

Name: Dr. Charissa Campbell (she/they)

Code: 699

Home institution: NASA Goddard Space Flight Center / Catholic University of America

Name of task: Aerosols within the Martian atmospheres such as dust storms or water-ice clouds

Role in task/ what they do for CRESST:

I am a postdoctoral researcher in the Planetary Environments Laboratory at NASA Goddard Space Flight Center (GSFC) where I use data from the Mars Reconnaissance Orbiter (MRO) to classify Martian aerosol activity, such as dust storms. This orbital data contains parameters such as temperature, dust opacity and water-ice opacity at various altitudes across the planet. Knowing how these parameters change over the course of a Mars Year will tell us any trends or behavior of Martian aerosols. This work is done in collaboration with Dr. Scott Guzewich, my GSFC sponsor.



Background/ Autobiography:

I have a B.Sc. in Physics & Astronomy from Saint Mary's University in Halifax, NS, Canada before moving to York University in Toronto, ON, Canada to complete my M.Sc. and Ph.D. in Physics & Astronomy, particularly Planetary Science. I grew up in Western Canada (Edmonton, AB) but have travelled quite extensively across the country including to Yukon territory and all the way to the Atlantic provinces for undergrad. Ever since I was young, I knew I wanted to study space science and my grandparents always told me to reach for the stars. My grandpa specifically convinced me that Mars science was the way to go which became true when I joined the Mars Science Laboratory (MSL, Curiosity rover) and InSight missions during my grad studies under Dr. John Moores where I used imagery from its cameras to study Martian water-ice clouds. The networking from that position helped land my postdoctoral job here at Goddard where I get to expand my knowledge of the Martian atmosphere but instead of using surface data looking up, I am using orbital data looking down. It is an honor to continue my dream and bring my partner and young son here to explore what NASA and the USA has to offer.

Favorite part of being a CRESST Scientist?

CRESST II has shown me the vast amount of science done at GSFC that could offer unique collaborations with other scientists either here or at other institutions. I hope to gain more networking skills and learn about what Goddard can do to support future space science studies.

Selected list of publications and conferences:

Publications:

Patel P., Tamppari L., de la Torre Juárez M., Lemmon M., Coates A., Wolff M., Toledo D., Branduardi-Raymont G., Jones G., **Campbell C.**, Moores J., Maki J., Ryan J. (2023) Geometric Properties of Water-ice Clouds as Observed from Jezero Crater in the First 600 sols with the NavCam Instrument On Board the Mars2020 Rover, Perseverance. The Planetary Science Journal 4. [<https://doi.org/10.3847/PSJ/acfc35>]

Campbell C. L., Meka S., Marrable D., Rohl A. L., Chai K., Benedix G. K., Smith C. L., Moores J. E. (2021) A self-supervised learning based approach to analyze Martian water-ice cloud properties for planetary atmospheric applications Acta Astronautica, 181, 1-13. [<https://doi.org/10.1016/j.actaastro.2020.12.041>]

Godin, P. J., Ramirez, R.M., **Campbell C. L.**, Wizenberg T., Nguyen T. G., Strong, K., Moores, J. E., (2020) Collision-Induced Absorption of CH₄-CO₂ and H₂-CO₂ Complexes and Their Effect on the Ancient Martian Atmosphere, JGR Planets 125 (12) [<https://doi.org/10.1029/2019JE006357>]

Campbell C. L., Kling A. M., Smith C. L., Kloos J. L., Guzewich S. D., Lemmon M. T., Moore C. A., Cooper B. A., Haberle R. M., Moores J. E., (2020) Estimating the Altitude of Martian Clouds at the Mars Science Laboratory Rover Landing Site, Planetary and Space Science, 182, 104785. [<https://doi.org/10.1016/j.pss.2019.104785>]

Guzewich S. D., Lemmon M., Smith C. L., Martínez G., de Vicente-Retortillo Á., Newman C. E., Baker M., **Campbell C.**, Cooper B., Gómez-Elvira J. Harri A. -M., Hassler D., Martin-Torres F. J., et al. (2019) Mars Science Laboratory Observations of the 2018/Mars Year 34 Global Dust Storm, Geophysical Research Letters, 46, 71-79. [<https://doi.org/10.1029/2018GL080839>]

Conferences:

Division for Planetary Science (DPS) meeting (2022) – Three Three Mars Years Worth of Altitudes for Martian Water-Ice Clouds Above Gale Crater, **Campbell, C. L.**, Ellison, D., Smith, C. L., Moores, J. E.

Mars Atmospheric Modelling and Observation (MAMO) Workshop (2022) – Wind Direction Record of Aerosols as Observed by The Mars Science Laboratory, **Campbell, C. L.**, Kloos, J. L. Ellison, D., Smith, C. L., Hayes C., Innanen, A. C., Moores, J. E.

Low-Cost Science Mission Concepts for Mars Exploration (2022) – MAPLE, a Simple Optical Meteorological Station for Mars, **Campbell C. L.**, et al.

Europlanet Science Congress (EPSC) meeting (2021) – Updated Altitudes for Martian Water-Ice Clouds above Gale Crater, **Campbell, C. L.**, Ellison, D., Smith, C. L., Moores, J. E.

Division for Planetary Science (DPS) meeting (2019) – Update on an Analog Rover Exploration Mission for Education and Outreach, **Campbell C. L.**, Smith C. L., Cooper B. A., Moores J. E.

Three fun facts:

1. I am a big advocate for outreach to help teach the younger generation about planetary science. This included developing and running an outreach event based on rover operations with the Curiosity rover that was showcased at the Ontario Science Centre.
2. I've had two press released by NASA about my work with the Curiosity rover at the start ([Watch Martian Clouds Scoot, Thanks to NASA's Curiosity](#)) and end ([Curiosity Captures Drifting Clouds on Dec. 12, 2021 – NASA Mars Exploration](#)) of my grad studies.
3. I am a huge animal lover currently with three cats and looking forward to adding a dog to the mix soon.

To contact Charissa to learn more about her work or to collaborate, you can reach them at:
charissa.campbell@nasa.gov