Luan da Fonseca Santos

https://luanfs.github.io | ls9640@princeton.edu | luanfsantos14@gmail.com

Summary

I am an applied mathematician and currently a CIMES Postdoctoral Researcher at Princeton University. My research focuses on the development, analysis, and implementation of numerical methods for solving partial differential equations in the context of global atmospheric modeling.

Research interests

- Finite-volume and finite-difference methods for geophysical fluid dynamics on the sphere.
- Cubed-sphere and spherical Voronoi grids, locally refined grids, grid imprinting mitigation.

Academic employment

Princeton University - AOS/CIMES — Princeton, NJ, USA

Postdoctoral Researcher Associate — *07/2024 - Present*

- Supervised by Dr. Lucas Harris and Dr. Joseph Mouallem. Based at the Geophysical Fluid Dynamics Laboratory.

Education

University of São Paulo - Institute of Mathematics and Statistics — São Paulo, SP, Brazil

Ph.D. in Applied Mathematics — *03/2020 - 05/2024*

M.Sc. in Applied Mathematics — *03/2018 - 03/2020*

B.Sc. with honors in Applied Mathematics — *02/2014 - 12/2017*

- Supervisor: Prof. Dr. Pedro da Silva Peixoto
- Ph.D. thesis: Analysis of finite-volume advection schemes on cubed-sphere grids and an accurate alternative for divergent winds.

Research visits

- September 2023 - Princeton University - Atmospheric & Oceanic Sciences (AOS) Program.

Publication list

- Luan F. Santos, Joseph Mouallem, Pedro S. Peixoto (2024). Analysis of finite-volume transport schemes on cubed-sphere grids and an accurate scheme for divergent winds, Journal of Computational Physics.
- Luan F. Santos and Pedro S. Peixoto (2021). Topography based local spherical Voronoi grid refinement on classical and moist shallow-water finite volume models, Geosci. Model Dev. Discuss.

Presentations

- **2025**: Talk at *PDEs on the sphere 2025*, São Paulo, Brazil: *Analysis of finite-volume transport schemes on cubed-sphere grids and an accurate scheme for divergent winds.*
- **2024**: Poster Presentation at *AGU24*, Washington D.C., USA: *Assessment of Finite-Volume Transport Schemes on Cubed-Sphere Grids and an Accurate Alternative for Divergent Winds.*‘
- **2023**: Talk at the *FV3 group meeting*, GFDL/NOAA, Princeton, USA: *Enhancing accuracy of FV3 finite-volume operators.*
- **2021**: Talk at *PDEs on the sphere 2021*, Offenbach, Germany (online): *Topography based local spherical Voronoi grid refinement on classical and moist shallow-water finite volume models.*
- **2019**: Poster Presentation at *PDEs on the sphere 2019*, Montréal, Canada: *Topography based local refinement in spherical Voronoi grids.*

Participation at events

- **2021**: ESCAPE2/Fondazione Alessandro Volta Summer school program - Towards exascale computing for numerical weather prediction, Lake Como School of Advanced Studies (online).
- **2019**: Winter School in Atmospheric Numerical Modeling at CPTEC (Center for Weather Forecasting and Climate Studies), Cachoeira Paulista, SP, Brazil.

Teaching experience

University of São Paulo - Institute of Mathematics and Statistics São Paulo, SP, Brazil

Teaching Assistant

- Graduate courses: Introduction to Numerical Analysis (1^{st} sem/2019, 1^{st} sem/2020 and 1^{st} sem/2021).
- Undergraduate courses: Non-linear Optimization (1^{st} sem/2017), Numerical Calculus with Applications to Physics (2^{nd} sem/2018), Numerical methods for PDEs (2^{nd} sem/2019).

Grants and awards

- Doctoral degree scholarship - FAPESP[1], grant 20/10280-4, 2020-2024.
- Master's degree scholarship - FAPESP, grant 17/25191-4, 2018-2020.
- Undergraduate research funding - FAPESP, grant 17/11542-0, 2017.
- Honourable Mention in the Best Student Award - IME-USP: Recognized for outstanding performance among all graduating students in Pure and Applied Mathematics, Statistics, and Computer Science at the Institute of Mathematics and Statistics, University of São Paulo (2017).

Referee Activities

- Meteorological Applications (2024).
- AGU24 Outstanding Student Presentation Awards (2024).

Technical Skills

- Programming languages: Fortran, Python, C, and Matlab.
- Experience with parallel programming (OpenMP and MPI) and HPC environments (slurm).
- General software and tools: Linux environment, Bash scripts, Git, remote servers, Vim, LaTeX.

Links

- Personal webpage: https://luanfs.github.io/
- Google scholar: https://scholar.google.com/citations?user=D-uXvM0AAAAJ&hl=en
- ORCID: https://orcid.org/0000-0001-9084-6170
- CV Lattes: http://lattes.cnpq.br/2647749463515278

Additional Information

- Citizenship: Brazilian.
- Languages: Portuguese (native) and English (advanced).

[1] São Paulo Research Foundation