

Laura K. Gruenburg

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EDUCATION

Ph.D. in Physical Oceanography <i>Columbia University, New York, NY</i> <i>Dissertation: "Indonesian Throughflow Heat Transport, and Spreading Within the Eastern Tropical Indian Ocean"</i> <i>Advisor: Professor Arnold L. Gordon</i>	February 2021
M.Phil. <i>Columbia University, New York, NY</i>	February 2019
M.A. <i>Columbia University, New York, NY</i>	May 2017
B.A. in Earth Science <i>Vassar College, Poughkeepsie, NY</i>	May 2012

AWARDS AND HONORS

NASA Earth and Space Science Fellowship	2017
Deans Fellow Columbia University	2015
Associate member Sigma Xi	2012

RESEARCH EXPERIENCE

Research Physical Scientist <i>National Marine Fisheries Service, National Oceanic and Atmospheric Administration</i> <ul style="list-style-type: none">Validation of outputs from the MOM6-COBALT coupled physical-biogeochemical model for the Northwest AtlanticDevelopment of methods for incorporation of model forecasts into fisheries management processes.	2024-Present
Postdoctoral Research Scientist <i>School of Marine and Atmospheric Sciences, Stony Brook University</i> <ul style="list-style-type: none">Developed ocean indicators to understand how changes in physical and chemical properties - such as temperature/salinity, stratification, pH - affect biological systems in the New York Bight. Indicators are compiled annually for public access.Conducted research on global climate change and species range shifts.	2021-2024
Doctoral Researcher <i>Department of Earth and Environmental Science, Columbia University</i> Research Advisor: Dr. Arnold Gordon Committee Members: Dr. Ryan Abernathey, Dr. Andreas Thurnherr <ul style="list-style-type: none">Analyzed contribution of Indonesian Throughflow variability to heat/freshwater in Eastern Indian Ocean with implications for regional climate	2015-2020
Doctoral Researcher <i>Research Cruise Aboard the Baruna Jaya VIII, Jakarta, Indonesia</i> PI's Dr. Arnold Gordon and Dr. Anna Kuswardani <ul style="list-style-type: none">Recovered Makassar Strait Mooring, with analysis of ADCP and CTD data.	August 2017
Masters Researcher <i>Department of Earth and Atmospheric Sciences, City College</i> Research Advisor: Dr. Steven Kidder	Spring 2015

- Developed titanium-in-quartz thermobarometry for determining pressure-temperature environment of deformation using recrystallized quartz in New Zealand Mylonites.

Undergraduate Researcher

2011-2012

Department of Earth Science and Geography, Vassar College

Research Advisor: Dr. Brain McAdoo

- Established methodologies for flood risk assessment in rural and urban watersheds in upstate New York.

Undergraduate Researcher

Summer 2010

Norwegian Geotechnical Institute, Oslo, Norway

Research Advisor: Dr. Carl Harbitz

- Verified methods for tsunami risk assessment using the 2009 tsunami in the Pacific that hit American Samoa.

PUBLICATIONS

Gruenburger, L.K., J. Nye, K. Lwiza, and L. Thorne. *In Press*. Vertical climate velocity adds a new dimension to species' shifts. *Nature Climate Change*

Bailey, S., H.F. Drake, **L.K. Gruenburger**, R.P. Abernathy. 2025. The Thermodynamics of the 2023 Gulf of Mexico Marine Heatwave. *Geophysical Research Letters* <https://doi.org/10.1029/2024GL111768>

Weisberg, S.J., S. Roberts, **L.K. Gruenburger**, T.G. Schwemmer, T. Menz, I.F. Fenwick, J.A. Nye, and R.G. Asch. 2024. Gulf Stream intrusions associated with extreme seasonal fluctuations among larval fishes. *Marine Ecology Progress Series* 739, <https://doi.org/10.3354/meps14592>

Li, M., D. Yuan, A.L. Gordon, **L.K. Gruenburger**, and D. Wang. 2024. South Pacific water intrusion into the sub-thermocline Makassar Strait in the winter of 2016-2017 following a super El Nino. *Geophysical Research Letters* 51(18) <https://doi.org/10.1029/2024GL109965>

Gruenburger, L.K., A.L. Gordon, and A.M. Thurnherr. 2023. Indonesian Throughflow partitioning between Leeuwin and South Equatorial Currents. *Journal of Physical Oceanography*, <https://doi.org/10.1175/JPO-D-22-0205.1>

Sprintall, J., A. Biastoch, **L.K. Gruenburger**, and H.E. Phillips. 2022. Ocean Basin Connections. In: *The Indian Ocean and its role in the global climate system*. ed. by C.C. Ummenhofer, and R.R. Hood, Raleigh. Elsevier, Amsterdam, The Netherlands, n.n.. ISBN 978-0-12-822698-8

Li, M., D. Yuan, A.L. Gordon, **L.K. Gruenburger**, X. Li, R. Li, X. Yin, Y. Yang, C. Corvianatie, J. Wei, and S. Yang. 2021. A Strong sub-thermocline intrusion of the North Equatorial Subsurface Current into the Makassar Strait in 2016-2017. *Geophysical Research Letters*, <https://doi.org/10.1029/2021GL092505>.

Li, M., D. Yuan, A.L. Gordon, **L.K. Gruenburger**, X. Li, R. Li, X. Yin, Y. Yang, C. Corvianatie, J. Wei, and S. Yang. 2021. A Strong Sub-Thermocline Intrusion of the North Equatorial Subsurface Current into the Makassar Strait in 2016-2017. *Geophysical Research Letters*, <https://doi.org/10.1029/2021GL092505>

Li, M., A.L. Gordon, **L.K. Gruenburger**, J. Wei, and S. Yang. 2020. Interannual to decadal response of the Indonesian Throughflow vertical profile to Indo-Pacific forcing. *Geophysical Research Letters*, <https://doi.org/10.1029/2020GL087679>

Gordon, A.L., A. Napitu, B.A. Huber, **L.K. Gruenborg**, K. Pujiana, T. Agustyadi, A. Kuswardani, N. Mbay, and A. Setiawan. 2019. Makassar Strait Throughflow Seasonal and Interannual Variability, an Overview. *Journal of Geophysical Research Oceans*, <https://doi.org/10.1029/2018JC014502>

Gruenborg, L.K., and A.L. Gordon. 2018. Variability in Makassar Strait heat flux and its effect on the eastern tropical Indian Ocean. *Oceanography* 31(2), <https://doi.org/10.5670/oceanog.2018.220>

Li, M., A.L. Gordon, J. Wei, **L.K. Gruenborg**, and G. Jiang. 2018. Multi-decadal timeseries of the Indonesian Throughflow. *Dynamics of Atmospheres and Oceans* 81(2018) 84-95, <https://doi.org/10.1016/j.dynatmoce.2018.02.001>

INVITED TALKS

Gruenborg, L.K., and A.L. Gordon. (2022) ITF waters in the South Equatorial Current, and their relation to Indian Ocean thermocline variability. Presented at the 4th Open Science Symposium on Western Pacific Ocean Circulation and Climate October 26, 2022. Xiamen, China and virtual.

Gruenborg, L.K. (2020) Indonesian Throughflow in the Indian Ocean: Pathways of Heat. Presented at Gateways to the Ocean Symposium February 13, 2020. Scripps Institution of Oceanography, La Jolla, California.

PRESENTATIONS

Gruenborg, L.K., J. Nye, and L. Thorne. (2023) Climate velocity in the vertical – slower speeds add a new dimension to species shifts. Presented at 2023 Effects of Climate Change on the World Ocean 5 Meeting, Bergen, Norway.

Gruenborg, L.K., S.A. Murty, C.C. Ummenhofer, P. Wagner, M. Scheinert, J. Durgadoo, A. Biastoch, C.W. Böning (2020) Makassar transport variability over the past century - a synthesis of observations, coral $\delta^{18}\text{O}$ and high-resolution ocean models. Presented at 2020 American Geophysical Union Fall Meeting.

Gruenborg, L.K., A.L. Gordon (2020) Seasonal and Interannual Variability in Cross-Indian ITF Plume Propagation. Presented at Ocean Sciences Meeting, San Diego, California.

Gruenborg, L.K., A.L. Gordon (2019) Variability in Indonesian Throughflow Partitioning Between Leeuwin and South Equatorial Current Pathways. Presented at American Geophysical Union Fall Meeting 2019.

Gruenborg, L.K., A.L. Gordon (2018) The Pathways and Impacts of Indonesian Throughflow Heat Flux on the Eastern Tropical Indian Ocean. Presented at American Geophysical Union Fall Meeting 2018.

Gruenborg, L.K., A.L. Gordon (2017) Indian Ocean Response to Indonesian Throughflow Variability. Presented at 2018 Ocean Sciences Meeting, Portland, Oregon.

Gruenborg, L.K., A.L. Gordon., M. Li (2017) Interannual Variability in ITF Plume Spreading Across the Indian Ocean. Presented at the European Geophysical Union General Assembly 2017.

Gruenborg, L.K. (2015) Titanium-in-Quartz Thermobarometry in New Zealand Mylonites. Presented at the Jeffrey Steiner Memorial Symposium, City College, NY, NY.

Harbitz, C.B., R. Frauenfelder, G. Kaiser, S. Glimsdal, K. Sverdrup-thygeson, F. Lovholt, **L. Gruenburg**, B. McAdoo (2015) Application and Validation of a GIS Model for Local Tsunami Vulnerability and Mortality Risk Analysis. Presented at the 2015 American Geophysical Union Fall Meeting.

PROFESSIONAL DEVELOPMENT

Inclusive Teaching Multi-Day Workshop Participant Spring 2019

Columbia University

- Developed strategies for leading effective and inclusive classrooms through two workshops:
 - *Blindspots in Inclusive Teaching: Implicit Bias*
 - *Managing our Blindspots: Strategies for Inclusive Teaching*

Oceanhackweek Contributing Scientist August 2019

University of Washington

- Worked with a team in-person and through GitHub to develop the [isopy python package](#).

Science of Learning Symposium Participant October 2018

Metacognition: From Research to Classroom

Columbia University

- Learned research-based pedagogy for encouraging effective learning at the point of curiosity.

PROFESSIONAL SERVICE

Reviewer for Nature Communications

Reviewer for Nature Reviews Earth & Environment

Reviewer for Journal of Geophysical Research - Oceans

Reviewer for Geophysical Research Letters

Reviewer for Climate Research

Reviewer for Marine Geodesy

Co-organizer of LDEO Ocean Climate Physics division weekly seminar series Fall 2018 and Spring 2019

SKILLS

Python, Matlab, GitHub, R

TEACHING EXPERIENCE

Adjunct Assistant Professor Spring 2021

Drew University

- Taught “Great Challenges in Environmental Science,” an introductory level course, to undergraduates

Teaching Assistant Spring 2019

Columbia University

- Assisted in “Earth's Oceans and Atmosphere,” a small introductory level course for undergraduates.
- Hosted office hours weekly to answer student questions and provide support.

Teaching Assistant Fall 2018

Columbia University

- Assisted in “Dynamics of Climate Variability and Change,” a Masters level course.
- Hosted weekly office hours.
- Prepared and taught a lecture on introductory physical oceanography.

Teaching Assistant Fall 2017

Columbia University

- Assisted in “Intro to Physical Oceanography,” a graduate level course.
- Hosted weekly office hours.

Teaching Assistant Fall 2016
Columbia University

- Assisted in “Oceanography,” a large introductory course for undergraduates.
- Hosted weekly office hours.
- Prepared and taught a lecture on introductory physical oceanography.

Instructor Spring 2015
City College

- Taught the laboratory section of “Earth System Science,” an introductory course for undergraduates.
- Developed lab exercises to effectively demonstrate core concepts.
- Created field trip guides and led students on two educational trips to city parks.

SCIENCE EDUCATION AND MENTORING

Cofounder of Pyclub-cu Fall 2020 - Spring 2021
Columbia University

- Cofounder, curriculum developer, and instructor of afterschool oceanography/computer science program ([Pyclub-cu](#)) for high school students.

Science Educator 2016-2020
Lamont Doherty Earth Observatory

- Developed ocean and atmospheric science demonstrations for the general public at three Lamont Doherty Earth Observatory Open House events (October 2020 (virtual), October 2018, October 2017, and October 2016)

Science Educator 2018-2019
Intrepid Sea Air and Space Museum

- Demonstrated ocean circulation and ocean acidification to the general public with hands-on experiments during events at Intrepid Kids Week (Feb 2019) and Intrepid for Girls in Science and Engineering Day (March 2018)

Science Educator 2015-2019
Columbia University

- Created engaging participatory science demonstrations for middle school girls during five Girls Science Day at Columbia University events. Science demonstrations: The Energy Budget (November 2019), Earthquake Hazard (April 2019), Ocean Acidification (November 2017), The Nitrogen Cycle (November 2016), Smog City (November 2015).
- Led a sea level rise demonstration for high school students at A Day in the Life of the Hudson River (October 2015)

Science Educator 2016-2018
American Museum of Natural History

- Led atmospheric chemistry and ocean acidification activities for the general public at three Sun-Earth Day events (March 2018, April 2017, and March 2016).

Peer Mentor 2016-2017
Columbia University

- Mentored an incoming graduate student as part of Lamont Doherty Earth Observatory’s first year peer mentoring program.
- Mentored a high school student as part of the Lamont Summer Intern program