Nicholas J. Montiel

Geologist, Planetary Scientist, and PhD Candidate
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PROFILE

I am a planetary geologist and PhD candidate at the University of Texas Institute for Geophysics and the Jackson School of Geosciences, currently searching for a post-doctoral research position. My research interests encompass regional tectonics, lithosphere dynamics, geodynamic evolution for Earth, Venus, and other planets and planet-like satellites, all with the goal of understanding planetary evolution and the origins of planetary diversity. I also have interests in science communication, education, and scientific art. Currently, I am using numerical models alongside geodetic and geological data to explore rift and coronae evolution on Venus and supercontinent fragmentation on Earth. I can be found online @thePaleomancer on Twitter and at my personal website: https://deeptime.online.

PUBLICATIONS

Montiel, N. J., Lavier, L. L., Hemingway, D. (2024, in prep). Crustal formation and recycling along Venus's global rift system.

Seltzer, C., Lien, R., Radzom, B., Mullikin, E., Bott, K., Brouwer, G., Burtt, D., Gentgen, C., Abbate, J., Gandarillas, V., Green, A., Head, T., Hill, J., Larson, J., Montiel, N., Moreno, R., Wagner, N., Wijesekara, P., Nash, A., Tuttle-Kean, J. (2024, submitted). THUNDER: A Titan orbiter mission concept for the New Frontiers program. *Planetary Science Journal.*

Montiel, N. J., Masini, E., Lavier, L., Müntener, O., & Calassou, S. (2023). Mantle deformation processes during the rift-to-drift transition at magma-poor margins. *Geochemistry, Geophysics, Geosystems*, 24, e2023GC010924. DOI: 10.1029/2023GC010924

Griffith, C. A., Penteado, P. F., Turner, J. D., Neish, C. D., Mitri, G., Montiel, N. J., ... & Lopes, R. M. (2019). A corridor of exposed ice-rich bedrock across Titan's tropical region. *Nature Astronomy*, *3*(7), 642-648. DOI: 10.1038/s41550-019-0756-5.

CONFERENCE PRESENTATIONS

Montiel, N. J., Lavier, L. L., Hemingway, D. J. (2024) Coronae and chasmata morphology consistent with generation of new Venusian crust. In *55th Lunar and Planetary Science Conference.* Lunar and Planetary Institute.

Seltzer, C., Lien, R., Radzom, B., Mullikin, E., Bott, K., Brouwer, G., Burtt, D., Gentgen, C., Abbate, J., Gandarillas, V., Green, A., Head, T., Hill, J., Larson, J., Montiel, N., Moreno, R., Wagner, N., Wijesekara, P., Nash, A., Tuttle-Kean, J. (2024) THUNDER: A New Frontiers-class Titan orbiter mission concept from the NASA JPL Planetary Science Summer School. THUNDER: A Titan orbiter mission concept for the New Frontiers program. In *55th Lunar and Planetary Science Conference.* Lunar and Planetary Institute.

Montiel, N. J., Lavier. (2023) Magmatic accretion and asthenospheric convection during Venusian-styled rifting. In *Fall Meeting 2023*. American Geophysical Union.

Montiel, N., Masini, E., Lavier, L., & Müntener, O. (2022, December). Magma-poor rifted margin evolution from rift to drift: a synthesis of numerical modeling and seismic experiments from the Deep Ivory Coast Basin. In *Fall Meeting 2022*. AGU. DOI:10.13140/RG.2.2.24407.14248.

Montiel, N., Massini, E., Lavier, L., & Müntener, O. (2022, May). Characterizing mantle deformation processes during the rift-to-drift transition at magma-poor margins. In *EGU General Assembly Conference Abstracts* (pp. EGU22-13043).

Montiel, N., Lavier, L., Hayman, N. W., & Ball, P. J. (2019, December). Estimating Carbon Flux During Continental Rifting In The Mesozoic And Cenozoic. In *AGU Fall Meeting Abstracts* (Vol. 2019, pp. T33G-0452).

WORK EXPERIENCE

JPL's Planetary Science Summer School (PSSS) - Summer 2023
I was a Science Objective Lead and Thermal Control Systems engineer on a concept study for a Titan polar orbiter called *THUNDER*. This was part of an internship meant to educate early career scientists on mission concept and design for planetary exploration. I was responsible for science traceability and hypothesis-framing that were answerable to the 2023 Decadal Survey and that drove instrument requirements. In addition, I helped design thermal regulation systems for the mission concept.

Telescope Operator, Gerard P. Kuiper Telescope, University of Arizona 2016
Took photometry of exoplanet transits to understand their atmospheres. Project supervised by Dr. Caitlin Griffith.

Undergraduate Research Assistant, Lunar and Planetary Lab, University of Arizona 2015-2017
Used principal components analysis and independent components analysis on Cassini data to identify the spectral signatures of water and organics on Titan to create a compositional map of the tropics. The resultant paper was published in Nature Astronomy. Project was headed by Dr. Caitlin Griffith.

Paid Internship, Organic Geochemistry/Paleoclimatology Lab, University of Arizona 2016-2018
Worked to isolate and analyze GDGTs, FAMEs, and alkenones from leaf waxes in sediment as paleoclimate proxies for surface temperatures and precipitation. The lab was run by Dr. Jessica Tierney, Patrick Murphy, and Paul Zander.

Undergraduate Research Assistant, Mineral Separation Lab, University of Arizona 2016
Worked on U-Pb geochronology on rocks from sedimentary basins in the Puna Plateau with Dr. Barbara Carrapa.

EDUCATION

University of Texas at Austin, Austin, TX PhD, 2018-2024 (Graduation Date: 14-28 July)
Draft Thesis Title: "Synthesizing Model Results and Observations to Investigate Tectonic and Magmatic Processes at Extensional Systems"
Class Highlights: Marine Geology, Marine Tectonics, Marine Geology and Geophysics Field Course, Transitions in the History of Life, Broader Impacts in Science, Python for Geoscientists, Thermodynamics of Petrology.

University of Arizona, Tucson, AZ Bachelor of Science, 2018
Major in Geoscience with a Minor in Planetary Science
Class Highlights: Western U.S Cordillera and Orogenic System Field Camp, Regional Structural Geology, Regional Tectonics, Exploration Seismology, and Orogenic Systems, Introduction to MATLAB, Geology and Geophysics of the Planets, Geology of Mars

SKILLS

Geological Theory, Analysis, and Synthesis
I am proficient in analysis of various types of geological, geophysical, and remote sensing data and framing testable hypotheses for fundamental geological processes. I also have a firm understanding and breadth of knowledge in general geoscience, planetary science, and history of science that is enhanced by interdisciplinary experience.

Numerical Modeling
I have experience using GeoFLAC and similar numerical modeling programs to do tectonic and geophysical simulations.

Data Visualization
I am proficient in ParaView, GeoMapApp, and JMARS data visualization softwares.

Programming
I have familiarity with Python (Anaconda distribution), MATLAB, and Fortran90 from using GeoFLAC and other modeling programs.

TEACHING & OUTREACH

"The Exploration of Venus: Past, Present, & Future" at LSU Spring 2024
Invited to a workshop on venusian geology and remote sensing methods in an advanced graduate course on planetary exploration (GEOL 7900 by Dr. Suniti Karunatillake, Planetary Science Lab, Geology & Geophysics, Louisiana State University).

Annular Eclipse Party - Fall 2023
On my own time, I travelled to San Antonio, TX to set up solar observing telescopes in a local park during the annular eclipse. It was an opportunity to teach basic astronomy and planetary science to communities that wouldn't otherwise have the access.

"Earth Works: Arizona Geology" at El Mirage Library Summer 2022
I was invited to give a public science talk at El Mirage Library in El Mirage, a city in the Phoenix Metropolitan Area. The talk was ~40 minutes long with a question and answer session at the end, during which I gave a 4.5 billion year history of Arizona, evidence for it in the local geology, and why it matters to Arizona residents.

Athletics Department Tutor Spring 2022
I was a strategy and content tutor for students in the University of Texas Athletics Department. My responsibilities were helping students come up with study plans, develop their reading comprehension and writing skills, and teaching science to ESL students.

Teacher's Assistant, University of Texas at Austin 2019-2021
Courses: Earth Science: Sustainability and Society, Introduction to Geology. I taught Earth Science: Sustainability and Society lab with Dr. Mary Poteet and Dr. Chris Bell as a general education class with a writing flag. This class was an overview of the earth sciences and how they impact our societies. I also taught the lab portion of Introduction to Geology with Dr. Timothy Shanahan, focusing on the basic principles of geology. Since the pandemic was in full swing while I was teaching that, I am intimately familiar with Zoom classrooms.

Undergraduate Teacher's Assistant, University of Arizona 2016-2017
Courses: Introduction to Paleontology, Structural Geology. I assisted Dr. Nan Smith and Dr. Paul Kapp with the paleontology and structural geology labs, respectively. My tasks were interfacing on-on-one with students, prepping lab assignments, and grading.