Mia Maria Pique (Jaffe)

Academic Profile

Geology researcher working across rock physics, geochemistry, critical minerals, and low-carbon geomaterials, with a commitment to accessible STEM education and mentorship.

Education

Stanford University, Stanford, California
Ph.D., Earth and Planetary Sciences (Present) | M.S., Earth and Planetary Sciences (2024–2026)

- Doerr School of Sustainability; Rock Physics and Geomechanics Lab; advisor: Professor Tiziana Vanorio.
- Dean's Graduate Scholars Award, 2024.

University of Queensland, St. Lucia, Queensland, Australia
Graduate Student Researcher | Geochemistry | October 2020–February 2022

- Earmarked Research Training Program Scholarship (Australian Government), 2020.

Northern Arizona University, Flagstaff, Arizona
B.S., Geology (Honors) | B.A., Spanish (Honors) | August 2015–May 2020

- Global Science and Engineering Emphasis; President's Prize; Gold Axe Award; Distinguished Senior in Geology; Outstanding Senior in Honors College and Modern Languages.

Universidad Nacional de Tucumán, Tucumán, Argentina
Exchange student, Global Science and Engineering Emphasis | July 2018–January 2019

Research Experience

Stanford University — Rock Physics and Geomechanics Lab
Research Assistant (from April 2024, pre-enrollment); Graduate Researcher (September 2024–Present)

- Joined Professor Tiziana Vanorio's lab early as a research assistant in April 2024, before starting graduate studies, to conduct ArcGIS mapping for the Phlego Project.
- Ph.D. research: mapping rare earth elements in carbonatite and alkaline igneous systems using rock physics and imaging techniques.
- M.S. research: investigated the incorporation of CNT-bearing bed carbon from methane pyrolysis into white Portland cement through additive-free mechanical processing.
- At 1 wt.% cement replacement, bed-carbon formulations achieved approximately 21–23% higher compressive strength than the control.
- Methods: P- and S-wave velocity, porosity, permeability, compression and tensile strength testing, SEM/EDS, ArcGIS Pro, QGIS, and Python/Jupyter.

University of Queensland, Brisbane, Australia
Researcher | October 2020–February 2022

- Studied diamonds and ultra-high-pressure minerals from hotspot volcanic plume tracks and ophiolites to investigate deep-mantle recycling into supra-subduction zones in eastern Australia.
- Applied SEM, ICP-MS, optical microscopy, and magnetic resonance techniques.

Instituto Geofísico EPN, Quito, Ecuador
Research Intern | January 2019–December 2020

- Learned volcano monitoring techniques at an active observatory; maintained monitoring networks and conducted micro-gravimetry surveys.
- Characterized El Reventador volcanic ash using SEM/EDS and integrated ash properties with geophysical and observational data.

Harvard University — Langmuir Geochemistry Group, Cambridge, Massachusetts
Guest Researcher | November 2019–May 2020

- Performed ICP-MS geochemical analyses of El Reventador volcanic ash at Hoffman Laboratories with Professor Charles Langmuir.

Northern Arizona University, Flagstaff, Arizona
Undergraduate Researcher and Hooper Research Award Grantee | August 2019–May 2020

- Continued volcanic ash research with Dr. Michael Ort, Instituto Geofísico, and Harvard using quantitative shape analysis and ICP-MS geochemistry; completed a senior thesis.

U.S. Geological Survey / Northern Arizona University
Undergraduate Researcher / NSF LSAMP Scholar | February–August 2018

- Conducted CVO–USGS thin-section research on the Redbanks Formation (Mount Shasta) as an NSF LSAMP Scholar, characterizing bulk chemistry, total crystallinity, and glass composition.

Northern Arizona University / UNAM, Serdán-Oriental Volcanic Field, Mexico
Student Researcher (GRIP Program) | March–July 2017

- Conducted two weeks of international field research using seismic refraction, electromagnetic techniques, and magnetic surveys.

Patent

Co-Production of Hydrogen and Carbon Nanotubes via Hydrocarbon Pyrolysis and Cementitious Composites Derived Therefrom
Stanford Office of Technology Licensing | Docket S26-075 | Filed February 2026 | Patent pending

Publications and Scholarly Contributions

Manuscript in preparation

- Moise, H.#, Pique, M.#, Liang, C., M. M., Majumdar, A., Vanorio, T., & Cargnello, M. (in preparation). *Reframing the Addressable Cement Market for Methane Pyrolysis: From Sequestration Sink to Value-Added Reinforcement* [working title]. Manuscript in preparation for submission to *Science*. Moise and Pique are designated as equal contributors.

Peer-reviewed journal articles and thesis

- Pique, M. (2026). *Physical and mechanical properties of sustainable cement with synergetic carbon nanotube byproducts from methane pyrolysis*. Master's thesis, Stanford University. Stanford Digital Repository. https://doi.org/10.25740/xy416yv9270
- Gaunt, H. E., Pique, M. M., Hernández, S., Hidalgo, S., Córdova, M. D., Ramón, P., & Bernard, B. (2024). Unravelling eruption dynamics at El Reventador, Ecuador: linking the physiochemical properties of volcanic ash with geophysical, geochemical and satellite remote sensing data. *Bulletin of Volcanology, 86*(11), Article 89. https://doi.org/10.1007/s00445-024-01777-x
- Tadini, A., Roche, O., Samaniego, P., et al. (including M. Pique). (2021). Eruption type probability and eruption source parameters at Cotopaxi and Guagua Pichincha volcanoes (Ecuador) with uncertainty quantification. *Bulletin of Volcanology, 83*(5), Article 35. https://doi.org/10.1007/s00445-021-01458-z

Conference contributions

- Gaunt, H. E., Pique, M., Hernández, S., Hidalgo, S., Córdova, M., Ramón, P., & Bernard, B. (2023). Long term multi-parametric assessment of activity from open vent volcano El Reventador: correlation of volcanic ash properties with geophysical data. *IAVCEI 2023 Scientific Assembly, Rotorua, New Zealand. Abstract 1022.*
- Tadini, A., Roche, O., Samaniego, P., et al. (including M. Pique). (2019). Developing probabilistic tephra fallout hazard maps for Cotopaxi and Guagua Pichincha volcanoes (Ecuador) with uncertainty quantification. *American Geophysical Union Fall Meeting, San Francisco, California. Abstract V23I-0313.*

Professional Experience

AGS, Inc., San Francisco, California
Senior Staff Geologist | December 2023–April 2024

- Promoted to senior staff and directed geotechnical investigations for government and municipal clients including the U.S. Army Corps of Engineers, SFO, SFPUC, and the City of San Francisco.
- Led marine geophysical surveying at Military Ocean Terminal Concord, including ferrous-object detection and sub-bottom profiling for Suisun Bay dredging.
- Directed SFO Terminal 3 West geotechnical operations, including drill core logging to depths exceeding 95 feet and cone penetration testing.

AGS, Inc., San Francisco, California
Staff Geologist | January–December 2023

- Provided geotechnical, laboratory testing, and environmental consulting; conducted ASTM geotechnical testing, GPR, and subsurface-profile interpretation.

Crosshair Therapeutics, Sunnyvale, California
Research Assistant | July–December 2022

- Supported early-disease diagnostics research through literature reviews, tissue culture, flow cytometry, and Western blotting.

Teaching and Mentorship

Tilden Preparatory School, Walnut Creek, California
Math and Science Teacher | March–May 2022

- Provided one-on-one and small-group instruction in AP Calculus AB, AP Physics C Mechanics, Precalculus, Algebra, Chemistry, and Earth and Life Sciences.

Universidad Nacional de Tucumán, Argentina
Geology Teaching Assistant | July–November 2018

- Supported three-hour introductory geology laboratory sessions taught entirely in Spanish.

Universidad Nacional de Tucumán, Argentina
Guest Speaker | October–December 2018

- Delivered a Spanish-language lecture on volcanism and Northern Arizona University's geology program.

Northern Arizona University, Flagstaff, Arizona
Honors Guru (Teaching Assistant) | December 2015–May 2018

- Led discussions, assessed coursework, and mentored students in interdisciplinary first-year Honors classes.

Leadership, Service, and Outreach

Stanford Doerr School of Sustainability
Access, Belonging, and Community Liaison | September 2025–June 2026

- Supports community-building and inclusion for graduate students and postdoctoral scholars.

Girls Teaching Girls
Co-Founder | March 2017–May 2020

- Founded hands-on STEAM mentorship programming for girls in underserved communities, emphasizing leadership, stewardship, and access to STEM.

Alpha Lambda Delta National Honor Society, Northern Arizona University
President | April 2017–May 2020

- Led a 300+ member honor society and coordinated volunteer service, weekly food-bank support, and fundraising.

NAU Honors College Students for Inclusion
President and Co-Founder | September 2016–May 2020

- Organized student workshops, diversity programming, and campus outreach.

National Science Foundation / Northern Arizona University
NSF LSAMP Scholar and Junior Mentor | November 2017–November 2018

- Mentored a first-year STEM student in research development and academic retention.

Dorothy Hill Symposium
Board Member and Organizer | 2020–2022

Community Involvement
Additional activities

- Artist for the 2023 San Francisco Chinatown Winter Wonderland Festival; Flagstaff Family Food Center organizer; NAU Science and Engineering Day student mentor; Sunny Patch Project planter; Queering Arizona ally; Goombay Bash fundraiser; Mitochondria Research Society awareness volunteer.

Honors, Scholarships, and Awards

Dean's Graduate Scholars Award, Stanford University | 2024 — Graduate academic excellence and access, belonging, and community commitment leadership.

Earmarked Research Training Program Scholarship, University of Queensland | 2020 — Australian Government Ph.D. funding.

President's Prize, Northern Arizona University | 2020 — University's highest undergraduate distinction (approximately four to five recipients university-wide).

Gold Axe Award, Northern Arizona University | 2020

Distinguished Senior in Geology, Northern Arizona University | 2020

Outstanding Senior, Honors College, Northern Arizona University | 2020

Outstanding Senior, Modern Languages (Spanish), Northern Arizona University | 2020

Hooper Undergraduate Research Award | 2019 — Support for El Reventador senior thesis research.

NSF Louis Stokes Alliance for Minority Participation Grant | 2017 — Associated with CVO–USGS undergraduate research.

Kenneth Coor Scholarship Award | 2018

Honors Merit Award | 2017

Carrol Lane and Mildred-Adams Fenton Scholarship | 2016

NAU President's Scholarship | 2015

Class of 1964 Award and Gift | 2019

Skills and Technical Competencies

Rock physics and materials: P- and S-wave velocity, porosity, permeability, cementitious materials preparation, compressive strength testing, tensile strength testing, point counting, stereonet.

Microscopy and analytical: SEM, EDS, ICP-MS, optical microscopy, HPLC, PCR, liquid handling.

Field and geotechnical methods: Field mapping, seismic refraction, GPR, micro-gravimetry, Brunton compass, Atterberg limits, sieve analysis, CPT.

Geospatial, programming, and design: ArcGIS Pro, QGIS, Python/Jupyter, MATLAB, Java, gINT, CorelDRAW, Adobe Suite.

Languages: English and Spanish (bilingual).

Creative Ventures

House of My Art

Artist and independent business owner | January 2023–Present

- Creates acrylic paintings, portraits, commissions, and surrealist art; featured at the 2023 "Nothiin but Kiinect" San Francisco creatives event.

The Phlego Project

Art–science–engineering collaboration | 2024–Present

- Collaborative exploration of volcanic cement fountain design with Stanford researchers.