

CONTACT INFORMATION	Jacob O. Wenegrat Assistant Professor Department of Atmospheric and Oceanic Science University of Maryland, College Park, MD	<a href="mailto:wenegrat@umd.edu">wenegrat@umd.edu</a> <a href="http://wenegrat.github.io">http://wenegrat.github.io</a>
RESEARCH INTERESTS	<b>Geophysical fluid dynamics, atmosphere and ocean dynamics, submesoscale processes, boundary-layer processes</b>	
EDUCATION	<b>Ph.D.</b> , Oceanography School of Oceanography University of Washington, Seattle, WA.	2015
	<b>M.S.</b> , Applied Mathematics Department of Applied Mathematics University of Washington, Seattle, WA.	2014
	<b>M.S.</b> , Oceanography Department of Oceanography University of Washington, Seattle, WA.	2013
	<b>B.S.</b> , Symbolic Systems Stanford University, Stanford, CA.	2006
APPOINTMENTS	<b>Assistant Professor</b> , University of Maryland, College Park Department of Atmospheric and Oceanic Science Burgers Program for Fluid Dynamics (affiliate) Applied Mathematics & Statistics, and Scientific Computation (affiliate)	2020 - present
	<b>Postdoctoral Fellow</b> , Stanford University Department of Earth System Science • Supervisor: <a href="#">Leif Thomas</a>	2016 - 2019
	<b>Visiting Scholar</b> , Kavli Institute for Theoretical Physics, UCSB Program on Planetary Boundary Layers in Atmospheres, Oceans, and Ice on Earth and Moons.	May 2018
	<b>Graduate Research Assistant</b> , University of Washington School of Oceanography • Advisor: <a href="#">Michael J. McPhaden</a>	2010 - 2015
	<b>Consultant</b> , Accenture Technology Labs R&D consultant focused on data center energy forecasting.	2007 - 2009
REFEREED PUBLICATIONS <small>(GROUP MEMBERS IN BOLD)</small>	<p>[15] <b>Wenegrat, J.O., E. Bonanno</b>, U. Rack, and G. Gebbie, 2022: A century of observed temperature change in the Indian Ocean. <i>Geophys. Res. Lett.</i> in review.</p> <p>[14] <b>Chor, T., J.O. Wenegrat</b>, and J.R. Taylor, 2022: Insights into the mixing efficiency of submesoscale centrifugal-symmetric instabilities <i>J. Phys. Oceanogr.</i>, in revision.</p>	

- [13] Ruan, X., **J.O. Wenegrat**, and J. Gula, 2021: Slippery bottom boundary layers: The loss of energy from the general circulation by bottom drag. *Geophys. Res. Lett.*, 48, 19. doi:10.1029/2021GL094434
- [12] Farrar, J.T., E.A. D'Asaro, E. Rodriguez, A. Shcherbina, E. Czech, P. Matthias, S. Nicholas, F. Bingham, A. Mahadevan, M. Omand, L. Rainville, C. Lee, D. Chelton, R. Samelson, L. O'Neill, D. Menemenlis, D. Perkovich-Martin, P. Mouroulis, M. Gierach, D. Thompson, A. Wineteer, A. Thompson, J. McWilliams, J. Molemaker, R. Barkan, **J.O. Wenegrat**, C. Rocha, G. Jacobs, J. D'Addezio, S. de Halleux, R. Jenkins, 2020: S-MODE: the Sub-Mesoscale Ocean Dynamics Experiment. *IEEE International Geoscience and Remote Sensing Symposium Conference Proceedings*, 3533-3536. doi:10.1109/IGARSS39084.2020.9323112
- [11] **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, 2020: Enhanced mixing across the gyre boundary at the Gulf Stream front. *Proc. Nat. Acad. Sci. (PNAS)*, 117, 30, 17607-17614. doi:10.1073/pnas.2005558117
- [10] **Wenegrat, J.O.**, and L.N. Thomas, 2020: Centrifugal and symmetric instability during Ekman adjustment of the bottom boundary layer. *J. Phys. Oceanogr.*, 50, 6, 1793-1812. doi:10.1175/JPO-D-020-0027.1
- [9] 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 II: Dynamics. *J. Phys. Oceanogr.* 50, 5, 1473-1487. doi:10.1175/JPO-D-19-0204.1
- [8] **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
- [7] **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
- [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
- [5] **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
- [4] **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
- [3] **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
- [2] **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
- [1] **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

OTHER  
PUBLICATIONS

Elipot, S., and **J.O. Wenegrat**, 2021: Vertical structure of near-surface currents: Importance, state of knowledge, and measurement challenges. *CLIVAR Variations*, 19, 1, 1-9, doi:10.5065/ybca-0s03

**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

Collaborative Research: Tracing the physics of submesoscale entrainment and subduction. PI: **Wenegrat**, NSF, \$568k, 2022-2025.

Collaborative Research: EarthCube Capabilities: ICESpark: An Open-Source Big Data Platform for Science Discoveries in the New Arctic and Beyond. PI: Xie, Co-I: **Wenegrat**. NSF, \$956k, 2021-2024.

Air-sea interaction and coupling at the ocean submesoscale. PI: **Wenegrat**. NASA, \$361k, 2021-2024.

Mixing and Resatification in the Bottom mixed-layer: impacts of submesoscale instabilities and internal waves (MIRABEAU). PI: Gula, Co-I: **Wenegrat**. ANR France, unfunded collaborator, 2020-2023.

Submesoscale instabilities in the ocean bottom boundary layer: A new pathway for energy dissipation. PI: **Wenegrat**. NSF, \$383k, 2020-2023.

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

INVITED TALKS

The Gulf Stream—Barrier, Blender, or...Breadmaker? Enhanced Mixing at Sharp Ocean Fronts. *Johns Hopkins Center for Environmental & Applied Fluid Mechanics*, Baltimore, MD, 2022.

The Gulf Stream—Barrier, Blender, or...Breadmaker? Enhanced Mixing at Sharp Ocean Fronts. *Horn Point Laboratories*, Cambridge, MD, 2021.

The Gulf Stream—Barrier, Blender, or...Breadmaker? Enhanced Mixing at Sharp Ocean Fronts. *George Mason University AOES Department Seminar*, Fairfax, VA, 2021.

The Deep Ocean, Menagerie of Instabilities? *Burgers Symposium Lecture, University of Maryland*, College Park, MD, 2020.

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.

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.

SELECTED  
PRESENTATIONS

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. *22<sup>nd</sup> 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. *21<sup>st</sup> Conference on Atmospheric and Oceanic Fluid Dynamics*, Portland, OR, 2017. Talk.

Effects of the submesoscale on the potential vorticity budget of ocean mode waters. *21<sup>st</sup> 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. *48<sup>th</sup> 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. *20<sup>th</sup> 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	Tomás Chor	since 2020
	<i>Postdoctoral Researcher, Atmospheric and Oceanic Science</i>	
	Victoria Whitley	since 2020
	<i>PhD Student, Applied Mathematics &amp; Statistics, and Scientific Computing</i>	
	Igor Uchôa Farias	since 2021
	<i>PhD Student, Atmospheric and Oceanic Science</i>	
	Rachel Wegener	since 2021
	<i>MS Student, Atmospheric and Oceanic Science</i>	

	Skylar Lama	since 2021
	<i>Undergraduate capstone project, Atmospheric and Oceanic Science</i>	
	George Campe	since 2021
	<i>Undergraduate capstone project, Atmospheric and Oceanic Science</i>	
	Daniel Levy	2021
	<i>Undergraduate Researcher, Mathematics &amp; Physics</i>	
	<i>UMD Goldwater Scholarship nominee</i>	
	Emma Bonnano	2020-2021
	<i>Undergraduate capstone project, Atmospheric and Oceanic Science</i>	
	<i>Bernice and Susan Tannenbaum Prize in Climate Science,</i>	
	<i>for outstanding research achievements</i>	
PHD COMMITTEES	Craig Schwartz PhD	2021
	Austin Hope PhD	2020
	Benjamin Johnson PhD	2020
	<i>Committee Co-Chair with Eugenia Kalnay</i>	
TEACHING	<b>University of Maryland, College Park, MD</b>	
	Instructor, <i>Oceanography of the Chesapeake and Mid-Atlantic</i>	Spring 2022
	Instructor, <i>Physical Oceanography</i>	Fall 2020, 2021
	<b>Stanford University, Stanford, CA</b>	
	Project Mentor, <i>SURGE Undergraduate Summer Research</i>	Summer 2018
	<b>University of Washington, Seattle, WA</b>	
	Instructor, <i>Physics across Oceanography</i>	Winter 2015
	Course Development, <i>Huckabay Teaching Fellow</i>	Autumn 2014
SERVICE AND LEADERSHIP	<b>Science</b>	
	<ul style="list-style-type: none"> <li>NASA Sub-Mesoscale Ocean Dynamics Experiment (S-MODE) Science Team member</li> <li>US CLIVAR Process Study and Model Improvement Panel (since 2021)</li> </ul>	
	<b>Conferences</b>	
	<ul style="list-style-type: none"> <li>Co-Chair: <i>Turbulent Mixing of the Ocean Surface Boundary Layer: Observation, Simulation, and Parameterization</i>, Ocean Sciences Meeting 2022</li> <li>Moderator: <i>Turbulent Mixing of the Ocean Surface Boundary Layer: Observation, Simulation, and Parameterization</i>, Ocean Sciences Meeting 2020</li> <li>Chair: <i>Air-Sea Interaction at the Mesoscale and Submesoscale</i>, Ocean Sciences Meeting 2018</li> </ul>	
	<b>Reviewing</b>	
	<ul style="list-style-type: none"> <li>Associate Editor, <i>Journal of Physical Oceanography</i></li> <li>2020 AMS Editor's award, <i>Journal of Physical Oceanography</i></li> <li><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, Journal of Climate</i></li> </ul>	

- *NASA Physical Oceanography* proposal review panels, *NSF* proposal reviewer, *NERC* proposal reviewer, *US-Israel Binational Science Foundation* reviewer
- Pre-publication chapters of: *Atmospheric and Oceanic Fluid Dynamics II*, G.H. Vallis.
- *NOAA Ernest F. Hollings Undergraduate Scholarship program*.

#### **Department**

- Graduate Admissions Co-Chair (since 2020)
- Seminar Committee Chair (since 2020)
- DMV Oceans Lunch Seminars organizer (since 2020)
- Lead for AOSC-AGU Bridge Program Partnership (since 2020)