Rosario Cecilio-Flores-Elie

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Research Interests

Hydrothermal Systems | **Ocean Worlds** | **Structural Geology** | **Near-Surface Geophysics** | **Field Work**

Education

Ph.D. in Geological Sciences – Cornell University 2024 – Present
M.S. in Astrophysics – CUNY Graduate Center 2024
B.S. in Physics – CUNY Lehman College 2022
M.S.Ed. in Literacy Education – Alfred University 2015
B.A. in Sociology – CUNY Lehman College 2013

Research Experience

Dragonfly Guest Investigator – Smithsonian National Air and Space Museum Jan. 2026 – Present
Mentor: Emily S. Martin *Washington, DC / Hybrid*
Project: Geologic Mapping and Surface Process Interpretation at Selk Crater, Titan

- Apply structural geology and geologic mapping approaches to Selk Crater, the primary landing site for the NASA Dragonfly rotorcraft lander, using ArcGIS Pro and available remote sensing data to characterize surface processes and crater modification on Titan.
- Investigate how impact crater morphology on Titan may record modification by surface and subsurface processes, with implications for habitability and mission science planning.

Ph.D. Student – Dept. of Earth and Atmospheric Sciences, Cornell University Aug. 2024 – Present
Advisor: Carolina Muñoz-Sáez *Ithaca, NY*
Project: Structural Lineaments and Hydrothermal Vent Distribution at El Tatio Geothermal Field

- Investigate structural controls on hydrothermal fluid ascent at the El Tatio Geothermal Field (Chile) by mapping fault and fracture networks using drone-derived RGB/thermal orthomosaics, DEMs, and ArcGIS Pro.
- Analyze vent temperature distributions and fault proximity correlations across two basins ($n > 1500$) using Python-based statistical workflows, including Mann–Whitney U tests and Spearman correlation analysis.
- Apply terrestrial analog framework to inform interpretation of fracture-controlled fluid activity on icy ocean worlds, including Enceladus and Titan.

Graduate Research Fellow – American Museum of Natural History Aug. 2022 – Sept. 2024
Advisor: Jacqueline Faherty *New York, NY*
Thesis: From Stars to Moons: Investigating Stellar Rotations, Planetary Interactions, and Exoplanetary Prospects

- Mapped mass ratios, orbital separations, and binding energies of planet-moon systems across the Solar System, identifying clustering patterns in geologically active moons, including Io, Europa, Titan, and Enceladus, and comparing these to cold ocean world candidates from Quick et al. (2023), including Proxima b and TRAPPIST-1f.
- Analyzed 99 NASA TESS light curves of young stars in the Carina–Near Moving Group using Lomb–Scargle periodograms to extract stellar rotation periods, successfully measuring periods for 10 targets and contributing age constraints for ultracool dwarf companion systems identified through the Backyard Worlds: Planet 9 citizen science project (Rothermich et al. 2024).

NSF REU – Water Quality in the Yucatán Peninsula – Northern Illinois University June – Aug. 2021
Advisors: Philip J. Carpenter & Melissa Lenczewski *Quintana Roo, México*
Project: Karst Conduit Identification Using Geophysical Surveys in Northeast Yucatán, México

- Conducted near-surface geophysical surveys in the Yucatán Peninsula using electrical resistivity tomography (SuperSting™) to image subsurface karst conduits near cenotes, with a focus on structural controls associated with the Holbox Fracture Zone.
- Identified previously unmapped subsurface karst features at the Agua Azul field site, including an air-filled cavity and a saturated karst conduit approximately 5 meters below the surface, results consistent with fracture-controlled fluid pathways in karst systems.

- Presented findings as an oral presenter at the American Geophysical Union (AGU) Annual Meeting (2021) and as a poster presenter at the NDiSTEM–SACNAS conference (2022).

Publications

Thesis

Cecilio-Flores-Elie, Rosario (2024). "From Stars to Moons: Investigating Stellar Rotations, Planetary Interactions, and Exoplanetary Prospects". MA thesis. CUNY Graduate Center. URL: https://academicworks.cuny.edu/gc_etds/6013.

Peer-Reviewed – Co-Author

Rothermich, Austin et al. (2024). "89 New Ultracool Dwarf Comoving Companions Identified with the Backyard Worlds: Planet 9 Citizen Science Project". In: *The Astronomical Journal* 167.6, p. 253. DOI: 10.3847/1538-3881/ad324e.

Conferences and Presentations

"Exploring Mass Ratios in Planetary–Moon Systems: Insights from Our Solar System and Beyond" Jan. 2024
Poster – American Astronomical Society (AAS), New Orleans, LA

"Mass Ratios of Planets and Active Moons: Insights for Ocean World Observation" Dec. 2023
Poster – American Geophysical Union (AGU), San Francisco, CA

"Ocean Worlds: To Enceladus and Beyond" (Public-Facing Translation) June 2023
Poster – CUNY Science Communication Symposium, New York, NY

"Karst Conduit Identification Using Geophysical Surveys in Northern Yucatán, México" Oct. 2022
Poster – SACNAS NDiSTEM Conference, San Juan, PR

"Karst Conduit Identification Using Geophysical Surveys in Northern Yucatán, México" Dec. 2021
Oral – American Geophysical Union (AGU), New Orleans, LA

Fellowships and Awards

Long Fellowship – Dept. of Earth and Atmospheric Sciences, Cornell University Aug. 2024 – May 2025

Best Poster Award – CUNY Science Communication Symposium June 2023
Public-Facing Translation category

Student Travel Grant – American Geophysical Union (AGU) Dec. 2021

Teaching Experience

Teaching Assistant – EAS 2250: Earth Systems (Lab) Aug. 2025 – Present
Dept. of Earth and Atmospheric Sciences, Cornell University *Ithaca, NY*

- Lead weekly lab sections for an introductory Earth systems course spanning geology, oceanography, atmospheric science, and Earth system processes.
- Design and deliver interactive mini-lessons to review key concepts prior to each lab session.
- Grade laboratory reports and provide feedback to strengthen students' interpretation of material.
- Hold weekly office hours to support student learning.

Second Grade Bilingual Teacher & Curriculum Lead Aug. 2013 – June 2022
P.S./I.S. 218 Rafael Hernandez Dual Language Magnet School *Bronx, NY*

- Designed and implemented dual-language (English–Spanish) instructional curricula, delivering rigorous and culturally responsive instruction to 25–50 students annually.
- Led grade-level literacy curriculum design, developing instructional units aligned with state and federal education standards.

- Applied evidence-based pedagogical strategies to support diverse learners, including students with disabilities and multilingual learners.
- Mentored 1–2 student teachers annually through the US PREP Program and CUNY Lehman College, providing instructional coaching and professional guidance.

Outreach and Science Communication

Letter to a Pre-Scientist – Science Pen Pal Program — Sept. 2024 – Present
Remote

Open Space – Planetarium Show (Co-ran) — May 2024
Hunter High School Field Trip, American Museum of Natural History, New York, NY

From Stars to Moons: Celestial Interactions – Public Talk — Feb. 2024
Lang Science Program, American Museum of Natural History, New York, NY

"Decoding the Night Sky: Exploring Maya Astronomy" — Apr. 2023
Science StoryTellers, Variety Boys and Girls Club of Queens, Queens, NY

Aprendizaje Automático para Física y Astronomía – Spanish Translator — Apr. 2023 – Sept. 2024
Astromaquinarios / Flatiron Institute Open Learning, New York, NY

- Translated Dr. Viviana Acquaviva's *Machine Learning for Physics and Astronomy* course (lectures, Jupyter notebooks, quizzes) from English to Spanish to support Spanish-speaking learners worldwide.

Workshops and Training

AstroTech – Astronomical Instrumentation Summer School — July 2023
University of California, Berkeley, CA

NExScI – Sagan Exoplanet Summer Workshop — July 2023
California Institute of Technology, Pasadena, CA

Skills

Programming & Data Analysis: Python (intermediate), machine learning (intermediate), JMARS (beginner)

GIS & Geospatial Analysis: ArcGIS Pro (intermediate), QGIS (intermediate), spatial analysis, shapefile creation and editing, DEM analysis, profile extraction, vent and fracture mapping

Remote Sensing & Photogrammetry: Agisoft Metashape, drone-derived visual and thermal orthomosaics, DEM generation, thermal raster analysis

Structural Geology & Field Methods: Fault and fracture mapping, vent trend analysis, permeability zone identification, geological interpretation of hydrothermal systems

Geophysics & Instrumentation: SuperSting™ electrical resistivity system (intermediate)

Scientific Computing & Writing: LaTeX / Overleaf

Languages: Bilingual and biliterate in English and Spanish

Certifications: NYS Childhood Education (Grades 1–6); Bilingual Extension (Grades PreK–12)

Other: American Red Cross First Aid / CPR / AED

Professional Memberships

American Geophysical Union (AGU)
American Astronomical Society (AAS)
Society for Advancement of Chicanos/Hispanics and Native Americans in Science (SACNAS)
League of Underrepresented Minoritized Astronomers (LUMA)
GeoLatinas