

JOSÉ PAULO MARCHEZI

Researcher in Space Physics, Space Weather, and Data Science
National Institute for Space Research (INPE)
Brazil

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[Web of Science](#) | [Google Scholar](#)

Education

- 2016–2020** **Ph.D. in Space Geophysics**
National Institute for Space Research (INPE), Brazil. Doctoral research included a sandwich period at NASA Goddard Space Flight Center.
Thesis: Evaluation of ULF Activity on Electron Transportation in the Outer Radiation Belt.
- 2014–2016** **M.Sc. in Space Geophysics**
National Institute for Space Research (INPE), Brazil.
Thesis: Identification of Geomagnetic Pulsations Detected by the EMBRACE Magnetometer Network.
- 2009–2013** **B.Sc. in Physics**
Federal University of Santa Maria (UFSM), Brazil.

Specializations

- 2025–2026** **Specialization in Quantum Communication**
Universidade SENAI CIMATEC, Brazil.
- 2025–2026** **Specialization in Quantum Computing**
Universidade SENAI CIMATEC, Brazil.

Postdoctoral Training

- 2024–2025** **Postdoctoral Researcher**
Institute of Geosciences, University of Campinas (UNICAMP), Brazil.
Research on data augmentation, rock physics, well-log modeling, and machine learning for seismic inversion.
- 2022–2024** **Postdoctoral Research Associate**
Space Science Center, University of New Hampshire (UNH), Durham, NH, USA.
Research on geomagnetically induced currents, rapid geomagnetic field variations, Space Weather forecasting, and data-driven methods.
- 2021–2022** **Postdoctoral Researcher**
China–Brazil Joint Laboratory for Space Weather / State Key Laboratory for Space Weather.
Research on wave–particle interactions and machine learning methods for estimating ULF and EMIC wave power.

Academic and Research Appointments

2025–Present	Research Associate National Institute for Space Research (INPE), Brazil. <i>CNPq Conhecimento Brasil Research Fellow. Research in Space Weather, geomagnetic disturbances, GICs, particle precipitation, and radiation belt physics.</i>
2022	Machine Learning Specialist Frontier Development Lab, Mountain View, CA, USA. <i>Applied machine learning and artificial intelligence to scientific and Space Weather challenges.</i>
2019–2021	Data Scientist Dom Rock, Campinas, Brazil. <i>Data science and machine learning applications.</i>
2018–2019	Visiting Researcher / Ph.D. Researcher NASA Goddard Space Flight Center, Greenbelt, MD, USA. <i>Research in magnetospheric physics and radiation belt dynamics during the doctoral sandwich period.</i>
2010–2014	Undergraduate Research Fellow Geomagnetism Laboratory, Southern Regional Space Research Center, INPE, Santa Maria, Brazil. <i>Research in geomagnetism, solar-terrestrial physics, and Space Weather.</i>

Scientific Leadership and Coordination

2025–Present	Research and Development Activities Project Leader. Research lines include GICs in Brazil, particle precipitation in the South Atlantic Magnetic Anomaly, and wave–particle interactions in the radiation belts of Earth and Saturn.
2023–2024	Space Science Center Seminar Series Project coordinator, University of New Hampshire. Seminar series for undergraduate and graduate audiences in Space Science.

Research Funding and Project Leadership

CNPq – Conhecimento Brasil

Project: Study of Geomagnetically Induced Currents in Brazil and the Influence of Particle Precipitation in the South Atlantic Magnetic Anomaly

Grant: 447404/2024-5

Period: 2025–Present

Funding Agency: Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq)

Role: Principal Investigator / Responsible Researcher

Total Funding: R\$ 914,149.84

The project investigates GICs in Brazil using high-temporal-resolution observations, with particular attention to the contribution of particle precipitation in the South Atlantic Magnetic Anomaly to ground-level geomagnetic disturbances.

Research Projects Coordinated

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|---------------------|---|
| 2024–Present | Rock Physics and Seismic Inversion with Data Augmentation and Machine Learning
Postdoctoral research project at UNICAMP focused on machine-learning-based augmentation of hydrocarbon well-log data and improvements in rock physics and seismic inversion. |
| 2022–2024 | Harnessing Big Data to Improve Understanding and Predictions of Geomagnetically Induced Currents
Research conducted at the University of New Hampshire in support of an NSF-funded project. |
| 2021–2022 | Neural Network Methods Applied to ULF and EMIC Waves Power Estimation in the Inner Magnetosphere
Research project conducted during postdoctoral training at the China–Brazil Joint Laboratory for Space Weather. |

Teaching Experience

Graduate Program in Space Geophysics, INPE

- **Mathematical Methods in Physics** — 2026–Present.
- **Geomagnetism** — 2025–Present.
- **Solar-Terrestrial Physics** — 2025–Present.

Student Supervision

Current

- **Edu P. Rockenbach** — M.Sc. student, INPE. Research on radial diffusion driven by ULF waves and pitch-angle diffusion driven by chorus waves in Saturn’s radiation belt.
- **Javier Ignacio Silva Navarrete** — Ph.D. student, INPE. Research on electron-flux anisotropy in the young solar wind and the response of the inner magnetosphere.
- **José Antonio de Carvalho Neto** — Undergraduate research student. Machine-learning prediction of low-latitude geomagnetic disturbances and development of a real-time monitoring platform.
- **Ana Carolina Nunes Pereira** — Undergraduate research supervision.

Completed

- **Michael Coughlan** — Ph.D. co-supervision, University of New Hampshire.
- **Raman Mukundan** — Ph.D. co-supervision, University of New Hampshire.

Scientific Output

Peer-reviewed journal publications: 30+ articles recorded in the Curriculum Lattes as of September 2026.

For the complete and continuously updated publication list, see: [Curriculum Lattes](#), [ORCID](#), and [Google Scholar](#).

Selected Publications

Marchezi, J. P., Keese, A., Coughlan, M., Mukundan, R., Pinto, V., Da Silva, L. A., et al. (2026). *On the effects of the solar wind structure in the global distribution of dB_H/dt spikes dur-*

- ing geomagnetic storms. *Journal of Geophysical Research: Space Physics*, 131, e2025JA034994. <https://doi.org/10.1029/2025JA034994>.
- Moro, J., Correia, E., Wrasse, C. M., Costa, J. R., Bageston, J. V., Denardini, C. M., Valcorte, A. J., Resende, L. C. A., Santos, A. M., Da Silva, L. A., **Marchezi, J. P.**, Trondsen, T. S. (2026). *New Observations of Cosmic Noise Absorption in the South American Magnetic Anomaly (SAMA) Using a Next-Generation Riometer*. *Space Weather*, 24, e2025SW004781. <https://doi.org/10.1029/2025SW004781>.
- Da Silva, L. A., Li, H., Resende, L. C. A., Andrioli, V. F., Santos, A. M., Moro, J., Jauer, P. R., Vieira, L. E., Alves, L. R., **Marchezi, J. P.**, et al. (2026). *Peculiar Magnetosphere-Atmosphere Coupling and Its Impacts Over the South American Magnetic Anomaly Region*. *Journal of Geophysical Research: Space Physics*, 131, e2026JA035200. <https://doi.org/10.1029/2026JA035200>.
- Marchezi, J. P.**, Mendes, O., Denardini, C. M. (2025). *Temporal and latitudinal occurrences of geomagnetic pulsations recorded in South America by the EMBRACE Magnetometer Network*. *Atmosphere*, 16. <https://doi.org/10.3390/atmos16060742>.
- Coughlan, M., Keesee, A., Pinto, V., Mukundan, R., **Marchezi, J. P.**, Adewuyi, M., Tibbetts, J., Johnson, J., Connor, H., Hampton, D. (2025). *Using Machine Learning Explainability Techniques to Examine Drivers of Ground Magnetic Field Localization*. *Space Weather*, 23, e2025SW004391. <https://doi.org/10.1029/2025SW004391>.
- Mukundan, R., Keesee, A. M., **Marchezi, J. P.**, Pinto, V. A., Coughlan, M., Hampton, D. (2025). *Localized geomagnetic disturbances: a statistical analysis of spatial scale*. *Frontiers in Astronomy and Space Sciences*, 12, 1610276. <https://doi.org/10.3389/fspas.2025.1610276>.
- Da Silva, L. A., Shi, J., Alves, L. R., Resende, L. C. A., Vieira, L. E. A., Costa, J. E. R., **Marchezi, J. P.**, et al. (2025). *Space weather effects over SAMA during the extreme geomagnetic storm on May 10–11, 2024: disturbances of the neutral and ionized atmosphere*. *Frontiers in Astronomy and Space Sciences*, 12. <https://doi.org/10.3389/fspas.2025.1550635>.
- Alves, L. R., Da Silva, L. A., Deggeroni, V., **Marchezi, J. P.**, Jauer, P. R., Silva, G. B. D., Sibeck, D. G. (2024). *Ultra-relativistic electron flux enhancement under persistent high speed solar wind stream*. *Frontiers in Astronomy and Space Sciences*, 11, 1478489. <https://doi.org/10.3389/fspas.2024.1478489>.
- Coughlan, M., Keesee, A., Pinto, V., Mukundan, R., **Marchezi, J. P.**, Johnson, J., Connor, H., Hampton, D. (2023). *Probabilistic Forecasting of Ground Magnetic Perturbation Spikes at Mid-Latitude Stations*. *Space Weather*, 21. <https://doi.org/10.1029/2023SW003446>.
- Da Silva, L. A., Shi, J., **Marchezi, J. P.**, Agapitov, O. V., Sibeck, D., Alves, L. R., Vieira, L. E. A., Deggeroni, V., Resende, L. C. A., Lopez, R., et al. (2023). *High-Energy Electron Flux Enhancement Pattern in the Outer Radiation Belt in Response to the Interplanetary Coronal Mass Ejections*. *Journal of Geophysical Research: Space Physics*, 128, e2023JA031360. <https://doi.org/10.1029/2023JA031360>.
- Chen, S. S., Resende, L. C. A., Denardini, C. M., Chagas, R. A. J., Da Silva, L. A., **Marchezi, J. P.**, et al. (2023). *The 14 December 2020 Total Solar Eclipse Effects on Geomagnetic Field Variations and Plasma Density Over South America*. *Journal of Geophysical Research: Space Physics*, 128, e2022JA030775. <https://doi.org/10.1029/2022JA030775>.
- Marchezi, J. P.**, Dai, L., Alves, L. R., Da Silva, L. A., Sibeck, D. G., Lago, A. D., Souza, V. M., Jauer, P. R., Vieira, L. E. A., Cardoso, F. R., Deggeroni, V., Alves, M. V., Wang, C., Li, H., Liu, Z. (2022). *Electron Flux Variability and Ultra-Low Frequency Wave Activity in the Outer Radiation Belt Under the Influence of Interplanetary Coronal Mass Ejections and High-Speed Solar Wind Streams: A Statistical Analysis From the Van Allen Probes Era*. *Journal of Geophysical Research: Space Physics*, 127. <https://doi.org/10.1029/2021JA029887>.
- Resende, L. C. A., Zhu, Y., Arras, C., Denardini, C. M., Chen, S. S., Moro, J., Barros, D., Chagas, R. A. J., Da Silva, L. A., Andrioli, V. F., **Marchezi, J. P.**, et al. (2022). *Analysis of the Sporadic-E Layer Behavior in Different American Stations during the Days around the September 2017 Geomagnetic Storm*. *Atmosphere*, 13, 1714. <https://doi.org/10.3390/atmos13111714>.

Selected Scientific Contributions

Rapid Geomagnetic Variations and Solar Wind Drivers

My postdoctoral research at the University of New Hampshire investigated the occurrence and global distribution of rapid geomagnetic field variations during geomagnetic storms. This work evaluates how different solar wind structures influence dB_H/dt spikes at mid and high latitudes and contributes to understanding Space Weather hazards relevant to GICs.

Probabilistic Forecasting of Geomagnetic Disturbances

During my postdoctoral research at UNH, I contributed to the supervision of doctoral research that developed probabilistic models for forecasting rapid ground magnetic perturbations at mid-latitude stations.

Radiation Belt Dynamics

My doctoral research investigated relativistic electron-flux variability and ULF-wave activity during storms driven by interplanetary coronal mass ejections and high-speed solar wind streams. This work developed approaches for estimating diffusion processes associated with ULF waves.

Geomagnetic Pulsations in South America

My master's research provided statistical analyses of geomagnetic pulsations using high-resolution observations from the EMBRACE/INPE magnetometer network, contributing to the characterization of ULF activity in the South Atlantic Magnetic Anomaly region.

Scientific Software and Technological Output

2024	pyGenFit INPI Registration BR512024003177-4. Software for nonlinear curve fitting and coefficient estimation.
2024	pyGroundMag INPI Registration BR512024003176-6. Software for processing and analyzing magnetometer-network data for Space Weather applications.
2024	PySatData INPI Registration BR512024003175-8. Software for processing and analyzing satellite and ground-based data for Space Weather applications.
2024	pyWavelab INPI Registration BR512024003215-0. Suite of tools for wavelet-based signal analysis.

Other Scientific and Educational Output

- *Clima Espacial: Fundamentos para a Aviação Civil*. São José dos Campos: INPE, 2023. Contributing author.
- *Ondas de plasma na magnetosfera da Terra*. Short course, 2021.

International Research Experience

- **University of New Hampshire, USA** — Postdoctoral Research Associate, 2022–2024.
- **NASA Goddard Space Flight Center, USA** — Visiting Researcher / doctoral sandwich period, 2018–2019.
- **Frontier Development Lab, USA** — Machine Learning Specialist, 2022.

- **State Key Laboratory for Space Weather / China–Brazil collaboration** — Postdoctoral research, 2021–2022.

Selected International Conference Presentations

1. **Advanced School in Applied Machine Learning: Uncertainty and Robustness of DL Models for Science.** “Modeling and Forecasting Radiation Belt Electron Flux: A Hybrid Kappa–Maxwellian Distribution and Neural Network Approach.” ICTP, 2026.
2. **European Space Weather Week.** “Assessing the Impact of ICMEs and HSSs on Global dB_H/dt Spikes During Geomagnetic Storms.” 2025.
3. **86th EAGE Annual Conference & Exhibition.** “Comparative Analysis of Data Augmentation Methods for Well Log Data.” 2025.
4. **AGU Annual Meeting.** “On the effects of the solar wind structures in the global distribution of ground-based geomagnetic perturbations during geomagnetic storms.” 2023.
5. **GEM Summer Workshop.** “On the effects of the solar wind structure in the global distribution of dB/dt spikes during geomagnetic storms from 1995 to 2021.” 2023.
6. **Workshop on Machine Learning, Data Mining and Data Assimilation in Geospace.** “Machine learning modeling and datasets that improve GIC forecasting and provide insights to geospace phenomena.” 2023.
7. **AGU Fall Meeting.** “Electron flux variability and Ultra-low frequency wave activity in the outer radiation belt under the influence of interplanetary coronal mass ejections and high-speed solar wind streams.” 2022.
8. **Joint Scientific Assembly IAGA–IASPEI.** “Outer Radiation Belt Electron Flux Variability and ULF Waves Under the Influence of ICME and HSS Events During the Van Allen Probes Era.” 2021.
9. **2018 AGU Fall Meeting.** “Increase in relativistic electron flux density during a complex interplanetary structure on 09 February 2014.” 2018.

Scientific Leadership and Event Organization

- **GSST/CBERS-5 International Symposium on Machine Learning in Heliophysics and Space Weather**, 2026.
- **11th Annual BRICS Astronomy Working Group (BAWG) Workshop**, 2025.
- **Miniescola de Física Espacial**, 2019.

Editorial and Professional Service

Editorial Activities

- Editorial activities associated with *Frontiers in Astronomy and Space Sciences*, 2026–Present.

Peer Review

Reviewer for scientific journals including:

- *Journal of Geophysical Research: Machine Learning and Computation*;
- *Space Weather*;
- *Remote Sensing*;
- *Atmosphere*;
- *Universe*;

- *Geoscience Letters*.

Operational Space Weather Activities

- Space Weather analyst for the INPE Space Weather Program, 2021–2022, responsible for daily and weekly Space Weather reports.

Awards, Distinctions, and Honors

- **2023** — GEM Student Poster Competition Winners, advisor/co-author, Geospace Environment Modeling (GEM).
- **2022** — Award of Merit, Frontier Development Lab.
- **2022** — Grant awarded to participate in the Geomagnetically Induced Currents and Power Systems Innovation Lab, UCAR.
- **2022** — 2nd Place, QHack 2022 Open Hackathon – Quantum Chemistry Challenge, XanaduAI.
- **2020** — Top Downloaded Paper 2018–2019 in *Journal of Geophysical Research: Space Physics* (co-author), John Wiley & Sons, Inc.
- **2017** — PrInt/CAPES doctoral sandwich scholarship.
- **2017** — Travel Grant for the 3rd IAGA School and the IAPSO–IAMAS–IAGA Joint Assembly, IAGA.
- **2015** — Travel Grant for the ICTP Conference of Earth-Space & Education, ICTP.
- **2011** — Travel Award for the IUGG General Assembly, IUGG.

Selected Complementary Education

- **2026** — Advanced School in Applied Machine Learning: Uncertainty and Robustness of DL Models for Science, ICTP, Italy.
- **2022** — Machine Learning for Heliophysics, CINECA, Italy.
- **2017** — 3rd IAGA School, South African National Space Agency.

Technical Skills

Programming and Data Analysis: Python, R, MATLAB, Fortran, SQL, NumPy, Pandas.

Machine Learning and AI: PyTorch, TensorFlow, Keras, Scikit-learn, deep learning, generative modeling, data augmentation.

Scientific Computing: Time-series analysis, statistical analysis, numerical modeling, signal processing, wavelet analysis, scientific visualization.

Computing and Cloud: Docker, CUDA, Google Cloud Platform, AWS, Microsoft Azure, BigQuery, Vertex AI.

Professional Memberships

- American Geophysical Union (AGU).
- European Geosciences Union (EGU).
- Brazilian Society of Space Geophysics and Aeronomy (SBGEA).

Languages

- Portuguese — Native.

- English — Professional working proficiency.
- Spanish — Basic to intermediate reading comprehension.

Selected Certifications

- IBM Quantum Challenge: Spring 2023 Achievement.
- Additional training and certifications in machine learning, natural language processing, and scientific computing.