Iury T. Simoes-Sousa, Ph.D. Curriculum Vitae

Postdoctoral Fellow – Woods Hole Oceanographic Institution
Physical Oceanography Department

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Education

2019 – 2023 Ph.D., Computational Sciences, **University of Massachusetts Dartmouth**

2015 – 2017 M.Sc., Physical Oceanography, **University of São Paulo**, Brazil

2011 – 2014 B.Sc., Interdisciplinary Oceanography, **Federal University of Ceará**, Brazil

Professional Experience

2023 – · · · · **Postdoctoral Investigator,** Department of Physical Oceanography,
Woods Hole Oceanographic Institution (WHOI).
Funding: Institutional (*Fellowship* by Vision Funds)

2020 – 2023 **Graduate Research Assistant,** College of Engineering,
University of Massachusetts Dartmouth (UMassD).
Funding: ONR and NSF

2019 – 2019 **Physical Oceanographer,** Oceanographic Institute,
University of São Paulo (USP).
Responsibilities: Scientific and technical support in physical oceanography data analysis, mentorship leading to publication of scientific articles.

Data Scientist in Artificial Intelligence,
InsilicAll.
Responsibilities: Data processing for neural networks, interactive visualization of machine learning model results.

2017 – 2019 **Data Scientist in Artificial Intelligence and Backend Developer,**
Altox - Alternative Toxicology.
Responsibilities: Developed first Brazilian online platform for *in-silico* toxicological tests, machine learning model development, co-authorship in cancer research paper.

Selected Academic Honors

2023 **Postdoctoral Fellowship,** *Vision Funds,* Woods Hole Oceanographic Institution.

2022 **Geophysical Fluid Dynamics Fellowship,** Woods Hole Oceanographic Institution.

2019 **First-Year Doctoral Fellowship,** University of Massachusetts.

2015 **Master's Research Fellowship,** São Paulo Research Foundation (FAPESP).

Additional Training

2023 **Certified Programming Instructor,** The Carpentries.
Mode: Virtual (20 hours).
Skills: Teaching in programming and data science, engagement in active pedagogical practices.

Additional Training (continued)

- **Life Skills for Young Scientists,** Planetary Science Institute.
  Instructor: Dr. Jonathan Lilly, Mode: Virtual (12 months, In Progress).
  Skills: Communication, conflict management, teamwork, resilience, and well-being in academia.

2022
- **Data-driven GFD, Geophysical Fluid Dynamics Fellowship,** WHOI.
  Instructors: Profs. Laure Zanna and Peter Schmid
  Mode: In-person (400 hours).
  Skills: Advanced methods in spatio-temporal analysis and decomposition, AI in fluid dynamics and development of a scientific project.
- **Openscapes Champions Cohort,** NASA.
  Mode: Virtual (2 months).
  Skills: Cloud computing in Earth science research, open science principles.

2021
- **OceanHackWeek, Data Science + Oceanography,** Bigelow Laboratory for Ocean Sciences and University of Washington.
  Mode: In-person - Boothbay, ME, USA (40 hours).
  Skills: Multidimensional data analysis, version control, AI in oceanography.

2018
- **Nanodegree in Machine Learning Engineering,** Udacity.
  Mode: Virtual (6 months).
  Focus: Linear regression, decision trees, SVM, neural networks, reinforcement learning.

2016
- **Lagrangian Perspective of Ocean Circulation,** Federal University of Santa Catarina.
  Instructor: Prof. Albert Kirwan
  Mode: In-person - Florianópolis, Brazil (20 hours).

2013
- **Integrated Teaching with Digital Technologies,** UFC Virtual - Federal University of Ceará.
  Mode: In-person - Fortaleza, CE (64 hours).

Educational Activities

Short Courses

2024 (expected, 40h)
- **Geophysical Flows Workshop,** IIT Madras.

2023 (2h)
- **Summer School on Marine Heatwave,** ICTP / CLIVAR.
  Title: Version control and cloud computing in Physical Oceanography

2021 (10h)
- **Unravelling Oceanography with Python,** Federal University of Ceará.

2016 (8h)
- **Python for Physical Oceanography,** University of São Paulo.

Teaching Assistant

2014 (190h)
- **Ocean Dynamics II,** Federal University of Ceará.
- **Oceanographic Data Analysis,** Federal University of Ceará.

Advising

2023 – · · · ·
- **Rebeca Crisóstomo Melo,** Undergraduate in Oceanography, Federal University of Ceará. Project: Parnaíba River plume study (*Main advisor*).

2021 – 2023
- **Caio Erick Braga Costa,** Masters in Tropical Marine Sciences, Federal University of Ceará. Project: Surface gravity waves and numerical reanalyses validation (*Co-advisor*).

Educational Activities (continued)

Mentoring

2023 — **Rafael Couto Martins,** Undergraduate in Physical Oceanography, University of São Paulo (USP). Project: Modeling the Brazil Current recirculation.
Main advisor: Amit Tandon.

2020 – 2023 — **Alan Andonian,** Undergraduate/Masters, University of Massachusetts Dartmouth (UMassD). Projects: Taylor columns and vortex shedding simulations.
Main advisor: Amit Tandon.

2019 – 2022 — **Igor Uchôa Farias,** Masters in Physical Oceanography, University of São Paulo. Project: Altimetry-based characterization of Brazil Current mesoscale eddies.
Main advisor: Ilson Silveira.

2019 – 2021 — **Caique Dias Luko,** Undergraduate in Oceanography, University of São Paulo (USP). Project: Revisiting the Atlantic South Equatorial Current.
Main advisor: Ilson Silveira.

2019 — **Ágata Piffer Braga,** Masters in Physical Oceanography, University of São Paulo. Project: Description and Dynamics of the Santos Bifurcation.
Main advisor: Ilson Silveira.

Academic Outreach

2012 – 2014 — **Tutorial Education Program (PET),** Federal University of Ceará. Institutional Scholarship. Activities: Educational projects, thematic weeks, outreach and training focused on reducing dropout rates from vulnerable students.

2012 – 2013 — **Exchange Student Support Program (PAI),** Federal University of Ceará. Volunteer. Activities: Assisting international students, focused support for low-income students.

Ad Hoc Reviewer for Scientific Journals

- *Journal of Open Source Software*
- *Journal of Physical Oceanography*
- *Frontiers in Marine Science*
- *Ocean and Coastal Research*
- *Geophysical Research Letters*
- *Remote Sensing*
- *Journal of Atmospheric and Oceanic Technology*
- *Journal of Geophysical Research: Oceans*

Research

Grants as Single Beneficiary

2023-2024 — ***Vision Funds* Postdoctoral Fellowship,** Woods Hole Oceanographic Institution (WHOI).
Funds: US$ 202 thousand.

2019-2020 — **First-year Doctoral Fellowship,** University of Massachusetts Dartmouth (UMassD).

Research (continued)

2015-2017 **Master's Research Fellowship,** University of São Paulo (USP).
Title: Dynamics of the multiple retroflections and recirculations of the North Brazil Undercurrent.
Funding Agency: São Paulo Research Foundation (FAPESP)

Participation in Research Projects

2023 **Sub-Mesoscale Ocean Dynamics Experiment (S-MODE).**
Role: Collaborator, Funding Agency: NASA, PI: Tom Farrar (WHOI).

Surface Water Ocean Topography (SWOT) Science Team.
Role: Collaborator, Funding Agency: NASA, PI: Tom Farrar (WHOI).

Ecological Connectivity and Material Dispersion on the Continental Shelf of Ceará.
Role: Collaborator, Funding Agency: FUNCAP (Brazil), PI: Carlos Eduardo Peres Teixeira (UFC), Status: Under evaluation.

2020 – 2023 **Understanding the Ocean-Atmosphere Coupling in the Northern Indian Ocean.**
Role: Research Assistant, Funding Agency: ONR, PI: Amit Tandon.

The Role of Sub-mesoscale Eddies and Fronts in Near-inertial Waves Generation.
Role: Research Assistant, Funding Agency: ONR, PI: Prof. Amit Tandon.

Sub-mesoscale and Mesoscale Interactions STudy (SubMIST).
Role: Research Assistant, Funding Agency: ONR, Program: Marine Underwater Science and Technology (MUST), PI: Amit Tandon.

2019 **Network for Studies of the Brazil Current on the Southeast-South Continental Margin (REMARSUL).**
Role: Physical Oceanographer, Funding Agency: CAPES (Brazil), PI: Ilson Silveira.

2015 – 2017 **Hydrodynamic Characterization of the Sergipe and Alagoas Basin (MARSEAL).**
Role: Physical Oceanographer, Funding Agency: Partnership between USP and Petrobras, PI: Ilson Silveira.

2017 – 2019 **Virtual InSilicoTox: Real-time in silico toxicological screening platform.**
Funding Agency: São Paulo Research Foundation (FAPESP).

Publications

Journal Articles

1. C. Carvalho, I. T. **Simoes-Sousa**, L. P. Santos, *et al.*, "Surfing the currents: The longest distance traveled by a released West Indian manatee (*Trichechus manatus*) and the implications for conservation," *Animal Conservation*, 2023, Under review., ISSN: 0006-3207.

2. C. B. Rocha and I. T. **Simoes-Sousa**, "Compact mesoscale eddies in the South Brazil Bight," *Remote Sensing*, vol. 14, no. 22, p. 5781, 2022. DOI: 10.3390/rs14225781.

3. I. C. Silveira, F. Pereira, G. R. Flierl, *et al.*, "The Brazil Current quasi-stationary unstable meanders at 22°S–23°S," *Progress in Oceanography*, p. 102 925, 2022, ISSN: 0079-6611. DOI: https://doi.org/10.1016/j.pocean.2022.102925.

4. I. T. **Simoes-Sousa**, A. Tandon, J. Buckley, D. Sengupta, E. Shroyer, and S. P. de Szoeke, "Atmospheric cold pools in the Bay of Bengal," *Journal of the Atmospheric Sciences*, 2022. DOI: 10.1175/JAS-D-22-0041.1.

5. I. T. **Simoes-Sousa**, A. Tandon, F. Pereira, C. Z. Lazaneo, and A. Mahadevan, "Mixed layer eddies supply nutrients to enhance the spring phytoplankton bloom," *Frontiers in Marine Science*, vol. 9, 2022, ISSN: 2296-7745. DOI: 10.3389/fmars.2022.825027.

6. I. Uchoa, I. T. **Simoes-Sousa**, and I. C. Silveira, "The Brazil Current mesoscale eddies: Altimetry-based characterization and tracking," *Deep Sea Research Part I: Oceanographic Research Papers*, p. 103 947, 2022, ISSN: 0967-0637. DOI: 10.1016/j.dsr.2022.103947.

7. C. Luko, I. Silveira, I. T. **Simoes-Sousa**, J. Araujo, and A. Tandon, "Revisiting the Atlantic South Equatorial Current," *Journal of Geophysical Research: Oceans*, e2021JC017387, 2021. DOI: 10.1029/2021JC017387.

8. D. C. Napolitano, C. B. Rocha, I. C. da Silveira, I. T. **Simoes-Sousa**, and G. R. Flierl, "Can the Intermediate Western Boundary Current recirculation trigger the Vitória Eddy formation?" *Ocean Dynamics*, vol. 71, no. 3, pp. 281–292, 2021. DOI: 10.1007/s10236-020-01437-6.

9. P. S. Polito, O. T. Sato, D. C. Napolitano, I. T. **Simoes-Sousa**, H. Almeida, and F. R. Lapolli, "Insights on the non-linear solution of Munk's ocean circulation theory from a rotating tank experiment," *Ocean and Coastal Research*, vol. 69, 2021. DOI: 10.1590/2675-2824069.20-011psp.

10. E. Shroyer, A. Tandon, D. Sengupta, *et al.*, "Bay of Bengal intraseasonal oscillations and the 2018 monsoon onset," *Bulletin of the American Meteorological Society*, pp. 1–44, 2021. DOI: 10.1175/BAMS-D-20-0113.1.

11. I. T. **Simoes-Sousa**, I. C. A. Silveira, A. Tandon, G. R. Flierl, C. H. Ribeiro, and R. P. Martins, "The Barreirinhas Eddies: Stable energetic anticyclones in the near-equatorial South Atlantic," *Frontiers in Marine Science*, vol. 8, p. 28, 2021. DOI: 10.3389/fmars.2021.617011.

12. J. R. Santin, G. F. da Silva, M. V. Pastor, *et al.*, "Biological and toxicological evaluation of n-(4methyl-phenyl)-4-methylphthalimide on bone cancer in mice," *Anti-Cancer Agents in Medicinal Chemistry (Formerly Current Medicinal Chemistry-Anti-Cancer Agents)*, vol. 19, no. 5, pp. 667–676, 2019. DOI: 10.2174/1871520619666190207130732.

13. I. Silveira, I. T. **Simoes-Sousa**, D. Napolitano, H. M. R. Almeida, P. Baldasso, and W. Watanabe, "As correntes oceânicas na Bacia Sergipe-Alagoas," *Revista Marseal: Edição Águas Profundas SE/AL*, vol. 2, pp. 36–39, 2018, Ciências da Terra e Meio Ambiente, Geologia e Geomorfologia., ISSN: 2596-0547. URL: https://www.livraria.ufs.br/produto/revista-marseal-edicao-aguas-profundas-seal-volume-2/.

Proceedings

1. I. T. **Simoes-Sousa**, "Stochasticity of turbulence closures," in *Proceedings Volumes of the GFD WHOI*, In press., Woods Hole, MA: Woods Hole Oceanographic Institution, 2022. URL: https://gfd.whoi.edu/gfd-publications/gfd-proceedings-volumes/.

Contributions to Open-Source Software

1. T. Biló and I. T. **Simoes-Sousa**, *vector_fields*, Python functions developed for handling vector fields. URL: https://github.com/iuryt/vector_fields.

2. K. Drushka, D. Balwada, D. LaScala-Gruenewald, I. T. **Simoes-Sousa**, and C. Cai, *ohw21-proj-model-subsampling*, OceanHackWeek21 project to subsample high-resolution model outputs for seagliders, ships, or other in situ platforms. URL: https://github.com/oceanhackweek/ohw21-proj-model-subsampling.

3. A. Ramadhan, G. L. Wagner, N. C. Constantinou, *et al.*, *CliMa/Oceananigans.jl: Vo.88.0*, version vo.88.0, Numerical model in Julia for oceanic fluid dynamics on CPUs and GPUs. Contributed to the source code on different pull requests. DOI: 10.5281/zenodo.4019271.

4. I. T. **Simoes-Sousa**, *Bioceananigans.jl*, Modules for estimating depth of mixing layer, phytoplankton shading, and calculating light-limited growth. URL: https://github.com/iuryt/Bioceananigans.jl.

5. I. T. **Simoes-Sousa**, *env_coringa*, Specialized Python environment for Earth sciences, focusing on analysis of oceanographic data. URL: https://github.com/iuryt/env_coringa.

6. I. T. **Simoes-Sousa**, *gaussian_bump*, MITgcm simulation of rotating flow over a Gaussian bump. URL: https://github.com/iuryt/gaussian_bump.

7. I. T. **Simoes-Sousa**, *NorthAtlanticBloom*, Code for simulations and data analysis related to the paper "Mixed layer eddies supply nutrients to enhance the spring phytoplankton bloom". URL: https://github.com/iuryt/NorthAtlanticBloom.

8. I. T. **Simoes-Sousa**, *ocean_gyre_tank*, MITgcm simulation for General Ocean Circulation in a rotating tank, based on the paper "Insights of the non-linear solution of Munk's ocean circulation theory from a rotating tank experiment". URL: https://github.com/iuryt/ocean_gyre_tank.

9. I. T. **Simoes-Sousa**, *Panthalassan*, Template tutorials for teaching Data Science in Oceanography using Python, GitHub, and Google Colab. URL: https://github.com/iuryt/Panthalassan.

10. I. T. **Simoes-Sousa**, *tico_peixeboi*, Contains data analysis and codes related to the paper "Surfing the currents: The longest distance traveled by a released West Indian manatee (Trichechus manatus) and the implications for conservation". URL: https://github.com/iuryt/tico_peixeboi.

11. I. T. **Simoes-Sousa** and K. Burns, *stochastic_closures*, WHOI GFD summer school project repository exploring the stochasticity of turbulent closures. URL: https://github.com/iuryt/stochastic_closures.

12. I. T. **Simoes-Sousa**, V. McDonald, and A. Wineteer, *2023-SMODE-Open-Data-Workshop*, Tutorial on access, processing, and combined multi-dimensional analysis of different datasets from the S-MODE project. URL: https://github.com/podaac/2023-SMODE-Open-Data-Workshop.

13. I. T. **Simoes-Sousa**, D. C. Napolitano, F. Vilela-Silva, L. Almeida, and O. Wang, *OceanLab*, Python script package for Oceanography with tools for optimal interpolation, estimation of vertical pressure modes, and empirical orthogonal functions. URL: https://github.com/OceanLabPy/OceanLab.

14. Various Contributors, *matplotlib*, Comprehensive library for creating visualizations in Python. Contributed to the documentation with an example for 3D plotting. URL: https://github.com/matplotlib/matplotlib.

15. Various Contributors, *OceanBioME.jl*, Modeling environment for coupled interactions between ocean physics and biogeochemistry. Contributed with a pull request and overall as a reviewer. URL: https://github.com/OceanBioME/OceanBioME.jl.

Gray Literature

1. I. T. **Simoes-Sousa**, *Swirls and gusts: Computational insights into ocean vortices and atmospheric cold pools*, Ph.D. Thesis (Computational Science and Engineering), North Dartmouth, United States, 2023.

2. I. T. **Simoes-Sousa**, *Recurrent anticyclone formation and shedding within the barreirinhas bight (ne-brazil)*, Master's Dissertation in Oceanografia Física, doi:10.11606/D.21.2018.tde-27032018-151700, São Paulo, Brazil, 2017. URL: https://www.teses.usp.br/teses/disponiveis/21/21135/tde-27032018-151700/ (visited on 12/29/2023).

3. I. T. **Simoes-Sousa**, *Sistema subcorrente norte do brasil através da aplicação do método dinâmico referenciado*, Portuguese, Bachelor's Thesis (Oceanography), 48 f., Fortaleza, Brazil, 2014. URL: https://repositorio.ufc.br/handle/riufc/33651 (visited on 12/29/2023).

Selected Presentations and Conferences

2024
- **IIT Madras Geophysical Flows Workshop: Innovations in Oceanography.**
  Location: IIT Madras, Chennai, India. Role: Lecturer, Status: Invited.
- **Ocean Sciences Meeting.**
  Location: New Orleans - LA. Role: Oral Presentation, Title: "A Global Unified Vortex-Profile Dataset and its Implications for Internal-Wave Mixing," Status: Accepted.

2023
- **S-MODE Meeting.**
  Location: NASA Ames Center, Mountain View, CA. Role: Oral Presentation, Title: "S-MODE and SWOT."
- **XV OMARSAT.**
  Location: Cabo Frio - Brazil. Role: Oral Presentation, Title: "At the Forefront of Oceanic Submesoscale Observations: A comparative study of NASA's S-MODE project and SWOT."
- **IEEE High Performance Extreme Computing Virtual Conference.**
  Location: Virtual. Role: Participant.
- **ICTP/CLIVAR Summer School on Marine Heatwave.**
  Location: Virtual. Role: Invited Lecturer, Title: "Version Control in Data Science: GitHub and Google Colab."
- **Gordon Research Conference and Seminar in Coastal Ocean Dynamics.**
  Location: Bryant University - RI. Role: Oral Presentation and Poster, Title: "Did Tico surf or swim? A case study of a manatee released in Brazil that ended up in Venezuela."
- **ONR Code 32 Graduate Student and Post-Doc Workshop.**
  Location: Arlington, VA. Role: Participant.
- **Mesoscale and Frontal-Scale Air-Sea Interactions Workshop.**
  Location: CLIVAR, Boulder, CO. Role: Poster Presentation, Title: "Atmospheric cold pools in the Bay of Bengal."

2022
- **High Performance Computing Day.**
  Location: University of Massachusetts Lowell. Role: Participant.
- **FilaChange.**
  Location: Brown University, RI. Role: Oral Presentation, Title: "Mixed layer eddies supply nutrients to enhance spring phytoplankton blooms."
- **IEEE High Performance Extreme Computing Virtual Conference.**
  Location: Virtual. Role: Participant.
- **Ocean Sciences Meeting.**
  Location: Virtual. Role: Poster Presentation, Title: "Atmospheric cold pools in the Bay of Bengal."
- **Gordon Research Conference and Seminar in Ocean Mixing.**
  Location: Holyoke College, MA. Role: Poster Presentation, Title: "The impact of submesoscale fronts on the near-inertial wave generation."
- **Intercampus Marine Science Symposium.**
  Location: University of Massachusetts Dartmouth. Role: Plenary Lecture, Title: "Atmospheric cold pools in the Bay of Bengal."

2021
- **Colóquio Belmiro de Castro.**
  Location: Virtual, University of São Paulo. Role: Invited Lecture, Title: "How does submesoscale intensify phytoplankton blooms?"

2020
- **Ocean Sciences Meeting.**
  Location: San Diego, CA. Role: Poster Presentation, Title: "The Barreirinhas Eddies conundrum: Why are these super anticyclones at low latitudes so long-lived?"
- **SciPy.**
  Location: Virtual. Role: Participant.

Selected Presentations and Conferences (continued)

2018 **2nd Pan-American Conference for Alternative Methods.**
Location: Rio de Janeiro, Brazil. Role: Poster Presentation, Title: "Contribution Mapping: a tool for Structure–toxicity relationship (STR) interpretation of the Machine and Deep Learning methods."

2017 **Brazilian Symposium on Water Waves.**
Location: Rio de Janeiro, Brazil. Role: Oral Presentation, Title: "Recurrent anticyclone formation and shedding in the Barreirinhas Bight."

2013 **Python Nordeste.**
Location: Fortaleza - Brazil. Role: Participant.

2012 **Brazilian Symposium of Oceanography.**
Location: Rio de Janeiro - Brazil. Role: Poster Presentation, Title: "Activities developed by the PET Oceanography group since its creation."