Gregory LeClaire Wagner

Research Scientist · MIT · Department of Earth, Atmospheric, and Planetary Sciences
gregory.leclaire.wagner@gmail.com · glwagner.github.io · +1 781 710 0871

Expertise

Scientific software development and design, fluid dynamics, physical oceanography, Earth system modeling

Education

2010–2016 PhD in Engineering Sciences
Department of Mechanical and Aerospace Engineering
University of California, San Diego

2009–2010 MSE in Aerospace Engineering
Department of Aerospace Engineering
University of Michigan, Ann Arbor

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

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
Department of Mechanical and Aerospace Engineering
University of California San Diego

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

Publications

In review Decaying turbulence beneath surface waves
Gregory L Wagner, Navid Constantinou
Journal of Fluid Mechanics

High-level, high-resolution ocean modeling at all scales with Oceananigans
Gregory L Wagner, Simone Silvestri, Navid C Constantinou, Ali Ramadhan, Jean-Michel Campin, Chris Hill, Tomas Chor, Jago Strong-Wright, Xin Kai Lee, Francis Poulin, Andre Souza, Keaton J Burns, John Marshall, Raffaele Ferrari
Journal of Advances in Modeling Earth Systems

2025 Formulation and calibration of CATKE, a one-equation parameterization for microscale ocean mixing
Gregory L Wagner, Adeline Hillier, Navid C Constantinou, Simone Silvestri, Andre Souza, Keaton Burns, Ali Ramadhan, Chris Hill, Jean-Michel Campin, John Marshall, and Raffaele Ferrari
Journal of Advances in Modeling Earth Systems

A GPU-based ocean dynamical core for routine mesoscale resolving climate simulations
Simone Silvestri, **Gregory L Wagner**, Navid C Constantinou, Christopher N Hill, Jean-Michel Campin, Andre N Souza, Siddhartha Bishnu, Valentin Churavy, John Marshall, and Raffaele Ferrari
Journal of Advances in Modeling Earth Systems

Deep flows transmitted by forced surface gravity waves
Nick Pizzo, **Gregory L Wagner**
Water Waves

2025 Harnessing Marine Open Data Science for Ocean Sustainability in Africa, South Asia, and Latin America
Paige Martin, Elizabeth Holmes, Emilio Mayorga, Joseph Ansong, Uday Bhaskar, Jorge Cornejo-Donoso, David Correa-Chilón, Richard Damoah, Denisse Fierro-Arcos, Laura Gómez-Navarro, Nimit Kumar, Aderonke Lawal-Are, Sourav Maity, Swarnali Majumder, Dimitris Menemenlis, Aditi Modi, Ebenezer Nyadjro, Oghenekevwe Oghenechovwen, Anthi Oikonomou, Mumin Oladipo, Marian Peña, Daniel Quaye, Yeray Santana-Falcón, BR Smitha, Charles Troupin, Georgios Vagenas, Héctor Villalobos, **Gregory Wagner**
Oceanography

2024 A new WENO-based momentum advection scheme for simulations of ocean mesoscale turbulence
Simone Silvestri, **Gregory L Wagner**, Jean-Michel Campin, Navid C Constantinou, Christopher N. Hill, Andre Nogueira Souza, Raffaele Ferrari
Journal of Advances in Modeling Earth Systems

SpeedyWeather.jl: Reinventing atmospheric general circulation models towards interactivity and extensibility
Milan Klöwer, Maximilian Gelbrecht, Daisuke Hotta, Justin Willmert, Simone Silvestri, **Gregory L Wagner**, Alistair White, Sam Hatfield, Tom Kimpson, Navid C Constantinou, Chris Hill
Journal of Open Source Software

CalibrateEmulateSample.jl: Accelerated parametric uncertainty quantification
R Oliver, Melanie Bieli, Alfredo Garbuno-Iñigo, Michael Howland, Andre Nogueira de Souza, Laura Anne Mansfield, **Gregory L Wagner**, N Efrat-Henrici
Journal of Open Source Software

2023 Transition to turbulence in wind-drift layers
Gregory L Wagner, Nick Pizzo, Luc Lenain, Fabrice Veron
Journal of Fluid Mechanics

Stokes drift should not be added to ocean general circulation model velocities
Gregory L Wagner, Navid C Constantinou, and Brandon Reichl
Geophysical Research Letters

2023 OceanBioME. jl: A flexible environment for modelling the coupled interactions between ocean biogeochemistry and physics
Jago Strong-Wright, Si Chen, Navid C Constantinou, Simone Silvestri, **Gregory LeClaire Wagner**, John R Taylor
Journal of Open Source Software

2022 Epidemic management and control through risk-dependent individual contact interventions
Tapio Schneider, Oliver RA Dunbar, Jinlong Wu, Lucas Böttcher, Dmitry Burov, Alfredo Garbuno-Inigo, **Gregory L Wagner**, Sen Pei, Chiara Daraio, Raffaele Ferrari, Jeffrey Shaman
PLOS Computational Biology

2021 Near-inertial waves and turbulence driven by the growth of swell
Gregory L Wagner, Greg Chini, Ali Ramadhan, Basile Gallet, Raffaele Ferrari
Journal of Physical Oceanography

2020 Uncertainty quantification of ocean parameterizations: application to the K-Profile-Parameterization for penetrative convection
Andre Souza, **Gregory L Wagner**, Ali Ramadhan, Brandon Allen, Valentin Churavy, James Schloss, Jean-Michel Campin, Chris Hill, Alan Edelman, John Marshall, Glenn Flierl, Raffaele Ferrari
Journal of Advances in Modeling Earth Systems

2020 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, Raffaele Ferrari
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, James B Girton
Geophysical Review Letters

2018 Stimulated generation: extraction of energy from balanced flow by near-inertial waves
Cesar B Rocha, **Gregory L Wagner**, William R Young
Journal of Fluid Mechanics

2017 An asymptotic model for the propagation of oceanic internal tides through quasi-geostrophic flow
Gregory L Wagner, Gwenael Ferrando, William R Young
Journal of Fluid Mechanics

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

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, **Gregory L Wagner**
Oceanography

Acoustically-propelled nanoshells
Fernando Soto, **Gregory L Wagner**, Victor Garcia-Gradilla, Kyle T Gillespie Deepak R Laksh- mipathy, Emil Karshalev, Chava Angell, Yi Chen, and Joseph Wang
Nanoscale

Available potential vorticity and wave-averaged quasi-geostrophic flow
Gregory L Wagner and William R Young
Journal of Fluid Mechanics

2014 Mixing by microorganisms in stratified fluids
Gregory L Wagner, William R Young, Eric Lauga
Journal of Marine Research

2014 Bubble-propelled micromotors for enhanced transport of passive tracers
Jahir Orozco, Beatriz Jurado-Sanchez, **Gregory L Wagner**, Wei Gao
Rafael Vazquez-Duhalt, Sirilak Sattayasamitsathit, Michael Galarnyk, Allan Cortes, David Santillan, and Joseph Wang
Langmuir

2013 Crawling scallop: Friction-based locomotion with one degree of freedom
Gregory L Wagner and Eric Lauga
Journal of Theoretical Biology

2009 Specific charge control for micro/nano-particle electrostatic propulsion
T Liu, **Gregory L Wagner**, A Gallimore, B Gilchris, P Peterson
45th AIAA/ASME/SAE/ASEE Joint Propulsion Conference, AIAA-2009-5090

Teaching

Fall 2015 Teaching Assistant
Introduction to Mathematical Physics
With David Santillian, MAE
(received MAE Outstanding Teaching Assistant Award)

Spring 2015 Teaching Assistant
Introduction to Mathematical Physics
With Stefan Llewellyn Smith, MAE

Fall 2014 Teaching Assistant
Fluid Dynamics II
Geno Pawlak, MAE

Spring 2014 Teaching Assistant
Applied Mathematics III
William R Young, Scripps

Accolades

2016–2018 Postdoctoral fellowship, NOAA Climate and Global Change Program
2016 Outstanding Teaching Assistant, Department of Mechanical and Aerospace Engineering, UCSD
2013 Fellow, Woods Hole Program in Geophysical Fluid Dynamics
2010–2013 Focht-Powell Graduate 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

William R. Young
Professor, Scripps Institution of Oceanography
University of California, San Diego
wryoung@ucsd.edu

Fabrice Veron
Dean, College of Earth, Ocean and Environment
University of Delaware
fveron@udel.edu