

**Daniel J. Czicz**

Professor and Department Head

Purdue University

Earth, Atmospheric and Planetary Sciences

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Professional Preparation:

Ph.D., Geophysical Sciences, The University of Chicago, 1999

M.S., Geophysical Sciences, The University of Chicago, 1997

B.S., Aerospace Engineering, The University of Illinois, 1992

Appointments:

Professor and Department Head, Purdue University, Department of Earth, Atmospheric and Planetary Sciences, 2019 -

Interim Department Head, Purdue University, Department of Statistics, 2023

Associate Professor, Massachusetts Institute of Technology, Earth, Atmospheric and Planetary Sciences and Civil and Environmental Engineering, 2011 – 2019

Affiliate Professor, The University of Washington, Department of Atmospheric Sciences, 2008 - 2014

Senior Scientist and Director, Atmospheric Measurement Lab, Atmospheric Science & Global Change Division, Fundamental Science Directorate, Pacific Northwest National Laboratory (PNNL), 2007 – 2011

Research and Teaching Faculty, Institute for Atmospheric and Climate Science, ETH Zurich, 2005 – 2007

Adjunct Professor, The University of Colorado, Department of Chemistry, 2003 - 2005

Research Scientist I&II, Chemical Sciences Division, National Oceanic and Atmospheric Administration (NOAA) and Cooperative Institute for Research in Environmental Sciences (CIRES), The University of Colorado, 2001 - 2005

Post-Doctoral Fellow, NOAA and CIRES, 1999 – 2001

Maneuver Analyst, Galileo Navigation Team, National Aeronautics and Space Administration (NASA) Jet Propulsion Laboratory (Contracted by Telos Information Systems), 1993 – 1994

Honors:

International Excellence Fellowship, Karlsruhe Institute of Technology, 2023

Big Ten Academic Alliance Executive Officer Program, 2021

Purdue Seeds of Success Award, 2020

Victor Starr Career Development Chair, 2013-16

NASA Group Achievement Award, MACPEX Mission, 2011

NASA Group Achievement Award, ARCTAS Mission, 2008

DOE Outstanding Performance Award, ISDAC Campaign, 2008

Presidential Early Career Award for Scientists and Engineers (PECASE), 2005

CIRES Outstanding Performance Award, 2004

NASA Group Achievement Award, CRYSTAL-FACE Mission, 2002

NASA Group Achievement Award, Galileo Ida/Dactyl Encounter, 1993

Societies:

American Geophysical Union  
American Meteorological Society

External Service:

UCAR President's Advisory Committee on University Relations (PACUR), 2013- 2020 and  
PACUR Chair, 2016-2020, Nomination Committee, 2020 – 2022 and Nomination  
Committee Chair 2021-2022 , MIT & Purdue Member Representative, 2014-  
National Center for Atmospheric Research (NCAR) Observing Facilities Assessment Panel  
(OFAP) 2018-2023 and OFAP Chair, 2021-2023  
Science for the Public (Public Broadcasting) Advisory Board, 2014 – 2021

Internal Service

Purdue

EAPS Department Head, 2019-  
Statistics Interim Department Head, 2023

MIT

EAPS Building Committee, 2012-2018  
PAOC Houghton Committee, 2015-2017  
PAOC Graduate Curriculum Review and Admissions Committee, 2012-13, 2015

External Activities:

Conference Convener: International Workshop on Measurements of Ice Clouds from  
Aircraft, 2010; Telluride Science Research Center Summer Workshop on Aerosols and  
Clouds: Connections from the Laboratory to the Field to the Globe, 2012; Workshop on  
Data Analysis and Presentation of Cloud Microphysical Measurements, Boston, 2014; Fifth  
Ice Nucleation Intercomparison, 2014-15; 3<sup>rd</sup> International Atmospheric Ice Nucleation  
Conference, 2020; Conference Convener: Midwest Climate Workshop, 2022

Editor: Atmospheric Chemistry and Physics (ACP), 2007-2019 (Special Issue Editor,  
'NETCARE', 2016-2018; 'INUIT', 2013-2018; 'CARES', 2011-14; 'ICIS', 2009-11),  
P.N.A.S., 2018-2019 (guest editor); Environmental Research Letters, Aerosol and Cloud  
Special Issue Guest Editor, 2007-08

Mission Flight Scientist: CIRRUS III, 2006, ISDAC, 2008 (co-), CARES, 2010 (co-)

Review Panelist: EU, NSF, NOAA, NASA, DOE, DOE-EMSL

Manuscript Referee: Nature, Science, Nature Geosciences, Proceedings of the National  
Academy of Sciences, Bulletin of the American Meteorological Society, Journal of  
Geophysical Research, Geophysical Research Letters, Journal of the Atmospheric Sciences,  
Journal of Physical Chemistry, Atmospheric Chemistry and Physics, Journal of Atmospheric

Chemistry, Chemical Reviews, Tellus, Aerosol Science and Technology, International Journal of Mass Spectrometry, Environmental Research Letters

Proposal Referee: NSF, NASA, NOAA, DOE, Swiss National Science Foundation, German Research Foundation, Canadian Foundation for Climate and Atmospheric Science, Canadian Research Chairs Council, United Kingdom National Environmental Research Council

Technical Interviews: Associated Press, Popular Science, USA Today, National Geographic, NPR, CBC Radio, New Scientist, The Conversation, Christian Science Monitor, Chemical and Engineering News, E&E News, American Chemical Society Focus Series, Environmental Science and Technology, La Pressa, Royal Society of Chemistry, IWP (EPA) News

Television / YouTube / Podcast Interviews: MIT Faculty Forum, Science for the Public, Superheroes of Science

Technical Reviews: NOVA Lab's (PBS) "Cloud Lab"

Publications:

\*denotes first author by Cziczo group student, post-doc or visiting scientist

\*\*denotes media highlight

\*\*93. Murphy, D. M. [Cziczo 3rd author of 11], Metals from spacecraft reentry in stratospheric aerosol particles, PNAS (2023).

\*92. Lacher, L. [Cziczo 10<sup>th</sup> author of 25], The Puy de Dôme ICe Nucleation Intercomparison Campaign (PICNIC): Comparison between online and offline freezing techniques in ambient air, Atmos. Chem. Phys. Disc. (2023).

91. Haspel, C. [Cziczo 4<sup>th</sup> author of 5], Measurements and Calculations of Enhanced Side/Back Scattering of Visible Radiation by Black Carbon Aggregates, Atmos. Chem. Phys. (2023).

\*90. Koolik, L. [5 authors] and Cziczo, D. J., A Phase Separation Inlet for Droplets, Ice Residuals, and Interstitial Aerosol Particles, Atmos. Meas. Tech. (2022).

\*89. Wolf, M. J. [4 authors] and Cziczo, D. J., A biogenic secondary organic aerosol source of cirrus ice nucleating particles, ACS Earth Space Chem., 5, 2074–2085 (2021).

\*88. Roesch, C. [5 authors] and Cziczo, D. J., CCN and INP activity of middle eastern soil dust, Aeolian Research, 52,100729 (2021).

\*87. Roesch, M. and Cziczo, D. J., Aqueous particle generation with a 3D printed nebulizer, Atmos. Meas. Tech., 13, 6807–6812 (2020).

86. Kulkarni, G. [Cziczo 6<sup>th</sup> author of 7], A new method for operating a continuous-flow diffusion chamber to investigate immersion freezing: assessment and performance study, Atmos. Meas. Tech., 13, 6631–6643 (2020).

\*85. Zhang, C.[6 authors] and Cziczo, D. J., The effects of morphology, mobility size, and secondary organic aerosol (SOA) material coating on the ice nucleation activity of black carbon in the cirrus regime, Atmos. Chem. Phys., 20, 13957–13984 (2020).

\*84. Wolf, M. J. [18 authors] and Cziczo, D. J., A biogenic secondary organic aerosol source of cirrus ice nucleating particles, Nature Communications, 11, 4834 (2020).

\*83. Wolf, M. J. [10 authors] and Cziczo, D. J., A link between the ice nucleation activity and the biogeochemistry of seawater, Atmos. Chem. Phys., 20, 15341–15356 (2020).

\*82. Zawadowicz, M. A. [6 authors] and Cziczo, D. J., Quantifying and improving the optical performance of the Laser Ablation Aerosol Particle Time of Flight Mass Spectrometer (LAAPToF) instrument, Aero. Sci. Tech., DOI: 10.1080/02786826.2020.1724867 (2020).

81. Cziczo, D. J., Wolf, M. J., Gasparini, B, Münch, S. and Lohmann, U., Unanticipated Side Effects of Stratospheric Albedo Modification Proposals Due to Aerosol Composition and Phase, Nature Scientific Reports, 9, 18825 (2019).

80. Nichman, L., [7 authors] and Cziczo, D. J., Laboratory study of the heterogeneous ice nucleation on black carbon containing aerosol, *Atmos. Chem. Phys.*, 19, 12175–12194 (2019).
- \*79. Zawadowicz, M. A. [7 authors] and Cziczo, D. J., Model-measurement consistency and limits of bioaerosol abundance over the continental United States, *Atmos. Chem. Phys.*, 19, 13859–13870 (2019).
78. Umo, N. [Cziczo 6<sup>th</sup> author of 9], D. J., Enhanced ice nucleation activity of coal fly ash aerosol particles initiated by ice-filled pores, *Atmos. Chem. Phys.*, 19, 8783 (2019).
77. Ullrich, R. [Cziczo 3<sup>rd</sup> author of 12], Comparison of Modeled and Measured Ice Nucleating Particle Composition a Cirrus Cloud, *J. Atmos. Sci.* 76, 4 (2019).
- \*76. Wolf, M. J. [6 authors] and Cziczo, D. J., Investigating the Heterogeneous Ice Nucleation of Sea Spray Aerosols Using *Prochlorococcus* as a Model Source of Marine Organic Matter, *Environ. Sci. and Tech.*, 53, 1139 (2019).
75. DeMott, P. J. [Cziczo 3<sup>rd</sup> author of 54], The Fifth International Workshop on Ice Nucleation phase 2 (FIN-02): laboratory intercomparison of ice nucleation measurements, *Atmos. Meas. Tech.*, 11, 6231–6257 (2018).
- \*74. Kong, X., Wolf, M. J., Thomson, E., Bartels-Rausch, T., Prisle, N. and Cziczo, D. J., A Continuous Flow Diffusion Chamber Study of Sea Salt Particles Acting as Cloud Nuclei: Deliquescence and Ice Nucleation, *Tellus B*, 70, 1463806 (2018).
- \*73. Christopoulos, C. D., Garimella, S., Zawadowicz, M. A., Moehler, O. and Cziczo, D. J., A Machine Learning Approach to Aerosol Classification for Single Particle Mass Spectrometry, *Atmos. Meas. Tech.*, 11, 5687–5699 (2018).
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- \*71. Osman, M., Zawadowicz, M. A., Das, S. B., and Cziczo, D. J., Real time analyses of insoluble particles in glacial ice using single particle mass spectrometry, *Atmos. Meas. Tech.*, 10, 4459–4477 (2017).
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- \*68. Roesch, M. and Cziczo, D. J., Dry particle generation with a 3D printed fluidized bed generator, *Atmos. Meas. Tech.* 10, 1999–2007 (2017).

67. Hiranuma, N., [10 authors] Cziczo, D. J., Development and characterization of an ice-selecting pumped counterflow virtual impactor (IS-PCVI) to study ice crystal residuals, *Atmos. Meas. Tech.*, 9, 3817–3836 (2016).
- \*66. Garimella, S., [21 authors], Cziczo, D. J., The SPectrometer for Ice Nuclei (SPIN): A new instrument to investigate ice nucleation, *Atmos. Meas. Tech.*, 9, 2781–2795 (2016).
65. Tang, M., Cziczo, D. J., and Grassian, V., Interactions of Water with Mineral Dust Aerosol: Water Adsorption, Hygroscopicity, Cloud Condensation, and Ice Nucleation, *Chem. Rev.*, DOI: 10.1021/acs.chemrev.5b00529 (2016).
- \*64. Zawadowicz, M. A, Abdelmonem, A., Mohr, C., Saathoff, H., Froyd, K. D., Murphy, D. M., Leisner, T., and Cziczo, D. J., Single-Particle Time-of-Flight Mass Spectrometry Utilizing a Femtosecond Desorption and Ionization Laser, *Anal. Chem.* 10.1021 (2015).
- \*,\*\*63. Ardon-Dryer, K., Huang, Y.-W. and Cziczo, D. J., Laboratory studies of collection efficiency of sub-micrometer aerosol particles by cloud droplets on a single-droplet basis, *Atmos. Chem. Phys.*, 15, 9159–9171 (2015).
- \*62. Zawadowicz, M. A, Proud, S. R., Seppalainen, S. S. and Cziczo, D. J., Hygroscopic and phase separation properties of ammonium sulfate/organics/water ternary solutions, *Atmos. Chem. Phys.*, 15, 8975–8986 (2015).
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58. Cziczo, D. J. and K. D. Froyd, Sampling the Composition of Cirrus Ice Residuals, *Atmos. Res.*, 142, 15-31 (2014).
- \*\*57. Cziczo, D. J. et al. Ice nucleation by surrogates of Martian mineral dust: What can we learn about Mars without leaving Earth?, *J. Geophys. Res. : Planets*, 118, 1–10 (2013).
- \*\*56. Cziczo, D. J. et al. Clarifying the dominant sources and mechanisms of cirrus cloud formation, *Science*, 340, 1320-1323 (2013).
- \*55. Friedman, B., [10 authors], Cziczo, D. J., Cloud Condensation Nuclei Measurements at a High Elevation Site: Composition and Hygroscopicity, *A.C.P.*, 13, 11839-11851 (2013).
- \*54. Pekour, M. [6 authors], Cziczo, D. J., Development of a new airborne humidigraph system, *Aero. Sci. Tech.* 47, 201-207 (2013).

53. Baustian, K. J., D. J. Cziczo, M. E. Wise, K. A. Pratt, G. Kulkarni, A. G. Hallar and M. A. Tolbert, Importance of Aerosol Composition, Mixing State and Morphology for Depositional Ice Nucleation: A Combined Field and Laboratory Approach, *J. Geophys. Res.* 117, D06217 (2012).
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51. Pierce, J. R. et al. [Cziczo 8<sup>th</sup> author of 21], Nucleation and Condensational Growth to CCN Sizes During a Sustained Pristine Biogenic SOA Event in a Forested Mountain Valley, *A.C.P.*, 12, 3147-3163 (2012).
50. Wong, J. P. S., A. K. Y. Lee, J.G. Slowik, D. J. Cziczo, W. R. Leitch, A. Macdonald, and J. P. D. Abbatt, Oxidation of Ambient Biogenic Secondary Organic Aerosol by Hydroxyl Radicals: Effects on Cloud Condensation Nuclei Activity, *Geophys. Res. Lett.*, 10.1029/2011GL049351 (2011).
49. Baumgardner, D. [Cziczo 8<sup>th</sup> author of 28], In Situ, Airborne Instrumentation: Addressing and Solving Measurement Problems in Ice Clouds, *B.A.M.S.* 10.1175/BAMS-D-11-00123.1 (2011).
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47. Slowik, J. G., D. J. Cziczo, and J. P. D. Abbatt, Analysis of Cloud Condensation Nuclei Composition and Growth Kinetics Using a Pumped Counterflow Virtual Impactor and Aerosol Mass Spectrometer, *A.M.T.* 10.5194/amt-4-1677-2011 (2011).
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43. McFarquhar, G. [Cziczo 11<sup>th</sup> author of 28], Indirect and Semi-Direct Aerosol Campaign (ISDAC): The Impact of Arctic Aerosols on Clouds, *B.A.M.S.* 10.1175/2010BAMS2935.1 (2010).
42. Kamphus, M., M. Ettner-Mahl, T. Klimach, F. Drewnick, L. Keller, D. J. Cziczo, S. Mertes, S. Borrmann, and J. Curtius, Chemical Composition of Ambient Aerosol, Ice Residues and Cloud Droplet Residues in Mixed-Phase Clouds: Single Particle Analysis During the Cloud and Aerosol Characterization Experiment (CLACE 6), *A.C.P.* 10, 8077 (2010).

41. Spichtinger, P., and D. J. Cziczo, Impact of Heterogeneous Ice Nuclei on Homogeneous Freezing Events, *J. Geophys. Res.* 10.1029/2009JD012168 (2010).
40. Kammermann, L. [Cziczo 4<sup>th</sup> author of 9], Arctic Atmospheric Aerosol Composition 3: CCN Prediction Using Hygroscopic Growth Factors as a Chemistry Proxy, *J. Geophys. Res.* 10.1029/2009JD012447 (2010).
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38. Cziczo, D. J. et al., Inadvertent Climate Modification Due to Anthropogenic Lead, *Nature Geosciences*, 10.1038/ngeo499 (2009).
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34. Cozic, J. Mertes, S., Verheggen, B., Cziczo, D. J., et al., Black Carbon Enrichment in Atmospheric Ice Particle Residuals Observed in Lower Tropospheric Mixed-Phase Clouds, *J. Geophys. Res.*, 10.1029/2007JD009266 (2008).
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27. Cziczo, D. J., D. S. Thomson, T. Thompson, P. J. DeMott, and D. M. Murphy, Aerosol Mass Spectrometry Studies of Ice Nuclei and Other Low Number Density Particles, *I.J.M.S.*, 258, 21 (2006).
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24. Murphy, D. M., Cziczo, D. J., et al., Single-Particle Mass Spectrometry of Tropospheric Aerosol Particles, *J. Geophys. Res.*, 10.1029/2006JD007340 (2006).
23. Zobrist, B. [Cziczo 9<sup>th</sup> author of 13], Oxalic Acid as Heterogeneous Ice Nucleus in the Upper Troposphere and its Indirect Aerosol Effect, *A.C.P.D.*, 6, 3115 (2006).
22. Jensen, E. [Cziczo 13<sup>th</sup> author of 18], Ice Supersaturations Exceeding 100% at the Cold Tropical Tropopause: Implications for Cirrus Formation and Dehydration, *Atmos. Chem. Phys.*, 5, 851 (2005).
21. Brock, C. A. [Cziczo 8<sup>th</sup> author of 23] Chemical and Microphysical Characteristics of Aerosols in the Free Troposphere Near the West Coast of North America, *J. Geophys. Res.*, 10.1029/2003JD004198 (2004).
20. Hudson, P. K., Murphy, D. M., Cziczo, D. J. et al., Biomass burning particle measurements: characteristic composition and chemical processing, *J. Geophys. Res.* 10.1029/2003JD004398 (2004).
19. Jost, H.-J. [Cziczo 8<sup>th</sup> author of 19] In-situ observations of mid-latitude forest fire plumes deep in the stratosphere, *Geophys. Res. Lett.*, 10.1029/2003GL019253 (2004).
18. Murphy, D. M., Cziczo, D. J., et al., Particle Generation and Resuspension in Aircraft Inlets When Flying in Clouds, *Aero. Sci. Tech.*, 38, 400 (2004).
17. Murphy, D. M., D. J. Cziczo, P. K. Hudson, M. E. Schein, and D. S. Thomson, Particle Density Inferred from Simultaneous Optical and Aerodynamic Diameters Sorted by Composition, *J. Aero. Sci.*, 35, 135 (2004).
16. Ray, E. A. Rosenlof, K. H., Richard, E. C., Hudson, P. K., Cziczo, D. J., et al., Evidence of the Effect of Summertime Midlatitude Convection on the Subtropical Lower Stratosphere from CRYSTAL-FACE Tracer Measurements, *J. Geophys. Res.*, 10.1029/2003JD004143 (2004).
15. Tuck, A. [Cziczo 8<sup>th</sup> author of 15] Horizontal Variability 1-2 km Below the Tropical Tropopause, *J. Geophys. Res.*, 10.1029/2003JD003942 (2004).
14. Cziczo, D. J., et al., Observations of Organic Species and Atmospheric Ice Formation, *Geophys. Res. Lett.*, 10.1029/2004GL019822 (2004).

13. Cziczo, D. J., D. M. Murphy, P. K. Hudson, and D. S. Thomson, Single Particle Measurements of the Chemical Composition of Cirrus Ice Residue During CRYSTAL-FACE, *J. Geophys. Res.*, 10.1029/2003JD004032 (2004).
12. Cziczo, D. J., et al., A Method for Single Particle Mass Spectrometry of Ice Nuclei, *Aero. Sci. Tech.*, 37, 460 (2003).
11. DeMott, P. J., D. J. Cziczo, A. Prenni, D. M. Murphy, S. Kreidenweis, D. S. Thomson, and R. Borys, Compositions and Concentrations of Atmospheric Ice Nuclei, *P.N.A.S.*, 100, 14655 (2003).
10. Eliason, T. L., S. Aloisio, D. J. Donaldson, D. J. Cziczo and V. Vaida, Processing of Unsaturated Organic Acid Films and Aerosols by Ozone, *Atmos. Environ.*, 37, 2207 (2003).
9. Wise, M. E., S. D. Brooks, D. J. Cziczo, and M. A. Tolbert, Solubility and Freezing Effects of  $\text{Fe}^{2+}$  and  $\text{Mg}^{2+}$  Solutions at Upper Tropospheric and Lower Stratospheric Temperatures and Compositions, *J. Geophys. Res.*, 10.1029/2003JD003420 (2003).
8. Cziczo, D. J., D. M. Murphy, D. S. Thomson, and M. Ross, Composition of Individual Particles in the Plume Wakes of an Athena II Rocket and the Space Shuttle, *Geophys. Res. Lett.*, 10.1029/2002GL015991 (2002).
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5. Cziczo, D. J., D. S. Thomson, and D. M. Murphy, Ablation, Flux and Atmospheric Implications of Meteors Inferred from Stratospheric Aerosol, *Science*, 291, 1772 (2001).
4. Cziczo, D. J., and J. P. D. Abbatt, Infrared Observations of the Response of  $\text{NaCl}$ ,  $\text{NH}_4\text{HSO}_4$ ,  $\text{MgCl}_2$ ,  $\text{NH}_4\text{HSO}_4$ , and  $\text{NH}_4\text{NO}_3$  Aerosols to Changes in Relative Humidity from 298 to 238 K, *J. Phys. Chem. A.*, 104, 4825 (2000).
3. Arora, O. P., D. J. Cziczo, A. M. Morgan, J. P. D. Abbatt, and R. F. Niedziela, Uptake of Nitric Acid by Sub-Micron-Sized Ice Particles, *Geophys. Res. Lett.*, 26, 3621 (1999).
2. Cziczo, D. J., and J. P. D. Abbatt, Deliquescence, Efflorescence, and Supercooling of  $(\text{NH}_4)_2\text{SO}_4$  Aerosols at Low Temperature: Implications for Cirrus Cloud Formation and Aerosol Phase in the Atmosphere, *J. Geophys. Res.*, 104, 13,781 (1999).
1. Cziczo, D. J., J. B. Nowak, J. H. Hu, and J. P. D. Abbatt, Infrared Spectroscopy of Model Tropospheric Aerosols as a Function of Relative Humidity: Observations of Deliquescence and Crystallization, *J. Geophys. Res.*, 102, 18,843 (1997).