

Gregory LeClaire Wagner



Contact

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77 Massachusetts Avenue
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Cambridge, Massachusetts 02142

Interests

Computational and theoretical fluid dynamics; physical oceanography; turbulence parameterization; ocean modeling and software development

Education

2010–2016

PhD in Engineering Sciences

Department of Mechanical and Aerospace Engineering

University of California, San Diego

Advisors—William Young and Eric Lauga

2009–2010

MSE in Aerospace Engineering

2005–2009

BSE in Aerospace Engineering, *magna cum laude*

Department of Aerospace Engineering

University of Michigan, Ann Arbor

Employment

2019–present

Research Scientist

Department of Earth, Atmospheric, and Planetary Sciences

Massachusetts Institute of Technology

Ocean parameterization with the [Climate Modeling Alliance](#)

Funded by a consortium led by [Schmidt Futures](#)

2016–2018

NOAA Climate and Global Change Postdoctoral Fellow

Department of Earth, Atmospheric, and Planetary Sciences

Massachusetts Institute of Technology

2013–2014, 2016

Graduate Research Assistant

Scripps Institution of Oceanography

University of California, San Diego

2014–2015

Teaching Assistant

2010–2013

Focht-Powell Graduate Fellow

Department of Mechanical and Aerospace Engineering

University of California, San Diego

2009–2010

Product Engineer

Accio Energy, Ann Arbor, Michigan

Wind energy technology research and development

Publications

- 2021 **Near-inertial waves and turbulence driven by the growth of swell**
Gregory L Wagner, Greg Chini, Ali Ramadhan, Basile Gallet, and Raffaele Ferrari
Journal of Physical Oceanography, 51.5
- 2020 **Uncertainty quantification of ocean parameterizations: application to the K-Profile-Parameterization for penetrative convection**
A. N. Souza, **G. L. Wagner**, A. Ramadhan, B. Allen, V. Churavy, J. Schloss, J. Campin, C. Hill, A. Edelman, J. Marshall, G. Flierl, R. Ferrari
Journal of Advances in Modeling Earth Systems, 12 (12)
- Oceananigans.jl: Fast and friendly geophysical fluid dynamics on GPUs**
Ali Ramadhan, **Gregory L Wagner**, Chris Hill, Jean-Michel Campin, Valentin Churavy, Tim Besard, Andre Souza, Alan Edelman, John Marshall, and Raffaele Ferrari
Journal of Open Source Software (9)
- 2019 **Squeeze dispersion and the effective diapycnal diffusivity of oceanic tracers**
Gregory L Wagner, Glenn Flierl, Raffaele Ferrari, Gunnar Voet, Glenn S Carter, Matthew H Alford, and James B Girton
Geophysical Review Letters 46 (10), 5378-5386
- 2018 **Stimulated generation: extraction of energy from balanced flow by near-inertial waves**
Cesar B Rocha, **Gregory L Wagner**, and William R Young
Journal of Fluid Mechanics 847, 417-451
- 2017 **An asymptotic model for the propagation of oceanic internal tides through quasi-geostrophic flow**
Gregory L Wagner, Gwenael Ferrando, and William R Young
Journal of Fluid Mechanics 828, 779-811
- 2016 **A three-component model for the coupled evolution of near-inertial waves, quasi-geostrophic flow, and the near-inertial second harmonic**
Gregory L Wagner and William R Young
Journal of Fluid Mechanics 802, 806-837
- A tale of two spicy seas**
Jennifer A MacKinnon, Jonathan D Nash, Matthew H Alford, Andrew J Lucas, John B Mickett, Emily L Shroyer, Amy F Waterhouse, Amit Tandon, D Sengupta, Amala Mahadevan, M Ravichandran, Robert Pinkel, Daniel L Rudnick, Caitlin B Whalen, Marion S Albery, J Sreelekha, Elizabeth C Fine, D Chaudhuri, and **Gregory L Wagner**
Oceanography 29 (2), 50-61
- Acoustically propelled nanoshells**
Fernando Soto, **Gregory L Wagner**, Victor Garcia-Gradilla, Kyle T Gillespie, Deepak R Lakshminpathy, Emil Karshalev, Chava Angell, Yi Chen, and Joseph Wang
Nanoscale 8 (41), 17788-17793

- 2015 **Available potential vorticity and wave-averaged quasi-geostrophic flow**
Gregory L Wagner and William R Young
 Journal of Fluid Mechanics 785, 401-424
- 2014 **Mixing by microorganisms in stratified fluids**
Gregory L Wagner, William R Young, and Eric Lauga
 Journal of Marine Research 72 (2), 47-72
- Bubble-Propelled Micromotors for Enhanced Transport of Passive Tracers**
 Jahir Orozco, Beatriz Jurado-Sanchez, **Gregory Wagner**, Wei Gao, Rafael Vazquez-Duhalt, Sirilak Sattayasamitsathit, Michael Galarnyk, Allan Cortes, David Santillan, and Joseph Wang
 Langmuir 30 (18), 5082-5087
- 2013 **Crawling scallop: Friction-based locomotion with one degree of freedom**
Gregory L Wagner and Eric Lauga
 Journal of Theoretical Biology, 324, 42-51
- 2009 **Specific Charge Control for Micro/Nano-Particle Electrostatic Propulsion**
 T Liu, **G L Wagner**, A Gallimore, B Gilchrist, and P Peterson
 45th AIAA/ASME/SAE/ASEE Joint Propulsion Conference, AIAA-2009-5090

Teaching

ug: undergrad

g: grad

- Fall 2015 **Teaching Assistant**, Introduction to Mathematical Physics (*ug*)
 with Prof David Santillan, Mech and Aero Engineering (MAE), UCSD
 Recieved MAE Outstanding Teaching Assistant Award
- Spring 2015 **Teaching Assistant**, Introduction to Mathematical Physics (*ug*)
 with Prof Stefan Llewellyn Smith, MAE, UCSD
- Fall 2014 **Teaching Assistant**, Fluid Dynamics II (*g*)
 with Prof Geno Pawlak, MAE, UCSD
- Spring 2014 **Teaching Assistant**, Applied Mathematics III (*g*)
 with Prof William R. Young, Scripps Institution of Oceanography, UCSD

Software development

Oceananigans.jl

A fast and friendly incompressible fluid flow solver in Julia for CPUs and GPUs

🔗 github.com/climate-machine/Oceananigans.jl

OceanTurb.jl

Framework for testing, optimization, and uncertainty quantification of single column models

🔗 github.com/glwagner/OceanTurb.jl

FourierFlows.jl

Ecosystem for solving partial differential equations with spectral methods on CPUs and GPUs using the [Julia](#) language for high-level, high-performance computing

🔗 github.com/FourierFlows

CLIMA

An Earth system model that automatically learns from diverse data sources

🔗 github.com/climate-machine

Service and workshop participation

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| Feb 2020 | Co-Chair —“Turbulent Mixing of the Ocean Surface Boundary Layer: Observation, Simulation, and Parameterization”
<i>AGU Ocean Sciences 2020 Session, San Diego, California, USA</i> |
| Since 2016 | Reviewer —Geophysical Research Letters, Journal of Advances in Modeling of Earth Systems, Ocean Modelling, Journal of Physical Oceanography, Journal of Fluid Mechanics, Quarterly Journal of the Royal Meteorological Society |
| Since 2015 | Participant —Woods Hole Program in Geophysical Fluid Dynamics, USA |
| Feb 2018 | Participant —Banff International Research Station Workshop, Canada
<i>Modeling imbalance in the atmosphere and ocean</i> |
| Aug 2017 | Participant —École de Physique des Houches summer school, France
<i>Fundamental aspects of turbulent flows in climate dynamics</i> |
| 2013 | Fellow —Woods Hole Program in Geophysical Fluid Dynamics, USA |
| 2012 | Participant —Cargèse Summer School, France
<i>Softflow: Biological Complex Fluids</i> |

Seminars and invited talks

Jun 2019	Los Alamos National Laboratory
Aug 2018	Woods Hole Program in Geophysical Fluid Dynamics
Jan 2018	Department of Physical Oceanography, WHOI <i>Physical Oceanography Seminar</i>
Nov 2017	Department of Atmospheric & Oceanic Sciences, McGill University <i>Departmental Seminar</i>
Nov 2017	Earth, Atmospheric, and Planetary Sciences, MIT <i>Sack Lunch Seminar</i>
Sep 2017	Earth, Environmental, and Planetary Sciences, Brown University <i>Lunch Bunch Seminar</i>
May 2016	College of Atmospheric and Ocean Sciences, NYU <i>Atmospheric Ocean Sciences Colloquium</i>
March 2016	Department of Mechanical Engineering, MIT <i>MSEAS Seminar</i>
Feb 2016	College of Earth, Ocean and Atmospheric Sciences, Oregon State University <i>Physics of Oceans and Atmospheres Seminar Series</i>
July 2015	Woods Hole Program in Geophysical Fluid Dynamics
March 2013	Theory Seminar, Scripps Institution of Oceanography, UCSD

Conference and workshop presentations

Dec 2022	AGU Ocean Sciences <i>Virtual, Honolulu, Hawaii, USA</i>
Dec 2021	AGU Fall Meeting <i>New Orleans, Louisiana, USA / Hybrid</i>
April 2021	EGU General Assembly <i>Virtual / Vienna, Austria</i>
March 2021	UCAR Improving Scientific Software <i>Virtual / Boulder, Colorado, USA</i>
Nov 2020	AGU Ocean Sciences <i>San Diego, California, USA</i>
Nov 2019	APS Division of Fluid Dynamics <i>Seattle, Washington, USA</i>
Jun 2019	Atmospheric and Oceanic Fluid Dynamics <i>Portland, Maine, USA</i>
Nov 2018	APS Division of Fluid Dynamics <i>Atlanta, Georgia, USA</i>
Feb 2018	BIRS Workshop <i>Banff, Alberta, Canada</i>
Feb 2018	AGU Ocean Sciences <i>Portland, Oregon, USA</i>
June 2017	Atmospheric and Oceanic Fluid Dynamics <i>Portland, Oregon, USA</i>
Feb 2016	AGU Ocean Sciences <i>New Orleans, Louisiana, USA</i>
July 2016	Liege Colloquium <i>Liège, Belgium</i>
Nov 2015	APS Division of Fluid Dynamics <i>Boston, Massachusetts, USA</i>
Feb 2014	AGU Ocean Sciences <i>Honolulu, Hawaii, USA</i>
Nov 2013	APS Division of Fluid Dynamics <i>Pittsburgh, Pennsylvania, USA</i>
April 2013	SoCal Fluids VII <i>Pasadena, California, USA</i>

- Research cruises**
- June 2016 “Flow Encountering Abrupt Topography (FLEAT)” —Western Pacific off Palau
With PI's Matthew Alford, Jennifer Mackinnon, Gunnar Voet
 - Sep 2015 “Arctic Mix” —Beaufort Sea, Chukchi Sea, and Bering Strait, Arctic Ocean
With PI's Jennifer Mackinnon, Matthew Alford, John Mickett

- Accolades**
- 2016–2018 **Postdoctoral Fellowship**—NOAA Climate and Global Change Program
 - 2016 **Award**—Outstanding Teaching Assistant, Department of Mechanical and Aerospace Engineering, UCSD
 - 2013 **Fellow**—Woods Hole Program in Geophysical Fluid Dynamics
 - 2010–2013 **Graduate Fellowship**—Focht-Powell Fellowship, Department of Mechanical and Aerospace Engineering, UCSD
 - 2009 **James B. Angell Scholar**—University of Michigan

References

Raffaele Ferrari

Professor, Department of Earth, Atmospheric, and Planetary Sciences
Massachusetts Institute of Technology
✉ rferrari@mit.edu | 🌐 ferrari.mit.edu

William R. Young

Professor, Scripps Institution of Oceanography
University of California, San Diego
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Glenn Flierl

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Massachusetts Institute of Technology
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