

Alia Renique Wofford

PhD Candidate George Mason University

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EDUCATION

Ph.D. Candidate Climate Dynamics

George Mason University 2021 – 2026 (expected)

M.Sc. Atmospheric Sciences

Howard University 2019– 2021

B.Sc. Biology and Comprehensive Science with Teaching Licensure

Elizabeth City State University 2013 – 2017

RESEARCH EXPERIENCE

Investigating the CO₂ Forcing Thresholds Needed to Deglaciate the Paleoproterozoic “Hard” Snowball Earth

Aug 2022 – Present Fairfax, Virginia

Keywords: *Atmospheric Sciences, Climate Dynamics, Global Climate Modeling*

Advisor: Dr. Linda Sohl, Dr. Shawn Domagal-Goldman

- Utilized the Resolving Orbital and Climate Keys of Earth and Extraterrestrial Environments with Dynamics (ROCKE-3D) Global Climate Model (GCM) to model the Paleoproterozoic “Hard” Snowball with CO₂ concentrations ranging from 500ppm-300,000ppm.
- Exploring the critical CO₂ levels needed to deglaciate the “hard” Snowball Earth

Comparative Analysis of Obliquity-Driven Changes in the Martian Atmosphere

Aug 2020 – Aug 2021 NASA Goddard Institute for Space Studies

Keywords: *Atmospheric Sciences, Climate Dynamics, Global Climate Modeling, General Circulation Modeling*

Advisor: Dr. Scott Guzewich, Dr. Konstantinos Tsigaridis

- Utilized the Resolving Orbital and Climate Keys of Earth and Extraterrestrial Environments with Dynamics (ROCKE-3D) Global Climate Model (GCM) to simulate the modern Martian atmosphere configuration at obliquities ranging from 0°-35°
- Analyzed how changes in obliquity influenced the dust transport and removal processes on Mars
- Analyzed how changes in obliquity impacted water exchange processes through Mars’s polar ice caps

Understanding Space Weather through Model Validation

May 2020 – Aug 2020 National Oceanic and Atmospheric Administration

Keywords: *Atmospheric Sciences, Climate Dynamics, Modeling, Statistical Analysis*

Advisor: Dr. Dimitrios Vassiliadis

- Conducted statistical analysis for model validation with regards to a space weather event
- Conducted graphical analysis for magnetospheric models in the model validation study

Revisiting Early Earth’s Methanogen Biosphere

Mar 2018 – July 2019 NASA Goddard Space Flight Center

Keywords: *Atmospheric Sciences, Climate Dynamics, Modeling, Statistical Analysis*

Advisor: Dr. Giada Arney

- Utilized 1-D Photochemical Climate Simulator (ATMOS) to simulate photochemistry and climatic profiles of various methane fluxes in Early Earth’s atmosphere
- Plotted various methane mixing ratios of abundant atmospheric molecules in Early Earth’s atmosphere
- Utilized SMART to generate spectra from the ATMOS simulation outputs to represent self-consistent synthesis of planetary processes from the biosphere, to the atmosphere, to the telescope.

Radio Observations of M-Dwarf Space Weather

May 2017 – Aug 2017 National Radio Astronomy Observatory

Keywords: *Radio Astronomy, Climate Dynamics, Space Weather, Statistical Analysis*

Advisor: Dr. Jackie Villadsen

- Utilized the Common Astronomy Software Applications package (CASA) to clean RFI in radio data of the M-Dwarf star CN Leo in the 8 -12(X-BAND) GHz frequency
- Visualized X-band radio circular polarizations and brightness temperature to determine the space weather conditions that the star could be producing such as non-thermal thermal gyrosynchrotron emission mechanisms, cyclotron maser emission or the detection of Coronal Mass Ejections.

How Microgravity Impacts Immune and Cancer Cell Development

📅 Aug 2016 – May 2017 📍 Elizabeth City State University

Keywords: *Cancer Research, Biology*

Advisor: Dr. Hirendranath Bannerjee

- Suspended immune and cancer cells in microgravity chamber to simulate free fall effect that occurs in space in 48-96hr. cycles
- Cell death assays were performed on immune and cancer cells at the end of each cycle.

How Dense Gases Contributed to Star Formation In Starburst galaxy NGC 2146

📅 May 2016 – Aug 2016 📍 National Radio Astronomy Observatory

Keywords: *Radio Astronomy, Climate Dynamics, Space Weather, Statistical Analysis*

Advisor: Dr. Amanda Kepley

- Compared the amount of HCN and CO gases that were produced by starburst galaxy NGC 2146 to other Luminous Infrared Galaxies

Effects of Antimalarial Drugs on Chick Embryonic Development

📅 Aug 2014 – May 2016 📍 Elizabeth City State University

Keywords: *Medical Research, Biology*

Advisor: Dr. Gloria Payne

- Chick embryos were injected 3x throughout their development with antimalarial drugs Chloroquine and Pyrimethamine to simulate dosages that human embryos would receive when treating a pregnant patient
- Embryos were allowed to develop until day 10 and then sacrificed to study the morphological impact caused

PUBLICATIONS

- Ford, Heather L. et al. (2025). "Warm Equatorial Upper Ocean Thermal Structure During the Mid-Pliocene Warm Period: A Data-Model Comparison". In: *Geophysical Research Letters* 52.16. e2025GL114749 2025GL114749, e2025GL114749. DOI: <https://doi.org/10.1029/2025GL114749>. eprint: <https://agupubs.onlinelibrary.wiley.com/doi/pdf/10.1029/2025GL114749>. URL: <https://agupubs.onlinelibrary.wiley.com/doi/abs/10.1029/2025GL114749>.
- Vidaurri, Monica et al. (2020). "Absolute Prioritization of Planetary Protection, Safety, and Avoiding Imperialism in All Future Science Missions: A Policy Perspective". In: *Space Policy* 51, p. 101345. ISSN: 0265-9646. DOI: <https://doi.org/10.1016/j.spacepol.2019.101345>. URL: <https://www.sciencedirect.com/science/article/pii/S0265964619300803>

FELLOWSHIPS AND AWARDS

Shukla Doctoral Fellowship - College of Science, George Mason University

2021-2023

National Astronomy Consortium (NAC) Bridge Scholarship Award – AUI Board of Trustees, National Radio Astronomy Observatory

2021

NOAA Cooperative Science Center in Atmospheric Sciences and Meteorology (NCAS-M) Fellow – Graduate Studies Department, Howard University

2019-2021

AAS 233rd Meeting Chambliss Astronomy Achievement Student Graduate Honorable Mention - American Astronomical Society (AAS) 233rd meeting, Seattle, Washington

2019

AAS 231st Meeting Chambliss Astronomy Achievement Student Undergraduate Honorable Mention - American Astronomical Society (AAS) 231st meeting, Washington, D.C.

2018

EMARC/UMARC-STAR Scholar – Department of Natural Sciences, Elizabeth City State University

2016-2017

NSF'S Louis Stokes Alliances for Minority Participation Scholar- Department of Natural Sciences, Elizabeth City State University

2014-2016

2ND place Oral Presentation Competition Winner - 9TH Annual LSAMP Symposium

2016

3RD place Oral Presentation Competition Winner - 8TH Annual LSAMP Symposium

2015

SELECT PRESENTATIONS

POSTERS

52nd Lunar and Planetary Science Conference 2021

Comparative analysis of obliquity-driven changes in the Martian atmosphere

233rd AAS Winter 2019

Comparative Climatology of Terrestrial Planets III 2018

Revisiting the Early Earth's Methanogen Biosphere

231st AAS Winter 2018

Radio Observations of M Dwarf Space Weather

229th AAS Winter 2017 Emerging Researchers National Conference 2016

How does Dense Molecular Gases contribute to star formation in starburst galaxy NGC 2146?

TALKS

Aug. 3, 2020, NCAS-M NERTO Final Presentation

Understanding Space Weather through Model Validation

2019 AbSciCon

Revisiting the Early Earth's Methanogen Biosphere

2017 National Astronomical Consortium

Radio Observations of M Dwarf Space Weather

2016 National Astronomical Consortium

How does Dense Molecular Gases contribute to star formation in starburst galaxy NGC 2146?

LANS Conference 2016

How does Dense Molecular Gases contribute to star formation in starburst galaxy NGC 2146?

8th Annual LSAMP Consortium 2015

Early Effects of Chloroquine on day 10 chick embryos

9th Annual LSAMP Consortium 2016

Early Effects of Pyrimethamine on day 10 chick embryos

CLUBS AND ORGANIZATIONS

American Astronomical Society

American Meteorological Society

National Astronomy Consortium

Zeta Phi Beta Sorority Incorporated

Gamma Sigma Sigma National Service Sorority Incorporated

George Mason University Climate Consensus

Young Democrats of North Carolina Forsyth County Chapter