Rosario Cecilio-Flores-Elie

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Research Interest

Icy Ocean Worlds | Hydrothermal Systems | Structural Geology | Near-Surface Geophysics | Planetary Analogs

Education

Ph.D in Geological Sciences – Cornell University 2024–Present
MS in Astrophysics – CUNY Graduate Center 2024
BS in Physics – CUNY Lehman College 2022
MSEd in Literacy Education – Alfred University 2015
BA in Sociology – CUNY Lehman College 2013

Research Experience

Ph.D Student – Dept. of Earth and Atmospheric Sciences Aug. 2024 – Present
Advisor: Carolina Muñoz-Saez *Ithaca, NY*

- Conducting detailed fault and fracture mapping of the El Tatio Geyser Field (Chile) to investigate structural controls on hydrothermal fluid pathways and surface vent distribution.
- Identifying, classifying, and spatially analyzing hydrothermal manifestations, including geysers, hot springs, fumaroles, mud pools, and sinter deposits, using a GIS-based workflow, QGIS.
- Integrating drone-derived visual imagery, thermal orthomosaics, and digital elevation models (DEMs) to characterize vent trends, fracture orientations, and zones of enhanced permeability.

Graduate Research Fellow – American Museum of Natural History Aug. 2022 – Sept. 2024
Advisor: Jacqueline Faherty *New York, NY*

- Conducted comparative analyses of mass ratios, orbital separation, and binding energies across planetary systems and their moons, spanning stellar to planetary mass regimes, to identify correlations relevant to geological activity.
- Analyzed 100+ NASA TESS light curves of young stars in the Carina–Near Moving Group using Lomb–Scargle periodograms to determine stellar rotation periods, characterize magnetic activity, flaring behavior, identify fast rotators, and candidate binary systems.

REU - Northern Illinois University – Water Quality in the Yucátan Penisula June 2021 – Aug. 2021
Advisor: Philip J. Carpenter, Melissa Lenczewski *Dekalb, IL*

- Conducted near-surface geophysical surveys in the Riviera Maya, México, using electrical resistivity instrumentation to image subsurface karst conduits near cenotes, with a focus on structural controls associated with the Holbox Fracture Zone.
- Applied electrical resistivity methods to identify subsurface karst features, including an air-filled cavity beneath the Agua Azul soccer field and a saturated karst conduit located approximately 5 meters below the surface.

NASA L'SPACE – Mission Concept Academy (MCA) Aug. 2020 – Dec. 2020
Student Led Project *Remote*

- Collaborated within an eleven member interdiciplinary team to contribute to a Preliminary Design Review (PDR) of a secondary payload lander mission concept for Enceladus, with a scientific focus on the Baghdad Sulcus region of the South Polar Terrain.
- Performed literature-based assessments of scientific instrumentation, including mass spectrometers and geophysical sensing technologies, to support payload selection and mission feasibility.

- Utilized Java Mission-planning and Analysis for Remote Sensing (JMARS) to evaluate surface characteristics and identify candidate landing sites consistent with mission science objectives.
- Led a STEM outreach initiative delivering mission-related educational content to 45 low-income public schools in New York City

Publications

Peer-Reviewed Publications – Other Co-Authors

Rothermich, Austin et al. (June 2024). "89 New Ultracool Dwarf Comoving Companions Identified with the Backyard Worlds: Planet 9 Citizen Science Project". In: *AJ* 167.6, p. 253. ISSN: 0004-6256, 1538-3881. DOI: 10.3847/1538-3881/ad324e. URL: https://iopscience.iop.org/article/10.3847/1538-3881/ad324e.

Teaching Experience

Teacher Assistant - EAS 2250: Earth Systems (Lab Section) Aug. 2025 – Present
Department of Earth and Atmospheric Sciences *Ithaca, NY*

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

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

- Designed and implemented dual-language instructional curricula using a side-by-side English-Spanish model, delivering rigorous and culturally responsive instruction to 25-50 second-grade students annually.
- Applied evidence-based pedagogical strategies to support diverse learners, including students with disabilities and multilingual learners, resulting in high levels of academic engagement and achievement.
- Developed differentiated instructional materials and scaffolding strategies to address varied learning needs and promote inclusive classroom environments.

Second Grade - Curriculum Lead Aug. 2014 – June 2022
P.S./I.S. 218 Rafael Hernandez Dual Language Magnet School *Bronx, NY*

- Led the design and coordination of grade-level literacy curricula, developing customized instructional units aligned with state and federal education standards.
- Collaborated with teaching teams to adapt curricula to the academic, linguistic, and socio-emotional needs of second-grade learners.

Student Teacher Mentor Sept. 2015 – Dec. 2021
P.S./I.S. 218 Rafael Hernandez Dual Language Magnet School *Bronx, NY*

- Mentored 1-2 student teachers annually, providing instructional coaching, classroom observation feedback, and professional guidance to support their pedagogical development.
- Participated in monthly mentor leadership meetings through the US PREP Program and CUNY Lehman College to refine mentoring practices and support structure for pre-service teachers.

Conferences and Symposium

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

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

Public-Facing Translation — "Ocean Worlds: To Enceladus and Beyond" June 2023
Poster Presenter — CUNY Science Communication Symposium *New York, NY*

"Karst Conduit Identification Using Geophysical Surveys in Northern Yucatán, México" Oct. 2022
Poster Presenter — NDISTEM SACNAS Conference *San Juan, PR*

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

Fellowships and Awards

Long Fellowship (Department of Earth and Atmospheric Sciences) Aug. 2024 - May 2025
Cornell University

Public Facing Translation — Best Poster Award June 2023
CUNY Science Communication Symposium

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

Outreach and Talks

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 — Talk Feb. 2024
Lang Science Program — American Museum of Natural History *New York, NY*

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

Science Communication

Aprendizaje Automático para Física y Astronomía — Course April 2023 – Sept. 2024
Astromaquinarios — Spanish Translator *New York, NY*

- Collaborated with a team of astronomers to translate Dr. Viviana Acquaviva's *Machine Learning for Physics and Astronomy* online course from English to Spanish.
- Translated instructional materials, including PowerPoint lectures, Jupyter Notebook exercises, and quizzes to support Spanish-speaking learners.
- Facilitated broader access to computational astrophysics education through Open Learning at the Flatiron Institute.

Workshops and Training

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

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

Skills

Programming & Data Analysis: Python (intermediate), machine learning (intermediate), Java Mission-planning and Analysis for Remote Sensing (JMARS) (beginner)

Geospatial Analysis & GIS: QGIS (intermediate), ArcGIS (beginner); 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, digital elevation model (DEM) generation, thermal raster analysis

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

Scientific Computing & Writing: LaTeX (Overleaf)

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

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 Society 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