Rubén Mauricio Romero Ramírez

Direct-entry PhD student at the Center for Radio Astronomy and Astrophysics Mackenzie (CRAAM)

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Languages: Spanish - English (C1) - Portuguese (C1)

Education

PhD, Electrical Engineering & Computing
Aug 2023 - Aug 2027

Mackenzie Presbyterian University - Brazil
Advancing the Global Atmospheric Electric Circuit: Enhanced EGATEC Modeling and Environmental & Seismo-Atmospheric Applications in South America.

Sandwich PhD Fellow (PDSE)
Feb - Jul 2026

Institute of Geophysics, PAS - Poland
Modeling of the Global Atmospheric Electric Circuit (GAEC).

IMCP Space Weather School (Training)
Nov 2025

International Meridian Circle Program – Haikou, China
Advanced training in solar–terrestrial physics and geospace science; fully funded participant with performance award.

Research Visitor
May - Jun 2025

Institute of Geophysics, PAS - Poland
Research visit focused on GAEC modeling and validation.

Training Fellow
Sep 2024

Institute of Geophysics, PAS - Poland
Short-term training in GAEC modeling.

BSc in Physics
2016 - 2022

National University San Luis Gonzaga – Peru
Bachelor of Science in Physics.

Publications

1. **Romero, R.**, Tacza, J., Vara-Vela, A., Szpigel, S., Raulin, J.-P. (2026). Regime-dependent sensitivity of the atmospheric potential gradient to anthropogenic air pollution in São Paulo, Brazil. **Submitted to Atmospheric Research (Q1).**
2. Tacza, J., Li, G., Fu, S., Chen, T., Xu, E., Kubicki, M., Gonçalves Silva, H., Raulin, J.-P., **Romero, R.**, Fernandez, G., Marun, A. (2025). The May 2024 geospace superstorm and its impact on the Global Electric Circuit worldwide. **Under review at Journal of Space Weather and Space Climate.**
3. Valio, A., Lopez, K., Gamonal, J., **Romero, R.**, Da Silva, D. (2025). Space weather impact of three solar flares observed by the POEMAS telescope at 45 and 90 GHz. Journal of Geophysical Research: Space Physics. https://doi.org/10.1029/2025JA034611
4. **Romero, R.**, Tacza, J., Arroyo, J., Prieto, F., Macotela, L., Buleje, Y., Loayza, R., Fernandez, U., & Raulin, J.-P. (2024). First results of the potential gradient variation in a tropical station in South America (Ica, Peru). Journal of Atmospheric and Solar Terrestrial Physics. https://doi.org/10.1016/j.jastp.2024.106198

Manuscripts in preparation:

Romero, R., Tacza, J. A., Szpigel, S., & Raulin, J.-P. (2026). Constraints on the interpretation of atmospheric potential gradient anomalies in seismically active regions of Peru and Argentina.

Romero, R., Orosco, G., Loayza, R., Calderon, D., Buleje, Y., Arroyo, J., Tacza, J. C., Szpigel, S., & Raulin, J.-P. (2026). Evaluating the lead-time advantage of atmospheric potential gradient measurements for extreme dust storm nowcasting in Ica, Peru.

Perriyl, S., **Romero, R.**, Giménez de Castro, C. G., & Simões, P. J. A. (2026). An improved method for Flare Anticipation Index (FAI) detection using GOES X-ray observations.

Research Experience

PhD candidate
2023-2027

Mackenzie Presbyterian University – Brazil

- AFINSA network (South America): Multi-site atmospheric potential gradient observations across Peru, Brazil, and Argentina, forming the core observational framework of my research.
- GAEC modeling: Development and application of the EGATEC model, including generator scheme improvements and validation with ground-based PG observations (PAS collaboration).
- Dust storms & air quality (Peru): PG-based early warning and lead-time analysis for extreme dust storms, integrating aerosols (PM) and wind dynamics.
- Urban pollution & PG coupling (São Paulo): Regime-dependent sensitivity of atmospheric PG to anthropogenic air pollution, combining long-term observations and neural-network modeling.

Collaborating researcher
2024 – 2025

National University San Luis Gonzaga - Peru
CIEASEST (cieasest.unica.edu.pe**)**

- Developed an early warning system for Paracas dust storms based on integrated sensor data: PG, PM1.0/2.5/10, wind speed, and direction.
- Leading the scientific design and alerting logic behind the real-time monitoring platform aireica.com, which visualizes environmental data and supports automated warnings.

Skills

- **Scientific computing:** Python; time-series analysis; neural networks for atmospheric PG modeling.
- **Geophysical & satellite data:** GOES, ISCCP, LIS/OTD, GLM, WWLLN; solar X-ray data; seismic integration.
- **Data handling & visualization:** HDF5, NetCDF, FITS, CSV; Matplotlib, Plotly.
- **Tools:** Jupyter, VS Code, Git/GitHub; Linux scripting.

Fellowships, Awards, and Honors

CAPES PDSE Sandwich PhD Scholarship – 2026 (Brazil): 6-month fully funded research fellowship at the Institute of Geophysics - Polish Academy of Sciences (IGF PAS), supporting GAEC modeling research. Includes travel, installation, insurance, and monthly stipend.

IMCP 2025 Full Financial Support - 2025 (China): Selected participant with full funding (airfare, accommodation, and meals) provided by the National Space Science Center (CAS, China) for the International Meridian Circle Program Space Weather School (Nov 2025).

IMCP 2025 Performance Award - 2025 (China): Received a Certificate of Award for exceptional performance in the research project on "Monitoring and Research of the Low-Latitude Ionosphere". The project, executed with a collaborative group, was recognized as one of the top three winning projects.

PAS – Research Visit Support – 2025 (Poland): Institutional support (approx. EUR 1,900), covering accommodation and daily allowances, for a 1-month research stay (May–June 2025) at the IGF PAS, Warsaw, focused on GAEC modeling using the EGATEC model.

IAGA/IASPEI 2025 Registration Fee Waiver - 2025 (Portugal): Full registration exemption (EUR 290) awarded upon abstract acceptance.

CAPES-Print Project Grant (Proc. 88887.979502) – 2024 (Brazil): Funded 15-day international training at the IGF PAS; support included travel, lodging, and per diem (EUR 2,990).

UNICA Scientific Research Project Award - 2023 (Peru): Researcher in the winning project on dust storm early warning; awarded PEN 60,000 (approx. USD 16,000).

CNPq Full Doctoral Scholarship (Proc. 141576/2023-5 – GD) - 2023 (Brazil): Fully funded doctoral program in Brazil (2023–2027).

Work Experience

Field Supervisor & Administrative Assistant – CISSA SRL, Peru (2017–2023)
Supervision of environmental sanitation services across multiple cities in Peru, including technical reporting, certification processes, and logistical support for field operations.

Transmission Station Supervisor – Peruvian Geophysical Institute (IGP), Ica (2020–2022)
Supervised HF radar transmission systems and the MAGDAS magnetometer at the UNICA Solar Station for the HF Sounding System project (Cornell University), coordinating system checks, incident reporting, and maintenance with the Jicamarca Radio Observatory.

Selected Presentations (View full list)

“Potential gradient as a proxy for anthropogenic air pollution in São Paulo, Brazil” | 2025
IAGA/IASPEI Joint Scientific Assembly (Lisbon, Portugal), **oral presentation**

“Advancing the EGATEC model: Improving generator schemes and validation with ground-based electric field observations” | 2025
AGU Fall Meeting (Online / New Orleans, USA), **poster presentation**

“Integrated climate monitoring and early warning of dust storms in Peru” | 2025
XIII CITICI / COINCOM, (Cartagena de Indias, Colombia), **oral presentation (coauthor)**

“The thunderstorm generator in the EGATEC model of the GEC: development and issues” | 2025
Workshop *Atmospheric Discharges in Dynamic Environments* (Bath, United Kingdom), **oral presentation (coauthor)**

“Atmospheric electricity research at CRAAM: Toward regional and global applications” | 2025
Academic Week of Space Geophysics, National Institute for Space Research – INPE (SP - Brazil), **oral presentation**

“Monitoring of the atmospheric electric field in South America: Advances and applications” | 2025
1st National Congress of Pure and Applied Sciences - CONACIPA, (Ica, Peru), **invited oral presentation**

“Modeling the impact of space weather and local effects on the Global Atmospheric Electric Circuit” | 2024
São Paulo School of Advanced Science on Solar Activity and Space Weather & PRESTO/SCOSTEP Workshop, CRAAM (Brazil), **poster presentation**

“Neural network–based prediction of the potential gradient: Insights from Peru, Argentina, and Brazil” | 2024
PolGEC Workshop, Institute of Geophysics, Polish Academy of Sciences (Poland), **poster presentation**

Research Data Access & Monitoring Platforms

Aireica – Real-time environmental monitoring platform: www.aireica.com
Atmospheric potential gradient, aerosols (PM), and wind monitoring for Paracas dust-storm early warning.

GOES X-ray Viewer: rudimirz.com/goes_xray
Interactive visualization of GOES solar X-ray flux (XRS A/B), 1995-2025.

NOAA Solar Flare Catalog Explorer: rudimirz.com/flares
Exploration and visualization of the NOAA GOES solar flare catalog (since 1975).

Volunteering

Space Weather Perú (spaceweather-peru.org)
Founding member (since 2024)
Multidisciplinary group focused on studying solar activity, space weather, and terrestrial space physics. We promote scientific outreach and collaboration to raise awareness of space weather's impact and inspire future generations in STEM fields.

Mutsunica Astronomy Group (www.mutsunica.space)
Member (2016-2021), president (2018-2019)
Coordinated physics seminars and scientific outreach programs, including a hydro-rocket competition. Organized public astronomy events using the 60cm NISHIMURA telescope at CIEASEST – UNICA, reaching over 500 participants and promoting astronomy and physics education within the local community.

References

Dr. José Tacza
IGF PAS (Poland)
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Dr. Jean-Pierre Raulin
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Dr. Sergio Szpigel
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