MARCELO R. DE SOUZA, PH.D.

I am an atmospheric scientist interested in climatology, synoptic meteorology, climate change, numerical modeling, and beautiful plots.

Contact

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Florianópolis, Santa Catarina, Brazil

Education

2019 - 2023
PhD in Meteorology
Federal University of Santa Maria/Brazil

2014-2016
MSc in Environmental and Water Resources
Federal University of Itajubá/Brazil

2008-2013
BSc in Oceanography
Federal University of Santa Catarina/Brazil

Complementary education

2016
Joint ICTP-Trieste/ICTP-SAIFR Advanced School on Regional Climate Modeling
São Paulo State University, UNESP, Brazil

Hard Skills

- Strong skills in data analysis and visualization applied to climate and geospatial data, including handling large datasets, time series analysis, and statistics
- Experience in climate modeling (WRF, RegCM models)
- Experience in GIS and remote sensing using ArcGIS software
- Proficiency in Python (Xarray, Scipy, Metpy, Geopandas, Pandas, Numpy, Matplotlib, Cartopy, among others packages)
- Proficient in Fortran language
- Experience in pre-processing and data handling using Climate Data Operators (CDO)
- Skilled in Shell scripting
- Proficient in both Linux and Windows operating systems

Experience and research projects

2019 - 2023
Federal University of Santa Maria, RS, Brazil

PhD thesis: Extratropical cyclones and associated precipitation in the Southern Hemisphere: present and future climate

The research focused on analyzing the behavior of extratropical cyclones and their associated precipitation in the Southern Hemisphere under current and future climate scenarios. Utilizing data from CMIP6 models, ERA5 reanalysis, and GPCP observations, automated algorithms were developed and applied to track cyclones and atmospheric fronts, and also to attribute the precipitation associated with these systems over the 1979-2014 and 2070-2099 periods, under the SSP5-8.5 scenario. The study projects a decrease in average cyclone frequency but an increase in cyclone speed and associated precipitation, particularly along frontal zones and in extreme events.

Members: Marcelo Rodrigues / Everson Dal Piva - Advisor

2020 - 2021
Federal University of Santa Maria, RS, Brazil

Teaching Assistant: Observational Climatology and Statistics

Developed and delivered comprehensive teaching materials and classes for the "Observational Climatology and Statistics" course at the bachelor's program in Meteorology at UFSM, Brazil.

2014 - 2017
Federal University of Itajubá, MG, Brazil

Weather and Climate in South America

This project aimed to investigate the different atmospheric systems influencing weather and climate in South America, using the regional climate model RegCM and conducting sensitivity experiments.

Members: Marcelo Rodrigues / Carolina Daniel Gouveia / Cássia Gabriele Dias / Vanessa Siqueira / Maria Amélia Alves / Esmeraldo David da Silva / Rosmeri Porfírio da Rocha / Michelle Reboita - Coordinator.

2014 - 2016
Federal University of Itajubá, MG, Brazil

MSc dissertation: Cyclones over the southwestern South Atlantic Ocean

Climatological studies in the Southern Hemisphere show a high frequency of cyclones in the South Atlantic's southwest, where conditions favor cyclogenesis. Cyclogenesis occurs mainly along the coasts of southern Brazil, Uruguay, and southeast Argentina. The study aims to assess cyclone climatology simulated by RegCM4 and HadGEM2-ES for the current climate (1979-2005) and future periods (2020-2050 and 2070-2089) under the RCP8.5 scenario, evaluating the model's performance to reproduce South Atlantic cyclogenesis patterns.

Members: Marcelo Rodrigues / Michelle Reboita - Advisor

Soft Skills

- Teamwork
- Communication
- Adaptability
- Critical thinking
- Proficient Time-Manager

Languages

- **English:** *Advanced (Reading, Listening, Speaking, Writing)*
- **Spanish:** *Intermediate (Speaking, Listening, Writing); Advanced (Reading)*
- **Portuguese:** *Native speaker*

Referee contacts

Dr. Everson Dal Piva

E-mail: everson.bento@gmail.com

Dr. Ernani de Lima Nascimento

E-mail: ernani.nascimento@ufsm.br

Dr. Vagner Anabor

E-mail: vanabor@ufsm.br

Experience and research projects

2012 - 2013

Federal University of Santa Catarina, SC, Brazil

Undergraduate thesis: Dynamics of the sessile community on rocky shores under distinct oceanographic conditions

This study aimed to assess the ecological dynamics of rocky shore environments at two beaches on the Santa Catarina Island (SC, Brazil) in relation to the interaction with beach dynamics associated with extreme events. **Members**: Marcelo Rodrigues / Bárbara Segal Ramos - Advisor

Publications

Published papers:

Souza, M. R.; Piva, E. D. Storm tracks and cyclogenesis over the Southern Ocean: An overview with the HadGEM3-GC3.1 model. **International Journal of Climatology**, v. 43, p. 7565-7587, 2023. https://doi.org/10.1002/joc.8280

Reboita, M. S.; Amaro, T. R. & Souza, M. R. Winds: intensity and power density simulated by RegCM4 over South America in present and future climate. **Climate Dynamics**, v. 51, p. 187-205, 2018. https://doi.org/10.1007/s00382-017-3913-5

Reboita, M. S.; Rocha, R. P.; Souza, M. R.; Llopart, M. Extratropical cyclones over the southwestern South Atlantic Ocean: HadGEM2-ES and RegCM4 projections. **International Journal of Climatology**, v. 38, p. 2866-287, 2018. https://doi.org/10.1002/joc.5468

Souza, M. R.; Dupas, F. A.; Reboita, M. S. Apparent Surface Temperature in the Tavares River Watershed, Florianópolis. **Brazilian Journal of Climatology,** v. 21, p. 1-19, 2017. http://dx.doi.org/10.5380/abclima.v21i0.46247

Reboita, M. S.; Corrêa, M. P.; Souza, M. R.; Silva, J. P. R. A Review of the Atmospheric Sciences Course in Southern Minas Gerais: Teaching, Research, Outreach, and Societal Benefits. **Brazilian Journal of Physical Geography**, v. 9, p. 2312-2324, 2016. https://doi.org/10.5935/1984-2295.20160165

Reboita, M. S.; Souza, M. R.; Armando, R. P.; Freitas, C.; Martins, D.; Miller, G. The Causes of the Semiarid Climate in the Northeastern Sertão Region. **Brazilian Journal of Climatology**, v. 19, p. 254-277, 2016. http://dx.doi.org/10.5380/abclima.v19i0.42091

Reboita, M. S.; Souza, M. R.; Silva, L. F.; Alves, M. A. Climatic Aspects of the State of Minas Gerais. **Brazilian Journal of Climatology**, v. 17, p. 206-226, 2015. http://dx.doi.org/10.5380/abclima.v17i0.41493

Abstracts published in conference proceedings:

Reboita, M. S.; Souza, M. R.; Rocha, R. P. **Extratropical cyclones over southwestern Atlantic Ocean: present and future climates projected by RegCM4.** In: EGU General Assembly, 2017, Viena. EGU General Assembly, 2017.

Publications

Rocha, R. P.; Reboita, M. S.; Souza, M. R. **Cyclones climatology over the South Atlantic Ocean in different reanalysis projects**. In: 11th International Conference on Southern Hemisphere Meteorology and Oceanography, Santiago, Chile, 2015.

Reboita, M. S.; Rocha, R. P.; Souza, M. R. **Cyclones climatology over the southwestern South Atlantic Ocean projected by RegCM4 nested in HadGEM2-ES**. In: 11th International Conference on Southern Hemisphere Meteorology and Oceanography, Santiago, Chile, 2015.

Amaro, T.; Souza, M. R.; Reboita, M. S. **Surface wind comparison in Minas Gerais: RegCM4, INMET, and ERA-INTERIM**. In: 18th Brazilian Congress of Meteorology, Recife, Brazil, 2014.