Baylor Fox-Kemper

Professor of Earth, Environmental, and Planetary Sciences

baylor@brown.edu, http://fox-kemper.com

Office: Lincoln Field Room 214
Thayer and George Streets
Providence, RI

tel: 401.863.3979
fax: 401.863.2058

Mailing: Dept. of Earth, Environmental,
and Planetary (DEEP) Sciences
324 Brook Street
Providence, RI 02912

Education

1998–2003 **PhD Physical Oceanography**, Massachusetts Institute of Technology/Woods Hole Oceanographic Institution (MIT/WHOI) Joint Program, Advisors: J. Pedlosky and P. M. Rizzoli

1996–1998 **MA Physics**, Brandeis University

1992–1996 **BA Physics**, Reed College

Honors and Awards

2026 **Boston University**, Fred Lang Memorial Lecturer: "The Curve and the Pollution: Modeling Toward Futures We Want"

2018–2022 **Intergovernmental Panel on Climate Change**, Coordinating Lead Author of Chapter 9: "Ocean, cryosphere, and sea level change" of the Sixth Assessment Report (AR6)

2019 **Provost's Faculty Lecture Series**, By Faculty For Faculty: Invited Speaker, "The Deluge"

2014–2019 **National Science Foundation Faculty Early Career Development (CAREER) Award**, for "Ready to resolve: Subgridscale physics for Mesoscale Ocean Large Eddy Simulations"

2015 **Editors' Citation for Excellence in Refereeing - Geophysical Research Letters**, American Geophysical Union Publications, Washington, DC

2011 **American Geophysical Union Ocean Sciences Early Career Award**, in recognition of "fundamental contributions to understanding the oceanic general circulation, the dynamical nature of the eddy-filled oceanic mixed layer, and their connection to climate modeling."

2003 **Outstanding Student Presenter Award**, American Meteorological Society 14^{th} Conference on Atmospheric and Oceanic Fluid Dynamics, San Antonio, Texas

2003 **Sigma Xi**, MIT Chapter

1996 **Phi Beta Kappa**, Reed College Chapter

Fellowship Awards and Sabbaticals

2024 **University of California San Diego**: Sabbatical. *Scripps Institution of Oceanography*, Office.

2016 **Cambridge University**: Beaufort Visiting Scholarship. *St. John's College for junior sabbatical*, Housing, dining, and library privileges.

2012 **University Corporation for Atmospheric Research**: Theme of the Year. *IMAGe/NCAR for 2012 Rotating and Stratified Turbulent Flows and Balanced Models (RST)*, Office and course buyout.

2003–2005 **NOAA**: Climate and Global Change Postdoctoral Fellowship. *Worldwide merit fellowship managed by the University Corporation for Atmospheric Research*, 100%.

2001–2002 **MIT**: Presidential Fellowship. *University-wide merit fellowship*, 100%.

1998–2001 **Office of Naval Research**: National Defense Science and Engineering Graduate Fellowship. *Nationwide merit fellowship*, 100%.

1997–1998 **Brandeis University**: Gillette Fellowship. *University-wide merit fellowship*, 100%.

1994-1996 **Society of the Cincinnati**: McCabe Scholarship. *Undergraduate merit scholarship*, 25%.

1992-1996 **Chesapeake Corporation**: Chesapeake Foundation Scholarship. *Undergraduate merit scholarship*, 25%.

Professional Appointments

2020– **Professor:** Brown University (Providence, Rhode Island), Dept. of Earth, Environmental, and Planetary (DEEP) Sciences. *Oceanography and Climate Modeling.*

2023– **JASON:** JASON Advisory Group (San Diego, California and McLean, Virginia), Oceanography, Defense, Research. *Consulting on US Government programs and projects.*

2020– **Affiliated Faculty:** Brown Initiative for Sustainable Energy, Affiliates. *Offshore Wind, Energy and Climate.*

2020– **Affiliated Faculty:** Brown Theoretical Physics Center, Affiliates. *Theoretical Physics.*

2013– **Affiliated Faculty:** Fluids at Brown, Affiliates. *Fluid Dynamics.*

2013– **Elected Fellow:** Institute at Brown for Environment and Society (IBES), Fellows. *Advise and develop research conducted at IBES.*

2016–2020 **Associate Professor:** Brown University (Providence, Rhode Island), Dept. of Earth, Environmental, and Planetary (DEEP) Sciences. *Oceanography and Climate Modeling.*

2013–2016 **Assistant Professor:** Brown University (Providence, Rhode Island), Dept. of Earth, Environmental, and Planetary (DEEP) Sciences. *Oceanography and Climate Modeling.*

2007–2012 **Assistant Professor:** University of Colorado (Boulder, Colorado), Cooperative Institute for Research in the Environmental Sciences (CIRES) and Dept. of Atmospheric and Oceanic Sciences (ATOC). *Oceanography.*

2009–2012 **Affiliated Faculty:** University of Colorado (Boulder, Colorado), Department of Applied Mathematics. *Geophysical Fluid Dynamics.*

2004–2007 **Research Scientist:** MIT (Cambridge, Massachusetts), Dept. of Earth, Atmospheric, and Planetary Sciences under R. Ferrari. *Eddy mixed-layer interactions.*

2003–2004 **Research Associate & Visiting Research Fellow:** Princeton University (Princeton, New Jersey), Atmospheric and Oceanic Sciences Program under G. Vallis. *Eddies and separated boundary currents.*

1998–2003 **Research Fellow:** MIT/WHOI Joint Program (Cambridge, Massachusetts), Physical Oceanography under J. Pedlosky, WHOI and P. Malanotte-Rizzoli, MIT. *Eddies in the wind-driven ocean circulation.*

1996–1998 **Research Fellow:** Brandeis University (Waltham, Massachusetts), Dept. of Physics under X.-J. Wang. *Modeling working memory.*

Visiting and Part-Time Positions

2024 **Sabbatical Visitor:** University of California San Diego, Scripps Institution of Oceanography, Air-Sea Dynamics. *Office and group meetings.*

2022–2024 **Scientist in International Research Platform of CORE:** Center for Ocean Research in Hong Kong and Macau (CORE), Scientific Advising. *Postdoctoral Mentoring.*

2022 **Invited Lecturer and Public Keynote Speaker:** Boulder School for Condensed Matter and Materials Physics, "Hydrodynamics Across Scales", Boulder, Colorado, Ocean Dynamics. *Three lectures and a public keynote presentation.*

2018–2022 **Intergovernmental Panel on Climate Change**, Coordinating Lead Author of Chapter 9: "Ocean, cryosphere, and sea level change" of the Sixth Assessment Report (AR6)

2019 **Invited Lecturer:** The Second Xiamen Spring School on Ocean Dynamics (XMOD II) at the State Key Laboratory of Marine Environmental Science, Xiamen University, China, Upper Ocean Dynamics. *Ten lectures giving a general introduction.*

2018 **Workshop Lead:** University of California Santa Barbara, Kavli Institute for Theoretical Physics. *Lead coordinator of the program "Planetary Boundary Layers in Atmospheres, Oceans, and Ice on Earth and Moons", Webpage.*

2017–2024 **Part-Time Researcher:** Nanjing University of Information Science & Technology, National Key Research Program of China (2017YFA0604100), PI Changming (Charles) Dong. *Student and Visitor Mentoring.*

2017 **Invited Lecturer:** A Global Ocean Data Assimilation Experiment (GODAE) International School in Mallorca, Spain, New Frontiers of Operational Oceanography. *Four lectures giving a general introduction on ocean variability.*

2017 **Invited Participant:** Climate Fluctuations and Non-equilibrium Statistical Mechanics: an Interdisciplinary Dialogue, Max-Planck-Institut fur Physik Komplexer Systeme, Dresden, Germany. *A month-long summer workshop.*

S2016 **Beaufort Visiting Fellow:** St. John's College and visiting scholar at the Department of Applied Mathematics and Theoretical Physics, Cambridge University. *Junior sabbatical.*

2014 **Visiting Scientist:** University of California Santa Barbara, Kavli Institute for Theoretical Physics. *Participant in the program "Wave-Flow Interaction in Geophysics, Climate, Astrophysics, and Plasmas", Webpage.*

2012 **Visiting Scientist:** National Center for Atmospheric Research (NCAR), Institute for Mathematics Applied to Geosciences (IMAGe). *Led an effort coordinating the 2012 Theme of the Year meeting: Connections Between Rotating, Stratified Turbulence and Climate.*

2011 **Lecturer:** NASA Jet Propulsion Laboratory Summer School, Center for Climate Sciences. *Lecturer on ocean dynamics and modeling.*

2010,2013, 2014 **Visiting Scientist:** Woods Hole Oceanographic Institution, Geophysical Fluid Dynamics Summer Program. *Staff member.*

Active Awarded Grants

05/01/26–4/30/27 **Brown Phase 2 2026 Division of Research Seed Track 2**: Research Innovation Award (RIA). K. Breuer, J. Marston, B. Fox-Kemper: *Dynamics of Offshore Wind Turbines*, $100k.

07/15/25–6/30/29 **NSF E-RISE**: OIA-2438542. D. Roxbury (URI), B. Fox-Kemper, S. K. O'Shea (RWU), V. Craver (URI), A. Maia (RIC): *E-RISE RII: Socio-ecological Impact of Microplastics in Coastal Ecosystems (SIMCoast)*, $7M, $999k to Brown.

07/01/24–6/30/28 **NSF E-CORE**: NSF OIA-2435071. E. Torell (URI), B. Jenkins (URI), J. Pipher, J. Bissonnette (RISD), A. Maia (RIC), J. Lemire (RWU), (Senior Personnel: Fox-Kemper): *E-CORE RII: Rhode Island Network for Excellence in Science and Technology (RI-NEST)*, $8M, $710k to Brown.

09/01/24–8/31/27 **NSF Collaborations in Artificial Intelligence and Geosciences**: NSF RISE-2425380. S. Bach, B. Fox-Kemper, A. Creamer: *CAIG: Navigating the Climate Science Deluge: Training Language Models to Assist in Comprehensive Assessments*, $661k.

04/01/25–03/21/27 **RI STAC**: Rhode Island Science and Technology Advisory Council. B. Fox-Kemper and N. Pizzo: *Air-Sea Interactions Guide Offshore Wind Farm Ecosystem Impacts*, $80k.

09/01/24–08/31/27 **Brown Provost Initiative Funding**: ECF. B. Fox-Kemper, E. Fussell (Faculty Co-Chairs); Kim Cobb, Ashish Jha, Wendy Schiller, Tejal Desai (Core Partner Directors): *Equitable Climate Futures*, $700k.

09/01/23–8/31/27 **NSF EPSCoR**: NSF OIA-2316271. E. Di Lorenzo, J. Pringle (UNH), A. Maia (RIC), A. Becker (URI), D. Reidmuller (GoMRI), (Senior Personnel: Fox-Kemper): *RII Track-2 FEC: Community-Driven Coastal Climate Research & Solutions (3CRS) for the Resilience of New England Coastal Populations*, $6M to Brown.

09/01/23-8/31/26 **DoE EPSCoR Implementation Grant**: DoE DE-SC0024572. G. Chini, C. White, M. Wosnik, N. Laxague, J. B. Marston, B. Fox-Kemper, J. Oishi: *Multiscale Modeling and Direct Statistical Simulation of Marine Atmospheric Boundary Layer Turbulence for Offshore Wind Energy*, $3M, $850k to Brown.

07/15/25–7/14/26 **RWU/US EPA**: OIA-2438542. B. Fox-Kemper, M. Freilich: *Analysis and Curation of Spatial Dissolved Oxygen*, $47k to Brown.

07/01/22–6/30/26 **NSF Physical Oceanography**: NSF 2220280. B. Fox-Kemper (Brown), J. Lilly (PSI): *Collaborative Research: A Coordinate-Free Framework for Improving Eddy Parameterizations*, $438k to Brown.

05/01/22–04/30/26 **NSF Physical Oceanography**: NSF 2149041. J. Wenegrat (UMD), B. Fox-Kemper (Brown), Jay Brett (JHU/APL): *Collaborative Research: Tracing the Physics of Submesoscale Entrainment and Subduction*, $474k to Brown.

Complete Awarded Grants

08/01/23-10/31/25 **Brown Initiative for Sustainable Energy Seed Award**: ISE. B. Marston, B. Fox-Kemper, K. Breuer: *Understanding the Marine Atmospheric Boundary Layer for the Modeling of Offshore Wind Turbine Farms*, $110k.

01/01/21–12/31/25 **Schmidt Futures Foundation**: . Rampal, Dansereau, Horvat, Olason, Carrassi, Korosov, Labbe, Le Sommer, Saramito, Weiss, Lique, Talandier, Rousset, Jones, Fox-Kemper, Johnson, Marshall: *The Scale-Aware Sea Ice Project*, $10M, $2.0M to Brown.

03/01/23–6/30/24 **Brown Office of the Vice President for Research Seed Award 2023**: OVPR. Fox-Kemper & Moretti (Warren Alpert Medical School): *Bayesian Modeling of Climate-Dependent Mortality Risk among US Residents from 1989 to 2020*, $41k.

09/01/19–08/31/24	**Climate Process Team supported by NOAA and NSF**: NOAA NA19OAR4310366. Zanna, Abernathey, Adcroft, Bachman, Cole, Danabasoglu, Drushka, Fox-Kemper, Griffies, Grooms, Hallberg, Jansen, Petersen, Smith: *Collaborative Research: Ocean Transport and Eddy Energy*, $3M, $57k to Brown.
09/15/17–7/19/23	**NSF EPSCoR**: NSF 1655221. G. Bothun (URI), J. Bissonnette (RISD), B. Fox-Kemper (Brown), B. Jenkins (URI), L. Rothstein (URI), B. Govenar, N. Overstrom, J. Morgan: *RII Track-1: Rhode Island Consortium for Coastal Ecology Assessment, Innovation, and Modeling*, $2M to Brown, $20M for RI total.
07/01/22–6/30/25	**NSF Physical Oceanography**: NSF 2146889. B. Pearson (OSU), C. Horvat (Brown), Fox-Kemper (administrative PI): *Collaborative Research: Quantifying the effects of Langmuir Turbulence on Sea Ice and The Arctic Ocean*, $175k to Brown.
06/01/21–5/31/22	**Institute at Brown for Environment and Society**: . J. Marston (Physics), B. Fox-Kemper, and J.-E. Lee (DEEPS): *IBES Multi-Investigator Research Project Proposal: Topological Signatures of Atmospheric and Oceanic Waves*, $51k.
06/01/21–5/31/21	**RI STAC**: . A. Davies, M. Bertin, K. Gomes (URI), B. Fox-Kemper, and Karianne Bergen (DEEPS): *Towards the Smart Interconnected Bay – Artificially intelligent detection of harmful algal blooms in Narragansett Bay, Rhode Island*, $80k.
09/15/17–09/14/22	**RI NSF EPSCoR**: NSF 1655221. Co-Lead Fox-Kemper, B. (Senior Personnel, before becoming PI) with L. Rothstein: *RII Track-1: Rhode Island Consortium for Coastal Ecology Assessment, Innovation, and Modeling, Theme 2: Predicting Ecosystem Response*, $20M for RI total .
01/01/17-12/29/22	**Office of Naval Research**: ONR N00014-17-1-2963. B. Fox-Kemper: *Beyond Spectra: Macroturbulence Observations Select High-Resolution Ocean Models*, $689k to Brown .
04/01/17–02/28/23	**Office of Naval Research**: ONR N00014-17-1-2393. B. Fox-Kemper: *Monsoon Intra-seasonal Oscillations: Sensitivity and Improvement of Coupled Model Representations*, $700k to Brown .
08/01/22–7/31/23	**NOAA Small Business Innovation Research Program**: NOAA P21231. Avi Pfeffer (Charles River Analytics), B. Fox-Kemper & M. Martinez-Wilhelmus (Brown), A Lavin (Institute for Simulation Intelligence): *Intelligent Climate Evaluations Concerning Arctic Passages (ICECAP)*, Awarded but declined by PI.
2/1/19–1/31/22	**Helmholtz-Zentrum Geesthacht**: . Collaborator Fox-Kemper, B. with PI Burkard Baschek: *Innovation, Information & Biologisation–Fonds (I^2B-Fonds)*, $254k, no funding to Brown.
03/15/14–02/28/21	**NSF**: Division of Ocean Sciences 1350795. B. Fox-Kemper: *CAREER: Ready to Resolve: Subgridscale Physics for Mesoscale Ocean Large Eddy Simulations*, $594k to Brown.
01/10/15–12/31/20	**Gulf of Mexico Research Initiative**: RFP-IV. Ozgokmen, T., F. Beron-Vera, D. Bogucki, M. Boufadel, A. Bracco, D.F. Carlson, S.S. Chen, S. Dalziel, E.A. D'Asaro, C. Dawson, W.K. Dewar, C. Dietrich, P. Fischer, B. Fox-Kemper, A. Griffa, B. K. Haus, R.R. Harcourt, P. Haynes, A. C. Haza, C. Hill, M.A. Hsieh, H. Huntley, M. Iskandarani, A.D. Kirwan, Jr., O. Knio, G. Jacobs, J. Landel, P. Linden, B. Lipphardt, Jr., J.C. McWilliams, J.H. MacMahan, A. Mariano, M.J. Molemaker, M.J. Olascoaga, A.C. Poje, A.J.H.M Reniers, J.M. Restrepo, A. Soloviev, J.R. Taylor, A.E. Tejada-Martinez, M.-L. Timmermans, A. Valle-Levinson, P. Zhu: *The Consortium for Advanced Research on Transport of Hydrocarbon in the Environment, (CARTHE)*, $20.2M, $541k to Brown.
6/1/17–5/30/20	**Ministry of Science and Technology of China**: National Key Research Program of China (2017YFA0604100). Part-Time Researcher Fox-Kemper, B. with PI Changming (Charles) Dong, Nanjing University of Information Science and Technology (NUIST): *R&D of Parameterization Schemes of Key Physical Processes in High-Resolution Ocean Models*, $3.6M, $78k for our group.
6/01/13–05/31/16	**NSF**: Division of Ocean Sciences 1258907. Hamlington, P. E., B. Fox-Kemper, and N. S. Lovenduski: *Collaborative Research: Reacting Tracers in a Turbulent Mixed Layer*, $672k, $271k to Brown.
9/01/12–08/31/17	**NSF**: Directorate for Geosciences and the Directorate for Mathematical and Physical Sciences 1245944. Weiss, J. B., B. Fox-Kemper, and R. K. Zia: *INSPIRE: Nonequilibrium Statistical Mechanics of Natural Climate Variability: Sea-Surface Temperature and Ocean Heat Content*, $709k, $67k to Brown.
2/1/2015–5/31/2016	**Rhode Island Science & Technology Advisory Council**: 2015 Collaborative Research Grant Award. Fox-Kemper, B., L. Rothstein, C. Kincaid, D. Ullman, D. Leavitt, and D. Taylor: *Pushing to New Limits for Models of Rhode Island Bays & Sounds*, $160k, $72k to Brown.

11/01/13–11/01/15 **Brown University**: Environmental Change Institute Seed Grant. Fox-Kemper, B., T. D. Herbert and S. Bova: *Establishing a Background Level of Variability of Abyssal Waters with Implications for Assessing Present and Future Warming*, $16k.

10/01/09–09/30/15 **NSF**: Division of Mathematical Sciences and Division of Ocean Sciences Collaboration in Mathematical Geosciences 0934737. Chini, G., E. D'Asaro, R. Harcourt, B. Fox-Kemper, and K. Julien: *CMG: Multiscale Modeling of the Coupling between Langmuir Turbulence and Submesoscale Variability in the Oceanic Mixed Layer*, $1.4M.

03/01/09-02/28/15 **NASA**: Research Opportunities in Space and Earth Sciences NNX09AF38G. Fox-Kemper, B., K. Julien, G. Chini, and E. Knobloch: *Langmuir Circulations: Observing and Modeling on a Global Scale*, $774k.

1/1/11–9/30/11 **UCAR**: Subaward. Fox-Kemper, B., L. Van Roekel: *Investigation of Langmuir Mixing Processes and Parameterizations*, $40k.

5/1/11–8/30/12 **UCAR**: Theme of the Year (TOY). Fox-Kemper, B., K. Julien, and A. Pouquet: *Theme of the Year at IMAGe/NCAR for 2011-2012: Rotating and Stratified Turbulent Flows and Balanced Models (RST)*, $50k.

4/22/10–11/19/11 **CIRES**: Innovative Research Grant. Fox-Kemper, B., S. Stevenson, H. McGregor, S. Phipps: *Statistics of ENSO Past and Present: Comparing Climate Models to Coral Reconstructions*, $15k.

07/01/09–06/30/13 **NSF**: Division of Mathematical Sciences Focused Research Group 0855010. Julien, K., B. Fox-Kemper, J.B. Weiss, and E. Knobloch: *FRG: Models of Balanced Multiscale Ocean Physics for Simulation and Parameterization*, $916k.

07/01/09–06/30/10 **University of Colorado at Boulder**: Innovative Seed Grant. Fox-Kemper, B.: *Small Waves, Big Climate: Effects of Surface Gravity Waves on Climate*, $21k.

11/18/08–11/19/09 **CIRES**: Innovative Research Grant. Fox-Kemper, B., G. Chini, K. Julien, and E. Knobloch: *Windrows in Global Models: How Much Do Langmuir Circulations Matter for Climate?*, $18k.

09/01/08–08/31/11 **NSF**: Division of Ocean Sciences 0825614 & 0913800. Fox-Kemper, B., F. Bryan, and J.M. Dennis: *Collaborative Research: A Global Bridge From Eddy-Rich to Eddy-Less: Quantifying, Mapping, and Improving Treatment of Mesoscale Eddy Tracer Fluxes*, $356k +$3k REU Supplement.

Computing Grants Awarded

05/01/23–04/30/25 **NCAR**: CISL High-performance computing Advisory Panel (CHAP). Jacob Wenegrat, Jay Brett, and Baylor Fox-Kemper: *High-Performance Computing for Tracing the Physics of Submesoscale Entrainment and Subduction*, 26.35 Mcpuhr.

07/01/18–08/31/22 **NCAR**: CISL High-performance computing Advisory Panel (CHAP). Baylor Fox-Kemper et al.: *High-Performance Computing for Rhode Island Consortium for Coastal Ecology Assessment, Innovation, and Modeling (RI C-AIM)*, 6.2 Mcpuhr.

11/01/14–03/14/19 **NCAR**: CISL High-performance computing Advisory Panel (CHAP). Baylor Fox-Kemper, James McWilliams, Peter Sullivan, Peter Hamlington, and Luke Van Roekel: *Advancing Mesoscale-Resolving Ocean Subgrid Schemes in Global Simulations, First Computing Resources Request for NSF Ocean Sciences 1350795 CAREER: Ready to Resolve: Subgridscale Physics for Mesoscale Ocean Large Eddy Simulations*, 8.74 Mcpuhr.

10/01/13–9/30/14 **NCAR**: CISL High-performance computing Advisory Panel (CHAP). Baylor Fox-Kemper, James McWilliams, Peter Sullivan, Peter Hamlington, and Luke Van Roekel: *Frontogenesis: Multiscale Modeling of the Coupling between Langmuir Turbulence and Submesoscale Variability in the Oceanic Mixed Layer*, 4 Mcpuhr.

8/01/12–11/30/12 **NCAR**: Accelerated Scientific Discovery (ASD) for Yellowstone. Baylor Fox-Kemper, James McWilliams, Peter Sullivan, Peter Hamlington, and Luke Van Roekel: *Special Assessment of Frontogenesis, Advanced Computing Resources for CMG: Multiscale Modeling of the Coupling between Langmuir Turbulence and Submesoscale Variability in the Oceanic Mixed Layer*, 1.6 Mcpuhr.

10/01/09–03/31/11 **NSF TeraGrid**: High-End Computing Pre-Allocation. Fox-Kemper, B., K. Julien, G. Chini, and E. Knobloch: *Multiscale Modeling of the Coupling between Langmuir Turbulence and Submesoscale Variability in the Oceanic Mixed Layer*, 9.5 Mcpuhr.

03/01/09-02/28/13 **NCAR**: High Performance Computing Grant. B. Fox-Kemper, K. Julien, R. Harcourt, G. Chini, E. D'Asaro, and P. P. Sullivan: *Multiscale Modeling of the Coupling between Langmuir Turbulence and Submesoscale Variability in the Oceanic Mixed Layer*, 1 Mcpuhr.

03/01/09-02/28/13 **NASA**: High-End Computing Grant. Fox-Kemper, B., K. Julien, G. Chini, and E. Knobloch: *Langmuir Circulations: Observing and Modeling on a Global Scale*, 1.1 Mcpuhr.

10/15/10–01/31/11 **NCAR**: High Performance Computing Grant. Fox-Kemper, B., F. Bryan, and J.M. Dennis: *A Global Bridge From Eddy-Rich to Eddy-Less: Quantifying, Mapping, and Improving Treatment of Mesoscale Eddy Tracer Fluxes*, 380k cpuhr.

02/07/07–04/06/09 **IBM**: Blue Gene Watson Grant. Dennis, J.M., F. Bryan, B. Fox-Kemper, M. Maltrud, J. McClean, and S. Peacock: *Eddy Stirring: The Missing Ingredient in Nailing Down Ocean Tracer Transport*, 5.4 Mcpuhr.

Teaching Experience

F13,F22,F25 **Professor:** Brown University, GEOL0160N, Monsters of the Abyss: Oceanography and Sea Tales. *A first-year seminar with readings from Darwin, Nansen, Verne, and Melville, with basic oceanography concepts as well as scientific and narrative writing styles explored (18 students in F13, 20 in F22).*

F14,F15, F16,F19, F21 **Professor:** Brown University, GEOL0350, Mathematical Methods of Fluid and Solid Geophysics and Geology. *Intended for undergraduates concentrating in geological and physical sciences or engineering, especially those interested in the quantitative study of Earth. Covers common approaches to quantify the dynamics and chemistry of solids and fluids in nature (16 students in F14, 7 in F15, 5 in F16, 12 in F19, 4 in F21).*

F24,F25 **Assisting Professor:** Brown University, EEPS1400, Climate Modeling I. *An introduction to climate modeling, focusing on the fundamental principles of climate dynamics and the techniques used to simulate and understand the climate system of Earth and other planets (48 students in F24, co-taught).*

S13,S15, S17,S19, S21,S23, S25 **Professor:** Brown University, EEPS1520 (prev. GEOL1100), Ocean Circulation and Climate. *Examines physical characteristics, processes, and dynamics of the global ocean to understand circulation patterns and how they relate to ocean biology, chemistry, and climate change (6 students in S13, 9 in S15, 12 in S17, 4 in S21, 6 in S23, 17 in S25).*

S24,S25 **Assisting Professor:** Brown University, EEPS1700, Climate Modeling II. *Climate Modeling II is an advanced course that builds on foundational concepts introduced in Climate Modeling I (EEPS1400). The course offers students a hands-on introduction to modeling Earth's climate system, and experience simulating Earth's atmosphere, oceans, cryosphere, and climate system. Students will learn the theoretical foundations of modern numerical climate modeling and its application in a modern climate model, the Community Earth System Model (CESM). The course is a combination of traditional lecture content, tutorial content introducing students to the code structure and makeup of CESM, and computational lab work in which CESM simulations are actually performed. Students will develop and present a final project building from their course learning, based on a self-designed experiment. (9 students in S25, co-taught).*

F16,S20,S26 **Professor:** Brown University, GEOL1820, Geophysical Fluid Dynamics. *Explores theories of the large-scale ocean and atmosphere, including quasigeostrophic, planetary geostrophic, and shallow water equations. Topics will vary to focus on features or the general circulation and climate system, instabilities and waves, or rotating stratified turbulence (7 students in F16, 6 in S20).*

F18,S22 **Professor:** Brown University, EEPS1960X (prev. GEOL2950), Ocean, Cryosphere, and Sea Level Change. *This graduate reading and writing seminar emphasizes the breakthrough science that has been published since the Intergovernmental Panel on Climate Change Fifth Assessment Report (i.e., accepted for publication since March 15, 2013). Focus is on the physical science basis: past and future changes in ocean circulation and properties, marine and terrestrial cryosphere, and sea level; evaluation of models and projection methods; detection and attribution; projections of global and regional sea level change; abrupt change and long-term commitment; and extreme water levels. (12 students, 2 auditors in F18, 10 in S22).*

F15,F19, F21, F23 **Professor:** Brown University, GEOL2300, Mathematical and Computational Earth Sciences. *For graduate students interested in quantitative study of the Earth in geological, physical, or engineering sciences. Addresses tools for research topics across disciplines. Intensive review of introductory mathematical methods (9 students in F15, 5 in F19, 5 in F21, 3 in F23).*

F17	**Co-Lead Professor with Hastings, Hirth, Russell:** Brown University, GEOL1950M, Geoengineering, or the Unnatural World. *Examines the processes, dynamics, and consequences of geoengineering, or intentional climate intervention, approaches to controlling climate change. Through assignments students will create a series of referenced, researched, public wikipedia pages summarizing the state of the art understanding (i.e., a geoengineering hackathon). (18 students, 1 auditor in F17).*
F14	**Co-Professor with Parman, Russell, Saal:** Brown University, GEOL2910N, Volcanism and Climate. *explores the effects of volcanism on climate over a range of spatial and temporal scales, including: historic and prehistoric eruptions, large igneous provinces and correlations of secular atmospheric change with supercontinent cycles (9 students in F14).*
S11,F12	**Professor:** University of Colorado at Boulder, ATOC1060, Our Changing Environment: El Nino, Ozone, Climate. *A broad undergraduate class for non-science majors, surveying processes and behavior in the atmosphere, oceans, cryosphere, lithosphere, and biosphere (210 students in S11, 67 in F12).*
F09,F12	**Professor:** University of Colorado at Boulder, ATOC/GEOL3070, Introduction to Oceanography. *A broad undergraduate oceanography class roughly divided amongst marine geology, marine chemistry, physical oceanography, and marine biology (95 students in F09, 146 in F12).*
F07,F08, S10	**Professor:** University of Colorado, ATOC5051, Introduction to Physical Oceanography. *A graduate-level class required for all ATOC students covering fundamental ocean dynamics and observation (16 students in F07, 17 in F08, 14 in S10).*
S09,F10, F11	**Professor:** University of Colorado at Boulder, ATOC5061, Dynamics of Oceans. *An advanced ocean class required for ATOC students in the Oceanography Track (9 students in S09, 11 in F10, 5 in F11).*
F08,F09, F10	**Professor:** University of Colorado at Boulder, ATOC6020, Oceanography Seminar. *A for credit research seminar with speakers from local and remote institutions (12 students in F08, 8 in F09, 5 in F10).*
S11	**Professor:** University of Colorado at Boulder, ATOC6020, Teaching Climate Seminar. *A teaching workshop for graduate students interested in improving their teaching in general and their teaching of climate in particular (4 students).*
F03	**Teaching Substitute:** Princeton University, Atmospheric and Oceanic Sciences Program, Introduction to Geophysical Fluid Dynamics under G. Vallis. *Substitute lecturer.*
F03	**Teaching Substitute:** Princeton University, Atmospheric and Oceanic Sciences Program, Introduction to Physical Oceanography under G. Philander. *Substitute lecturer.*
F00	**Teaching Asst.:** MIT/WHOI Joint Program, Fluid Dynamics of the Atmosphere and Ocean under J. Price. *Designed and taught 1/3 of the class meetings.*
F97,S98	**Teaching Lab Asst.:** Brandeis University, First Year Honors Physics under P. Heller. *Taught and graded weekly lab experiments.*
F96,S97	**Teaching Lab Asst.:** Brandeis University, First Year Physics under H. Wellenstein. *Taught and graded weekly lab experiments.*

Advising at Brown University (final dates indicate graduation or completion with group, DEEPS students unless specified)

Visitors: *Haijin Cao (Visitor F2019-S2020 from Hohai University), Jihai Dong (Visitor F2019-S2020 from Nanjing University of Information Science & Technology), Zhiyou Jing (Visitor S2015 from South China Sea Institute of Oceanology), Alejandro Orfila (Visitor S2019 from Institut Mediterrani d'Estudis Avancats), Shanon Reckinger (Visitor F2014 from Fairfield University).*

Junior Faculty: *Christian Huber (2017–2019), Brandon Johnson (2016–2019), Mara Freilich (2023–), Chris Horvat (2020–).*

Postdoctoral Scientists: *Adam Ayouche (2024–), Leah Johnson (2018–2021), Chris Horvat (2017–2020), Xinyi Huang (2025–), Brodie Pearson (2015–2020), Scott Reckinger (2013–2015), Nobuhiro Suzuki (2013–2016).*

Co-Supervised Postdoctoral Scientists: *Samuel Brenner (2022–2024), Momme Hell (2020–2023), Arin Nelson (URI, 2019–2022).*

PhD Principal Advisor: *Abigail Bodner (2015–2021), Joel Feske (2020–), Qing Li (2013–2018), John Nicklas (2022–), Jenna Pearson (2015–2020), Anna Lo Piccolo (2021–), Aakash Sane (Mechanical Engineering, 2016–2021).*

PhD Co-Advisor: *Ashfaq Ahmed (Mechanical Engineering, with M. Martinez-Wilhelmus, 2024–), Leah Hoogstra (Applied Math, with M. Freilich, 2024–), Joseph Skitka (Physics, with B. Marston, 2015–2019), Anson Cheung (with T. Herbert, 2017–2023), Weixuan "Rosa" Xu (with J.-E. Lee, 2019–2022).*

Independent Study Advisor: *Spencer Francis (Physics S.M., S2025).*

Visiting Research Students: *Victoria Boatwright (Visiting BS 2020–2022 from Georgetown University), Matthew Cecchini (Visiting BSE 2020-2021 from URI), Daniel Cruz (Visiting BSE 2020–2021 from URI), Troy Gibbs-Brown (Leadership Alliance visiting BA 2021 from NYU), Maya Gong (Visiting BA 2022 from Haverford College), Grace Kowalski (Visiting BS 2022 from Purdue University), Anna Lo Piccolo (Visiting MS 2019–2020 from University of Bologna), Sokpearoun Lorn (2021 from URI), Haili Wang (Visiting PhD 2018–2019 from Nanjing University of Information Science & Technology), Seth Wojciechowski (2020–2021 Visiting BSE from URI).*

PhD Thesis Committee: *Nir Badt (2016–2021), Elise Beaudin (2023–2025), Samuel Bell (2014–2016), Zachary Bischoff-Mattson (2016–2017), Samantha Bova (2013–2016), Michael Bramble (2014–2016), Xi Chen (2025–), Sara Cuevas-Quinones (2024–), Karen Godfrey (2014–2019), Christopher Kelly (2014–2017), Kristin Kimble (2021–2024), Jared Kodero (2023–), Jennifer Kowalczyk (2018–2022), Laura Lark (2018–2024), Janette Levin (2021–), Yusen Liu (2023–), Bradley Lockhart (2020–2023), Miguel Segura (2013–2014), Peter Van Katwyk (2021–), Mengxi Wu (2016–2021), Chenyu Zhang (Physics, 2020–2022).*

Undergraduate Research Students: *Jonathan Benoit (2019–2022), Elias Berkowitz (Applied Math, 2017), Rebecca Bowers (2023), Liam R Carpenter-Urquhart (DEEPS/Physics, 2016–2018), Allison Cavallo (2021–), Jacinta Clay (2018–2019), Brett Cotler (2017), Lorenzo Davidson (2021–2023), Eliza Feero (Mathematics, 2015), Alice Foster (Applied Math, 2019–2020), Mara Freilich (Applied Math, 2014), Morgan Holstine (2023), Rachel Gottlieb (2013), Jordan Hartzell (2021), Bernard Li (2023), Yongxi Lin (2021), John Nicklas (Applied Math, 2018–2020), Patrick Orenstein (2016–2019), Nasir Perera-Olivo (2021), Eugene Robinson (2013), Benny Smith (Computer Science, 2020), Erica Thieleman (2013), Daniel Wexler (2022), Ella Wood (2020), Jason Wu, (2023).*

SM Thesis Advisor: *Jinxuan Zhu (2015–2017), Xiaoyu "Rain" Fan (2019–2022).*

SB Thesis Advisor: *Jonny Benoit (2021–2022), Allison Cavallo 2025–, Jasper Chen (2023–2024), Jacinta Clay (2018–2019), Galen Hall (Physics, w/ Ian Dell'Antonio, 2019–2020), Hannah Kolus (Physics, w/ R. Pelcovits, 2014–2015), Mara Freilich (Applied Math, w/ B. Sandstede, 2014–2015), Grant Landon (2023–2024), John Nicklas (Applied Math, w/ C. Lawrence, 2019–2020), Patrick Orenstein (2018), Mika Siegelman (Physics, w/ J.B. Marston, 2013–2014).*

SB Thesis Reader: *Mina Bahadori (Mechanical Engineering, advisor: M. Martinez-Wilhelmus, 2026), Andres Chang (advisor: A. Lynch, 2017), Zihan Chen (advisor: A. Lynch, 2020), Nicholas O'Mara (advisor: T. Herbert, 2017), Rebecca Payne (advisor: J.-E. Lee, 2015), Wyatt Sieminski (advisor: M. Freilich, 2026), Helen Situ (advisor: A. Lynch, 2019), Serena Vu (Mechanical Engineering and Applied Math, advisor: M. Martinez-Wilhelmus, 2025).*

Academic Advisor: *Khari Goosby (2013–2015), Thien Vuong Nguyen (2013–2015), Vivian Ramos (2014–2015), Christian Taugner (2013–2015), Ayenna Cagaanan (2014–2016), Kelsey Fenn (2014–2016), Samuel Miller-Smith (2014–2016), Alexis Muro (2014–2016).*

Advising Elsewhere (final dates indicate graduation)

Visitors and Supervisees: *Francis Poulin (Visitor to CU S2011 from U. Waterloo), Peter Hamlington (CU Aerospace Engineering Research Faculty supported 2011–2012), Luke Van Roekel (CU Visitor 2012–2014 from Northland College), Ralph Milliff (CU Visitor 2012 from Colorado Research Associates), Mark Hemer (CU Visitor F2012 from Commonwealth Scientific and Industrial Research Organisation).*

Postdoctoral Scientists: *Luke Van Roekel (2010–2011).*

PhD Principal Advisor: *Scott Bachman (CU ATOC, 2009–2013), Sean Haney (CU ATOC, 2011–2015), Katherine McCaffrey (CU ATOC, 2010–2014), Samantha Stevenson (CU ATOC, 2008–2011), Adrean Webb (CU Applied Math, 2008–2013), Stephen Yeager (CU ATOC, 2011–2013).*

PhD Thesis Committee: *Joern Callies (MIT EAPS, 2014–2015), Esther Capo (IMEDEA – Mediterranean Institute for Advanced Studies External Reviewer, 2019-2020), Samuel Dorsi (CU ATOC 2009–2012), Benet Duncan (CU ATOC, 2007–2011), Marcel du Plessis (University of Cape Town Oceanography External Reviewer, 2018), Katelynn Greer (CU Aerospace Engineering, 2011–2013), Ian Grooms (CU Applied Math, 2009–2011), Benjamin Hamlington (CU Aerospace Engineering, 2008–2011), Barry Mather (CU Electrical Engineering, 2008–2010), Waqas Qazi (CU Aerospace Engineering, 2011–2013), Shanon Reckinger (CU Mechanical Engineering, 2010–2011), Isa Rosso (Australian National University Earth Sciences External Reviewer, 2015), Suraj Singh (Indian Institute of Technology Madras, 2021), Laurie Trenary (CU ATOC, 2007–2012), Kim Trenbath (CU ATOC, 2011–2012).*

MS Thesis Committee: *Jacinta Clay (Princeton AOS, 2022–2023), Carl Drews (CU ATOC, 2008–2009), Erik Baldwin-Stevens (CU Co-Advisor, Aerospace Engineering, 2009–2010).*

Undergraduate Research Experiences Students: *Theodore Jamieson (CU Math & Psychology, 2008–2010), Andrew Margolin (CU Chemistry, ATOC minor, 2008–2012), Bradley Cooper (CU Mechanical Engineering, 2010–2011), Stephanie Kupper (CU Ecology & Evolutionary Biology, ATOC minor, 2010–2011).*

Significant Opportunities in Atmospheric Research and Science (SOARS) Students: *Ana Ordonez (Arizona State U., Geography with Meteorology, 2012).*

BA Honors Thesis Advisor: *Aaron Zettler-Mann (Geography, 2009–2010).*

Service to Brown University

2024–2027 **Faculty Co-Chair:** Equitable Climate Futures Initiative, Steering Committee. *Advise, structure, and oversee initiative.*

2025– **Member:** Brown DEEP Sciences, Chair's Advisory Committee. *Advise, review, strategize before full faculty discussions.*

2022–2023, 2025– **Chair:** Brown DEEP Sciences, Curriculum Committee. *Advise, structure, and monitor department curricula.*

2021–2023 **Chair:** Brown DEEP Sciences, Computing Committee. *Advise and monitor department computing resources and needs.*

2020–2022 **Coordinator:** Brown DEEP Sciences, Department Diversity Inclusion and Action Committee. *Organize meetings, working groups, and documents for the DDIAC..*

2019 **Member:** Brown University, Data Sciences Initiative DEEPS ad hoc Hiring Committee. *Process applications for department interviews and selection.*

2019,2015, 2014 **Member:** Brown University, IBES Voss Postdoc Committee. *Process applications and recommend candidates for selection.*

2018 **Member:** Brown University, Climate Change DEEPS Hiring Committee. *Process applications for department interviews and selection.*

2018–2021 **Alternate Member:** Brown University, Grievance Committee. *Review petitions by faculty and students.*

S2017 **Organizer:** Brown DEEP Sciences, Department Colloquium. *Invite speakers and organize the weekly curriculum.*

2016–2020, 2021–2022 **Member:** Brown DEEP Sciences, Curriculum Committee. *Advise, structure, and monitor department curricula.*

2015–2025 **Member Representative:** University Corporation for Atmospheric Research, Members' Council. *Through these representatives, member universities help guide the direction and set priorities for the University Corporation and the National Center for Atmospheric Research.*

2013–2020 **Member:** Brown DEEP Sciences, Computing Committee. *Advise and monitor department computing resources and needs.*

2013–2015 **Member:** DEEP Sciences Curriculum Committee Reviewing Graduate and Undergraduate Climate Physics Curricula, with Earth Systems History Colleagues. *Strategize a combination of core courses to support education of climate physics students.*

2015 **Member:** Brown DEEP Sciences, Geophysics Search Hiring Committee. *Identify candidates and coordinate interviews.*

2013 **Co-Representative:** DEEP Sciences Working Group on Water Strategy, with J. Russell. *Plan.*

2013–2015, 2019 **Reviewer:** Institute at Brown for Environment and Society (IBES), Seed Grants and Voss Postdoctoral Applicants. *Review research projects for funding from IBES.*

Service to the Profession and Community

2023– **Co-Chair:** World Climate Research Program (WCRP), Earth System Modelling and Observations (ESMO) Core Project. *Coordinate, advance, and facilitate all modelling, data assimilation and observational activities within WCRP, working jointly with all other WCRP projects and providing strategic connections to related external programs..*

2024– **Member:** Energy Exascale Earth System Model (E3SM) Advisory Committee, US Department of Energy (DOE), Office of Biological and Environmental Research (BER). *Participate in project review and discussions, recommend improvements.*

2021– **Member:** Nucleus for European Modelling of the Ocean (NEMO), Scientific Advisory Committee (SAC). *Provide feedback on Science and Development Strategies, etc.*

2021– **Member:** Narragansett Bay Estuary Program (NBEP), Science Advisory Committee. *NBEP's mission is to ensure clean water and habitat for all who live, work, and play in the Narragansett Bay region.*

2024–2026 **Chair:** Stochastic Transport in Upper Ocean Dynamics (STUOD) External Advisory Board, an ERC major project with Imperial College, INRIA, and IFREMER. *Advice from "high-level outside representatives of the field", attend annual workshop and review proceedings.*

2023–2025 **Member:** Climate Data and Predictions for Coastal Solutions Working Group, USCLIVAR. *Participate in scientific discussions.*

2022–2025 **Committee Member:** University Corporation for Atmospheric Research, Members Nominating Committee. *Suggest, nominate, and evaluate potential candidates for roles at UCAR..*

2017–2024 **Associate Member:** SCOR Working Group 153 on Floating Litter and its Oceanic TranSport Analysis and Modelling (FLOTSAM), Scientific Committee on Oceanic Research, International Council for Science (ICSU). *Participate in scientific discussions.*

2020–2024 **Member:** Stochastic Transport in Upper Ocean Dynamics (STUOD) External Advisory Board, an ERC major project with Imperial College, INRIA, and IFREMER. *Advice from "high-level outside representatives of the field", attend annual workshop and review proceedings.*

2022–2023 **Team Member:** Climate Intervention Task Team, World Climate Research Program. *Advice and participation in formulation of a new potential structure to examine science of climate intervention, produce a report.*

2018–2022 **Coordinating Lead Author:** Intergovernmental Panel on Climate Change, 6th Assessment Report. *Chapter 9: "Ocean, cryosphere, and sea level rise".*

2016–2022 **Member, Co-chair from 2017:** World Climate Research Programme's Climate and Ocean: Variability, Predictability and Change (CLIVAR), Ocean Model Development Panel. *Stimulate the development of ocean models for research in climate and related fields.*

2015–2020 **Co-Chair:** Community Earth System Model (CESM), Ocean Model Working Group. *Provide feedback and guidance, coordinate semi-annual meetings.*

2019–2022 **Member:** Air-Sea Interactions Working Group, USCLIVAR. *Participate in scientific discussions.*

2015–2021 **Member:** Community Earth System Model (CESM), Scientific Steering Committee. *Provide feedback on Science or Implementation Plans, response to the Advisory Board, prioritizing major simulation suites, etc.*

2011–2013 **Member & Panel Co-Chair:** The U.S. Climate Variability and Predictability Research Program (USCLIVAR), Process Studies and Model Improvement Panel. *Advise, review, and prioritize US scientific plans (NSF, NOAA, NASA, ONR) for process studies.*

2008–2010 **Member:** American Forestry Foundation, Research Partners Group. *Design and judge grant solicitations and proposals.*

Service Convening the Community

2023 **Scientific Committee Member:** Air-Sea Interactions Working Group Workshop, USCLIVAR. *Organize meeting in March.*

2022–2024 **Scientist in IPRC:** Center for Ocean Research in Hong Kong and Macau (CORE), an international research center for interdisciplinary ocean research and a bilateral collaboration between the Hong Kong University of Science and Technology (HKUST) and the Qingdao National Laboratory for Marine Science and Technology (QNLM)., International Research Platform of CORE (IRPC). *Recruit and supervise or co-supervise postdoctoral fellows funded by CORE.*

2022 **International Co-Leader, Providence Host:** FilaChange Meeting, an international (Providence, Paris, Hobart, Qingdao) conference on ocean processes linking filaments and finescales (1-100 km) with climate change, Surface Water/Ocean Topography Adopt-a-Crossover, NASA, CLIVAR. *Organize meeting in September.*

2021–2022 **Interim Scientific Steering Group Member:** Earth System Modelling and Observational Capabilities (ESMO), a new home, new core project within the World Climate Research Program (WCRP). *Advice and participation in formulation of the new structure.*

2022 **Convener:** AGU Ocean Sciences Meeting Town Hall, with Helene Hewitt. *Oceanography of the IPCC Sixth Assessment Report.*

2022 **Convener:** EGU Meeting Session, with Anne Marie Treguier, Francois Massonnet, and Raquel Sommavilla. *The ocean surface mixed layer: multi-scale dynamics and ecosystems in a changing climate.*

2020 **Convener:** AGU Ocean Sciences Meeting Session, with N. Suzuki and P. Calil. *Multidisciplinary upscale effects of submeso- and smaller-scale physical processes.*

2019 **Workshop Co-Chair:** Florida State University, Jointly sponsored by the CLIVAR Ocean Model Development Panel and USCLIVAR Process Study & Model Improvement Panel. *Lead coordinator of the program "Sources and Sinks of Ocean Mesoscale Eddy Energy".*

2018 **Workshop Lead:** University of California Santa Barbara, Kavli Institute for Theoretical Physics. *Lead coordinator of the program "Planetary Boundary Layers in Atmospheres, Oceans, and Ice on Earth and Moons".*

2018 **Convener:** Asia Oceania Geosciences Society (AOGS) Annual Meeting Session, with Changming Dong, Sung Yong Kim, Qingxuan Yang. *Submesoscale Processes and Their Parameterizations.*

2016–2018 **Board Member (Invited):** Mentoring Physical Oceanography Women to Increase Retention, MPOWIR. *Shaping how MPOWIR evolves and assisting in finding support.*

2016 **Session Co-chair (Invited):** Mixing and stirring session with M. Levy, Charting the Course for Climate and Ocean Research. *CLIVAR Open Science Conference, Qingdao, China, April 13-15.*

2016 **Session Co-chair (Invited):** Development of coherent designs and collaborations for experiments session with H. Hewitt and G. K. Vallis, High-Resolution Ocean Modelling for Coupled Seamless Predictions Workshop. *Met. Office Hadley Centre for Climate Science and Services, Exeter, U.K., February 4.*

2016 **Scientific Committee:** 48th Liege GeoHydrodynamics and Environment Research Colloquium, Submesoscale Processes: Mechanisms, Implications and New Frontiers. *University of Liege, Belgium, May 23-27.*

2016 **Convener:** AGU Ocean Sciences Meeting Session, with D. Halkides, S. E. Belcher, and D. Menemenlis. *The Ocean Surface Boundary Layer: Physical Processes and Roles in Weather, Climate and Biogeochemistry.*

2014 **Convener:** AGU Fall Meeting Session, with J. Teixeira, S.K. Krueger, and Y. Liu. *Physics of climate models.*

2014 **Scientific Committee:** Institute for Pure and Applied Mathematics (IPAM) situated on the UCLA campus, "Geophysical and Astrophysical Turbulence" workshop part of a semester program on Mathematics of Turbulence, with J. Aurnou (UCLA), Oliver Buhler (NYU, Courant Institute of Mathematical Sciences), Pascale Garaud (UC Santa Cruz), and Keith Julien (University of Colorado). *Choose speakers and run meeting.*

2014 **Convener:** AGU Ocean Sciences Meeting Session, with M. Bates, S. Griffies, and T. Ringler. *Physical and biogeochemical ocean modeling: development, assessment and applications.*

2013 **Scientific Committee:** Los Alamos National Lab Center for Nonlinear Studies 33rd Annual Meeting: The Oceans and Turbulence, with G. Vallis, B. Wingate, R. Ferrari, and P. Gent. *Plan and run meeting, choose speakers.*

2013 **Session Secretary:** Joint Global Ocean Data Assimilation Experiment (GODAE) OceanView/Working Group on Numerical Experimentation (WGNE) Workshop on Short- to Medium-range coupled prediction for the atmosphere-wave-sea-ice-ocean: Status, needs and challenges, with J. Teixeira. *Parameterizations Session.*

2012 **Convener:** AGU Ocean Sciences Meeting Session, with S. E. Belcher, E. A. D'Asaro, and A. C. Naviera-Garabato. *Dynamics of Upper Ocean Boundary and Mixed Layers.*

2010 **Convener:** AGU Ocean Sciences Meeting Session, with D. Halkides, R. Harcourt, H. Brix. *Dynamics of Upper Ocean Boundary and Mixed Layers.*

Service to Academic Literature and Funding Agencies

2022–2026 **Associate Editor, Editorial Board:** *Science Advances*, an open access multidisciplinary journal, American Association for the Advancement of Science (AAAS). *Maintain high quality standards, oversee the peer review of papers, assess manuscripts, and decide based on the reviews.*

2017–2023	**Editor:** *Journal of Physical Oceanography*, American Meteorological Society. *Maintain high quality standards, oversee the peer review of papers, assess manuscripts, and decide based on the reviews.*
2014–2019	**Member:** *Philosophical Transactions of the Royal Society A*, Editorial Board. *Advise editors, review papers and themes, propose themes.*
2015–2018	**Founding Editor:** *Dynamics and Statistics of the Climate System: An Interdisciplinary Journal*, Oxford University Press. *Define the scope of the journal, promote the journal.*
2013–2015	**Editor:** *Ocean Modelling*, Lead Editor for Virtual Special Issue. *"Gulf of Mexico Modelling: Lessons Learned from the Spill".*
2009–2020	**Member:** *Ocean Modelling*, Editorial Board. *Advise editors, review papers.*
2012–2014	**Member:** *Climate*, Editorial Board. *Advise editors, review papers.*

Reviewer for *Acta Oceanologica Sinica*, *Advances in Atmospheric Sciences*, *American Journal of Physics*, *Bulletin of the American Meteorological Society*, *Climate Dynamics*, *Deep Sea Research*, *Dynamics of Atmospheres and Oceans*, *Environmental Research Letters)*, *Earth System Dynamics*, *Europhysics Letters*, *Geophysical Research Letters*, *Journal of Advances in Modeling Earth Systems*, *Journal of Applied Meteorology and Climatology*, *Part M: Journal of Engineering for the Maritime Environment*, *Journal of Fluid Mechanics*, *Journal of Mathematical Physics*, *Journal of Marine Research*, *Journal of Physical Oceanography*, *Journal of Geophysical Research*, *Limnology and Oceanography*, *Monthly Weather Review*, *Nature*, *Ocean Modelling*, *Oceanography*, *Ocean Science*, *Paleoceanography*, *Physical Review Fluids*, *PLoS One*, *Proceedings of the National Academy of Sciences*, *Progress in Oceanography*, *Science*, *Science Advances*, the Climate Literacy and Energy Awareness Network, Elsevier Science & Technology Books, John Wiley & Sons Limited Books, l'Agence Nationale de la Recherche, the Department of Energy, the Deutscher Akademischer Austausch Dienst, the Deutsche Forschungsgemeinschaft, the Dutch Research Council (NWO), the Engineering and Physical Sciences Research Council, the European Research Council, the Israel Science Foundation, the International Foundation for Science, the Marsden Fund (New Zealand), the National Oceanic and Atmospheric Administration, the Natural Environment Research Council, the Natural Sciences and Engineering Research Council of Canada, the National Science Foundation, the National Research Foundation (NRF, South Africa), the Partnership for Advanced Computing in Europe, and the Swiss National Science Foundation. **Review panelist** for the National Oceanic and Atmospheric Administration, the National Science Foundation, and the Deutsche Forschungsgemeinschaft. Hiring and promotions referee for California Institute of Technology (CalTech), University of California, Los Angeles (UCLA), Scripps Institution of Oceanography (UCSD), University of Delaware, Courant Institute of Mathematical Sciences (NYU), Woods Hole Oceanographic Institution.

Service to Other Universities

2011	**Founder & Coordinator:** ATOC, Study Center. *Plan, coordinate, and supervise undergraduate Study Center Leaders.*
2010–2012	**Member:** CIRES, Executive Committee. *Advise on executive decisions.*
2008–2010	**Faculty Liaison:** CIRES, Graduate Student Association. *Assist and advise student association.*
2008–2012	**Member:** Climate Diagnostics Center, Executive Committee. *Guide proposals and research direction.*
2007–2012	**Fellow:** CIRES, Council of Fellows. *Advise and develop research conducted at CIRES.*
2008	**Designer:** ATOC, Oceanography Core Curriculum. *Synthesize cross-campus oceanography offerings into Master's and PhD curriculum.*
2003–2004	**Coordinator:** Atmosphere-Ocean Dynamics Club, Princeton University Atmospheric and Oceanic Sciences Program. *Organize speakers.*
2000–2002	**Coordinator:** Oceanography Sack Lunch Seminar, MIT Program in Atmospheres, Oceans and Climate. *Invite and introduce speakers.*
1999–2002	**System Administrator and Lobbyist:** Student Computing, Dept. of Physical Oceanography, WHOI. *Maintain a networked cluster and negotiate funding for upgrades.*
2000–2001	**Graduate Student Representative:** Physical Oceanography, MIT/WHOI Joint Program. *Elected to represent physical oceanography graduate students.*
1997–1998	**Graduate Student Representative:** Physics, Brandeis University. *Elected to represent physics graduate students at faculty meetings.*

Refereed Publications

[R.1] A. Ayouche, B. Fox-Kemper, M. Hell, B. Pearson, and C. Wagner, 2026: PyTurbo_SF: An adaptive bootstrap framework for efficient structure function analysis in turbulent flows. *Journal of Open Source Software*, **11**(120):9876. (DOI).

[R.2] B. Fox-Kemper, P. DeRepentigny, A. M. Treguier, C. Stepanek, E. O'Rourke, C. Mackallah, A. Meucci, Y. Aksenov, P. J. Durack, N. Feldl, V. Hernaman, C. Heuz19 e, D. Iovino, G. Madan, A. L. Marquez, F. Massonnet, J. Mecking, D. Samanta, P. C. Taylor, W.-L. Tseng, and M. Vancoppenolle, 2026: CMIP7 data request: Ocean and sea ice priorities and opportunities. *Geoscientific Model Development*. Accepted, (DOI).

[R.3] P. *Van Katwyk*, B. Fox-Kemper, H. T. Hewitt, and K. J. Bergen, 2026: Rewiring climate modeling with machine learning emulators. *Communications Earth & Environment*, **7**(106). (DOI).

[R.4] H. Cao, B. Fox-Kemper, X. Song, Y. Yuan, and Z. Jing, 2026: Submesoscale stirring drives lateral dispersion and vertical exchange in a cyclonic mesoscale eddy. *Journal of Geophysical Research–Oceans*, **131**:e2025JC023066. (DOI).

[R.5] A. H. Cheung, A. Sane, and B. Fox-Kemper, 2026: Understanding the characteristics and drivers of Pacific decadal variability over the last millennium. *Climate Dynamics*, **64**(35). (DOI).

[R.6] T. Uchida, A. S. Bodner, B. G. Reichl, A. Adcroft, B. Fox-Kemper, M. Ilicak, M. Bentsen, G. M. Marques, and W. G. Large, 2026: Representation of surface mixed-layer eddies affects the large-scale ventilation of the global ocean. *Geophysical Research Letters*, **53**:e2025GL116872. (DOI).

[R.7] K. Moretti, Y. Liang, J. Nicklas, B. Fox-Kemper, C. DiCerbo, H. Torabzadeh, C. Schmid, and A. Aluisio, 2026: The impact of urban heat islands on emergency medical services utilization in Rhode Island. *The Western Journal of Emergency Medicine*. (DOI).

[R.8] H. T. Hewitt, G. Flato, E. O'Rourke, J. P. Dunne, F. Adloff, J. Arblaster, F. Bonou, O. Boucher, T. Cavazos, B. Dingley, P. J. Durack, B. Fox-Kemper, T. Ilyina, T. Miyakawa, M. Mizielinski, V. Naik, Z. Nicholls, R. Pincus, K. E. Taylor, S. Tegtmeier, and N. Wedi, 2025: Towards provision of regularly updated climate data from the Coupled Model Intercomparison Project. *PLoS Climate*. (DOI).

[R.9] M. Hell, B. Chapron, and B. Fox-Kemper, 2025: A particle-in-cell wave model for efficient sea-state and swell estimates in Earth System Models – PiCLES. *Journal of Advances in Modeling Earth Systems*. (DOI).

[R.10] A. H. Cheung, X. Du, M. C. Parish, R. S. Vachula, B. Fox-Kemper, and T. D. Herbert, 2025: The influence of carbon dioxide and precession on western North American hydroclimate and Pacific sea surface temperature during the Holocene. *Paleoceanography and Paleoclimatology*. (DOI).

[R.11] B. Pearson, C. Wagner, B. Fox-Kemper, and R. Samelson, 2025: Estimating spectral fluxes in quasi-two-dimensional flows with advective structure functions and Bessel functions. *Journal of Physical Oceanography*. (DOI).

[R.12] S. B. Ajjur, E. D. Lorenzo, and B. Fox-Kemper, 2025: Global hotspots for sea-level changes: decadal extremes and uncertainties from CMIP6 models. *Earth and Space Science*. (DOI).

[R.13] Z. Zheng, J. O. Wenegrat, Fox-Kemper, and G. J. Brett, 2025: Wind-catalyzed energy exchanges between fronts and boundary layer turbulence. *Journal of Physical Oceanography*. (DOI).

[R.14] A. Ayouche, B. Fox-Kemper, Y. Liu, and G. Matheou, 2025: Investigating turbulent dynamics in the nocturnal boundary layer: A Large Eddy Simulation study of the South Fork Wind farm. *Journal of Physics: Conference Series (WAKE 2025)*, **3016**:012048. (DOI).

[R.15] A. Ahmed, B. Fox-Kemper, D. M. Watkins, D. Wexler, and M. M. Wilhelmus, 2025: Estuarine temperature variability: Integrating four decades of remote sensing observations and in-situ sea surface measurements. *Remote Sensing of Environment*, **322**:114643. (DOI).

[R.16] J. M. Nicklas, B. Fox-Kemper, and C. Lawrence, 2025: Efficient estimation of climate state and its uncertainty using Kalman filtering with application to policy thresholds and volcanism. *Journal of Climate*, **38**(5):1235–1270. (DOI).

[R.17] J. Dong, B. Fox-Kemper, J. Wenegrat, A. Bodner, X. Yu, S. Belcher, and C. Dong, 2024: Submesoscales are a significant turbulence source in global ocean surface boundary layer. *Nature Communications*, **15**(9566). (DOI).

[R.18] A. Lo Piccolo, C. Horvat, and B. Fox-Kemper, 2024: Energetics and transfer of submesoscale brine driven eddies at a sea ice edge. *Journal of Physical Oceanography*, **54**:1489–1501. (DOI).

[R.19] J. M. Lilly, J. Feske, B. Fox-Kemper, and J. J. Early, 2024: Integral theorems for the gradient of a vector field, with a fluid dynamical application. *Proceedings of the Royal Society A: Mathematical, Physical, and Engineering Sciences*, **480**(2293). (DOI).

[R.20] L. Johnson and B. Fox-Kemper, 2024: Modification of boundary layer turbulence by submesoscale flows. *Flow*, **4**. (DOI).

[R.21] H. Cao, Z. Jing, and B. Fox-Kemper, 2024: Scale-dependent vertical heat transport inferred from quasi-synoptic submesoscale-resolving observations. *Geophysical Research Letters*, **51**(12):e2024GL110190. (DOI).

[R.22] A. Sane, B. Fox-Kemper, and D. Ullman, 2024: Internal vs forced variability metrics for geophysical flows using information theory. *Journal of Geophysical Research–Oceans*, **129**(5):e2023JC020101. (DOI).

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Publications in Progress

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[P.2] P. *Van Katwyk*, B. Fox-Kemper, S. Nowicki, H. Seroussi, and K. J. Bergen, 2026: Emulator-expanded projections reveal structure in Antarctic sea level uncertainty. *Geophysical Research Letters*. Submitted.

[P.3] H. Cao, Z. Jing, B. Fox-Kemper, B. Qiu, and J. H. Lacasce, 2026: Direct observations of submesoscale turbulence driving mesoscale eddy leakage. *Science Advances*. Submitted.

[P.4] P. W. Thorne, J. M. Nicklas, J. J. Kennedy, B. Calvert, B. Fox-Kemper, M. T. Richardson, A. Simmons, E. Hawkins, R. Rohde, K. Cowtan, N. J. Abram, A. Andersson, S. Noone, P. Marbaix, N. Lenssen, D. Olonscheck, T. Walsh, S. Outten, I. Bethke, B. H. Samset, C. Smith, A. Pirani, J. Fuglestvedt, L. Rajamani, R. A. Betts, E. C. Kent, B. Trewin, C. Morice, T. Osborn, S. N. Burgess, O. Geden, A. Parnell, P. M. Forster, C. Hewitt, Z. Hausfather, V. Masson-Delmotte, J. Marotzke, N. Gillett, S. I. Seneviratne, G. A. Schmidt, D. Chan, S. Br**1**27 onnimann, A. Reisinger, M. Menne, M. R. Corradi, C. Kadow, P. Huybers, D. B. Stephenson, E. Wallis, J. Rogelj, A. Schurer, K. McKinnon, P. Zhai, F. Driouech, W. M. Okia, S. Vazifehkhah, S. Szopa, C. J. Merchant, S. Hirahara, M. Ishii, F. A. Engelbrecht, Q. Li, J.-Y. Lee, A. J. Cannon, C. Cassou, K. von Schuckmann, A. H. Delju, and E. Murtagh, 2025: How well can we quantify when 1.5 °c of global warming has been exceeded? In discussion, (DOI).

[P.5] P. Chabert, E. Di Lorenzo, S. B. Ajjur, B. Fox-Kemper, J. C. Furtado, C. Galeotti, S. Masina, J. M. Pringle, B. Sadhukhan, and E. Scoccimarro, 2026: Decline and poleward shift of extra-tropical storm frequency and intensity in the Northwest Atlantic. *Science Advances*. Submitted.

[P.6] S. B. Ajjur, P. Chabert, E. Di Lorenzo, B. Fox-Kemper, J. M. Pringle, and B. Sadhukhan, 2025: Incorporating sea-level rise in storm surge models: Importance of dynamical interactions. *Earth's Future*. Submitted.

[P.7] J. Dong, A. S. Bodner, B. Fox-Kemper, S. Guan, C. Dong, and J. Tian, 2025: Significant contribution of submesoscales to turbulence in the upper ocean boundary layer of an anticyclonic mesoscale eddy. *Journal of Physical Oceanography*. Submitted.

[P.8] P. *Van Katwyk*, B. Fox-Kemper, S. Nowicki, H. Seroussi, and K. J. Bergen, 2025: ISEFlow v1.0: A flow-based neural network emulator for improved sea level projections and uncertainty quantification. *Cryosphere*. Resubmitted, (DOI).

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[P.10] L. A. Dove, M. A. Freilich, L. Siegelman, Fox-Kemper, and P. Hall, 2024: Pycnocline stratification shapes submesoscale vertical tracer transport. *Journal of Physical Oceanography*. Submitted, (DOI).

Selected Talks

[T.1] B. Fox-Kemper, 2026: The curve and the pollution: Modeling toward the futures we want (invited, keynote). In *Annual Fred Lang Memorial Lecture*. Boston University Marine Program.

[T.2] B. Fox-Kemper, 2026: Emulators and parameterizations: Indirect tools for climate science (invited). In *AI for Climate Initiative (AICE) Speaker Series*. University of Chicago.

[T.3] B. Fox-Kemper, 2025: Climate data use and the connection between local observation networks and global outputs (invited). In *Earth Information Day 2025*. United Nations Framework Convention on Climate Change (UNFCCC), Thirtieth Conference of the Parties (COP30), Virtual.

[T.4] B. Fox-Kemper, 2025: Ocean model spin-up practices in diverse contexts (invited). In *Working Group on Numerical Experimentation Annual Meeting*. World Climate Research Programme–World Meteorological Organization, Virtual.

[T.5] B. Fox-Kemper, 2025: Emulators and parameterizations: Indirect tools for climate science (invited). In *Lamont-Doherty Earth Observatory Division of Ocean and Climate Physics Seminar*. Columbia University, Virtual.

[T.6] B. Fox-Kemper, 2025: Emulators and parameterizations: Indirect tools for climate science (invited). In *Small-Scale Processes in the Upper Ocean and their Interaction with the Earth's Climate System Working Group*. USCLIVAR, Virtual.

[T.7] B. Fox-Kemper, 2025: Emulators and parameterizations: Indirect tools for climate science (invited). In *Topical Group on the Physics of Climate*. American Physical Society, Virtual.

[T.8] B. Fox-Kemper, 2025: Coordinates, emulators, and parameterizations. In *Stochastics and Dynamics of the Upper Ocean Annual Meeting*. University of Edinburgh, Edinburgh, Scotland.

[T.9] B. Fox-Kemper, 2025: Emulators and parameterizations: Indirect tools for climate science (invited, closing keynote). In *50th Anniversary of MPI: CELLO–Climate Exploration in Lively Liaison with the Ocean*. Max Planck Institut f**1**27 ur Meteorologie, Hamburg, Germany.

[T.10] B. Fox-Kemper, 2025: The ocean state ocean model, what is it? (invited). In *BlueTech Team Meeting*. MITRE Corporation, Bedford, MA.

[T.11] B. Fox-Kemper, 2025: Climate and sea level change: A perspective for the breakers (invited, keynote). In *The Breakers Management Team Meeting*. The Breakers, Palm Beach, FL.

[T.12] B. Fox-Kemper, 2025: The real-life aquatic with sea level, heating, and acidification (and what you can do) (invited introduction to "The Life Aquatic with Steve Zissou"). In *Science on Screen*. Martha's Vineyard Film Society, Vineyard Haven, MA. (link).

[T.13] B. Fox-Kemper, 2025: Emulators and parameterizations: Indirect tools for ocean science (invited). In *Physical Oceanography Seminar*. Woods Hole Oceanographic Institution, Woods Hole, MA.

[T.14] B. Fox-Kemper, 2025: Sea-crets of the climate (invited). In *Climate Seminar Series*. Colorado School of Mines, Golden, CO.

Other Information

Member of American Meteorological Society, American Geophysical Union, and American Association for the Advancement of Science
U.S. Citizen
Rock, Jazz & Blues Musician
Languages: English, French, UNIX, LINUX, HTML, FORTRAN, C++, Python, julia, LaTeX, Mathematica, Matlab, BASIC, FERRET

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