Dr. Matthew E. Wise
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Education

University of Colorado at Boulder, Boulder, CO
Ph.D., Analytical/Atmospheric Chemistry, May 2004.

• Thesis: "Laboratory studies of sulfate aerosols at upper tropospheric and lower stratospheric temperatures and compositions." Thesis committee: Prof. Margaret A. Tolbert (CU, advisor), Dr. Daniel J. Cziczo (NOAA), Prof. O. Brian Toon (CU), Prof. Carl A. Koval (CU), and Prof. Jose L. Jimenez (CU).

Ohio University, Athens, OH
B.S., Chemical Engineering, June 1998.

• Minors in chemistry and mathematics

Work Experience

Associate Chair for Undergraduate Academic Affairs, Department of Chemistry, University of Colorado, Boulder, CO, July 2021 – present.

Director of Chemistry Instruction and Senior Instructor, Department of Chemistry, University of Colorado, Boulder, CO, Aug. 2020 – present.

Director of General Chemistry Laboratories, Department of Chemistry, University of Colorado, Boulder, CO, Aug. 2018 – Aug. 2020.

Professor of Chemistry, College of Arts and Sciences, Concordia University, Portland, OR, Aug. 2011 – Aug. 2018

Research Experience

Summer Undergraduate Research Institute, Portland, OR, July 2012 – Aug. 2018

• Studied freezing point depression and cirrus cloud nucleation mechanisms using a differential scanning calorimeter.
• Fabricated an aerosol particle impactor using rapid-prototyping, 3-D printing technology.
• Authored two papers that appeared in the Journal of Chemical Education.
• Worked with eleven Concordia University, Portland undergraduate science students.

Visiting Faculty, Pacific Northwest National Laboratory, Richland, WA, summer 2014 and 2015. Co-PI: Dr. John Shilling

• ~$51,000 Department of Energy grants
• Studied the optical and physical properties of secondary organic aerosol particles using a UV/Vis and FTIR spectrometer.
• Co-authored a paper that appeared in Atmospheric Chemistry and Physics in 2016.
• Worked with two Concordia University, Portland undergraduate science students.

Research Associate, Cooperative Institute for Research in Environmental Sciences, Boulder, CO, July 2007 – Aug. 2011. Supervisor: Prof. Margaret A. Tolbert

• Studied the phase transitions of atmospherically relevant aerosol particles using a Raman microscope.

Postdoctoral Research Associate, Department of Geological Sciences, Arizona State University, Tempe, AZ, May 2004 – July 2006. Supervisor: Prof. Peter R. Buseck

• Pioneered the use of a transmission electron microscope with an environmental cell (ETEM) to study phase transitions of atmospherically relevant aerosol particles.

Graduate Research Associate, Department of Chemistry and Biochemistry, University of Colorado at Boulder, Boulder, CO, Aug. 1998 – May 2004. Supervisor: Prof. Margaret A. Tolbert

• Studied phase transitions of atmospherically relevant aerosol particles using a Fourier transform infrared spectrometer.

Competitive Research Grants

• Murdock College Research Program for Natural Sciences – Physical Sciences (2017-2018): "The use of civilian unmanned aerial vehicle (UAV) technology to sample and characterize atmospheric aerosol particles in the Pacific Northwest"

• Concordia University Faculty Research Grants (2013, 2014, 2015, 2016, 2018)

Honors

• Student nomination for Concordia University College of Arts and Sciences professor of the year (2015, 2018)
• NASA Earth System Science Fellowship 2000-2003 (ESS/00-0000-0109)
• Arizona State University Honors Disciplinary Faculty
• Exemplary faculty recognition by Disabilities Services at the University of Colorado

Professional Association Memberships

• American Chemical Society

Compiled Textbooks

(4) **Wise, M.E.:** Introduction to Science (online edition), Kendal Hunt Publishing, Dubuque, IA, 2012.

(3) **Wise, M.E.:** Introduction to Science, Kendal Hunt Publishing, Dubuque, IA, 2012.

(2) **Wise, M.E. and N. Rontu-Carlon:** Environmental Chemistry 2, Kendal Hunt Publishing, Dubuque, IA, 2012.

(1) **Wise, M.E.:** Environmental Chemistry, Kendal Hunt Publishing, Dubuque, IA, 2011.

Peer-Reviewed Journal Publications

(31) D'Ambro, E. L., Schobesberger, S., Gaston, C. J., Lopez-Hilfiker, F. D., Lee, B. H., Liu, J., Zelenyuk, A., Bell, D., Cappa, C. D., Helgestad, T., Li, Z., Guenther, A., Wang, J., **Wise, M**., Caylor, R., Surratt, J. D., Riedel, T., Hyttinen, N., Salo, V.-T., Hasan, G., Kurtén, T., Shilling, J. E., and Thornton, J. A.: Chamber-based insights into the factors controlling epoxydiol (IEPOX) secondary organic aerosol (SOA) yield, composition, and volatility, Atmos. Chem. Phys., 19, 11253-11265, 2019.

(30) Crosby, C.M., Maldonado, R., Hong, A., Caylor, R. and **Wise, M.E.**, Investigating NO_x concentrations on an urban university campus using passive air samplers and UV-Vis spectroscopy, *J. Chem. Ed*., 95 (11), 2023-2027, 2018.

(29) Liu, J., Lin, P., Laskin, A., Laskin, J., Kathmann, S.M., **Wise, M.**, Caylor, R., Imholt, F., Selimovic, V. and Shilling, J.E., Optical properties and aging of light absorbing secondary organic aerosol, *Atmos. Chem. Phys.*, 16, 12815-12827, 2016.

(28) Liu, J., Lin, P., Laskin, A., Laskin, J., Kathmann, S.M., **Wise, M.**, Caylor, R., Imholt, F., Selimovic, V. and Shilling, J.E., Optical properties and aging of light absorbing secondary organic aerosol, *Atmos. Chem. Phys. Discuss*, doi:10.5194/acp-2016, 2016.

(27) Bodzewski, K.Y., Caylor, R.L., Comstock, A.M., Hadley, A.T., Imholt, F.M., Kirwan, K.D., Oyama, A.S., and **Wise, M.E.,** Investigating freezing point depression and cirrus cloud nucleation mechanisms using a differential scanning calorimeter, *J. Chem. Ed*., 93 (4), 729-732, 2016.

(26) Baustian, K. J., **Wise, M. E.,** Jensen, E. J., Schill, G. P., Freedman, M. A., and Tolbert, M. A.: State transformations and ice nucleation in amorphous (semi-) solid organic aerosol, *Atmos. Chem. Phys*., 13, 5615-5628, 2013.

(25) Baustian, K.J., **M. E. Wise**, E. J. Jensen, G. P. Schill, M. A. Freedman, and M. A. Tolbert, State transformations and ice nucleation in glassy or (semi-) solid amorphous organic aerosol, *Atmos. Chem. Phys. Discuss*., 12, 27333-27366, 2012.

(24) **Wise, M.E.**, K.J. Baustian, T. Koop, M.A. Freedman, E. J. Jensen and M.A. Tolbert, Depositional ice nucleation onto hydrated NaCl particles: A new mechanism for ice formation in the troposphere, *Atmos. Chem. and Phys.*, 12, 1121-1134, 2012.

(23) 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 heterogeneous ice nucleation: A combined field and laboratory approach, *J. Geohys., Res.,* 117, D6, 2012.

(22) **Wise, M.E.**, K.J. Baustian, T. Koop, M.A. Freedman, E. J. Jensen and M.A. Tolbert, Depositional ice nucleation onto hydrated NaCl particles: A new mechanism for ice formation in the troposphere, *Atmos. Chem. and Phys. Discuss.*, 11, 23139-23167, 2011.

(21) Gough, R.V., V.F. Chevrier, K.J. Baustian, **M.E. Wise** and M.A. Tolbert, Laboratory studies of perchlorate phase transitions: Support for metastable aqueous perchlorate solutions on Mars, *Earth and Planetary Science Letters*, 312 (3-4), 371-377, 2011.

(20) Freedman, M.A., K.J. Baustian, **M.E. Wise** and M.A. Tolbert, Characterizing the morphology of organic aerosols at ambient temperature and pressure, *Anal. Chem.*, *82*, 7965-7972, 2010.

(19) Baustian, K.J., **M.E. Wise** and M.A. Tolbert, Depositional ice nucleation on solid ammonium sulfate and glutaric acid particles, *Atmos. Chem. and Phys., 10*, 2307-2317, 2010.

(18) **Wise, M.E.**, K.J. Baustian, and M. Tolbert, Water uptake and depositional ice nucleation on ammonium sulfate particles coated with palmitic acid : Impact on cirrus clouds, *PNAS*, *107* (15), 6693-6698, 2010.

(17) Baustian, K.J., **M.E. Wise** and M.A. Tolbert, Depositional ice nucleation on solid ammonium sulfate and glutaric acid particles, *Atmos. Chem. and Phys. Discuss., 9*, 20949-20977, 2009.

(16) **Wise, M.E.**, K. Baustian, and M. Tolbert, Laboratory studies of ice formation pathways from ammonium sulfate particles, *Atmos. Chem. and Phys., 9*, 1639-1646, 2009.

(15) **Wise, M. E.**, E. J. Freney, C. A. Tyree, J. O. Allen, S. T. Martin, L. M. Russell, and P. R. Buseck, Hygroscopic behavior of aerosol particles generated from natural and artificial seawaters, *J. Geophys. Res*., *114*, D03201, doi:10.1029/2008JD010449, 2009.

(14) **Wise, M. E.**, K. Baustian, and M. Tolbert, Laboratory studies of ice formation pathways from ammonium sulfate particles, *Atmos. Chem. and Phys. Discuss.*, *8*, 15101-15129, 2008.

(13) **Wise, M. E.**, S. T. Martin, L. M. Russell, and P. R. Buseck, Water uptake by NaCl particles prior to deliquescence and a modified phase rule, *Aerosol Sci. Tech*., *42*, 281-294, 2008.

(12) **Wise, M. E.**, T. A. Semeniuk, R. Bruintjes, S. T. Martin, L. M. Russell, and P. R. Buseck, Hygroscopic behavior of NaCl-bearing natural aerosol particles using environmental transmission electron microscopy, *J. Geophys. Res*., *112* (D10), 2007.

(11) T. A. Semeniuk, **Wise, M. E.**, S. T. Martin, L. M. Russell, and P. R. Buseck, Water uptake characteristics of individual atmospheric particles having coatings, *Atmos. Env.*, *41*, 6225-6235, 2007.

(10) T. A. Semeniuk, **Wise, M. E.**, S. T. Martin, L. M. Russell, and P. R. Buseck, Hygroscopic behavior of aerosol particles from biomass fires using environmental transmission electron microscopy, *J. Atmos. Chem.*, *56* (3), 259-273, 2007.

(9) Katrib, Y., G. Biskos, P. R. Buseck, P. Davidovits, J. T. Jayne, M. Mochida, **M. E. Wise**, D. R. Worsnop, and S. T. Martin, Ozonolysis of mixed oleic-acid/stearic-acid particles: Reaction kinetics and chemical morphology, *J. Phys. Chem. A*, *109*, 10910-10919, 2005.

(8) **Wise, M. E.**, G. Biskos, S. T. Martin,L. M. Russell, and P. R. Buseck, Phase transitions of single salt particles studied using a transmission electron microscope with an environmental cell, *Aerosol Sci. Tech*., *39* (9), 849-856, 2005.

(7) Garland, R. M., **M. E. Wise**, M. R. Beaver, H. L. DeWitt, A. C. Aiken, J. L. Jimenez, and M. A. Tolbert, Impact of palmitic acid coating on the water uptake and loss of ammonium sulfate particles, *Atmos. Chem. Phys.*, *5*, 1951-1961, 2005.

(6) **Wise, M. E.**, R. M. Garland, and M. A. Tolbert, Ice nucleation in internally mixed ammonium sulfate/dicarboxylic acid particles, *J. Geophys. Res.*, *109* (D19), 2004.

(5) **Wise, M. E.**, J. D. Surratt, D. B. Curtis, J. E. Shilling, and M. A. Tolbert, Hygroscopic growth of ammonium sulfate/dicarboxylic acids, *J. Geophys. Res.*, *108* (D20), 4638-4645, 2003.

(4) **Wise, M. E.**, S. D. Brooks, R. M. Garland, D. J. Cziczo, S. T. Martin, and M. A. Tolbert, Solubility and freezing effects of Fe^{2+} and Mg^{2+} in H_2SO_4 solutions representative of upper tropospheric and lower stratospheric sulfate particles, *J. Geophys. Res.*, *108* (D14), 4434-4444, 2003.

(3) Brooks, S. D., R. M. Garland, **M. E. Wise**, A. J. Prenni, M. Cushing, E. Hewitt, and M. A. Tolbert, Phase changes in internally mixed maleic acid/ammonium sulfate aerosols, *J. Geophys. Res.*, *108* (D15), 4487-4496, 2003.

(2) Brooks, S. D., **M. E. Wise**, M. Cushing, and M. A. Tolbert, Deliquescence behavior of organic/ammonium sulfate aerosol, *Geophys. Res. Lett.*, *29* (19), 1917-1920, 2002.

(1) Prenni, A. J., **M. E. Wise**, S. D. Brooks, and M. A. Tolbert, Ice nucleation in sulfuric acid and ammonium sulfate particles, *J. Geophys. Res.*, *106* (D3), 3037-3044, 2001.

Conference Oral (O) and Poster (P) Presentations

(16) Bishop, L. and **M.E. Wise,** Chemistry Labs – Navigating Through the Pandemic with Lab Kits, *2021 OLC Innovate Conference,* online, March 2021. (O)

(15) Vincent, S.J., Daley, S.D. and **M.E. Wise**, Digital fabrication of an atmospheric aerosol particle impactor, *2017 Murdock College Science Research Conference*, Spokane, WA, November 2017. (P)

(14) Taylor, J., Daley, S.D. and **M.E. Wise**, Raspberry Pi Sensor Array, *2017 Murdock College Science Research Conference*, Spokane, WA, November 2017. (P)

(13) Vincent, S.J., Daley, S.D. and **M.E. Wise**, Digital fabrication of an atmospheric aerosol particle impactor, *2017 Oregon Academy of Science Meeting*, Corvallis, OR, February 2017. (P)

(12) Caylor, R.L., Shilling, J.E., and **M.E. Wise,** Peroxide content of secondary organic aerosol, *2015 Murdock College Science Research Conference*, Vancouver, WA, November 2015. (P)

(11) Imholt, F.M., Caylor, R.L., Shilling, J.E., and **M.E. Wise,** Optical properties of secondary organic aerosols*, 2014 Murdock College Science Research Conference*, Vancouver, WA, November 2014. (P)

(10) Imholt, F.M., Caylor, R.L., Shilling, J.E., and **M.E. Wise,** Composition and optical properties of secondary organic aerosol particles*, 2014 Murdock College Science Research Conference*, Vancouver, WA, November 2014. (O)

(9) Caylor, R.L., Imholt, F.M., Shilling, J.E., and **M.E. Wise,** Composition of secondary organic aerosols, *2014 Murdock College Science Research Conference*, Vancouver, WA, November 2014. (P)

(8) Selimovic, V., Shilling, J.E., and **M.E. Wise**, Determining the optical properties of secondary organic aerosols using UV-Vis spectroscopy, *2014 Oregon Academy of Science Meeting,* Eugene, OR, March 2014. (O)

(7) **Wise, M. E.**, K. J. Baustian, T. Koop, M. Freedman, E.J. Jensen, and M. A. Tolbert, Deliquescence, efflorescence and ice nucleating ability of NaCl/hydrated NaCl particles under upper tropospheric conditions, *2010 American Geophysical Union Meeting*, San Francisco, CA, December 2010. Paper A21F-0156. (P)

(6) **Wise, M. E.**, K. J. Baustian, and M. A. Tolbert, Laboratory studies of ice formation pathways from ammonium sulfate particles, *2008 American Geophysical Union Meeting*, San Francisco, CA, December 2008. Paper A41J-0247. (P)

(5) **Wise, M. E.**, G. Biskos, S. T. Martin, and P. R. Buseck, Deliquescence investigated by environmental transmission electron microscopy, *2004 American Geophysical Union Meeting*, San Francisco, CA, December 2004. Paper A54B-03. (O)

(4) **Wise, M. E.**, R. M. Garland, and M. A. Tolbert, Ice nucleation in internally mixed ammonium sulfate/dicarboxylic acid particles, *2003 American Geophysical Union Meeting*, San Francisco, CA, December 2003. Paper A42E-07. (O)

(3) **Wise, M. E.**, S.D. Brooks, R. M. Garland, D. J. Cziczo, D. M. Murphy, S. T. Martin, and M. A. Tolbert, Solubility and freezing effects of Fe^{2+} and Mg^{2+} in H_2SO_4 solutions at upper tropospheric and lower stratospheric temperatures and compositions, *2002 American Geophysical Union Meeting*, San Francisco, CA, December 2002. Paper A71F-08. (O)

(2) **Wise, M. E.**, A. J. Prenni, S. D. Brooks, D. J. Cziczo, D. M. Murphy, and M. A. Tolbert, Ice nucleation and solubility studies of sulfates representative of the upper tropospheric aerosol, *The 2000 Conference on the Atmospheric Effects of Aviation*, Snowmass Village, CO, June 2000. (P)

(1) **Wise, M. E.**, N. P. Magtoto, and H. H. Richardson, Probing surface reaction mechanism using in-situ FTIR spectroscopy: NO and CO reaction on a platinum surface, *1997 Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy*, Atlanta, GA, March 1997. (O)