Gregory LeClaire Wagner

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Expertise

Scientific software development and design, Earth system modeling, numerical methods, differentiable programming, theoretical and computational fluid dynamics

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

2025–present **Principal Engineer**
Aeolus Labs, San Francisco, California
Leading the development of next-generation physics+ML software for weather science, prediction, and intervention

2019–2025 **Research Scientist**
Department of Earth, Atmospheric, and Planetary Sciences, MIT
Lead, Oceananigans modeling system development

2016–2018 **NOAA Climate and Global Change Postdoctoral Fellow**
Department of Earth, Atmospheric, and Planetary Sciences, MIT

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

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

Phenomenology of decaying turbulence beneath surface waves
Gregory L Wagner, Navid Constantinou
Journal of Fluid Mechanics

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

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William R. Young

Professor, Scripps Institution of Oceanography

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Fabrice Veron

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