Qing Li

Earth, Ocean and Atmospheric Sciences Thrust, Function Hub
The Hong Kong University of Science and Technology (Guangzhou)
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Education

2018 **Ph.D. Earth, Environmental and Planetary Sciences**,
Brown University, Providence, RI, USA
Advisor: B. Fox-Kemper
PhD thesis: *Langmuir Turbulence and Its Effects on Global Climate*

2013 **M. S. Meteorology**, Peking University, Beijing, China
Advisor: H. Yang
Master's thesis: *Numerical Simulations of a Fully Coupled Aqua-Planet: Mean Climate and Meridional Heat Transport*

2010 **B. S. Atmospheric Sciences**, Peking University, Beijing, China
Senior thesis advisor: H. Yang
Senior thesis: *Lagrangian Analysis on the Circulation in the Pacific Ocean*

2010 **B. S. Double Major in Economics**, Peking University, Beijing, China

Research Interests

Planetary boundary layer turbulence, Ocean surface waves, Numerical modeling, Climate sciences

Professional Appointments

2021 - **Assistant Professor**, The Hong Kong University of Science and Technology (Guangzhou)
Earth, Ocean and Atmospheric Sciences Thrust, Function Hub

2021 - **Affiliate Assistant Professor**, The Hong Kong University of Science and Technology
Dept. of Ocean Science, School of Science

2018 - 2021 **Postdoctoral Research Associate**, Los Alamos National Laboratory (LANL)
Fluid Dynamics and Solid Mechanics, Theoretical Division

2013 - 2018 **Research Assistant**, Brown University
Dept. of Earth, Environmental and Planetary Sciences
The Institute at Brown for Environment and Society (IBES)

2010 - 2013 **Research Assistant**, Peking University
Dept. of Atmospheric and Oceanic Sciences, School of Physics

Awards and Grants

2023 - 2025 **Research Grant:** Young Scientists Fund of National Natural Science Foundation of China.
Q. Li, *Langmuir turbulence in a diurnal cycle and its effects on turbulent mixing of momentum and tracers in the upper ocean*, RMB 300k

2022 - 2024 **Research Grant:** Center for Ocean Research in Hong Kong and Macau (CORE) Project 2022.
Q. Li, *Modeling the Ocean Boundary Layer Turbulent Mixing: From Open Oceans to Coastal Oceans*, HKD 400k

2019 **Travel Support:** Visit to National Center for Atmospheric Research, Boulder, CO, USA

2018 - 2020 **Computing Grant:** Institutional Computing at LANL.

	Q. Li and L. Van Roekel, *Better Understanding of the Air-Sea Fluxes Using Atmosphere-Ocean Coupled Large Eddy Simulation*, 7 Mcpuhr. + 40.9 TB storage
2018	**Travel Support:** Physical Oceanography Dissertation Symposium X, Kailua-Kona, HI, USA
2016	**Travel Support:** CLIVAR Open Science Conference, Qingdao, China
2016	**Travel Support:** Liège Colloquium on Submesoscale Processes: Mechanisms, Implications and new Frontiers, Liège, Belgium
2015 - 2016	**Fellowship:** IBES Graduate Student Fellowship at Brown University
2014	**Travel Support:** Institute for Mathematics and its Applications Workshop on Impact of Waves Along Coastlines, Minneapolis, MN, USA
2014	**Travel Support:** The Community Earth System Model Tutorial, Boulder, CO, USA
2013 - 2014	**Fellowship:** First-Year Graduate Student Fellowship at Brown University

Teaching Experience

At The Hong Kong University of Science and Technology (Guangzhou)

2023 Spring	**Lecturer**, *EOAS5002: Atmosphere-Ocean Dynamics*
	Lecturer, *EOAS5004: Earth System Modeling*, co-lectured with Q. Yang and L. Yu
	Guest Lecturer, *FUNH5000: Introduction to Function Hub for Sustainable Future*
2022 Fall	**Guest Lecturer**, *EOAS6000B: Global Carbon Cycle and Climate Change*
	Guest Lecturer, *FUNH6800C: Function Hub Seminar*
	Guest Lecturer, *FUNH6770: Professional Development for Function Hub*
2022 Spring	**Guest Lecturer**, *FUNH5000: Introduction to Function Hub for Sustainable Future*
2021 Fall	**Lecturer**, *EOAS6000A: Ocean Circulation, Carbon Cycle, Ecosystems, and Changing Climate* co-lectured with Q. Ji and L. Yu
	Guest Lecturer, *FUNH6770: Professional Development for Function Hub*

Elsewhere

2020 Summer	**Student Mentor**, Los Alamos National Laboratory
	Parallel Computing Summer Research Internship with L. Van Roekel and M. Turner
2017 Fall	**Teaching Assistant**, Brown University
	Principles of Planetary Climate under J.-E. Lee
2017 Spring	**Guest Lecturer**, Brown University
	Ocean Circulation and Climate under B. Fox-Kemper
2016 Fall	**Guest Lecturer**, Brown University
	Mathematical Methods of Fluid and Solid Geophysics and Geology under B. Fox-Kemper
	Teaching Assistant, Brown University
	Mathematical Methods of Fluid and Solid Geophysics and Geology under B. Fox-Kemper
2015 - 2016	**Sheridan Teaching Certificate I**, Brown University
2010 Fall	**Teaching Assistant**, Peking University
	Fluid Dynamics under G. Xin

Academic Advising

Postdoctoral Scientists: Yaoru Pan (with B. Fox-Kemper, 2022-)
PhD Prime Advisor: Wentao Pan (2022-), Zheng Wei (2022-)
PhD Co-Advisor: Zhuowei Xu (with L. Yu, 2022-)

Service to the Profession and Academic Literature

2020 **Session Co-Chair:** with Ivan Savelyev, Gregory Wagner and Leah Johnson, Ocean Sciences Meeting, AGU/ASLO/TOS, San Diego, CA, USA. *Session: Turbulent mixing of the ocean surface boundary layer: Observation, Simulation, and Parameterization*

2018 **Session Chair:** KITP Conference on Frontiers in Oceanic, Atmospheric, and Cryospheric Boundary Layers, Santa Barbara, CA, USA. *Session: Interdisciplinary*

2015 **Student Volunteer:** Abstract sorting for 68th Annual Division of Fluid Dynamics Meeting, APS, Boston, MA, USA

Reviewer: National Science Foundation, Acta Oceanologica Sinica, Deep-Sea Research Part I: Oceanographic Research Papers, Geophysical Research Letters, Geoscientific Model Development, Journal of Advances in Modeling Earth Systems, Journal of Atmospheric and Oceanic Technology, Journal of Climate, Journal of Computational Physics, Journal of Geophysical Research: Atmospheres, Journal of Geophysical Research: Oceans, Journal of Physical Oceanography, Journal of Turbulence, Marine Geodesy, Ocean Dynamics, Ocean Modelling

Member: American Geophysical Union, American Meteorological Society

Publications

[A.1] L. Johnson, B. Fox-Kemper, **Q. Li**, H. Pham, S. Sarkar, A finite-time ensemble method for mixed layer model comparison, Journal of Physical Oceanography, In press (2023). doi:10.1175/JPO-D-22-0107.1.

[A.2] H. Pham, S. Sarkar, L. Johnson, B. Fox-Kemper, P. Sullivan, **Q. Li**, Multi-scale variability of turbulent mixing during a monsoon intraseasonal oscillation in the Bay of Bengal: an LES study, Journal of Geophysical Research - Oceans, In press (2022). doi:10.1029/2022JC018959.

[A.3] J.-C. Golaz, L. P. Van Roekel, X. Zheng, A. F. Roberts, J. D. Wolfe, W. Lin, A. M. Bradley, Q. Tang, M. E. Maltrud, R. M. Forsyth, C. Zhang, T. Zhou, K. Zhang, C. S. Zender, M. Wu, H. Wang, A. K. Turner, B. Singh, J. H. Richter, Y. Qin, M. R. Petersen, A. Mametjanov, P.-L. Ma, V. E. Larson, J. Krishna, N. D. Keen, N. Jeffery, E. C. Hunke, W. M. Hannah, O. Guba, B. M. Griffin, Y. Feng, D. Engwirda, A. V. Di Vittorio, C. Dang, L. M. Conlon, C.-C.-J. Chen, M. A. Brunke, G. Bisht, J. J. Benedict, X. S. Asay-Davis, Y. Zhang, X. Zeng, S. Xie, P. J. Wolfram, T. Vo, M. Veneziani, T. K. Tesfa, S. Sreepathi, A. G. Salinger, M. J. Prather, S. Mahajan, **Q. Li**, P. W. Jones, R. L. Jacob, J. E. J. R. Eyre, G. W. Huebler, X. Huang, B. R. Hillman, B. E. Harrop, J. G. Foucar, Y. Fang, D. S. Comeau, P. M. Caldwell, T. Bartoletti, K. Balaguru, M. A. Taylor, R. B. McCoy, L. R. Leung, D. C. Bader, The DOE E3SM model version 2: Overview of the physical model, Journal of Advances in Modeling Earth Systems 14 (2022) e2022MS003156. doi:10.1029/2022MS003156.

[A.4] C. Zhu, J. Zhang, Z. Liu, B. Otto-Bliesner, C. He, E. Brady, R. Tomas, Q. Wen, **Q. Li**, C. Zhu, S. Zhang, L. Wu, Antarctic warming during Heinrich Stadial 1 in a transient isotope-enabled deglacial simulation, Journal of Climate 35 (2022) 3753–3765. doi:10.1175/JCLI-D-22-0094.1.

[A.5] H. Wang, C. Dong, B. Fox-Kemper, **Q. Li**, Y. Yang, X. Chen, K. T. Lim Kam Sian, Parameterization of ocean surface wave-induced mixing using large eddy simulations (LES) II, Deep Sea Research Part II: Topical Studies in Oceanography 203 (2022) 105167. doi:10.1016/j.dsr2.2022.105167.

[A.6] X. Zheng, **Q. Li**, T. Zhou, Q. Tang, L. Van Roekel, J.-C. Golaz, Description of historical and future projection simulations by the global coupled E3SMv1.0 model as used in CMIP6, Geoscientific Model Development 15 (9) (2022) 3941–3967. doi:10.5194/gmd-15-3941-2022.

[A.7] P. Orenstein, B. Fox-Kemper, L. Johnson, **Q. Li**, A. Sane, Evaluating coupled climate model parameterizations via skill at reproducing the monsoon intraseasonal oscillation, Journal of Climate 35 (6) (2022) 1873–1884. doi:10.1175/JCLI-D-21-0337.1.

[A.8] **Q**. **Li**, J. Bruggeman, H. Burchard, K. Klingbeil, L. Umlauf, K. Bolding, Integrating CVMix into GOTM (v6.0): A consistent framework for testing, comparing, and applying ocean mixing schemes, Geoscientific Model Development 14 (7) (2021) 4261–4282. doi:10.5194/gmd-14-4261-2021.

[A.9] **Q**. **Li**, L. Van Roekel, Towards multiscale modeling of ocean surface turbulent mixing using coupled MPAS-Ocean v6.3 and PALM v5.0, Geoscientific Model Development 14 (4) (2021) 2011–2028. doi:10.5194/gmd-14-2011-2021.

[A.10] **Q**. **Li**, B. Fox-Kemper, Anisotropy of Langmuir turbulence and the Langmuir-enhanced mixed layer entrainment, Physical Review Fluids 5 (1) (2020) 013803. doi:10.1103/PhysRevFluids.5.013803.

[A.11] P. M. Caldwell, A. Mametjanov, Q. Tang, L. P. Van Roekel, J.-C. Golaz, W. Lin, D. C. Bader, N. D. Keen, Y. Feng, R. Jacob, M. E. Maltrud, A. F. Roberts, M. A. Taylor, M. Veneziani, H. Wang, J. D. Wolfe, K. Balaguru, P. Cameron-Smith, L. Dong, S. A. Klein, L. R. Leung, H.-Y. Li, **Q**. **Li**, X. Liu, R. B. Neale, M. Pinheiro, Y. Qian, P. A. Ullrich, S. Xie, Y. Yang, Y. Zhang, K. Zhang, T. Zhou, The DOE E3SM coupled model version 1: Description and results at high resolution, Journal of Advances in Modeling Earth Systems 11 (12) (2019) 4095–4146. doi:10.1029/2019MS001870.

[A.12] **Q**. **Li**, B. G. Reichl, B. Fox-Kemper, A. Adcroft, S. Belcher, G. Danabasoglu, A. Grant, S. M. Griffies, R. W. Hallberg, T. Hara, R. Harcourt, T. Kukulka, W. G. Large, J. C. McWilliams, B. Pearson, P. Sullivan, L. Van Roekel, P. Wang, Z. Zheng, Comparing ocean surface boundary vertical mixing schemes including Langmuir turbulence, Journal of Advances in Modeling Earth Systems 11 (11) (2019) 3545–3592. doi:10.1029/2019MS001810.

[A.13] B. G. Reichl, **Q**. **Li**, A parameterization with a constrained potential energy conversion rate of vertical mixing due to Langmuir turbulence, Journal of Physical Oceanography 49 (11) (2019) 2935–2959. doi:10.1175/JPO-D-18-0258.1.

[A.14] A. B. Villas Boas, F. Ardhuin, A. Ayet, M. A. Bourassa, B. Chapron, P. Brandt, B. D. Cornuelle, J. T. Farrar, M. R. Fewings, B. Fox-Kemper, S. T. Gille, C. Gommenginger, P. Heimbach, M. C. Hell, **Q**. **Li**, M. Mazloff, S. T. Merrifield, A. Mouche, M.-H. Rio, E. Rodriguez, J. D. Shutler, A. C. Subramanian, E. J. Terrill, M. Tsamados, C. Ubelmann, E. van Sebille, Integrated observations and modeling of global winds, currents, and waves: Requirements and challenges for the next decade, Frontiers in Marine Science 6 (2019) 425. doi:10.3389/fmars.2019.00425.

[A.15] **Q**. **Li**, B. Fox-Kemper, Assessing the effects of Langmuir turbulence on the entrainment buoyancy flux in the ocean surface boundary layer, Journal of Physical Oceanography 47 (12) (2017) 2863–2886. doi:10.1175/JPO-D-17-0085.1.

[A.16] **Q**. **Li**, B. Fox-Kemper, Ø. Breivik, A. Webb, Statistical models of global Langmuir mixing, Ocean Modelling 113 (2017) 95–114. doi:10.1016/j.ocemod.2017.03.016.

[A.17] **Q**. **Li**, A. Webb, B. Fox-Kemper, A. Craig, G. Danabasoglu, W. G. Large, M. Vertenstein, Langmuir mixing effects on global climate: WAVEWATCH III in CESM, Ocean Modelling 103 (2016) 145–160. doi:10.1016/j.ocemod.2015.07.020.

[A.18] H. Yang, K. Wang, H. Dai, Y. Wang, **Q**. **Li**, Wind effect on the Atlantic meridional overturning circulation via sea ice and vertical diffusion, Climate Dynamics 46 (11) (2016) 3387–3403. doi:10.1007/s00382-015-2774-z.

[A.19] H. Yang, Y. Zhao, Z. Liu, **Q**. **Li**, F. He, Q. Zhang, Heat transport compensation in atmosphere and ocean over the past 22,000 years, Scientific Reports 5 (2015) 16661. doi:10.1038/srep16661.

[A.20] H. Yang, **Q**. **Li**, K. Wang, Y. Sun, D. Sun, Decomposing the meridional heat transport in the climate system, Climate Dynamics 44 (9) (2015) 2751–2768. doi:10.1007/s00382-014-2380-5.

Conference Presentations

[P.1] **Q. Li**, Z. Wei, B. Chen, Progress towards modeling the ocean boundary layer turbulence from open oceans to coastal oceans, in: 2nd Ocean Forum in Hong Kong and Macao, Hong Kong, China, 2023, Talk.

[P.2] **Q. Li**, How do we compare ocean mixed layer models?, in: 7th Youth Forum on Ocean Dynamics, Qingdao, China, 2023, Talk.

[P.3] **Q. Li**, Langmuir turbulence in a diurnal cycle, in: 6th Xiamen Symposium on Marine Environmental Sciences, Virtual Meeting Online, 2023, Talk (Invited).

[P.4] **Q. Li**, Modeling the ocean boundary layer turbulent mixing: From open oceans to coastal oceans, in: 1st Ocean Forum in Hong Kong and Macao, Macao, China, 2022, Talk.

[P.5] **Q. Li**, A comparison of recent langmuir turbulence parameterizations, in: 9th Lihai Young Scientist Forum, Virtual Meeting Online, 2022, Talk.

[P.6] **Q. Li**, L. Van Roekel, S. Stevenson, Tropical instability waves in a warmer climate simulated in the Energy Exascale Earth System Model, in: 1st Youth Forum on Marine Science, Guangzhou, China, 2022, Talk.

[P.7] **Q. Li**, L. Van Roekel, S. Stevenson, Tropical instability waves in a warmer climate simulated in the Energy Exascale Earth System Model, in: Ocean Sciences Meeting, Virtual Meeting Online, 2022, Talk.

[P.8] **Q. Li**, Modeling the turbulent mixing in coastal oceans, in: CORE Annual Research Symposium, Virtual Meeting Online, 2022, Talk.

[P.9] **Q. Li**, J. Bruggeman, H. Burchard, K. Klingbeil, L. Umlauf, K. Bolding, Integrating CVMix into GOTM: A consistent framework for testing, comparing, and applying ocean mixing schemes, in: 10th Warnemünde Turbulence Days (WTD) on Interfaces and turbulent boundary layers, Virtual Meeting Online, 2021, Talk.

[P.10] **Q. Li**, L. Van Roekel, Towards multi-scale modeling of ocean surface turbulent mixing using coupled MPAS-Ocean and PALM, in: 1st IAMES Conference, International Association of Meteorological Education and Sciences (IAMES), Virtual Meeting Online, 2021, Talk.

[P.11] **Q. Li**, An update on Langmuir mixing parameterizations in CESM2.2, in: CESM Ocean Model Working Group Meeting, NCAR, Virtual Meeting Online, 2021, Talk.

[P.12] **Q. Li**, L. Van Roekel, Towards multiscale modeling of ocean surface turbulent mixing using coupled MPAS-Ocean and PALM, in: Ocean Sciences Meeting, AGU/ASLO/TOS, San Diego, CA, USA, 2020, Poster.

[P.13] **Q. Li**, Modeling the ocean surface boundary layer vertical mixing by Langmuir turbulence, in: 9th Warnemünde Turbulence Days (WTD) on Ocean Mixing and its Efficiency, Putbus, Germany, 2019, Talk (Invited).

[P.14] **Q. Li**, L. Van Roekel, P. Caldwell, J.-C. Golaz, M. Maltrud, A. Mametjanov, Q. Tang, J. Wolfe, Labrador Sea air-sea fluxes, circulation, and sea-ice in High-Res and Low-Res E3SM, in: 22nd Conference on Atmospheric and Oceanic Fluid Dynamics, AMS, Portland, ME, USA, 2019, Poster.

[P.15] **Q. Li**, B. G. Reichl, B. Fox-Kemper, A. Adcroft, S. Belcher, G. Danabasoglu, A. Grant, S. M. Griffies, R. W. Hallberg, T. Hara, R. Harcourt, T. Kukulka, W. G. Large, J. C. McWilliams, B. Pearson, P. Sullivan, L. Van Roekel, P. Wang, Z. Zheng, Comparing ocean boundary vertical mixing schemes with Langmuir turbulence, in: Fall Meeting, AGU, Washington, DC, USA, 2018, Talk.

[P.16] **Q. Li**, Langmuir turbulence and its effects on global climate, in: Physical Oceanography Dissertation Symposium X, Kailua-Kona, HI, USA, 2018, Talk.

[P.17] **Q. Li**, B. Fox-Kemper, Anisotropy of Langmuir turbulence and the entrainment buoyancy flux, in: Gordon Research Conference on Ocean Mixing, Andover, NH, USA, 2018, Poster.

[P.18] **Q. Li**, B. Fox-Kemper, Anisotropy of Langmuir turbulence and the entrainment buoyancy flux, in: Ocean Sciences Meeting, AGU/ASLO/TOS, Portland, OR, USA, 2018, Poster.

[P.19] **Q. Li**, B. Fox-Kemper, Surface wind wave induced entrainment at the base of the ocean surface boundary layer, in: Open Science Conference, CLIVAR, Qingdao, China, 2016, Poster.

[P.20] **Q. Li**, B. Fox-Kemper, T. Arbetter, A. Webb, Ø. Breivik, A. Craig, G. Danabasoglu, W. G. Large, M. Vertenstein, A statistical modeling of the Langmuir mixing effects on the global climate, in: 21st CESM Workshop, NCAR, Breckenridge, CO, USA, 2016, Talk.

[P.21] **Q. Li**, A. Webb, B. Fox-Kemper, T. Arbetter, A. Craig, G. Danabasoglu, W. G. Large, M. Vertenstein, A statistical modeling of the Langmuir mixing effects on global climate, in: 48th International Liège Colloquium On Ocean Dynamics, University of Liège, Liège, Belgium, 2016, Poster.

[P.22] **Q. Li**, A. Webb, B. Fox-Kemper, T. Arbetter, A. Craig, G. Danabasoglu, W. G. Large, M. Vertenstein, Langmuir mixing affects the global climate: A statistical modeling, in: Ocean Sciences Meeting, AGU/ASLO/TOS, New Orleans, LA, USA, 2016, Talk.

[P.23] **Q. Li**, A. Webb, B. Fox-Kemper, A. Craig, G. Danabasoglu, W. G. Large, M. Vertenstein, Langmuir mixing effects on global climate: WAVEWATCH III in CESM, in: 68th Annual Division of Fluid Dynamics Meeting, APS, Boston, MA, USA, 2015, Poster.

[P.24] **Q. Li**, A. Webb, B. Fox-Kemper, A. Craig, G. Danabasoglu, W. G. Large, M. Vertenstein, Langmuir mixing effects on global climate: WAVEWATCH III in CESM, in: 4th COWCLIP Workshop, Paris, France, 2015, Talk.

[P.25] **Q. Li**, A. Webb, B. Fox-Kemper, A. Craig, G. Danabasoglu, W. G. Large, M. Vertenstein, Langmuir mixing in CESM, in: 20th CESM Workshop, NCAR, Breckenridge, CO, USA, 2015, Talk.

[P.26] **Q. Li**, A. Webb, B. Fox-Kemper, A. Craig, G. Danabasoglu, W. G. Large, M. Vertenstein, Langmuir mixing effects on global climate: WAVEWATCH III in CESM, in: Fall Meeting, AGU, San Francisco, CA, USA, 2014, Poster.

[P.27] **Q. Li**, A. Webb, B. Fox-Kemper, A. Craig, G. Danabasoglu, W. G. Large, M. Vertenstein, Langmuir mixing effects on global climate: WAVEWATCH III in CESM, in: Workshop on the Impact of Waves Along Coastlines, IMA, University of Minnesota, Minneapolis, MN, USA, 2014, Poster.

[P.28] **Q. Li**, B. Fox-Kemper, T. Arbetter, A. Webb, Assessing the influence of surface wind waves to the global climate by incorporating WAVEWATCH III in CESM: Langmuir mixing in KPP, in: 19th CESM Workshop, NCAR, Breckenridge, CO, USA, 2014, Talk.

[P.29] **Q. Li**, B. Fox-Kemper, T. Arbetter, A. Webb, Assessing the influence of surface wind waves to the global climate by incorporating WAVEWATCH III in CESM, in: Ocean Sciences Meeting, AGU/ASLO/TOS, Honolulu, HI, USA, 2014, Poster.