

Christina S. McCluskey

Project Scientist I
National Center for Atmospheric Science
Boulder, Colorado, USA

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EDUCATION

PhD Atmospheric Science, *Colorado State University, Fort Collins, CO* December 2017
Dissertation Topic: Exploring links between the abundance of ice nucleating particles in sea spray aerosol and ocean biological activity via laboratory mesocosms and field observations.
Co-advisors: Sonia Kreidenweis and Paul DeMott

M.S. Atmospheric Science, *Colorado State University, Fort Collins, CO* December 2013
Thesis Topic: Characteristics of atmospheric ice nucleating particles associated with biomass burning in the US: prescribed burns and wildfires
Co-advisors: Sonia Kreidenweis and Paul DeMott

B.S. Chemistry, Mathematics Minor, *Coastal Carolina University, Conway, SC* May 2011

PROFESSIONAL EXPERIENCES

Project Scientist I Jan 2020 – Present
Climate and Global Dynamics Lab, National Center for Atmospheric Science Boulder, CO

- Utilizing remote sensing observations and in situ measurements of aerosols to improve aerosol-cloud-climate interactions model representation
- Designing simulations with the NCAR Community Earth System Model (CESM) and single column atmosphere model (SCAM)

Postdoctoral Fellow Jan 2018 – Dec 2019
Advanced Study Program, National Center for Atmospheric Science Boulder, CO

- Utilized observations and modeling tools to investigate aerosol-cloud interactions
- Flight Scientist, Southern Ocean Clouds, Radiation, Aerosol Transport Experimental Study (SOCRATES)
- Designed and conducted CESM experiments to investigate cloud microphysical processes
- Mentored 4 graduate students during the 2018 Advanced Study Program Summer Symposium on observations and modeling

Graduate Research Assistant Jul 2011 – Dec 2017
Department of Atmospheric Science, Colorado State University Fort Collins, CO

- Characterized the abundance, composition, ice nucleation, and cloud activation properties of atmospheric aerosols with observations and modeling
- Managed research scope, communications, resources, shipping, timelines, decision making, and conflict management associated with two international research campaigns
- Contributed to success and management of fourteen field and two method-development projects

Undergraduate Research Student, Simpson and Slusher Research Groups Aug 2010 – May 2011
Department of Chemistry and Physics, Coastal Carolina University Conway, SC

- Developed methods for atmospheric ozone measurements (Slusher) and for detecting bisphenol-A using Solid Phase Micro-Extraction with GC-FID (Simpson)

NSF REU Intern, Collett Research Group May 2010 – Aug 2010
Department of Atmospheric Science, Colorado State University Fort Collins, CO

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- Evaluated nitrogen deposition in the Rocky Mountain National Park using an Ion Chromatograph and a Total Carbon/Total Nitrogen Analyzer

NASA Student Airborne Research Program Intern, Blake Research Group
Student Airborne Research Program, NASA, University of California - Irvine

Jul 2009 – Aug 2009
Irvine, CA

- Investigated dairy farm contributions to California Central Valley ozone production with the Whole Air Sampler on NASA's DC-8 scientific aircraft.

RESEARCH GRANTS

Co-I, "Freezing Processes in Southern Ocean Mixed Phased Clouds", Department of Energy
October 2019 – August 2022, PI Andrew Gettelman, Co-I Laura Riihimaki

PEER-REVIEWED PUBLICATIONS

1. **McCluskey, C. S.**, P. J. DeMott, P. Maand, and S. M. Burrows (2019), Numerical Representations of Marine Ice Nucleating Particles in Remote Marine Environments Evaluated Against Observations, *Geophys. Res. Lett.*, doi: 10.1029/2018GL081861.
2. Levin, E. J. T, P. J. DeMott, K. J. Suski, Y. Boose, T. C. J. Hill, **C. S. McCluskey**, G. P. Schill, K. Rocci, H. Al-Mashat, L. J. Kristensen, G. C. Cornwell, K. A. Prather, J. Tomlinson, F. Mei, J. Hubbe, M. Pekour, R. Sullivan, R. Leung, and S. M. Kreidenweis (2019), Characteristics of ice nucleating particles in and around California winter storms, *J. Geophys. Res. Atmos.*, doi: 10.1029/2019JD030831.
3. Cornwell, G. C., **C. S. McCluskey**, E. J. T. Levin, K. J. Suski, P. J. DeMott, S. M. Kreidenweis, and K. A. Prather (2019), Direct on-line mass spectrometry measurements of ice nucleating particles at a California coastal site, *J. Geophys. Res. Atmos.*, doi:10.1029/2019JD030466.
4. **McCluskey, C. S.**, T. C. J. Hill, R. S. Humphries, A. M. Rauker, S. Moreau, P. Stratton, S. D. Chambers, A. G. Williams, I. McRobert, J. Ward, M. Keywood, J. Harnwell, W. Ponsoby, Z. Loh, P. Drummel, M. van der Schoot, A. Protat, S. M. Kreidenweis, P. J. DeMott (2018), Observations of ice nucleating particles over Southern Ocean Waters, *Geophys. Res. Lett.*, doi: 10.1029/2018GL079981.
5. **McCluskey, C. S.**, J. Ovadnevaite, M. Rinaldi, J. Atkinson, F. Belosi, D. Ceburnis, S. Marullo, T. C. J. Hill, U. Lohmann, Z. A. Kanji, C. O'Dowd, S. M. Kreidenweis, P. J. DeMott (2018), Marine and Terrestrial Organic Ice Nucleating Particles in Pristine Marine to Continentally-Influenced Northeast Atlantic Air Masses, *J. Geophys. Res. Atmos.*, doi: 10.1029/2017JD028033
6. **McCluskey, C. S.**, T. C. J. Hill, C. M. Sultana, O. Laskina, J. Trueblood, M. V. Santander, C. M. Beall, J. M. Michaud, K. A. Prather, V. H. Grassian, P. J. DeMott (2018), A mesocosm double feature: Insights into the chemical make-up of marine ice nucleating particles, *J. Atmos. Sci.*, doi: 10.1175/JAS-D-17-0155.1
7. DeMott, P. J., R. H. Mason, **C. S. McCluskey**, T. C. J. Hill, R. J. Perkins, A. K. Bertram, O. Laskina, J. V. Trueblood, V. H. Grassian, Y. Qiu, V. Molinero, Y. Tob, F. Paesani, C. M. Sultana, C. Lee, and K. A. Prather, (2018): Ice nucleation by particles containing long-chain fatty acids of relevance to freezing by sea spray aerosols, *Environ. Sci.: Processes Impacts*, 20, 1559-1569, doi: 10.1039/c8em00386f.
8. **McCluskey, C. S.**, T. C. J. Hill, F. Malfatti, C. M. Sultana, C. Lee, M. V. Santander, C. M. Beall, K. A. Moore, G. C. Cornwell, D. B. Collins, K. A. Prather, T. Jayarathne, F. Azam, E. A. Stone, S. M. Kreidenweis, P. J. DeMott (2017), A dynamic link between ice nucleating particles released in nascent sea spray aerosol and oceanic biological activity during two mesocosm experiments. *J. Atmos. Sci.* 74, 151–166, doi: 10.1175/JAS-D-16-0087.1.
9. DeMott, P. J., T. C. J. Hill, M. D. Petters, A. K. Bertram, Y. Tobo, R. H. Mason, K. J. Suski, **C. S. McCluskey**, E. J. T. Levin, G. P. Schill, Y. Boose, A. M. Rauker, A. J. Miller, J. Zaragoza, K. Rocci, N. E. Rothfuss, H. P Taylor, J. D. Hader, C. Chou, J. A. Huffman, U. Pöschl, A. J. Prenni, S. M. Kreidenweis,

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- (2017): Comparative measurements of ambient atmospheric concentrations of ice nucleating particles using multiple immersion freezing methods and a continuous flow diffusion chamber, *Atmos. Chem. Phys.*, doi: 10.5194/acp-17-11227-2017
10. Twohy, C. H., G. R. McMeeking, P. J. DeMott, **C. S. McCluskey**, T. C. J. Hill, S. M. Burrows, G. R. Kulkarni, M. Tanarhte, D. N. Kafle and D. W. Toohey (2016), Abundance of fluorescent biological aerosol particles at temperatures conducive to the formation of mixed-phase and cirrus clouds, *Atmos. Chem. Phys.*, doi: 10.5194/acp-16-8205-2016.
 11. DeMott, P. J., T. C. J. Hill, **C. S. McCluskey**, K. A. Prather, D. B. Collins, R. C. Sullivan, M. J. Ruppel, R. H. Mason, V. E. Irish, T. Lee, C. Y. Hwang, T. S. Rhee, J. R. Snider, G. R. McMeeking, S. Dhaniyala, E. R. Lewis, J. J. B. Wentzell, J. Abbatt, C. Lee, C. M. Sultana, A. P. Ault, J. L. Axson, M. D. Martinez, I. Venero, G. Santos-Figueroa, M. D. Stokes, G. B. Deane, O. L. Mayol-Bracero, V. H. Grassian, T. H. Bertram, A. K. Bertram, B. F. Moffett and G. D. Franc (2016), Sea spray aerosol as a unique source of ice nucleating particle, *Proc. Natl. Acad. Sci. U.S.A.*, doi: 10.1073/pnas.1514034112.
 12. Levin, E. J. T., G. R. McMeeking, P. J. DeMott, **C. S. McCluskey**, C. M. Carrico, S. Nakao, T. Jayarathne, E. A. Stone, C. E. Stockwell, R. J. Yokelson, Kreidenweis, S. M. (2016). Ice Nucleating Particle Emissions from Biomass Combustion and the Potential Importance of Soot Aerosol. *J. Geophys. Res. Atmos*, doi: 10.1002/2016JD024879
 13. Carrico, C. M., A. J. Prenni, S. M. Kreidenweis, E. J. T. Levin, **C. S. McCluskey**, P. J. DeMott, G. R. McMeeking, S. Nakao, C. Stockwell, R. J. Yokelson (2016), Rapidly Evolving Ultrafine and Fine Mode Biomass Smoke Physical Properties: Comparing Laboratory and Field Results, *J. of Geophys. Res. Atmos.*, doi: 10.1002/2015JD024389
 14. Wang, X., C. M. Sultana, J. Trueblood, T. C. J. Hill, F. Malfatti, C. Lee, O. Laskina, K. A. Moore, C. M. Beall, **C. S. McCluskey**, G. C. Cornwell, Y. Zhou, J. L. Cox, M. A. Pendergraft, M. V. Santander, T. H. Bertram, C. D. Cappa, F. Azam, P. J. DeMott, V. H. Grassian, K. A. Prather (2015), Microbial Control of Sea Spray Aerosol Composition: A Tale of Two Blooms, *ACS Cent. Sci.* 2015, DOI: 10.1021/acscentsci.5b00148.
 15. Mason, R. H., C. Chou, **C. S. McCluskey**, E. J. T. Levin, C. L. Schiller, T. C. J. Hill, J. A. Huffman, P. J. DeMott, A. K. Bertram (2015), The micro-orifice uniform deposit impactor-droplet freezing technique (MOUDI-DFT) for measuring concentrations of ice nucleating particles as a function of size: improvements and initial validation, *Atmos. Meas. Tech. Discuss.*, 8(2), 223-2262.
 16. Hiranuma, N., S. Augustin-Bauditz, H. Bingemer, C. Budke, J. Curtius, A. Danielczok, K. Diehl, K. Dreischmeier, M. Ebert, F. Frank, N. Hoffmann, K. Kandler, A. Kiselev, T. Koop, T. Leisner, O. Möhler, B. Nillius, A. Peckhaus, D. Rose, S. Weinbruch, H. Wex, Y. Boose, P. J. DeMott, J. D. Hader, T. C. J. Hill, Z. A. Kanji, G. Kulkarni, E. J. T. Levin, **C. S. McCluskey**, M. Murakami, B. J. Murray, D. Niedermeier, M. D. Petters, D. O'Sullivan, A. Saito, G. P. Schill, T. Tajiri, M. A. Tolbert, A. Welti, T. F. Whale, T. P. Wright, and K. Yamashita (2015), A comprehensive laboratory study on the immersion freezing behavior of illite NX particles: A comparison of seventeen ice nucleation measurement techniques, *Atmos. Chem. Phys.* 15, 2489-2518, doi: 10.5194/acp-15-2489-2015.
 17. **McCluskey, C. S.**, P. J. DeMott, A. J. Prenni, E. J. T. Levin, G. R. McMeeking, A. P. Sullivan, T. C. J. Hill, S. Nakao, C. M. Carrico, S. M. Kreidenweis (2014), Characteristics of atmospheric ice nucleating particles associated with biomass burning in the US: prescribed burns and wildfires, *J. Geophys. Res.*, 119(17), 10458 – 10470, doi:10.1002/2014JD021980
 18. Levin, E. J. T., G. R. McMeeking, **C. S. McCluskey**, P. J. DeMott, and S. M. Kreidenweis (2014), A New Method to Determine the Number Concentrations of Refractory Black Carbon Ice Nucleating Particles, *Aerosol Sci. Tech.*, doi: 10.1080/02786826.2014.977843
 19. Prenni, A. J., Y. Tobo, E. Garcia, P. J. DeMott, J. A. Huffman, **C. S. McCluskey**, S. M. Kreidenweis, J. E. Prenni, C. Pöhlker, and U. Pöschl (2013), The impact of rain on ice nuclei populations at a forested site in Colorado, *Geophys. Res. Lett.*, 40, 277-231.

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20. Tobo, Y., A. J. Prenni, P. J. DeMott, A. Huffman, **C. S. McCluskey**, G. Tian, C. Pöhlker, U. Pöschl, and S. M. Kreidenweis (2013), Biological aerosol particles as a key determinant of ice nuclei populations in a forest ecosystem, *J. Geophys. Res.*, *118*(10), doi: 10.1002/jgrd.50801.

PRESENTATIONS

1. **McCluskey, C. S.**, et al., “The Critical Role of Observations in Developing Numerical Representations of Ice Nucleating Particles for Southern Ocean Mixed Phased Clouds”, Oral Presentation at the *12th Annual Symposium on Aerosol-Cloud-Climate Interactions* at the American Meteorology Society Annual Meeting, January 13, 2020, **INVITED**.
2. **McCluskey, C. S.**, et al., “Insights from measurements of atmospheric INPs around the world: Marine Ice Nucleating Particles”, Keynote Oral Presentation at the *Atmospheric Ice Nucleation Conference*, January 11, 2020, **INVITED**.
3. **McCluskey, C. S.**, et al., “Simulating Southern Ocean Mixed Phased Aerosol-Cloud interactions and Ice Microphysics with the NCAR Community Atmosphere Model”, Poster Presentation at the *American Geophysical Union Fall Meeting*, December 09 2019.
4. **McCluskey, C. S.**, et al., “Simulating Southern Ocean Mixed Phased Aerosol-Cloud interactions and Ice Microphysics with the NCAR Community Atmosphere Model”, Oral Presentation at the *Southern Ocean Atmospheric Research Data Meeting*, Hobart, TAS, Australia, November 20 2019.
5. Järvinen, E., **McCluskey, C. S.**, et al., “Investigating Secondary Ice Production in Southern Ocean Stratocumulus Clouds”, Oral Presentation at the *Southern Ocean Atmospheric Research Data Meeting*, Hobart, TAS, Australia, November 19 2019.
6. **McCluskey, C. S.**, et al., “Simulating Mixed Phased Clouds from the Southern Ocean Clouds, Radiation, Aerosol Transport Experimental Study (SOCRATES) Field Campaign with the NCAR Community Atmosphere Model”, Oral Presentation at the *American Meteorology Society’s 15th Conference on Polar Meteorology and Oceanography*, May 19-23, 2019.
7. **McCluskey, C. S.**, et al., “Influence of Heterogeneous Ice Nucleation of Sea Spray Aerosol on Southern Ocean Clouds in the NCAR Community Atmosphere Model”, Poster Presentation at the *American Geophysical Union Fall Meeting*, December 10, 2018.
8. **McCluskey, C. S.**, “Investigating Aerosol Cloud Interactions In Remote Marine Environments: From Laboratory Phytoplankton Blooms To Global Climate Models”, Oral Presentation at the *University of Utah Department of Atmospheric Sciences*, December 5, 2018, **INVITED**.
9. **McCluskey, C. S.**, et al., “Influence of Heterogeneous Ice Nucleation of Sea Spray Aerosol on Southern Ocean Clouds”, Oral Presentation at the *Special Symposium: Unraveling the many facets of ice nucleating particles and their interactions with clouds at the International Aerosol Conference*, Sept 2, 2018, **INVITED**.
10. **McCluskey, C. S.**, et al., “Aerosol Cloud Interactions over the Southern Ocean”, Oral Presentation at the *NCAR Day of Networking and Discovery*, April 20, 2018.
11. **McCluskey, C. S.**, et al., “Marine Ice Nucleating Particles: Observational and Modeling Studies”, Virtual Oral Presentation at the *University of Washington Cloud and Climate Discussion Group Meeting*, January 9, 2018, **INVITED**.
12. **McCluskey, C. S.**, et al., “Abundance and Characteristics of Marine Ice Nucleating Particles: Implications for High Latitude Aerosol-Cloud Interacts”, Oral Presentation at the *14th Atmospheric Chemistry Colloquium for Emerging Senior Scientist*, July 28, 2017.

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13. **McCluskey, C. S.**, et al., “Chemical Make-up of Ice Nucleating Particles Released in Nascent Sea Spray Aerosol during Two Phytoplankton Bloom Laboratory Experiments”, Poster Presentation at the *Atmospheric Chemistry Gordon Research Conference*, July 30- August 4, 2017.
14. **McCluskey C. S.**, et al., “Observations of Marine Ice Nucleating Particles: Implications for High Latitude Aerosol-Cloud Interactions”, Oral Presentation at the *DOE Pacific Northwest National Laboratory Earth Systems Analysis and Modeling Group Meeting*, July 21, 2017.
15. **McCluskey, C. S.**, et al., “Abundance and Characteristics of Ice Nucleating Particles in Remote Coastal and Oceanic Regions”, Oral Presentation at the *20th International Conference on Nucleation and Atmospheric Aerosols*, June 25-30, 2017.
16. **McCluskey, C. S.**, et al., “Identity, Production and Chemical Aging of Marine Ice Nucleating Particles”, Poster Presentation at the *Center for Aerosol Impacts on Chemistry of the Environment Annual Review*, May 22, 2017.
17. **McCluskey, C. S.**, "Marine Ice Nucleating Particles: Implications for High Latitude Aerosol-Cloud Interactions" Oral Presentation at the *National Center for Atmospheric Research Earth Observatory Laboratory Seminar Series*, April 4, 2017, **INVITED**
18. **McCluskey, C. S.**, et al., “Ice nucleating particles over oceans to high latitudes”, Oral Presentation at the *American Meteorological Society Annual Meeting*, January 2017.
19. **McCluskey, C. S.**, et al., “Isolated characterization of marine ice nucleating particles at the Mace Head Observatory and the Southern Ocean”, Oral Presentation at the *American Geophysical Union Fall Meeting*, December 2016.
20. **McCluskey, C. S.**, et al., “Sea spray aerosols influence atmospheric ice nucleating particle populations”, Oral Presentation at the *International Conference on Clouds and Precipitation*, July 2016.
21. **McCluskey, C. S.**, et al., “Identifying links between sea spray ice nucleating particle and oceanic biological activity”, Poster Presentation at the *American Geophysical Union Fall Meeting*, December 2015.
22. **McCluskey, C. S.**, et al., “Identifying links between sea spray ice nucleating particle and oceanic biological activity”, Oral Presentation for *the American Meteorological Society Annual Meeting*, January 06, 2015.
23. **McCluskey, C. S.**, et al., “Does biology change the abundance of ice nucleating particles in sea spray aerosol?”, Poster Presentation at the *CAICE Annual Meeting*, October 27, 2014.
24. **McCluskey, C. S.**, “Characteristics of atmospheric ice nucleating particles associated with biomass burning in the US: prescribed burns and wildfires”, Oral Presentation for *Coastal Carolina University School of Coastal and Marine Systems Science Seminar Series*, December 12, 2013, **INVITED**.
25. **McCluskey, C. S.**, et al., “Measuring the abundance of fluorescent particles on the NCAR GV: coupling the CVI with the WIBS-4A”, Oral Presentation for the *EOL external advisory committee meeting*, December 4, 2013, **INVITED**.
26. **McCluskey, C. S.**, et al., “Observations of Ice Nuclei Associated with Biomass burning”, Poster Presentation at the *International Conference on Nucleation and Atmospheric Aerosols*, June 24-28, 2013.

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27. **McCluskey, C. S.**, et al., “The production and characteristics of ice nuclei from biomass burning in the US”, Oral Presentation at the *ESF Workshop on Ice Nucleation*, April 4-6, Vienna, Austria, poster presentation at the *European Geophysical Union Annual Meeting*, April 6-10, 2013, Vienna, Austria.
28. **McCluskey, C. S.**, et al., “Ice Nuclei Produced from Prescribed Fires in Southeastern United States”. Poster Presentation at the *American Association for Aerosol Research Annual Meeting*, Abstract 2CC.12, October 3, 2012, Minneapolis, MN.
29. **McCluskey, C. S.**, K. B. Beem, and J. L. Collett Jr., “The presence of reactive nitrogen in fine and coarse aerosol”, Poster Presentation at the *American Geophysical Union Fall Meeting*, December 2010, San Francisco, CA.
30. **McCluskey, C. S.**, M. Yang, and D. R. Blake, “Investigation of dairy farm silage emissions”, Poster Presentations at the *American Chemical Society Regional Conference*, 2009, San Juan, PR, and the *American Geophysical Union Fall Meeting*, December 2009, San Francisco, CA.

TEACHING AND MENTORING EXPERIENCE

NCAR Advanced Study Program Summer Colloquium, Mentor	June 2018
Various education/outreach events (K-12) <i>Wow! Children’s Museum Girls in Science Annual Event, Earth Explorers (UCAR), Front Range Teen Science Café, Little Shop of Physics Open House, Panel luncheons with TRIO participants and Veterans</i>	2011 - present
NSF PROGRESS mentoring program mentor and volunteer	2015 – 2018
REU Intern Graduate Student Mentor <i>Department of Atmospheric Science, Colorado State University</i>	Summers 2015, 2016 Fort Collins, CO
General Chemistry Workshop Leader <i>Department of Chemistry and Physics, Coastal Carolina University</i>	2008 –2011 Conway, SC
Chemistry Tutor <i>Department of Chemistry and Physics, Coastal Carolina University</i>	2008 –2011 Conway, SC

SKILLS AND TRAINING

Field campaigns with significant contribution (aircraft, ship and ground-based):

NCAR Airborne Research Instrumentation Testing Opportunity (ARISTO 2016 & 2017, Colorado), Clouds, Aerosols, Precipitation Radiation and atmospheric Composition Over the southern ocean (CAPRICORN 2015, Tasmania, Australia), Impact of Biogenic versus Anthropogenic emissions on Clouds and Climate: towards a Holistic UnderStanding (BACCHUS) Mace Head Research Station Study (2015), NSF Pre-CalWater and CalWater (California, 2014 & 2015), NSF Center for Aerosol Impacts on Climate and the Environment (CAICE) Marine Aerosol Reference Tank and Investigation into Marine Particle Chemistry and Transfer Science (IMPACTS) Experiments (California, 2014), NCAR Instrument Development Education in Airborne Science (IDEAS, Colorado, 2011 & 2013), Fire Lab at Missoula Experiment FLAME-4, Montana, 2012), Bio-hydro-atmosphere interactions of Energy, Aerosols, Carbon, H₂O, Organics and Nitrogen—Rocky Mountain Biogenic Aerosol Study (BEACHON-RoMBAS Colorado, 2011)

Flight scientist, Southern Ocean Clouds, Radiation, Aerosol Transport Experimental Study (SOCRATES), Hobart, Tasmania, Australia, 2018 and the NCAR Instrument Development and Education in Airborne Science (IDEAS IV) project (<http://www.eol.ucar.edu/raf/Projects/IDEAS/>)

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Laboratory and field instrumentation: ice spectrometer, total particle counters, continuous flow diffusion chamber, aerodynamic particle sizer, aircraft counterflow virtual impactor, wideband integrated bioaerosol sampler, single particle soot photometer, ion chromatography, gas chromatography,

Numerical Modeling: NCAR Community Earth System Model and the Weather Research and Forecasting model

Proficient programming in Python, IDL, MatLab, Igor, and Excel

Completed NSF responsible conduct of research training

HONORS AND AWARDS

Postdoctoral Fellowship, Advanced Study Program, National Center for Atmospheric Research - 2017

DOE Office of Science Graduate Student Research (SCGSR) Program award - 2017

CSU Dept. of Atmos. Science Alumni Student Paper Award - 2017

Invited participant, Fourteenth Atmospheric Chemistry Colloquium for Emerging Senior Scientists (ACCESS XIV) – 2017

First Place Oral Presentation Student Award, 14th Polar Meteorology and Oceanography Annual Conference – 2017

Student Travel Awards for the 20th International Conference on Nucleation and Atmospheric Aerosols (2017), the 14th Polar Meteorology and Oceanography Annual Conference (2017), and the International Conference on Clouds and Precipitation (2016)

CSU Dept. of Atmos. Science ASCENT Travel Award - 2015

CSU Dept. of Atmos. Science Herbert Riehl Memorial Student Paper Award - 2015

Outstanding Student Poster Award, American Association for Aerosol Research Annual Meeting, 2012

CCU Chemistry Student of the Year, 2011

PROFESSIONAL ACTIVITIES

Special Issue Guest Co-Editor, Observations and Simulations of Clouds, Aerosols, Precipitation, and Radiation over the Southern Ocean, *Atmosphere*

Primary Convener, AGU 2019 Annual Meeting Session: Atmospheric Ice Nucleating Particles, Primary Ice Nucleation, and Secondary Ice Production: Laboratory, Field, and Modeling Studies

Journal Reviewer, *Bulletin of the American Meteorological Society*, *Journal of Geophysical Research Atmospheres*, *Atmospheric Chemistry and Physics*, *Journal of Atmospheric Science*, *Atmospheric Research*, *Atmospheric Environment*, *Environmental Science & Technology*

Selection Committee Member, NCAR Advanced Study Program Graduate Student Summer Colloquium (2018), CSU Dept. of Atmos. Sci. REU Internship (2013-2017), CSU Dept. of Atmos. Sci. MAC Student Travel Award Committee (2016-2017)

Member, AGU (2009 - Present), AMS (2011 - Present), AAAR (2011 - Present)

NCAR Fellows Association Professional Development Committee, member (2019)

NCAR Postdoc Proposal Mock Panel Review Organizer and Founder (2019)

NCAR Advanced Study Program Thompson Lector Series Committee Chair (2018) and Member (2019)

NSF Center for Aerosol Impacts on Climate and Environment Student Leadership Committee, 2015- 2017 Member, 2018 AMS Cloud Physics Committee, 2015-2018

Young Student Symposium on Atmospheric Science Planning Committee Chair, 2012-2013

American Association for Aerosol Research CSU Student Organization – Vice President (2012/2013 & 2015/2016), President (2013/2014), Member (2014/2015 & 2016/2017)