hawaii (online)   2022
Title: *"Spinning ice floes reveal intensification of mesoscale eddies in the western Arctic Ocean"*
Session Chair: *"Floe-scale sea ice processes: constraints from observations and models"*

Workshop on "Modeling the Granular Nature of Sea Ice"   2021
Title: *"SubZero: a Sea Ice Model with an Explicit Representation of a Floe Lifecycle"*

Ocean Sciences Meeting, San Diego, CA   2020
Title: *"Mesoscale and Submesoscale Sea Ice-Ocean Interactions in the Arctic Ocean"*
Session Chair: *"Sea Ice Dynamics and Predictability"*

Arctic Dynamics Workshop, Massachusetts Institute of Technology, Cambridge, MA   2019
Title: *"Eddies in the Beaufort Gyre: Big or Small?"*

Frontiers in Oceanic, Atmospheric, and Cryospheric Boundary Layers   2018
Kavli Institute for Theoretical Physics, UC Santa Barbara
Title: *"Submesoscale sea ice-ocean interactions in marginal ice zones"*

Ocean Sciences Meeting, Portland, OR   2018
Titles: *"Knocking on the doors of non-equilibrium mesoscale turbulence"* and
*"Heavy footprints of mesoscale and submesoscale ocean turbulence on weakened
sea ice in the Arctic and Southern Oceans"* (Invited);
Session Chair: *"Role of Small-Scale Processes in the Dynamics of the Changing Arctic Ocean"*

Geophysical Fluid Dynamics Summer School (staff member), WHOI, Woods Hole, MA.   2017

AGU Fall Meeting, San Francisco, CA   2016
Title: *"Eddy-Memory mode of decadal ocean variability"*

Forum for Arctic Modeling & Observational Synthesis, WHOI, MA   2016
Title: *"The role of mesoscale eddies in the wind-driven Beaufort Gyre variability"*

Panelist for the discussion topic: *"Role of small-scale processes"*

Ocean Sciences Meeting, New Orleans, LA   2016
Title:*"Transient halocline and freshwater dynamics of the Arctic's Beaufort Gyre"*

American Geophysical Union, Fall Meeting, San Francisco, CA   2015
Title:*"Wind-Driven Freshwater Buildup in the Beaufort Gyre is Inevitably
Constrained by Mesoscale Eddies"*

Conference on Atmospheric and Oceanic Fluid Dynamics, Minneapolis, MN   2015
Title:*"Arctic Halocline Response to Changing Surface Stress Forcing"*

Geophysical Fluid Dynamics Summer School, WHOI, Woods Hole, MA   2009–12,14

Conference on Atmospheric and Oceanic Fluid Dynamics, Newport, RI   2013
Title:*"Generation and Separation of Mesoscale Eddies from Surface Ocean Fronts"*

65th annual meeting of APS, Division of Fluid Dynamics, San Diego, CA   2012
Titles:*"Entrainment and Mixing Dynamics of Surface-Stress-Driven Linearly
Stratified Flow in a Cylinder"; "Steady Rotating Density Currents on a Slope"*

Graduate Climate Conference, MIT, Woods Hole, MA   2011
Title: *"Climate Impacts of Intermittent Mixing by Tropical Cyclones"*

American Geophysical Union Fall Meeting, San Francisco, CA   2011
Title: *"Global Impacts of Intermittent Mixing Induced by Tropical Cyclones"*

Ocean Sciences Meeting, Portland, OR   2010

Fundamental Problems in Climate Dynamics, PCTS, Princeton, NJ   2009

INVITED SEMINARS $\left(\begin{array}{c}\textbf{\textit{"Topics"}}\\ \textbf{Locations}\end{array}\right)$	• *SubZero: Rethinking Floe-Scale Sea Ice Modeling* Geophysical Fluid Dynamics Laboratory, Princeton, Formal Seminar Series.	2022

• *Rethinking sea ice modeling*   2022
University of Washington, Banse Oceanography Seminar Series

• *"Spinning Ice Floes reveal intensification of mesoscale eddies*   2022
in the western Arctic Ocean", Atmospheric and Oceanic Sciences, McGill University

• *"Emerging Arctic Ocean turbulence revealed by rotating sea ice fragments"*   2021
University of South Florida, College of Marine Science

• *"Eddy Memory in the Ocean"*   2021
Leeds University, Department of Mathematics

• *"Ice-ocean interactions"*   2021
US CLIVAR Phenomena, Observations, and Synthesis (POS) Panel

• *"Dynamical analysis of SSH observations via Deep Learning"*
NASA Jet Propulsion Laboratory, Pasadena, CA   05/2019

• *"Spatiotemporal interpolation of SSH data using Machine Learning"*
SWOT Science Team Meeting, Bordeaux, France   06/2019

• *"Heavy footprints of upper-ocean eddies on weakened Arctic sea ice"*
Laboratoire d'Océanographie et du Climat: Expérimentations et Approches   07/2019
Numériques, Institut Pierre Simon Laplace, Paris, France.

• *"Deep Learning for disentangling information on subsurface flows*   12/2019
and mesoscale eddy heat fluxes from SSH data"

Scripps Institution of Oceanography, UC San Diego, CA

- *"Turbulent dynamics of the Arctic Ocean and its interactions with the sea ice"*

UC Santa Barbara, Mechanical Engineering	02/2018
Florida State University, Earth Ocean and Atmospheric Science	03/2018
Woods Hole Oceanographic Institution, Physical Oceanography	04/2018

- *"Submesoscale sea ice-ocean interactions in marginal ice zones"*

UC Santa Barbara, Kavli Institute for Theoretical Physics. Frontiers in Oceanic, Atmospheric, and Cryospheric Boundary Layers	05/2018

- *"Turbulent dynamics of the Arctic Ocean"*

UC Santa Cruz, Ocean Sciences	02/2017

- *"Ideas on mesoscale eddy parameterizations for transient flows"*

UC Los Angeles, Department of Atmospheric and Oceanic Sciences	03/2017
Caltech, Division of Geological and Planetary Science, Yuk Lunch Seminar	01/2016

- *"A hidden mode of decadal Arctic Ocean variability"*

Caltech, Environmental Science and Engineering	03/2016
Jet Propulsion Laboratory, NASA	06/2016
Woods Hole Oceanographic Institution, Department of Physical Oceanography	08/2016

- *"Wind-driven halocline dynamics of the Beaufort Gyre"*

Woods Hole Oceanographic Institution, Department of Physical Oceanography	07/2015

- *"Influence of tropical cyclones on large-scale ocean circulation"*

MIT-WHOI Joint Program Student Seminar	10/2014
Yale University, Department of Geology & Geophysics	10/2011

- *"Persistent ENSO across a wide range of climates"*

Caltech, Division of Geological and Planetary Sciences	05/2015
Columbia University, Lamont-Doherty Earth Observatory	01/2014
Princeton University, Program in Atmospheric and Oceanic Sciences	10/2013

- *"Mesoscale eddies and surface ocean fronts"*

Massachusetts Institute of Technology, EAPS, Sack Lunch Seminar	10/2014
University of Washington, Applied Physics Laboratory	03/2014
Woods Hole Oceanographic Institution, Department of Physical Oceanography	10/2013
Courant Institute for Mathematical Sciences, CAOS	09/2013
University of Miami, Rosenstiel School of Marine and Atmospheric Science	11/2012