Gregory LeClaire Wagner

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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

in prep

Near-inertial waves and turbulence driven by the growth of swell
Gregory L Wagner, Ali Ramadhan, Greg Chini, Basile Gallet, and Raffaele Ferrari
in preparation for the Journal of Physical Oceanography

Uncertainty quantification of ocean turbulence models
Andre N. Souza, **Gregory L Wagner**, Ali Ramadhan, Jean-Michel Campin, Chris Hill, John Marshall, and Raffaele Ferrari
in preparation for the Journal of Advances in Modeling Earth Systems

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
submitted to the Journal of Open Source Software

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
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Massachusetts Institute of Technology
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William R. Young
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Glenn Flierl
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Massachusetts Institute of Technology
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