

Daniel B. Whitt

*Research AST Earth Sciences Remote Sensing
NASA Ames Research Center*

*Skype: danielbwhitt • E-mail: dan.whitt@gmail.com • Web: danielwhitt.github.io
Current Work Address: Biospheric Sciences Branch, NASA Ames Research Center, Moffett Field, CA 94035*

Research Interests

Interdisciplinary oceanography, Earth system science, physical oceanography, marine biogeochemistry and ecosystems, geophysical fluid dynamics

Education

2011-2015

PhD, Stanford University, Stanford, CA

Environmental Earth System Science

Dissertation Title: "Near-inertial waves in oceanic fronts: from generation to dissipation"

2009-2011

MS, Stanford University, Stanford, CA

Civil and Environmental Engineering (Atmosphere/Energy)

2004-2009

BA/BS, Columbia University, New York, NY

Mathematics and Applied Mathematics

Research Positions

2021-

Research AST, Earth Sciences Remote Sensing, NASA Ames Research Center, Moffett Field, CA, Biospheric Sciences Branch

2017-2021

Project scientist I, National Center for Atmospheric Research, Boulder, CO, Climate and Global Dynamics, Oceanography Section

2017

Post-doctoral scientist, National Center for Atmospheric Research, Boulder, CO, Climate and Global Dynamics, Oceanography Section

2015-2016

Post-doctoral research fellow, University of Cambridge, Cambridge, UK, Department of Applied Mathematics and Theoretical Physics

2011-2014

Graduate research assistant, Stanford University, Stanford, CA, Environmental Earth System Science Department

2010-2011

Graduate research assistant, Stanford University, Stanford, CA, Civil and Environmental Engineering Department

2009

Summer intern in parallel computing, National Center for Atmospheric Research, Institute for Mathematics Applied to Geosciences

Grants and Fellowships

NASA ARC (2021-Present):

2021-2024

Whitt, D., **NASA New Investigator Program, PI, \$365k**

Proposal title: “Elucidating the role of the ocean circulation in changing North Atlantic Ocean nutrients and biological productivity”

NCAR (2017-2021):

2020-2025

*Bidle, K. et al., **NSF Growing Convergence Research, senior personnel/institutional PI, \$3.5m, \$277k to NCAR**

Proposal title: “GCR: Collaborative Research: The convergent impact of marine viruses, minerals and microscale physics on phytoplankton carbon sequestration.”

* Phase 1 of 2 has been funded

2020-2023

Thompson, L., L. Maroon, and D. Whitt **NSF Physical Oceanography, co-I/institutional PI, \$480k, \$76k to NCAR**

Proposal title: “Collaborative Research: Midlatitude Marine Heatwaves in a Changing Climate: Variability, Predictability, and Projections”

2020-2023

Eddebarr, Y., M. Merrifield, A. Subramanian, M. Long and D. Whitt. **NSF Chemical Oceanography, co-I, \$751k, \$129k to NCAR**

Proposal title: “Mesoscale drivers of oxygen in the tropical Pacific”

2020-2023

Small, R. J., D. Whitt, I. Cerovecki, M. Mazloff, **NASA Salinity Science, co-I, \$594k, \$447k to NCAR**

Proposal title: “The role of salinity in subantarctic mode water formation and variability”

2019-2022

Whalen, C. and D. Whitt. **NASA Physical oceanography, co-I/institutional PI, \$432k, \$196k to NCAR**

Proposal Title: “Exploring mixing in the thermocline in the context of satellite winds and currents”

2018-2020

Whitt, D., S. Bachman, W. Large, R. Holmes, R.-C. Lien. **NOAA/OAR CVP, lead PI, \$573k, \$484k to NCAR**

Proposal Title: “Simulations and analysis of mesoscale to turbulence scale process models to facilitate observational process deployments in the Equatorial Pacific Cold Tongue”

Stanford and Cambridge (2009-2016):

2015-2016

NSF International Postdoctoral Research Fellowship, \$194k

Proposal Title: “Modeling ocean biogeochemical dynamics in wind-forced fronts and eddies”

2011-2014

William Whiteford Fellowship, Full tuition and stipend

Stanford University School of Earth Sciences

Compute Allocations

NASA (2021-):

2021-2023

NASA HECC, 30,000 SBU

Proposal Title: “Exploring mixing in the thermocline in the context of satellite winds and currents”

NCAR (2017-2021):

2019-2020

NCAR Strategic Capability Allocation, lead PI, 10.1 million cpu hours

Proposal Title: “Large eddy simulations of upper-ocean turbulence to facilitate observational studies and parameterization of mixing in the Equatorial Pacific Cold Tongue”

2018-2019

NCAR Strategic Capability Allocation, co-I, 10.7 million cpu hours

Proposal Title: “Collaborative research: Regional-scale process models to facilitate observational deployments in the Equatorial Pacific Cold Tongue”

2018-2020

NCAR University Allocation, co-I, 7 million cpu hours

Proposal Title: “The impact of climate change on the physics and biology of the ocean on scales down to the submesoscale”

2018-2019

NCAR Strategic Capability Allocation, co-I, 10.7 million cpu hours

Proposal Title: “Regional scale process models to facilitate observational deployments in the Equatorial Pacific Cold Tongue”

2017-2018

NCAR Strategic Capability Allocation, lead PI, 10.6 million cpu hours

Proposal Title: “Modeling impacts of winds on ocean submesoscales and mixed layer dynamics”

Teaching, Supervision, Mentoring and Collaboration with Students and Post-docs

Summer 2020

Co-advisor, NCAR CISL SIPARCS intern & OSU PhD student Dallas Foster

Spring 2020

Co-advisor, NCAR ASP graduate fellow & U. Wash. PhD student Hillary Scannell

Spring 2020-

Collaborator/mentor, UCSD/Scripps post-doc Yassir Eddebbbar

2019-2021

Supervisor, project scientist Deepak Cherian

2018-2020

Thesis committee, Rutgers University PhD student Clifford Watkins

2018-2021

Collaborator/mentor, University of Hawaii MS student Kate Feloy

2018-2021

Collaborator/mentor, University of Hawaii post-doc Genevieve Brett

2017-2019

Collaborator/mentor, NCAR post-doc Magdalena Carranza

Summer 2015

Summer research advisor, University of Cambridge undergraduate Lois Baker.

Spring 2012, Spring 2014

Teaching Assistant, Stanford University, Stanford, CA, EESS 146B/246B Atmosphere, Ocean and Climate Dynamics: the ocean circulation, taught by Leif Thomas.

Oceanographic Field Experience

August 2014 – September 2014

Scientist, R/V New Horizon, Dimensions of Biodiversity Program, National Science Foundation, Chief Scientist Matthew Mills.

February 2012 – March 2012

Scientist, R/V Knorr, Scalable Lateral Mixing and Coherent Turbulence, Office of Naval Research, Chief Scientist Craig Lee.

Professional Service

2021 American Meteorological Society Editor's award from J. Phys. Oceanog. "For well thought-out reviews of some particularly difficult papers, as well as many other high-quality reviews."

2021- Associate Editor, *Journal of Physical Oceanography*

Peer reviewer, *Agence Nationale Recherche, Chemical Oceanography of Frontal Zones, Continental Shelf Res., Deep Sea Res., Environ. Sci. Technol., Estuarine, Coastal, and Shelf Science, Frontiers in Mar. Sci., Geophys. Res. Lett., Geosci. Model Dev., Global Biogeochem. Cycles, Hydrobiologia, J. Fluid Mech., J. Geophys. Res., J. Mar. Res., J. Phys. Oceanogr., Meteorol. Atmos. Phys., National Science Foundation, Ocean Modelling, Ocean Sci., Proc. Natl. Acad. Sci., Prog. Oceanogr., Science Advances*

Meeting Session Co-Chair, 2018 Ocean Sciences Sessions, *Southern Ocean Mixed Layer Dynamics and Air-Sea Exchange, Physical-biogeochemical interaction across scales: from microscale to mesoscale*; 2020 Ocean Sciences Session, *(Sub)mesoscale physical/biogeochemical interaction*

Grant Review Panels, NOAA OAR/CPO 2020, NASA ROSES OBB 2021

Post-doctoral fellowship reviewer, NCAR ASP program (2018-2020)

Communication with the media:

July 2, 2020, Quoted in Kaufman, M. "Why Earth has a stubborn spot that's cooling"
<https://mashable.com/article/cold-blob-atlantic-ocean-climate-change/>

November 17, 2020, The Climate Academy Podcast by Katinka Bellomo,
<https://anchor.fm/the-climate-academy/episodes/S1Ep--10-Dan-Whitt-Oceans--fisheries-and-dealing-with-rejection-in-academia-emj8po>

February 8, 2021, Story Corps Archive NASA Ames Interview by Katrina Wesenraft.
<https://archive.storycorps.org/interviews/katrina-wesenraft-and-dan-whitt/>

Peer-reviewed publications

[R1] Brett, G. J., D. Whitt, M. Long, F. Bryan, K. Feloy, K. Richards (2021) Sensitivity of 21st-century projected ocean new production changes to idealized biogeochemical model structure. *Biogeosciences.*, doi: 10.5194/bg-2020-479

[R2] Richards, K., D. Whitt, G. Brett, F. Bryan, K. Feloy, M. Long (2021). The impact of climate change on ocean submesoscale activity. *J. Geophys. Res. Oceans.*, doi: 10.1029/2020JC016750

[R3] Cherian, D., D. Whitt, R. Holmes, R. C. Lien, S. Bachman, W. Large (2021). Off-equatorial deep cycle turbulence forced by Tropical Instability Waves in the equatorial Pacific. *J. Phys. Oceanogr.*, doi: 10.1175/JPO-D-20-0229.1

[R4] Watkins, C. and D. Whitt (2020). Large-aspect-ratio structures in simulated ocean surface boundary layer turbulence under a hurricane. *J. Phys. Oceanogr.*
doi: 10.1175/JPO-D-20-0134.1

[R5] Small, R. J., A. DuVivier, D. Whitt, M. Long, I. Grooms, W. Large (2020), On the control of subantarctic stratification by the ocean circulation. *Climate Dynamics.*
doi:10.1007/s00382-020-05473-2

[R6] Whitt, D. and M. Jansen (2020), Slower nutrient stream suppresses Subarctic Atlantic biological productivity in global warming. *Proc. Natl. Acad. Sci.*,
doi:10.1073/pnas.2000851117

[R7] Whitt, D. B, M. Lévy, J. R. Taylor (2019), Submesoscales enhance storm-driven vertical mixing of nutrients: insights from a biogeochemical large eddy simulation, *J. Geophys. Res.*, doi:10.1029/2019JC015370.

[R8] Whitt, D. B., S. A. Nicholson, M. M. Carranza (2019), Global impacts of subseasonal wind variability on surface stress, buoyancy flux and mixed layer depth, *J. Geophys. Res.*,
doi:10.1029/2019JC015166.

[R9] Whitt, D. B (2019), On the role of the Gulf Stream in the changing Atlantic nutrient circulation in the 21st century, in *Kuroshio Current: Physical, Biogeochemical and Ecosystem Dynamics*, AGU-Wiley Geophysical Monograph Series. isbn: 978-1-119-42834-3.

[R10] Whitt, D. B., L. N. Thomas, J. Klymak, C. M. Lee, and E. A. D'Asaro (2018), Interaction of super-inertial waves with submesoscale cyclonic filaments in the North Wall of the Gulf Stream. *J. Phys. Oceanogr.*, 48, 81-99, doi:10.1175/JPO-D-17-0079.1

[R11] Kimura, S, A. Jenkins, H. Regan, P. Holland, K. Assman, D. Whitt, M. Dan Wesse, W. Jan van de Berg, C. H. Reijmer, P. Dutrieux (2017), Oceanographic controls on the variability of ice-shelf melting and circulation of glacial meltwater in the Amundsen Sea Embayment, Antarctica. *J. Geophys. Res.*, doi:10.1002/2017JC012926.

[R12] Whitt, D. B., and J. R. Taylor (2017), Energetic submesoscales maintain strong mixed layer stratification during an autumn storm. *J. Phys. Oceanogr.*, 47, 2419-2427. doi:10.1175/JPO-D-17-0130.1.

[R13] Whitt, D. B., J. R. Taylor, M. Lévy (2017), Synoptic-to-planetary scale wind variability enhances phytoplankton biomass at ocean fronts, *J. Geophys. Res.*, doi:10.1002/2016JC011899.

[R14] Whitt, D. B., M. Lévy, J. R. Taylor (2017), Low-frequency and high-frequency oscillatory winds synergistically enhance nutrient entrainment and phytoplankton at fronts, *J. Geophys. Res.*, doi:10.1002/2016JC012400.

[R15] Whitt, D. B. and L. N. Thomas (2015), Resonant generation and energetics of wind-forced near-inertial motions in a geostrophic flow, *J. Phys. Oceanogr.*, 45, 181-208, doi: 10.1175/JPO-D-14-0168.1.

[R16] Whitt, D. B. and L. N. Thomas (2013), Near-inertial waves in strongly baroclinic currents, *J. Phys. Oceanogr.*, 43, 706 – 725, doi: 10.1175/JPO-D-12-0132.1.

[R17] Whitt, D. B., M. Z. Jacobson, J. T. Wilkerson, A. D. Naiman, S. K. Lele (2011), Vertical mixing of commercial aviation emissions from cruise altitude to the surface, *J. Geophys. Res.*, 116, D14109, doi:10.1029/2010JD015532.

Submitted Manuscripts

[S1] Eddebar, YE, AC Subramanian, DB Whitt, MC Long, A Verdy, M Mazloff, M Merrifield (2021). Seasonal modulation of dissolved oxygen in the equatorial Pacific by Tropical Instability Vortices.

[S2] Nicholson, S., D. Whitt, I. Fer, M. DuPlessis, A. Lebehot, S. Swart, A. Sutton, and P. Monteiro (2021) Storms drive outgassing of CO₂ in the subpolar Southern Ocean.

[S3] Foster, D., D. J. Gagne, D. Whitt (2021) Probabilistic machine learning estimation of ocean mixed layer depth from dense satellite and sparse in-situ observations.

Selected Conference Presentations (see web for a full list)

[C1] Whitt, D. B (2019), Mesoscale resolving simulations of marine climate change in the RCP8.5 scenario, CESM Workshop, Boulder, CO, June, 2019.

[C2] Whitt, D. B and J. Y. Luo (2019), Large eddy simulations of ocean bio-physical interactions: bridging the gap from microscale to submesoscale, Microscale ocean biophysics workshop, Whistler, BC. January, 2019

[C3] Whitt, D. B (2018), On the role of the Gulf Stream in the changing North Atlantic nutrient circulation, CESM Workshop, Boulder, CO, June, 2018.

[C4] Whitt, D. B (2017), Ekman suction enhances entrainment at fronts, Atmospheric and Oceanic Fluid Dynamics Meeting, Portland, OR, June, 2017, Paper 318961.

[C5] Whitt, D. B., M. Levy and J. Taylor (2016), Physical and biogeochemical dynamics in a submesoscale front forced by high-frequency winds, Ocean Sciences Meeting, New Orleans, LA, February, 2016, Abstract 92972.

[C6] Van Dijken, G., D. Whitt, et al. (2016), Observations of a summertime phytoplankton bloom in the northeastern subtropical Pacific, Ocean Sciences Meeting, New Orleans, LA, February, 2016, Abstract 91921.

[C7] Whitt, D. B. and L. N. Thomas (2014), Resonant generation and energetics of wind-forced near-inertial motions in a geostrophic flow, AGU Annual Meeting, San Francisco, CA, December 15-19, 2014. Abstract OS31C-1006

[C8] Whitt, D. B. and L. N. Thomas (2014), Near-inertial surf-zone in strong fronts, Ocean Sciences Meeting, Honolulu, HI, February 23-28, 2014. Abstract 14464

[C9] Whitt, D. B., L. N. Thomas, R. K. Shearman, C. M. Lee, J. Klymak, and E. A. D'Asaro (2013), Near-inertial waves in strongly baroclinic currents: linking theory and observations to explain enhanced turbulence in the Gulf Stream thermocline, CNLS Annual Conference: Ocean Turbulence, Santa Fe, NM, June 3-7, 2013

[C10] Whitt, D. B., J. T. Wilkerson, M. Z. Jacobson, A. D. Naiman, S. K. Lele (2011), Disaggregating global commercial aviation emissions by background static-stability in the upper-troposphere and lower-stratosphere, Fall 2010 AGU Annual Meeting, San Francisco, CA, Abstract A51B-0094