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Bia Villas Bôas

Education

2014–2020 | **Ph.D. in physical oceanography**, Scripps Institution of Oceanography.

2012–2014 | **MSc. in physical oceanography**, University of São Paulo.

2007–2011 | **BSc. in physics**, Federal University of Rio Grande do Norte.

Academic Appointments

2022-PRESENT | **Assistant Professor - Colorado School of Mines**
Department of Geophysics
Hydrologic Science and Engineering, Affiliated Faculty

2021-2022 | **Postdoctoral Researcher - Caltech**
Leverage measurements from NASA's Sub-Mesoscale Ocean Dynamics Experiment (S-MODE) to better constrain interactions between surface waves, winds, and currents. Supervisor: Andy Thompson.

2020-2021 | **Postdoctoral Researcher - SIO**
Explore the role of surface waves in modulating signals detected by NASA's SWOT mission and evaluate how surface waves can be used to improve understanding of upper ocean currents.

Fellowships and Awards

2022 | **The US CLIVAR Early Career Scientist Leadership Award** – Awarded by the US CLIVAR to early career scientists for their contributions to leading community activities to advance science on the role of the ocean in climate variability and predictability.

2021 | **Fellow of the Machine Learning and the Physics of Climate Program** – The Kavli Institute for Theoretical Physics, University of California, Santa Barbara.

2018 | **Fellow of the Planetary Boundary Layers in Atmospheres, Oceans, and Ice on Earth and Moons Program** – The Kavli Institute for Theoretical Physics, University of California, Santa Barbara.

2017-2020 | **NASA Earth and Space Science Graduate Fellowship** – Awarded by the National Aeronautics and Space Administration.

2017 | **French-American Doctoral Exchange Program** (FADEX-O) Laureate– Awarded by the Embassy of France in the US.

Mentoring

Postdoctoral Mentorship

2022-present | **Gwendal Marechal** – Postdoc Supervisor, Colorado School of Mines.

Graduate Student Mentorship

2022-present | **Jessica Caggiano** – PhD committee, University of South Florida.

2021-present | **Luna Bai** – PhD committee, California Institute of Technology.

2020-present | **Elena Savidge** – PhD committee, Colorado School of Mines.

Undegraduate Student Mentorship

2018-present | **Luke Colosi** – Co-advisor (with Sarah Gille), UC San Diego.

2017–2020 | **Roger Wu** – Co-advisor (with Sarah Gille), UC San Diego.

Teaching experience

Undergraduate Courses

Spring 2023 | **Instructor** – GPGN 268: *Geophysical Data Analysis*, Colorado School of Mines.

Graduate Courses

Fall 2020 | **Teaching Assistant** – SIOC 221A: *Analysis of Physical Oceanographic Data* (`https://github.com/biavillasboas/SIO221A`), UC San Diego (remote).

Short Courses and Workshops

May 2021 | **Instructor** – NASA-Openscapes Software Carpentry Workshop.

Feb. 2019 | **Programming with Python** – School of Global Policy and Strategy, UC San Diego.

2017 - Present | **Software and Data Carpentry Instructor** – Certified Software and Data Carpentry Instructor. I have taught several Carpentries workshops for a broad range of audiences, including the Scripps Undergraduate Research Fellowship (SURF) and the UC San Diego Library.

Guest Lecturer

2022 | **"Remote Sensing of the Oceans"** – Guest lecturer for GPGN 470/570: *Applications of Remote Sensing*, Colorado School of Mines.

2019 | **"An impractical guide to surfing surface waves"** – Guest lecturer for SIO 90: *Undergraduate Seminar* , UC San Diego.

Service

University Service

University Commitees

Fall 2022 | Core Computing Course Taskforce

Spring 2023 | Pakiser Fellowship review committee

Outreach

Feb 2023	Performed climate experiments for the "Girls Lead the Way"outreach event (Colorado School of Mines)
Nov 2022	Featured in The Fall 2022 Mines Geophysics Newsletter.

External Service

Commitees and Science Teams

2023–present	NASA Ocean Vector Winds Science team PI.
2022–present	NASA ODYSEA mission concept science team member.
2022–present	Member of the US CLIVAR Phenomena Observations and Synthesis (POS) Panel.
2022–present	Member of the US CLIVAR Air-Sea Transition Zone Study Group.
2022–present	Member of the American Meteorological Society Committee on Air-Sea Interaction.
2021–present	NASA S-MODE science team affiliate.
2016–present	NASA SWOT science team affiliate.

Conference Service

Jan. 2023	**Session chair** – Convener of "*Physical Processes at the Air-Sea Interface, Including Waves, Spray, Bubbles, and Aerosols I*" at the 23rd Conference on Air-Sea Interaction at the AMS 103rd Annual Meeting.
Feb. 2022	**Session convener** – Convener of "*Understanding Coupled Ocean Wind, Current and Wave Processes through Remotely Sensed and In Situ Observations*" at the Ocean Sciences Meeting, virtual.
Feb. 2022	**Session convener** – Convener of "*Towards an understanding of how multiscale ocean-atmosphere interactions modulate fluxes in the air-sea boundary layer*" at the Ocean Sciences Meeting, virtual.
Feb. 2020	**Session convener** – Convener of "*Wave Breaking in Ocean-Atmosphere Exchanges*" at the Ocean Sciences Meeting, San Diego, CA.
Dec. 2018	**Session convener** – Convener of "*Integrated Observations and Modeling of Surface Currents, Waves, and Winds*" at the AGU Fall Meeting, Washington, DC.

Referee Service

Oct. 2020	**Ad hoc referee for funding agency** – Ad hoc referee for the NSF Physical Oceanography Program.
Mar. 2020	**Ad hoc panelist for funding agency** – Panel reviewer for the National Aeronautics and Space Administration (NASA), Washington, DC.
2016–present	**Ad hoc referee for scientific journals** – Reviewer for the Journal of Physical Oceanography, the Journal of Geophysical Research, Geophysical Research Letters, and Remote sensing of Environment.

Outreach

2016–present	**Outreach** – Help lead various outreach activities at Scripps' Hydraulics Laboratory running demos in the wave tank.

Proposals and Grants

2021 **NASA ROSES 2021 A.15 proposal** – Seeds of change: Investigating the impact of Antarctic basal channel and persistent polynya co-evolution on ice shelf stability. *Awarded.($582,084).*
PI: Matthew Siegfried
Co-I/Science-PI: Tasha Snow
Co-I: Bia Villas Bôas, Ted Scambos
International Co-I: Karen Alley, Lars Boehme
No-cost Co-I: Fernando Pèrez, Susheel Adusumilli

2022 **NSF Physical Oceanography Program** – Interactions between winds and sea surface temperature at timescales of several days.*Awarded ($416,771)*
PI: Bia Villas Bôas

2022 **NASA ROSES 2022 A.13 proposal** – A coupled framework for quantifying interactions between winds, waves, and currents. *Awarded ($820,478)*
PI: Bia Villas Bôas
Co-I: Gwendal Marechal, Rui Sun, Matthew Mazloff

Conference Presentations

Work led by students and postdocs that I advise are marked with a star.

Invited Talks

Ana B. Villas Bôas. Future strategies for observations and modeling of air-sea interactions (**invited talk**). US CLIVAR - Mesoscale and Frontal-Scale Air-Sea Interactions Workshop, Boulder, CO, 2023b

Ana B. Villas Bôas. Interactions between ocean currents and surface waves (**invited talk**). The Geophysical Fluid Dynamics Laboratory (GFDL) Formal Seminar Series, Princeton, NJ, 2023a

Ana B. Villas Bôas. Not the surface waves you are thinking about! (**invited talk**). Geophysics Heiland lecture, Golden, CO, 2022

Ana B. Villas Bôas. Wind, wave, and current interactions (**invited talk**). US CLIVAR - Surface Currents in the Coupled Ocean-Atmosphere System Workshop, La Jolla, 2020

Ana B. Villas Bôas, Sarah T. Gille, Matthew R. Mazloff, Bruce D. Cornuelle, Donata Giglio, Shang-Ping Xie, et al. Wind, wave, and current interactions from CFOSAT: Processes in the california current region (**invited talk**). CFOSAT Science Team Meeting, Brest, France, 2019c

Conference Abstracts

Gwendal Marechal*, **Ana B. Villas Bôas**, Luc Lenain, and Nicholas Pizzo. Observations and modeling of current effects on waves during the s-mode pilot campaign (poster). AMS Annual Meeting, 2023

Han Wang, **Ana B. Villas Bôas**, Jacques Vanneste, and William Young. Imprint of ocean currents on significant wave height (talk). AMS Annual Meeting, 2023

Sarah Gille and The ODYSEA science team. Simultaneous measurements of winds and surface currents from space: Odysea (ocean dynamics and surface exchange with the atmosphere. AMS Annual Meeting, 2023

Rui Sun, **Ana B. Villas Bôas**, Alison Cobb, Sabique Langodan, Aneesh C Subramanian, Matthew R Mazloff, Bruce D Cornuelle, Arthur J Miller, and Ibrahim Hoteit. The effects of waves in a regional coupled ocean–wave–atmosphere model: A case study of cyclone mekunu (poster). AMS Annual Meeting, 2023

Ana B Villas Bôas, Luc Lenain, Bruce D Cornuelle, Sarah T Gille, and Matthew R Mazloff. Surface waves: opportunities and challenges in the context of SWOT (talk). SWOT Science Team Meeting, virtual, 2022b

Elena Savidge, Tasha Snow, Matthew Siegfried, Yixi Zheng, **Ana Beatriz Villas Bôas**, Guilherme Bortolotto, Lars Boehme, and Karen E Alley. Wintertime polynya structure and variability at pine island glacier, west antarctica, from thermal remote sensing and seal-borne observations. AGU Fall Meeting, 2022

Ana B Villas Bôas, Luc Lenain, Bruce D Cornuelle, Sarah T Gille, and Matthew R Mazloff. A broadband view of the sea surface height wavenumber spectrum (talk). Ocean Sciences Meeting, virtual, 2022a

Yue Bai, **Ana B Villas Bôas**, Andrew Thompson, Patrice Klein, Hector Torres, Jinbo Wang, and Dimitris Menemenlis. Submesoscale wind-front interactions in the southern ocean (talk). Ocean Sciences Meeting, virtual, 2022

Ana B. Villas Bôas, Sarah T. Gille, Matthew R. Mazloff, Bruce D. Cornuelle, and Fabrice Ardhuin. Wave-current interactions at meso and submesoscales: Insights from idealized numerical simulations (talk). Ocean Sciences Meeting, San Diego, 2020a

William Young and **Ana B. Villas Bôas**. Diffusion of surface gravity waves by submesoscale turbulence at the sea surface (talk). Ocean Sciences Meeting, San Diego, 2020

Luke Colosi*, **Ana B. Villas Bôas**, and Sarah T. Gille. The seasonal cycle of significant wave height: Local vs. remote forcing (poster). Ocean Sciences Meeting, San Diego, 2020

Ana B. Villas Bôas, Weiguang Wu*, and Sarah T. Gille. Upper-ocean response to alongshore winds off the California coast (talk). International Ocean Vector Winds Science Team Meeting, Portland, ME, 2019d

Ana B. Villas Bôas, Fabrice Ardhuin, et al. Upper-ocean response to alongshore winds off the California coast (talk). SWOT Science Team Meeting, Bordeaux, France, 2019b

Ana B. Villas Bôas, Sarah T. Gille, Matthew R. Mazloff, and Bruce D Cornuelle. The surface wave variability in the California Current region: Potential implications for SWOT (talk). SWOT Science Team Meeting, Toulouse, France, 2017

Publications

Submitted Articles

Han Wang, **Ana B Villas Bôas**, William R Young, and Jacques Vanneste. Scattering of swell by currents. *Journal of Fluid Mechanics*, submitted

Yue Bai, Andrew Thompson, **Ana B Villas Bôas**, Patrice Klein, Hector Torres, and Dimitris Menemenlis. Sub-mesoscale wind-front interactions: the combined impact of thermal and current feedback. *Geophysical Research Letters, Oceans*, submitted

Peer-Reviewed Articles

Elena Savidge, Tasha Snow, Matthew Siegfried, Yixi Zheng, **Ana B Villas Bôas**, Guilherme Bortolotto, Lars Boehme, and Karen E Alley. Wintertime polynya structure and variability at pine island glacier, west antarctica, from thermal remote sensing and seal-borne observations. *IEEE Transactions on Geoscience and Remote Sensing*, 2023

Rui Sun, Alison Cobb, **Ana B Villas Bôas**, Sabique Langodan, Aneesh C Subramanian, Matthew R Mazloff, Bruce D Cornuelle, Arthur J Miller, Raju Pathak, and Ibrahim Hoteit. Waves in SKRIPS: WaveWatch III coupling implementation and a case study of cyclone mekunu. *EGUsphere*, 2022:1–29, 2022. doi: 10.5194/egusphere-2022-1298

Ana B Villas Bôas, Luc Lenain, Bruce D Cornuelle, Sarah T Gille, and Matthew R Mazloff. A broadband view of the sea surface height wavenumber spectrum. *Geophysical Research Letters*, page e2021GL096699, 2022c. doi: 10.1029/2021GL096699

Rui Sun, **Ana B Villas Bôas**, Aneesh C Subramanian, Bruce D Cornuelle, Matthew R Mazloff, Arthur J Miller, Sabique Langodan, and Ibrahim Hoteit. Focusing and defocusing of tropical cyclone generated waves by ocean current refraction. *Journal of Geophysical Research: Oceans*, page e2021JC018112, 2021. doi: 10.1029/2021JC018112

Yao Yu, David Sandwell, Sarah Gille, and **Ana B. Villas Bôas**. Assessment of ICESat-2 for the recovery of ocean topography. *Geophysical Journal International*, 2021. doi: 10.1093/gji/ggab084

Luke V. Colosi, **Ana B. Villas Bôas**, and Sarah T. Gille. The seasonal cycle of significant wave height in the ocean: Local versus remote forcing. *Journal of Geophysical Research: Oceans*, 126(8):e2021JC017198. doi: https://doi.org/10.1029/2021JC017198

Ana B. Villas Bôas, Sarah T. Gille, Matthew R. Mazloff, Bruce D. Cornuelle, and Fabrice Ardhuin. Wave-current interactions at meso and submesoscales: Insights from idealized numerical simulations. *Journal of Physical Oceanography*, 2020b. doi: 10.1175/JPO-D-20-0151.1

Ana B. Villas Bôas and W. R. Young. Directional diffusion of surface gravity wave action by ocean macroturbulence. *Journal of Fluid Mechanics*, 890:R3, 2020. doi: 10.1017/jfm.2020.116

Ana B. Villas Bôas, Fabrice Ardhuin, Ernesto Rodriguez, Christine Gommenginger, et al. Integrated observations of global surface winds, currents, and waves: requirements and challenges for the next decade. *Frontiers in Marine Science*, 2019a. doi: 10.3389/fmars.2019.00425

Ana B. Villas Bôas, Sarah T. Gille, Matthew R. Mazloff, and Bruce D. Cornuelle. Characterization of the deep water surface wave variability in the California Current Region. *Journal of Geophysical Research: Oceans*, 122(11):8753–8769, 2017. ISSN 2169-9291. doi: 10.1002/2017JC013280

Ana B. Villas Bôas, Olga T Sato, Alexis Chaigneau, and Guilherme P Castelão. The signature of mesoscale eddies on the air-sea turbulent heat fluxes in the South Atlantic Ocean. *Geophysical Research Letters*, 42(6):1856–1862, 2015. doi: 10.1002/2015GL063105

Guilherme P Castelão, Luiz C Irber, and **Ana B. Villas Bôas**. An objective reference system for studying rings in the ocean. *Computers & Geosciences*, 61:43–49, 2013. doi: https://doi.org/10.1016/j.cageo.2013.07.004

White Papers

Ana B. Villas Bôas and Nicholas Pizzo. The geometry, kinematics, and dynamics of the two-way coupling between wind, waves, and currents. pages 18–26. US CLIVAR, 2021. doi: http://dx.doi.org/10.5065/ybca-0s03

Carol Anne Clayson, Luca Centurioni, Meghan F Cronin, James Edson, Sarah Gille, Frank Muller-Karger, Rhys Parfitt, Laura D Riihimaki, Shawn R Smith, Sebastiaan Swart, **Ana B Villas Bôas**, et al. Super sites for advancing understanding of the oceanic and atmospheric boundary layers. *Marine Technology Society Journal*, 55(3):144–145, 2021. doi: https://doi.org/10.4031/MTSJ.55.3.11

Christopher Erdmann, Natasha Simons, Reid Otsuji, Stephanie Labou, Ryan Johnson, Guilherme Castelão, **Ana B Villas Bôas**, et al. Top 10 fair data software things. `http://doi.org/10.5281/zenodo.2555498`, 2019

S. T. Gille, R. Abernathey, T. Chereskin, B. Cornuelle, P. Heimbach, M. Mazloff, C. Rocha, S Soares, M. Sonnewald, **Ana B Villas Bôas**, et al. Open code policy for NASA Space Science: A perspective from NASA-supported ocean modeling and ocean data analysis. White paper submitted in support of National Academies study on *Open Source Software Policy Options for NASA Earth and Space Sciences,* `https://www.nap.edu/resource/25217/whitepapers/pdf/41_GilleSarahT.pdf`, 2018

Data and Software

Ana B. Villas Bôas. Source code for: A Broadband View of the Sea Surface Height Wavenumber Spectrum. `https://github.com/biavillasboas/BroadbandSpectrum`, 1 2022

Ana B. Villas Bôas, Luc Lenain, and Nicholas Statom. Data from: "A broadband view of the sea surface height wavenumber spectrum". `https://doi.org/10.6075/J0W0963R`, 2022

Luke V. Colosi. Source code for: "The seasonal cycle of significant waveheight in the ocean: Local vs remote forcing". https://github.com/lcolosi/WaveClimatology, 2021

Ana B. Villas Bôas and Guilherme P. Castelão. Data from: "Wave-current interactions at meso and submesoscales: Insights from idealized numerical simulations". https://doi.org/10.6075/J0X928V6, 2020

Ana B. Villas Bôas. Source code for: "Wave-current interactions at meso and submesoscales: Insights from idealized numerical simulations". https://github.com/biavillasboas/IdealizedWaveCurrent, 2020

Ana B. Villas Bôas. Source code for: "Characterization of the deep water surface wave variability in the California Current region". https://github.com/biavillasboas/CaliforniaWaveVariability, 2020