## Dr. Alexandria V. Johnson

Assistant Professor - Purdue University

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#### Education

**Ph.D. Atmospheric Science**, "The Formation of Ice in Maritime Cumuli: Insights from New Observations and Modeling" Advisor: S. Lasher-Trapp 2014 - Purdue University

## **B.S. Physics with Mathematical Sciences Minor** (Cum Laude)

2009 - Michigan Technological University

#### Professional Appointments

#### **Purdue University**

2023 - Present	Assistant Professor
2023	Associate Professor of Practice
2019 - 2023	Assistant Professor of Practice
2019 - 2023	Assistant Professor of Research

#### **Brown University**

2018 - 2019	Assistant Professor of Research
2018 - 2019	Institute at Brown for Environment and Society Visiting Fellow
2015 - 2018	Adjunct Assistant Professor of Research

#### **Massachusetts Institute of Technology**

2018 - 2019	Visiting Researcher
2015 - 2018	Postdoctoral Fellow through the Simons Foundation Collaboration on the Origins of Life "Clouds in exoplanet atmospheres – Are They Blocking our View of Life Below?" Supervisor: D. Cziczo
2014 - 2015	Postdoctoral Associate – Nucleation and spectral properties of cloud particles in exoplanet atmospheres. Supervisors: D. Cziczo and S. Seager

#### **Purdue University**

2010 - 2014	Graduate Research Assistant - Early ice formation and proliferation in
	maritime cumulus clouds. Advisor: S. Lasher-Trapp

2010 Graduate Research Assistant – Applications of airborne and balloonborne GPS radio occultation systems for the remote sensing of water vapor in the atmosphere. Advisor: J. Haase

## University of Illinois Urbana-Champaign

2009 - 2010 Graduate Research Assistant – Nucleation properties of aged aerosols in the atmosphere. Advisor: N. Riemer

## Michigan Technological University

2008 - 2009	Undergraduate Research Assistant – Variation in the latent heat release of water below $0^{\circ}$ C. Advisor: W. Cantrell
2007 - 2008	Undergraduate Research Assistant – Ice nucleation under the influence of long chain organic compounds. Advisor: W. Cantrell

## NASA Ames Research Center

2008

Undergraduate Research Intern – Formation and growth of water vapor ice clouds under Martian conditions on JSC Mars-1 regolith simulant. Advisor: L. Iraci

#### **Publications**

Underlined names represent those of advised students

#### In Review

Hamill, C. D., A. V. Johnson, and P. Gao: Light Scattering Measurements of KCl Particles as an Exoplanet Cloud Analog. *In review at the Planetary Science Journal*.

## **In Preparation**

#### Drafts available upon request

<u>Walker, K.</u> and **A. V. Johnson**: A Novel Exoplanet Electrodynamic Balance (exoEDB) for the Study of Exotic Clouds. *In prep for Atmospheric Measurement Techniques*.

## Published

<u>Aguilar, M.</u>, 2023: Clouds in the Ancient Lunar Atmosphere: Water Ice Nucleation on Aerosol Simulants. *Journal of Purdue Undergraduate Research*. – This work was conducted in the Johnson Cloud Lab and under Prof. Johnson's guidance

Weller, M. B., A. J. Evans, D. E. Ibarra, and A. V. Johnson, 2022: The Ancient Venus Atmosphere: Atmospheric N<sub>2</sub> Explained by Early Plate Tectonics. *Nature Astronomy*.

<u>Grey, L.</u>, A. V. Johnson, T. Matthews, L. B. Perry, A. C. Elmore, A. Khadka, D. Shrestha, S. Tuladhar, S. K. Baidya, D. Aryal, and A. P. Gajurel, 2022: Mount Everest's photogenic weather during the post-monsoon. *Weather*, **77**, 156-160.

Fortney **et al**., 2019: The Need for Laboratory Measurements and Ab Initio Studies to Aid Understanding of Exoplanetary Atmospheres. Astro2020 Science White Paper.

Lasher-Trapp, S., D. Leon, P. DeMott, C. Villanueva-Birrel, **A. Johnson**, D. Moser, C. Tulley, and W. Wu, 2016: Multi-Senor Investigation of Rime-Splintering in Tropical Maritime Cumuli. J. Atmos. Sci., **73**, 2547-2564.

**Johnson, A.**, S. Lasher-Trapp, A. Bansemer, Z. Ulanowski, and A. Heymsfield, 2014: Difficulties in Early Ice Detection with the Small Ice Detector 2 HIAPER (SID-2H). *J. Atmos. Oceanic Technol.*, **31**, 1263–75.

Haase, J. S., J. Maldonado-Vargas, F. Rabier, P. Cocquerez, M. Minois, V. Guidard, P. Wyss, and **A. V. Johnson**, 2012: A Proof-of-concept Balloon-borne Global Positioning System Radio Occultation Profiling Instrument for Polar Studies. *Geophys. Res. Lett.*, **39**.

Evans et al., 2012: The PRE-Depression Investigation of Cloud-systems in the Tropics (PREDICT) Field Campaign: Perspectives of Early Career Scientists. *Bull. Amer. Meteor. Soc.*, **93**, 173-87.

Phebus, B. D., A. V. Johnson, B. Mar, B. M. Stone, A. Colaprete, and L. T. Iraci, 2011: Water ice nucleation characteristics of JSC Mars-1 regolith simulant under simulated Martian atmospheric conditions. *J. Geophys. Res.*, **116**.

Cantrell, W., A. Kostinski, A. Szedlak, and **A. Johnson**, 2011: Heat of Freezing for Supercooled Water: Measurements at Atmospheric Pressure. *J. Phys. Chem. A*, **115**, 5729-34.

#### Talks

Underlined names represent those of advised students

## **Invited Talks**

NASA Lab Astro PI meeting invited presentation. Washington, DC (2023)

American Chemical Society Bridging the Interfaces of Atmospheric Chemistry Symposium invited presentation – Indianapolis, IN (2023)

Cloud Zwei Con keynote speaker – Bavaria, Germany (2023)

Penn State Department of Meteorology and Atmospheric Science Colloquium – Virtual (2022)

University of Illinois Urbana-Champaign Atmospheric Sciences Graduate Seminar – Virtual (2021)

Indiana Astronomical Society June Meeting – Virtual (2021)

Boston University Center for Space Physics Seminar - Virtual (2021)

Laboratory Astrophysics Division Invited Speaker for the 234<sup>th</sup> American Astronomical Society Meeting - St. Louis, MO (2019)

RI Space Grant Annual Symposium Keynote Speaker - Bristol, RI (2019)

University of Wisconsin – Madison Department of Atmospheric and Oceanic Sciences Colloquium - Madison, WI (2019)

Brown University Department of Earth, Environmental and Planetary Sciences Colloquium -Providence, RI (2019)

University of Washington Atmospheric Sciences Colloquium - Seattle, WA (2018)

Brown University BASS Colloquium - Providence, RI (2016)

University of Illinois Urbana-Champaign Atmospheric Sciences Graduate Seminar - Urbana, IL (2016)

Michigan Technological University Remote Sensing Seminar - Houghton, MI (2016)

Templeton Foundation Opportunity M Meeting - Cambridge, MA (2016)

Harvard Center for Astrophysics Small Scale Seminar - Cambridge, MA (2016)

Massachusetts Institute of Technology Planetary Lunch Colloquium Series - Cambridge, MA (2015)

Massachusetts Institute of Technology - Cambridge, MA (2013)

NCAR RAF - Broomfield, CO (2012)

## **Oral Conference Presentations**

Hamill, C. D., and A. V. Johnson, 2021: Characterizing Super-Earth and Mini-Neptune Light Scattering via Experimental Phase Curves. *Division of Planetary Sciences Meeting*, Virtual.

<u>Walker, K.</u>, and **A. V. Johnson**, 2021: A Novel Exoplanet Electrodynamic Balance (exoEDB) for the Study of Exotic Clouds. *Division of Planetary Sciences Meeting*, Virtual.

**Johnson, A.,** <u>D. T. Altoaimi, K. Hernandez, D. Tersegno</u>, 2019: Laboratory Studies of Extraterrestrial Clouds through Terrestrial Means. *American Geophysical Union Annual Meeting*, San Francisco, CA.

Johnson, A., M. Zawadowicz, S. Lance, and D. Cziczo, 2018: Scattering Matrices of Single Levitated Particles. *10<sup>th</sup> International Aerosol Conference*, St. Louis, Missouri.

Johnson, A., <u>T. M. Safran</u>, A. J. R. Bauer, and D. Cziczo, 2017: A Study of Exoplanet Aerosols by Earth Means. *AAAR National Meeting*, Raleigh, NC.

Johnson, A., S. Lance, D. J. Cziczo, S. Seager, D. Charbonneau, and A. Bauer, 2016: Exploring the Microphysical Properties of Exoplanet Clouds. *16th ICCP*, Manchester, UK.

**Johnson, A.**, D. J. Cziczo, A. J. R. Bauer, and S. Seager, 2015: Light Scattered by Ammonium Nitrate as a Function of Crystalline Phase. *ACS National Meeting*, Boston MA.

**Johnson, A.** and S. Lasher-Trapp, 2014: Modeling of Early Ice Formation in Maritime Cumulus Clouds. *AMS Cloud Physics Meeting*, Boston, MA.

**Johnson, A.**, S. Lasher-Trapp, and A. Bansemer, 2013: Ice detection with SID-2H during the ICE-T field campaign. *Davos Atmosphere and Cryosphere Assembly*, Davos, Switzerland.

#### Service, Engagement, & Activities

#### **University Service**

2022 – present	Purdue University Meteorological Association (PUMA) faculty representative
2021	Continuing Lecturer in Purdue EAPS search committee
2020 - 2022	Purdue EAPS Code of Conduct Task Force
2019 - present	Purdue EAPS Seminar Committee, Faculty Chair
2019 - 2021	Purdue EAPS Alumni and Corporate Relations Committee
2018 - 2019	Brown Planetary Climate Task Force, Chair
2014 - 2015	MIT EAPS Postdoctoral Meetings, Organizer
2013	Purdue EAPS Women in Science Program Retreat, Organizer
2011 - 2013	Purdue – University of Illinois Urbana-Champaign Biannual Midwest Cloud and Aerosol Forum, Co-founder and Organizer

## **Professional Service**

Reviewer for: Planetary Science Journal, Nature Astronomy, Nature Reviews Earth and Environment, The Astrophysical Journal, Journal of Atmospheric Science, Atmospheric Measurement and Technology, Atmospheric Chemistry and Physics, Journal of Oceanic and Atmospheric Technology, and Journal of Purdue Undergraduate Research.

NSF external and panel grant reviewer (~ yearly)

NASA panel grant reviewer (~ yearly)

2023	Associate Editor for the Journal of the Atmospheric Sciences
2021	DPS LOC Committee for Providence, RI meeting (transitioned to virtual)
2019	AGU Annual Meeting Session Co-Convener
2017	AAAR Special Symposium Co-Convener (Inaugural Session) – Extraterrestrial Aerosols: From Mars to Titan and Beyond, Co-chair

## **Diversity Activities**

2023	Ungrading Extravapolooza Data Workshop (part of the Summer Professional Learning Academy at CalTeach)
2022	Faculty workshop on Equitable Practices for Writing, Reading, and Soliciting Letters of Recommendation
2022	Teaching for Equity Extravapalooza (part of the summer Professional Learning Academy through CalTeach)

2022	Maximizing Student Potential Conference at Purdue – Belonging – A Virtual Gathering for Exploring, Reflecting, and Acting
2022	AGU / AGI Building Antiracist Spaces in your Department seminar
2021	Trans inclusion training through Purdue LGBTQ center
2021	Promoting LGBTQIA+ Student Success in the Classroom Workshop through Purdue LGBTQ center
2021	Bystander Intervention to stop anti-Asian/American and xenophobic harassment training presented by Asian Americans Advancing Justice (AAJC) and Hollaback!
2021	Maximizing Student Potential Conference at Purdue – Infusing Inclusive Pedagogy Throughout the Curriculum
2020	EAPS Anti-racism Workshop through the Office of Diversity and Inclusion at Purdue
2020	UNH PowerPlay and Incluxion Works: Bias Awareness and Intervention training
2020	Pursing Racial Justice Together Series at Purdue University
2020	Division of Diversity and Inclusion's Democracy, Civility, and Freedom of Expression programming series at Purdue [Cancelled due to COVID-19]
2019	Instrumental in bringing LGBTQ center in for a departmental seminar on inclusivity and bystander intervention
2019	Safe Space Training at Purdue University
2019	Maximizing Student Potential Conference at Purdue University
2018-2019	Out in Science, Technology, Engineering, and Math (oSTEM) at Brown University
2018-2019	(Chair) Task Force on Climate in Planetary Science at Brown University
2017	Safe Space training at Brown University

# **Community Engagement**

2024	Purdue Women in Science Program (WISP) invited talk on the Johnson Cloud Lab and sharing my experiences as a women in science
2023	Fall Office of Undergraduate Research Expo Fall Judge
2023	Earth Science Women's Network Career Panel on the Two-Body Problem
2022	Graduate Student Government at Michigan Tech career panel guest speaker
2018-2021	Earth Science Women's Network Science-a-thon Participant

2020	Academic Women in STEM at UIUC – Career Panel on Job Searching in times of COVID-19
2019-2020	Skype-a-Scientist Participating Scientist
2019	Purdue University Meteorological Association (PUMA) Guest lecture
2017-2018	Letters to a Pre-Scientist

#### Awards and Honors

College of Science EAPS Undergraduate Advising Award (2023) Teaching for Tomorrow Junior Fellow (2021-2022) Simons Foundation Collaboration on the Origins of Life Instrument Grant (2016) MIT Postdocs Share their Science – 2<sup>nd</sup> Place (MIT, 2016) Simons Foundation Collaboration on the Origins of Life Prize Postdoctoral Fellowship (2015) Outstanding Graduate Student Award (Purdue University, 2013) Henry Silver Graduate Student Scholarship (Purdue University, 2012) Ted Rozsa Endowed Scholarship (Michigan Technological University, 2007)

## Teaching and Advising

## **Courses Taught**

+ Indicates teaching honor roll based on student evaluations		
2024 (Spring)	EAPS 591 Planetary Atmospheres EAPS 691 Seminar in Earth Sciences	
2023 (Fall)	EAPS 421 Atmospheric Thermodynamics + EAPS 691 Seminar in Earth Sciences	
2023 (Spring)	Teaching relief	
2022 (Fall)	EAPS 421 Atmospheric Thermodynamics + EAPS 691 Seminar in Earth Sciences	
2022 (Spring)	EAPS 391 Planetary Atmospheres + EAPS 591 Exoplanets EAPS 691 Seminar in Earth Sciences	
2021 (Fall)	EAPS 421 Atmospheric Thermodynamics + EAPS 691 Seminar in Earth Sciences	
2021 (Spring)	EAPS 591 Planetary Atmospheres [Online due to COVID-19] + EAPS 691 Seminar in Earth Sciences [Online due to COVID-19]	
2020 (Fall)	EAPS 421 Atmospheric Thermodynamics [Online due to COVID-19] + EAPS 691 Seminar in Earth Sciences [Online due to COVID-19]	
2020 (Spring)	EAPS 320 Physics of Climate [Transitioned online due to COVID-19] EAPS 691 Seminar in Earth Sciences	
2019 (Fall)	EAPS 421 Atmospheric Thermodynamics + EAPS 691 Seminar in Earth Sciences	

2019 (Spring)	Exoplanets Seminar (Brown University)
2017, 2018 (Spring)	Planetary Atmospheres (MIT), Development and Co-instructor as a Postdoctoral Associate and Fellow
2010 (Spring)	Earth Sciences for Elementary Teachers (Purdue University), Graduate Teaching Assistant
2009 (Summer, Fall)	Introduction to Meteorology and General Physical Meteorology (University of Illinois Urbana-Champaign), Graduate Teaching Assistant
2005, 2007-2009	General and specialty Physics labs for Engineers and Physics Labs for Physics Majors (Michigan Technological University), Undergraduate Teaching Assistant

# **Currently Advised Students**

Giovanni Bacon	Pursuing a Ph.D. in Planetary Atmospheres at Purdue University. Advised 2022 – Present.
Colin Hamill	Pursing a Ph.D. in Planetary Atmospheres at Purdue University. Advised 2020 – Present.
Ashlynne Gary	Undergraduate Planetary Science major at Purdue University. Advised 2023 – Present.
Sydney Brown	Undergraduate Atmospheric Science major at Purdue University. Advised 2023 – Present.
Mariana Aguilar	Undergraduate Planetary Science and Chemistry major at Purdue University. Joined as part of the Louis Stokes Alliance for Minority Participation program. Advised 2022 – Present.
Rowan Nag	Undergraduate Planetary Sciences major at Purdue University. Advised September 2023 – Present.
Jacob Dorson	Undergraduate Atmospheric Science and Planetary Science major. Advised October 2023 – Present.
Haoyu (Paul) Shen	Undergraduate Physics major. Advised October 2023 – Present.

# Formerly Advised Students

Kevin Walker	Sought M.S. in Planetary Atmospheres at Purdue University. Advised 2020 – 2023.
Tommy Pavell	Undergraduate Planetary Atmospheres major at Purdue University. Advised 2022 – 2023. Graduated May 2023.
Emma Miller	Undergraduate Planetary Atmospheres major at Purdue University. Advised 2022 – 2023. Graduated May 2023.
Kyle Morin	Undergraduate Planetary Science major at Purdue University. Advised summer of 2022. Graduated May 2023.

Katherine Meves	Undergraduate Planetary Science major at Purdue University. Started as a summer researcher through the Summer Research Opportunity in Planetary Science Program and continued in lab. Advised 2021 – 2022.
Logan Grey	Undergraduate Physics major at Purdue University. Currently a part time researcher. Advised 2020 – 2022. Graduated December 2021.
Jasmine Singh	Undergraduate Planetary Atmospheres major at Purdue University. Advised 2020 – 2022. Graduated May 2022.
Julianna Heptinstall	Undergraduate Planetary Atmospheres major at Purdue University. Advised 2020 – 2022. Graduated May 2022
Valeria Garcia	Undergraduate Planetary Atmospheres major at Purdue University. Advised 2020 – 2022. Graduated 2022.
Matt Weller	Postdoctoral Associate at Brown University (co-advised with Prof. Alexander Evans). Advised 2019 – 2021.
Natalie Grober	Undergraduate Planetary Science major with English Minor at Purdue University. Summer researcher as part of the Summer Stay program. Advised 2020. Graduated May 2021.
Kevin Walker	Undergraduate Astrobiology major at Purdue University. Advised 2019-2020. Graduated May 2020.
Robert Washington	Undergraduate Planetary Science major at Purdue University. Advised 2019-2020. Graduated May 2020.
David Tersegno	Ph.D. in Planetary Science at Brown University. Advised 2018-2019.
Dana Altoaimi	Undergraduate Geophysics major at Brown University. Summer researcher as part of the Kaust Grifted Student Program. Advised 2019.
Kimberly Hernandez	Undergraduate Physics major at Wellesley College. Summer researcher as part of the Brown University Leadership Alliance Program. Advised 2019.

#### **Student Committee Service**

Ashley Walker – Ph.D. in Atmospheric Science at Howard University. Served 2021 – Present. Kris Laferriere – PhD. in Planetary Sciences at Purdue University. Served 2020 – Present. Mengxi Wu – Ph.D. in Planetary Sciences at Brown University. Served 2018 – 2019. Laura Lark – Ph.D. in Planetary Sciences at Brown University. Served 2018 – 2019.

## Field Campaign Experience

2011

Ice in Clouds Experiment – Tropical (ICE-T) In-field researcher, ground-based monitoring and data quality control, weather forecasting, and outreach. 2010 Pre-Depression Investigation of Cloud-Systems in the Tropics (PREDICT) Operation, maintenance, and quality control of GPS radio occultation system onboard the NSF/NCAR Gulfstream-V.

#### Laboratory Experience

Grant budget tracking Lab equipment purchases (large [>\$5k] and small [<\$5k]) Instrument development, building, testing, and maintenance Undergraduate, Graduate, and high-school student mentoring Laboratory management Group management Data archiving Environmental, Health, and Safety compliance Chemical inventory maintenance and compliance

## Professional Memberships

American Geophysical Union American Chemical Society American Meteorological Society American Association for Aerosol Research American Astronomical Society - Division of Planetary Sciences American Astronomical Society - Laboratory Astrophysics Division

## In the News and Media

2024	'How is snow made? An atmospheric scientist describes the journey of frozen ice crystals from clouds to the ground' <u>The Conversation</u> ; <i>this article has since been translated into Japanese and can be found <u>here</u></i>
2023	'Billions of Years Ago, Venus May Have Had a Key Earthlike Feature' <u>New York Times article</u> on Weller et al. (2023) paper; <i>this research</i> <i>publication had 200+ placements in the news</i> .
2023	'Studying clouds to learn more about other planets' AccuWeather
2023	'Four EAPS professors chosen by NASA to study lunar science' <u>Purdue</u> <u>Press Release</u>
2023	'Cloud computing and blue-sky thinking: An atmospheric scientist illuminates the science of clouds in Earth's sky and beyond' <u>Purdue Press</u> <u>Release</u>
2023	'Lifting the Veil' <u>Science</u>
2022	Voiceover for Purdue EAPS promotional video
2022	'Head in the Clouds: Examining Clouds to Better Understand Exoplanet Atmospheres' InnovatED article featuring Ph.D. student Colin Hamill

2021	'Atmospheric professors awarded grant for flexible, portable kit-based lab instruction' <u>EAPS Departmental News</u>
2021	'Metal Clouds and Exoplanet Science' Superheroes of Science
2020	'How do you teach when everything changes world-wide at once? EAPS professors share how they managed teaching during a pandemic' <u>EAPS</u> <u>Department News</u>
2019	'Battle of the Exoplanets' BBC Documentary
2019	Scientific photographer for 'Rare metallic asteroids might have erupted molten iron' press release and related coverage <u>Purdue Newsroom</u>
2019	'How do Clouds Form?' Ask EAPS on MIT Open Learning
2019	Commentary on 'How Manganese Played a Pivotal Role in Photosynthesis and Oxidation Protection' <u>Astrobiology at NASA</u>
2017	'Probing Exoplanet Atmospheres' WGBH Science for the Public
2016	'Exoplanet Clouds on Earth' MIT EAPS Scope 2016-2017 Issue
2016	'Clouds Might Ruin Our Chance to Spot Extraterrestrial Life' The Atlantic