Gregory LeClaire Wagner

Contact

gregory.leclaire.wagner@gmail.com
glwagner.github.io
+1 781 710 0871

77 Massachusetts Avenue
Building 54-1622
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, Gwenäel 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 Alberty, 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 Lakshmipathy, 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 Santillian, 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

Feb 2020	**Co-Chair**—"Turbulent Mixing of the Ocean Surface Boundary Layer: Observation, Simulation, and Parameterization" *AGU Ocean Sciences 2020 Session, San Diego, California, USA*
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 Meterological Society
Since 2015	**Participant**—Woods Hole Program in Geophysical Fluid Dynamics, USA
Feb 2018	**Participant**—Banff International Research Station Workshop, Canada *Modeling imbalance in the atmosphere and ocean*
Aug 2017	**Participant**—École de Physique des Houches summer school, France *Fundamental aspects of turbulent flows in climate dynamics*
2013	**Fellow**—Woods Hole Program in Geophysical Fluid Dynamics, USA
2012	**Participant**—Cargèse Summer School, France *Softflow: Biological Complex Fluids*

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 *Physical Oceanography Seminar*
Nov 2017	Department of Atmospheric & Oceanic Sciences, McGill University *Departmental Seminar*
Nov 2017	Earth, Atmospheric, and Planetary Sciences, MIT *Sack Lunch Seminar*
Sep 2017	Earth, Environmental, and Planetary Sciences, Brown University *Lunch Bunch Seminar*
May 2016	College of Atmospheric and Ocean Sciences, NYU *Atmospheric Ocean Sciences Colloquium*
March 2016	Department of Mechanical Engineering, MIT *MSEAS Seminar*
Feb 2016	College of Earth, Ocean and Atmospheric Sciences, Oregon State University *Physics of Oceans and Atmospheres Seminar Series*
July 2015	Woods Hole Program in Geophysical Fluid Dynamics
March 2013	Theory Seminar, Scripps Institution of Oceanography, UCSD

Conference and workshop presentations

Nov 2020	AGU Ocean Sciences *San Diego, California, USA*
Nov 2019	APS Division of Fluid Dynamics *Seattle, Washington, USA*
Jun 2019	Atmospheric and Oceanic Fluid Dynamics *Portland, Maine, USA*
Nov 2018	APS Division of Fluid Dynamics *Atlanta, Georgia, USA*
Feb 2018	BIRS Workshop *Banff, Alberta, Canada*
Feb 2018	AGU Ocean Sciences *Portland, Oregon, USA*
June 2017	Atmospheric and Oceanic Fluid Dynamics *Portland, Oregon, USA*
Feb 2016	AGU Ocean Sciences *New Orleans, Louisiana, USA*
July 2016	Liege Colliquium *Liège, Belgium*
Nov 2015	APS Division of Fluid Dynamics *Boston, Massachusetts, USA*
Feb 2014	AGU Ocean Sciences *Honolulu, Hawaii, USA*
Nov 2013	APS Division of Fluid Dynamics *Pittsburgh, Pennsylvania, USA*
April 2013	SoCal Fluids VII *Pasadena, California, USA*

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
✉ wryoung@ucsd.edu | www-pord.ucsd.edu/ wryoung

Glenn Flierl
Professor, Department of Earth, Atmospheric, and Planetary Sciences
Massachusetts Institute of Technology
✉ glenn@lake.mit.edu | eapsweb.mit.edu/people/grflierl