

CONTACT INFORMATION	Jacob O. Wenegrat Assistant Professor Department of Atmospheric and Oceanic Science University of Maryland, College Park, MD	wenegrat@umd.edu http://wenegrat.github.io
RESEARCH INTERESTS	Geophysical fluid dynamics, atmosphere and ocean dynamics, submesoscale processes, boundary-layer processes	
EDUCATION	Ph.D., Oceanography 2015 School of Oceanography University of Washington, Seattle, WA. M.S., Applied Mathematics 2014 Department of Applied Mathematics University of Washington, Seattle, WA. M.S., Oceanography 2013 Department of Oceanography University of Washington, Seattle, WA. B.S., Symbolic Systems 2006 Stanford University, Stanford, CA.	
APPOINTMENTS	Assistant Professor , University of Maryland, College Park 2020 - present Department of Atmospheric and Oceanic Science Burger's Program for Fluid Dynamics (affiliate) Applied Mathematics & Statistics, and Scientific Computation (affiliate) Postdoctoral Fellow , Stanford University 2016 - 2019 Department of Earth System Science • Supervisor: Leif Thomas Visiting Scholar , Kavli Institute for Theoretical Physics, UCSB May 2018 Program on Planetary Boundary Layers in Atmospheres, Oceans, and Ice on Earth and Moons. Graduate Research Assistant , University of Washington 2010 - 2015 School of Oceanography • Advisor: Michael J. McPhaden Consultant , Accenture Technology Labs 2007 - 2009 R&D consultant focused on data center energy forecasting.	
REFEREED PUBLICATIONS	[1] Wenegrat, J.O. , L.N. Thomas, M.A. Sundermeyer, J.R. Taylor, E.A. D'Asaro, J. Klymak, R.K. Shearman, and C.M. Lee, <i>in revision</i> : Enhanced mixing across the gyre boundary at the Gulf Stream front. <i>PNAS</i>	

- [2] **Wenegrat, J.O.**, and L.N. Thomas, 2020: Centrifugal and symmetric instability during Ekman adjustment of the bottom boundary layer. *J. Phys. Oceanogr.* doi:[10.1175/JPO-D-020-0027.1](https://doi.org/10.1175/JPO-D-020-0027.1)
- [3] Johnson, L., C.M. Lee, E.A. D'Asaro, **J.O. Wenegrat**, and L.N. Thomas, 2020: Restratification at a California Current Upwelling Front, Part 2: Dynamics. *J. Phys. Oceanogr.* In Press
- [4] **Wenegrat, J.O.**, and R.S. Arthur, 2018c: Response of the atmospheric boundary layer to submesoscale sea surface temperature fronts. *Geophys. Res. Lett.* 45, 24, 13505-13512. doi:[10.1029/2018GL081034](https://doi.org/10.1029/2018GL081034)
- [5] **Wenegrat, J.O.**, J. Callies, and L.N. Thomas, 2018b: Submesoscale baroclinic instability in the bottom boundary layer. *J. Phys. Oceanogr.* 48, 11, 2571-2592. doi:[10.1175/JPO-D-17-0264.1](https://doi.org/10.1175/JPO-D-17-0264.1)
- [6] **Wenegrat, J.O.**, L.N. Thomas, J. Gula, and J.C. McWilliams, 2018a: Effects of the submesoscale on the potential vorticity budget of ocean mode waters. *J. Phys. Oceanogr.* 48, 9, 2141-2165. doi:[10.1175/JPO-D-17-0219.1](https://doi.org/10.1175/JPO-D-17-0219.1)
- [7] **Wenegrat, J.O.**, and L.N. Thomas, 2017: Ekman transport in balanced currents with curvature. *J. Phys. Oceanogr.*, 47, 5, 1189-1203. doi:[10.1175/JPO-D-16-0239.1](https://doi.org/10.1175/JPO-D-16-0239.1)
- [8] **Wenegrat, J.O.**, and M.J. McPhaden, 2016a: A simple analytical model of the diurnal Ekman layer. *J. Phys. Oceanogr.*, 46, 9, 2877-2894. doi:[10.1175/JPO-D-16-0031.1](https://doi.org/10.1175/JPO-D-16-0031.1)
- [9] **Wenegrat, J.O.**, and M.J. McPhaden, 2016b: Wind, waves, and fronts: Frictional effects in a generalized Ekman model. *J. Phys. Oceanogr.*, 46, 2, 371-394. doi:[10.1175/JPO-D-15-0162.1](https://doi.org/10.1175/JPO-D-15-0162.1)
- [10] **Wenegrat, J.O.**, and M.J. McPhaden 2015: Dynamics of the surface layer diurnal cycle in the equatorial Atlantic Ocean (0°, 23°W). *J. Geophys. Res. Oceans*, 120, 563-581. doi:[10.1002/2014JC010504](https://doi.org/10.1002/2014JC010504)
- [11] **Wenegrat, J.O.**, M.J. McPhaden, and R.-C. Lien, 2014: Wind stress and near-surface shear in the equatorial Atlantic Ocean. *Geophys. Res. Lett.*, 141, 1226-1231. doi:[10.1002/2013GL059149](https://doi.org/10.1002/2013GL059149)

OTHER
PUBLICATIONS

Wenegrat, J.O., 2015: Ocean Boundary Layer Dynamics and Air-Sea Interaction. Ph.D. Thesis, University of Washington, Seattle, WA, <http://hdl.handle.net/1773/35286>

Benedek, Z., J.W.J. Liang, and **J.O. Wenegrat**, 2014: System for providing strategies to reduce the carbon output and operating costs of a workplace. U.S. Patent 8812971.

Tung, T.S., and **J.O. Wenegrat**, 2013: System for providing strategies for increasing efficiency of data centers. U.S. Patent 8395621.

EXTERNAL
FUNDING

Submesoscale instabilities in the ocean bottom boundary layer: A new pathway for energy dissipation. PI: **Wenegrat**. NSF, \$383k, 2020-2022.

Submesoscale instabilities near the sea-floor and their effects on the ocean circulation and mixing. PIs: Thomas/**Wenegrat**. NSF, \$325k, 2018-2020.

INVITED TALKS

From the surface to the abyss: Effects of the submesoscale on the large-scale circulation. *SOEST, University of Hawaii*, Honolulu, HI. 2019.

Submesoscale turbulence in the bottom boundary layer: A new frontier for oceanography. *AOSC, University of Maryland*, College Park, MD, 2019.

SELECTED
PRESENTATIONS

- Air-sea interaction at the ocean submesoscale: Ekman transport and surface winds. *NASA Jet Propulsion Laboratory*, Pasadena, CA, 2019.
- Into the deep: Submesoscale turbulence in the ocean bottom boundary layer. *Climate and Global Dynamics Seminar, NCAR*, Boulder, CO, 2018.
- Submesoscale processes in the abyss: A new frontier for ocean dynamics. *Research School for Earth Sciences, Australian National University*, Canberra, AUS, 2018.
- From the submesoscale to the gyre scale: How small-scale fronts modify the properties of ocean gyres. *Mechanical Engineering Department Seminar, University of California, Santa Barbara*, Santa Barbara, CA, 2018.
- From the submesoscale to the gyre scale: How small-scale fronts modify ocean mode waters. *Oceanography Department Seminar, Dalhousie University*, Halifax NS, Canada, 2017.
- Mixed layer dynamics and the diurnal cycle in the equatorial Atlantic Ocean. *Equatorial Dynamics of the Atmosphere and Oceans, AGU Fall Meeting*, San Francisco, CA, 2014.
- Mixed layer dynamics and the diurnal cycle in the equatorial Atlantic Ocean. *Physics of Oceans and Atmospheres Seminar, Oregon State University*, Corvallis, OR, 2014.
- It's fronts all the way down: Response of the atmosphere to a submesoscale front. *CLIVAR Surface Currents Workshop*, San Diego, CA, 2020. Poster.
- Forced symmetric and centrifugal instability in the bottom boundary layer *Ocean Sciences Meeting*, San Diego, CA, 2020. Poster.
- Enhanced mixing across the gyre boundary at the Gulf Stream front. *Environmental Fluid Mechanics and Hydrology Seminar, Stanford University*, Stanford, CA, 2019. Talk.
- Symmetric instability in the ocean bottom boundary layer: A new pathway for energy dissipation? *California Geophysical Fluid Dynamic Symposium*, Pasadena, CA, 2019. Talk.
- Submesoscale turbulence in the ocean bottom boundary layer: Baroclinic, symmetric, and centrifugal instabilities. *22nd Conference on Atmospheric and Oceanic Fluid Dynamics*, Portland, ME, 2019. Talk.
- Submesoscale instabilities in the bottom boundary layer. *Workshop on BBL turbulence and the Ocean Overturning Circulation, MIT*, Boston, MA, 2018. Talk.
- Into the deep: Submesoscale turbulence in the bottom boundary layer. *SLS, MIT*, Boston, MA, 2018. Talk.
- Into the deep: Submesoscale turbulence in the bottom boundary layer. *PO Seminar, WHOI*, Woods Hole, MA, 2018. Talk.
- Submesoscale baroclinic instability in the bottom boundary layer. *Ocean Mixing Conference*, Gordon Research Conference, Andover, NH, 2018. Poster.
- PV dynamics in the turbulent boundary layer. *Program on Planetary Boundary Layers*, Kavli Institute for Theoretical Physics, Santa Barbara, CA, 2018. Talk.
- Submesoscale baroclinic instability in the bottom boundary layer. *Frontiers in Oceanic, Atmospheric, and Cryospheric Boundary Layers*, Kavli Institute for Theoretical Physics, Santa Barbara, CA, 2018. Poster.
- Submesoscale baroclinic instability in the bottom boundary layer: A mechanism for enhanced vertical buoyancy fluxes. *Ocean Sciences Meeting*, Portland, OR, 2018. Talk.

From the submesoscale to the gyre scale: How small-scale fronts modify ocean mode waters. *Climate, Atmospheric Sciences, and Physical Oceanography Seminar, Scripps Institution of Oceanography*, San Diego, CA, 2018. Talk.

Submesoscale symmetric instability and observed rapid horizontal dispersion across the Gulf Stream. *CLIVAR Ocean Carbon Hotspots Workshop*, Monterey, CA, 2017. Poster.

Ekman transport in balanced currents with curvature. *21st Conference on Atmospheric and Oceanic Fluid Dynamics*, Portland, OR, 2017. Talk.

Effects of the submesoscale on the potential vorticity budget of ocean mode waters. *21st Conference on Atmospheric and Oceanic Fluid Dynamics*, Portland, OR, 2017. Poster.

Submesoscale dynamics in the turbulent boundary layer. *Oceanography Department Seminar, Dalhousie University*, Halifax NS, Canada, 2017. Talk.

Competing frictional and diabatic potential vorticity fluxes at ocean fronts. *AGU Fall Meeting*, San Francisco, CA, 2016. Talk.

Ocean boundary layer dynamics and air-sea interaction. *Physical Oceanography Dissertation Symposium (PODS) IX*, Honolulu, HI, 2016. Talk.

Dynamics of the diurnal cycle in the upper ocean: Theory, observations, and future challenges. *Environmental Fluid Mechanics and Hydrology Seminar, Stanford University*, Stanford, CA, 2016. Talk.

Implications of spatially varying boundary layer turbulence at a frontal system. *48th International Liège Colloquium on Ocean Dynamics*, Liège, Belgium, 2016. Talk.

The time-dependent vertical structure of mixed layer currents. *Ocean Sciences Meeting*, New Orleans, LA, 2016. Poster.

On the influence of winds, waves, and fronts on ocean currents. *School of Oceanography, University of Washington*, Seattle, WA, 2015. Talk.

Wind, waves, and fronts: An analytic solution to the generalized Ekman model. *20th Conference on Atmospheric and Oceanic Fluid Dynamics*, Minneapolis, MN, 2015. Talk.

Dynamics of the surface layer diurnal cycle in the equatorial Atlantic Ocean. *Physical Oceanography Seminar, University of Washington*, Seattle, WA, 2014. Talk.

A WKB approximation to the generalized Ekman equation, with application to the diurnal cycle. *Applied Mathematics MS Symposium, University of Washington*, Seattle, WA, 2014. Talk.

The diurnal cycle of near-surface stratified shear flow at 0°N, 23°W. *Ocean Sciences Meeting*, Honolulu, HI, 2014. Poster.

Near-surface shear flow on the Equator. *Physical Oceanography Seminar, University of Washington*, Seattle, WA, 2013. Talk.

Near-surface shear, stratification, and the mixed layer momentum budget at 0°N, 23°W. *Tropical Atlantic Variability Conference*, Kiel, Germany, 2012. Poster.

Near-surface eddy viscosity at 0°N, 23°W inferred from ADCP and wind stress data. *Ocean Sciences Meeting*, Salt Lake City, UT, 2012. Poster.

ADVISING

Benjamin Johnson, *PhD committee Co-Chair with Eugenia Kalnay*

2020

TEACHING	Stanford University, Stanford, CA	
	Project Mentor, <i>SURGE Undergraduate Summer Research</i>	Summer 2018
	Guest Instructor, <i>Geophysical Fluid Dynamics</i>	Autumn 2017
	Guest Instructor, <i>Atmosphere, Ocean, and Climate Dynamics</i>	Spring 2017
	University of Washington, Seattle, WA	
	Instructor, <i>Physics across Oceanography</i>	Winter 2015
	Course Development, <i>Huckabay Teaching Fellow</i>	Autumn 2014
	Tutorial Instructor, <i>Physics 121 and 123: Mechanics and Waves</i>	Autumn 2014
	Teaching Assistant, <i>Physical Processes in the Ocean</i>	Winter 2012
	Conferences	
SERVICE AND LEADERSHIP	<ul style="list-style-type: none"> • Chair: <i>Air-Sea Interaction at the Mesoscale and Submesoscale, Ocean Sciences 2018</i> • Moderator: <i>Turbulent Mixing of the Ocean Surface Boundary Layer: Observation, Simulation, and Parameterization, Ocean Sciences 2020</i> 	
	Reviewing	
	<ul style="list-style-type: none"> • 2020 AMS Editor's award, <i>Journal of Physical Oceanography</i> • <i>Journal of Physical Oceanography, Journal of Fluid Mechanics, Geophysical Research Letters, Journal of Geophysical Research, Nature, Quarterly Journal of the Royal Meteorological Society, BAMS, Ocean Dynamics, Ocean Sciences, TOS, Scientific Reports, Journal of Atmospheric and Oceanic Technology, JAMES, Continental Shelf Research</i> • <i>NASA Physical Oceanography</i> proposal review panels, <i>NSF</i> proposal reviewer, <i>NERC</i> proposal reviewer • Pre-publication chapters of: <i>Atmospheric and Oceanic Fluid Dynamics II</i>, G.H. Vallis. • <i>NOAA Ernest F. Hollings Undergraduate Scholarship program</i>, 2012-2014, 2016. 	