

ANNA GANNET HALLAR

Director, Storm Peak Laboratory
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Desert Research Institute
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EDUCATION

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| B.A. | 1999 | Physics | Truman State University |
| M.S. | 2001 | Atmospheric and Oceanic Sciences | University of Colorado at Boulder |
| Ph.D. | 2003 | Atmospheric and Oceanic Sciences | University of Colorado at Boulder |

Title of dissertation: *“Use of Tunable Diode Laser Closed Path Hygrometer for the Measurement of Total Water in Tropopause Cirrus”*

PROFESSIONAL EXPERIENCE

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| 2006 – Present | Director, Storm Peak Laboratory, Steamboat Springs, CO. |
| 2014 – Present | Research Professor, Division of Atmospheric Sciences, Desert Research Institute, Reno, NV. |
| 2012 – 2014 | Program Director, Physical and Dynamic Meteorology (PDM), Div. of Atmospheric & Geospace Sciences (AGS), National Science Foundation, Arlington, VA 22230. |
| 2012 – 2014 | Associate Research Professor, Division of Atmospheric Sciences, Desert Research Institute Reno, NV. |
| 2006 – 2012 | Assistant Research Professor, Division of Atmospheric Sciences, Desert Research Institute Reno, NV. |
| 2006 – Present | Adjunct Faculty, Atmospheric Science Program, Department of Physics, University of Nevada, Reno. |
| 2004 – 2006 | National Research Council Fellow, Postdoctoral Research Associate, NASA Ames Research Center, Moffett Field, CA.; Advisor: Dr. Anthony Strawa. |
| 2006 – 2006 | Adjunct Professor, Environmental Studies, Santa Clara University, CA. |
| 1999 – 2003 | Graduate Research Assistant, Laboratory for Atmospheric and Space Physics; University of Colorado at Boulder, CO.; Advisor: Dr. Linnea Avallone. |
| 2003 | Graduate Teaching Assistant, Program in Atmospheric and Oceanic Studies, University of Colorado at Boulder, CO. |
| 1996 – 1999 | Undergraduate Teacher’s Assistant, Multidisciplinary course titled “Physics for Poets”, Department of Physics, Truman State University, Kirksville, MO. Advisor: Dr. Ken Hahn. |
| 1999 | Undergraduate Research Assistant Truman State, University Physics Department, Kirksville, MO; Advisor: Dr. David Chyba. |
| 1998 | Student Volunteer for National Weather Service, Weather Forecasting Office in Pleasant Hill, MO. |

AWARDS/HONORS RECEIVED

- Awardee, 2012 Regents' Rising Research Award from the Nevada System of Higher Education Board of Regents.
- Awardee, Peter B. Wagner 2011 Medal of Excellence for DRI Scholars in the Early Stages of Career Development.
- National Academy of Sciences Postdoctoral Research Fellowship; February 2004 – July 2006
- University of Colorado at Boulder, Program in Atmospheric and Oceanic Science, Graduate Student Research Fellowship – August 1999 to December 2003
- University of Colorado at Boulder, Program in Atmospheric and Oceanic Science, Graduate Student Travel Grant for European Geophysical Society Meeting -2003
- National Aeronautics and Space Administration, Group Achievement Award – CRYSTAL-FACE – 2003
- Truman State University, President's Combined Ability Scholarship – 1995 to 1999
- Truman State University, Eugene Smith Physics Scholarship – 1997

FUNDED PROJECTS as Principal Investigator (PI):

Title: Aerosol-Cloud-Precipitation Interactions during StormVEX

Sponsor: Department of Energy Atmospheric Science Research

Funding: \$361,252 Duration: 7/15 – 6/18

Title: Major Research Instrumentation: Acquisition of New Generation of Aerosol, Trace Gas, and Water Isotope Instruments for Storm Peak Laboratory

Sponsor: National Science Foundation

Funding: \$217,880 Duration: 4/11 - 3/13

Title: Collaboration between DRI and NASA GISS - Bioaerosols in Cloud Processing

Sponsor: Nevada NASA EPSCoR program

Funding: \$62,416 Duration: 8/11 – 8/12

Title: Collaborative Research: Colorado Airborne Multi-Phase Cloud Study (CAMPS)

Sponsor: National Science Foundation

Funding: \$117,180 Duration: 01/10 – 12/12

Title: Collaborative Research: Hygroscopic Properties of Aerosol Organics

Sponsor: National Science Foundation

Funding: \$347,253 Duration: 11/09 – 10/12

Title: Track 1 – Geoscience Research at Storm Peak Lab (GRASP)

Sponsor: National Science Foundation

Funding: \$198,216 Duration: 07/09 – 06/12

Title: Upgrades to Storm Peak Laboratory, a High Elevation Atmospheric Research and Education Station

Sponsor: National Science Foundation

Funding: \$601,245 Duration: 03/10 – 02/12

Title: Collaborative Research: ADVANCE Atmospheric Science Collaborations and Enriching Networks (ASCENT)
Sponsor: National Science Foundation
Funding: \$278,850 Duration: 01/09 – 12/11

Title: The Storm Peak Lab Cloud Property Validation Experiment (StormVEx)
Sponsor: Department of Energy
Funding: \$137,841 Duration: 11/09 – 10/11

Title: NASA JPL Airborne Cloud Radar Trailer at Storm Peak Lab Cloud Properties Validation
Sponsor: UCCSN Nevada - EPSCoR
Funding: \$36,520 Duration: 07/09 – 06/10

Title: Collaborative Research: RAPID--Investigating Potential Secondary Organic Aerosol (SOA) Increases Due to Beetle Infestation across the Western United States
Sponsor: National Science Foundation
Funding: \$55,581 Duration: 05/09 – 5/10

Title: Geoscience Research at Storm Peak with Diversity (GRASP)
Sponsor: National Science Foundation
Funding: \$71,913 Duration: 03/07 – 04/08

Title: Climatic Studies of Thin Cirrus
Sponsor: NASA-Ames Research Center
Funding: \$93,028 Duration: 01/07 – 12/07

FUNDED PROJECTS as Co-Principal Investigator (Co-PI):

Title: Collaborative Research: NO₃ Induced Nighttime Air Chemistry
Investigator: W. Goliff
Sponsor: National Science Foundation
Funding: \$310,008 Duration: 07/07 – 06/11

Title: Local Host and Logistical Support for DOE-ARM AMF2 Deployment to StormVEx
Investigator: I. McCubbin
Sponsor: DOE - ANL
Funding: \$464,635 Duration: 07/10 – 08/11

Title: MRI: Development of a Cavity Ring-Down Sensor for Real-Time Measurement of Atmospheric Mercury Concentrations and Fluxes
Investigator: D. Obrist
Sponsor: National Science Foundation
Funding: \$653,473 Duration: 09/09 – 08/12

FIELD STUDIES

Isotopic Fractionation in Snow (IFRACS) – Storm Peak Laboratory: December 2013 – February 2014

Study to improve understanding of precipitation processes in mixed phase orographic clouds and the variation in the isotopic signature of snowfall associated with aerosol effects on cloud microphysics.

Aerosol Lifecycle Intensive Operating Period – Brookhaven National Laboratory: June-September 2011

Deployment of the Department of Energy Atmospheric Radiation Measurement Mobile Facility for ground based aerosol field campaign.

Colorado Airborne Multiphase Cloud Study (CAMPS) – Laramie, Wyoming:

December 2010- February 2011

Research aircraft flights using the University of Wyoming King Air over the StormVEx field sites.

Storm Peak Cloud Properties Validation Experiment (StormVEx):

October 2010 - May 2011

Deployment of the Department of Energy Atmospheric Radiation Measurement Mobile Facility.

Hygroscopic Growth of Organic Aerosols - Storm Peak Laboratory:

June - August 2010

In situ aerosol measurements to study relationship between aerosol chemistry and cloud droplet formation.

Inhibition of Snowfall by Pollution Aerosols II (ISPA II) - Storm Peak Laboratory:

January -February 2010

Investigates the relationships among pollution aerosols, snow growth by riming, and snowfall amounts on the ground.

Storm Peak Aerosol and Cloud Characterization (SPACC) – Storm Peak Laboratory:

March-April 2007

Multiple disciplinary investigations of organic aerosols in the free troposphere.

Inhibition of Snowfall by Pollution Aerosols I (ISPA I) - Storm Peak Laboratory:

January -February 2007

Investigates the relationships among pollution aerosols, snow growth by riming, and snowfall amounts on the ground.

MARine Stratus Radiation Aerosol and Drizzle (MASRAD) – Point Reyes, CA:

July-August 2005

In situ measurements to study relationship between aerosol particles and cloud droplet properties.

Atmospheric Brown Cloud - Post Monsoon EXperiment (APMEX) – Maldives, Indian Ocean:

Oct-Nov 2004

Ground site in situ measurements of aerosol optical properties to study pollution transport.

Caldecott Tunnel – Black Carbon Investigation: Oakland, CA: June 2004

In situ measurements of the aerosol optical properties of vehicle emission inside traffic tunnel.

Extended – MODIS – λ Validation Experiment, Marina, CA: April – May 2004

In situ measurement of aerosol extinction and scattering aboard CIRPAS Twin Otter.

Winter Fly-in (Winfly) 2002, McMurdo, Antarctica: August-November 2002

Ground-based in situ measurements of ClO, BrO, NO, NO₂, and O₃ to study boundary layer ozone depletion.

Cirrus Regional Study of Tropical Anvils and Layers Experiment (CRYSTAL-FACE), Key West, Fl: July 2002

In situ measurements of cirrus cloud total water from NASA WB-57 aircraft.

Instrumentation Development and Education in Airborne Science (IDEAS), Broomfield, CO: April 2002

In situ measurements of H₂O - Counter Flow Virtual Impactor from NCAR C-130 aircraft mentored by Dr. Cynthia Twohy.

SYNERGISTIC ACTIVITIES

- Member of the Department of Energy Atmospheric Radiation Measurements (ARM) Science Board (2015 – 2018)

- Elected to the Department of Energy Atmospheric Radiation Measurements (ARM) User Executive Committee in 2014, an independent body charged with providing objective, timely advice and recommendations to the leadership of the ARM Climate Research Facility.
- Member (2014-2018) of President’s Advisory Committee on University Relations (PACUR), which builds and reinforces relationships between UCAR management and its membership.
- Member (2015-present) of the Department of Energy Aerosol Measurements and Science Group, which reports to ARM and interacts closely with Atmospheric System Research to address aerosol measurements needs.
- Guest editor for Special issue in Aerosol and Air Quality Research on Atmospheric Chemistry and Physics at Mountain Sites (2014-2015).
- Hosted the 13th AeroCom workshop in Steamboat Springs, CO, September 29 to October 2, 2014.
- Hosted the 2nd AeroSat workshop in Steamboat Springs, CO, September 27-28, 2014.
- Hosted 2014 Symposium on Atmospheric Chemistry and Physics at Mountain Sites in Steamboat Springs, CO, August 11-15, 2014.
- Session Convener at AGU 2013 Meeting for “Chemical, Physical, and Morphological Properties of Remote Aerosols”.
- Session Convener at AAAR 2013 Meeting for “Bioaerosols: Characterization and Environmental Impact”.
- Session Convener at AGU 2012 and 2013 Meeting for “Aerosol Observations at High Elevation”.
- Chair, NSF’s Observing Facilities Assessment Panel (OFAP) provided technical and operational assessment of requests associated with the use of NSF’s Lower Atmospheric Observing Facilities in the field (2010 to 2012).
- Panelist, NSF’s OFAP provided technical and operational assessment of requests associated with the use of NSF’s Lower Atmospheric Observing Facilities in the field (2009-2012).
- Chair, the AMS Mountain Meteorology Meeting, Steamboat Springs, CO, August 2012.
- Representative, University Cooperative for Atmospheric Research, Nevada System of Higher Education (2008 to present).
- Served on External Panel to review NASA Langley Science Directorate, focusing on the atmospheric airborne capabilities (2011).
- Chair, Peter B. Wagner Memorial Award for Women in Atmospheric Sciences (2011–2012).
- Chair, Platform Session, “Aerosol optical depth and other aerosol properties” at the Atmospheric Chemistry and Physics at Mountain Sites Symposium, Interlaken, Switzerland, June 2010.
- Participant, NSF Sponsored Biogenic Secondary Organic Aerosol Nordic program (2008–2010). Program included three visits to Nordic research centers in Denmark, Sweden, and Finland.
- Active member of “Earth Science Women’s Network” (2007 to present).
- Commonly review NSF, EPA and NASA proposals, both as an adhoc reviewer and via panel service, in atmospheric science and education (2007-present).
- Review for AMS and AGU journals, *Science*, *Atmospheric Environment*, *Environmental Science & Technology* (2007-present).
- Featured on CNN, History Channel, The Weather Channel, and nightly news nationally representing Storm Peak Laboratory (2007-present).
- Assisted Timothy R. Gaffney on a chapter for his children’s book titled “Extreme Weather Scientists”. A chapter features my research experiences at Storm Peak Laboratory (2007-2008).

- Directs a community program at Storm Peak Laboratory, giving field trips middle school students in Northwestern Colorado. This program provides a three-day lesson on the topics of weather and climate and reaches ~ 200 elementary students each year (2007-present).
- Participated in the UCAR Member Representatives Diversity breakout session (2006).
- Seminar Director for Earth Science Division at NASA Ames Research Center (2005).
- Conducted Laboratory Training for students of the Atmospheric Brown Cloud Training School, Hanimaadhoo, Maldives, Oct 9-14, 2004.

MEMBERSHIPS

- 2000-2015 Member, American Geophysical Union
- 2015-2016 Member, American Meteorological Society

PUBLICATIONS

Peer-Reviewed Journal Articles:

- Lowenthal, D.; A. G. Hallar; I. McCubbin; R. David; R. Borys; P. Blossey; A. Muhlbauer; Z. Kuang; M. Moore, 2015: Isotopic Fractionation in Wintertime Orographic Clouds. I: Isotopic Measurements, *Journal of Atmospheric and Oceanic Technology*, submitted.
- Hallar, A.G., R. Petersen, E. Andrews, J. Michalsky, I. B. McCubbin, J. A. Ogren: 2015, Contributions of Dust and Biomass-burning to Aerosols at a Colorado Mountain-top Site, *Atmos. Chem. Phys.*, 15, 1–15.
- Hallar, A.G. R. Petersen, I. B. McCubbin, D. Lowenthal, S. Lee, E. Andrews, F. Yu: 2015, Climatology of New Particle Formation and Corresponding Precursors at Storm Peak Laboratory, *Aerosol and Air Quality Research*, doi: 10.4209/aaqr.2015.05.0341.
- Yu, F., G. Luo, S. C. Pryor, P. R. Pillai, S. H. Lee, J. Ortega, J. J. Schwab, A. G. Hallar, W. R. Leitch, V. P. Aneja, J. N. Smith, J. T. Walker, O. Hogrefe, and K. L. Demerjian: 2015, Spring and summer contrast in new particle formation over nine forest areas in North America, *Atmospheric Chemistry and Physics*, MS No.: acp-2015-453.
- Yu, F., G. Luo, A. G. Hallar: 2015, Vertical profiles and seasonal variations of key parameters controlling particle formation and growth at Storm Peak Laboratory *Aerosol and Air Quality Research*, doi:10.4209/aaqr.2015.05.0341
- Goliff, W., M. Luria, D. R. Blake, B. Zielinska, A.G. Hallar, R. J. Valente, C. V. Lawson, W.R. Stockwell, 2015: Nighttime air quality under desert conditions, *Atmospheric Environment*, Volume 114, Pages 102-111, ISSN 1352-2310.
- Kristensen, T.B., L. Du, Q. T. Nguyen, J. K. Nojgaard, C. Bender Koch, O. Faurskov Nielsen, A. G. Hallar, D. H. Lowenthal, B. Nekat, D. van Pinxteren, H. Herrmann, M. Glasius, H. G. Kjaergaard, M. Bilde, 2015: Physico Chemical Properties of HULIS from Different Environments, *Journal of Atmospheric Chemistry*, Volume 72, Issue 1, pp 65-80.
- Yu, F. and A. G. Hallar, 2014: Difference in particle formation at a mountain-top location during the spring and summer: Implications for the role of sulfuric acid and organics in nucleation, *J. of Geophysical Research*, 119, 21, 12,246–12,255.
- Yu, H., A. G. Hallar, Y. You, A. Sedlacek, S. Springston, V. P. Kanawade, Y. N. Lee, J. Wang, C. Kuang, R. L. McGraw, I.B. McCubbin, J. Mikkila and S. H. Lee, 2013: Sub-3 nm Particles Observed at the Coastal and Continental Sites in the United States, *J. of Geophysical Research*, 119, doi:10.1002/2013JD020841.

- Hallar, A.G., D. H. Lowenthal, S. L. Clegg, V. Samburova, N. Taylor, L. R. Mazzoleni, B. K. Zielinska, T. B. Kristensen, G. Chirokova, I. B. McCubbin, C. Dodson, D. Collins, 2013: Chemical and Hygroscopic Properties of Aerosol Organics at Storm Peak Laboratory, *J. of Geophysical Research*, 118, 4767 - 4779, doi:10.1002/jgrd.50373.
- Zhao, Y., A. G. Hallar, and L. R. Mazzoleni, 2013: Atmospheric organic matter in clouds: exact masses and molecular formula identification using ultrahigh resolution FT-ICR mass spectrometry; *Atmos. Chem. Phys.*, 13, 12343 -12362, doi:10.5194/acp-13-12343-2013, 2013.
- Friedman, B., A. Zelenyuk, J. Beránek, G. Kulkarni, M. Pekour, A.G. Hallar, I.B. McCubbin, J. A. Thornton, and D. J. Cziczo, 2013: Aerosol measurements at a high elevation site: composition, size, and cloud condensation nuclei activity, *Atmos. Chem. Phys.*, 13, 11839-11851.
- Asmi, A., M. Collaud Coen, J.A. Ogren, E. Andrews, P. Sheridan, A. Jefferson, E. Weingartner, U. Baltensperger, N. Bukowiecki, H. Lihavainen, N. Kivekäs, E. Asmi, P. P. Aalto, M. Kulmala, A. Wiedensohler, W. Birmili, A. Hamed, C. O'Dowd, S.G. Jennings, R. Weller, H. Flentje, A.M. Fjaeraa, M. Fiebig, C.L. Myhre, A. G. Hallar, E. Swietlicki, A. Kristensson, and P. Laj, 2013: Aerosol decadal trends – Part 2: In-situ aerosol particle number concentrations at GAW and ACTRIS stations, *Atmos. Chem. Phys.*, 13, 895-916, doi:10.5194/acp-13-895-2013.
- Amin, H. S, R. S. Russo, B. Sive, E. R. Hoebeke, C. Dodson, I. B. McCubbin, A. G. Hallar, K. E. Huff Hartz, 2013: Monoterpene emissions from bark beetle infested Engelmann spruce trees, *Atmospheric Environment*, Volume 72, 130–133.
- Berg, A. R., C.L. Heald, K. E. Huff Hartz, A.G. Hallar, A. J. H. Meddens, J.A. Hicke, J.-F. Lamarque, and S. Tilmes, 2013: The impact of bark beetle infestations on monoterpene emissions and secondary organic aerosol formation in western North America, *Atmos. Chem. Phys.*, 13, 3149-3161, doi:10.5194/acp-13-3149-2013.
- Samburova, V., A. G. Hallar, L. R. Mazzoleni, P. Saranjampour, D. Lowenthal, S. Kohl, and B. Zielinska, 2013: Composition of the water-soluble organic fraction in atmospheric remote aerosols, *Environmental Chemistry*, <http://dx.doi.org/10.1071/EN13079>.
- Marchand, R., G. G. Mace, A. G. Hallar, I. B. McCubbin, S. Y. Matrosov and M. Shupe, 2013: Enhanced Radar Backscattering due to Oriented Ice Particles at 95 GHz during StormVEx, *J. of Atmospheric and Oceanic Technology*, doi:10.1175/JTECH-D-13-00005.1.
- Hallar, A.G., L. Avallone, H. Thiry, and L. Edwards, 2015: ASCENT, A Discipline Specific Model to Support the Retention and Advancement of Women in Science, American Geophysical Union Book Series, *Best Practices towards Gender Parity in the Academic Science Departments*, 70, 135.
- Avallone, L., A. G. Hallar, H. Thiry, L. M. Edwards, 2013: Supporting the Retention and Advancement of Women in the Atmospheric Sciences: What women are saying" *Bulletin of the American Meteorological Society*, 94, 1313–1316. doi: <http://dx.doi.org/10.1175/BAMS-D-12-00078.1>.
- Hallar, A.G., A. Fridlind, J. A. Huffman, 2012: Biological Aerosol Effects on Clouds and Precipitation, *EOS*, Meeting Summary, 93, 51, December 18.
- Kristensen, T., H. Wex, B. Nekat, J. K. Nøjgaard, D. van Pinxteren, D. H. Lowenthal, L. R. Mazzoleni, K. Dieckmann, C.B. Koch, T. F. Mentel, H. Herrmann, A. G. Hallar, F. Stratmann, and Merete Bilde, 2012: Hygroscopic growth and CCN activity of HULIS from different environments, *J. of Geophysical Research*, 117, D22, 27.
- Mazzoleni, L.R., P. Saranjampour, M. M. Dalbec, V. Samburova, A. G. Hallar, B. Zielinska, D. Lowenthal, and Steve Kohl, 2012: Identification of Water-Soluble Organic Carbon in Nonurban Aerosols using Ultrahigh Resolution FT-ICR Mass Spectrometry: Organic Anions, *Environmental Chemistry*, DOI:10.1071/EN11167 .

- Amin, H., P.T. Atkins, R. Russo, A. W. Brown, B. Sive, A. G. Hallar, K.E. Huff Hartz, 2012: Effect of Bark Beetle Infestation on Secondary Organic Aerosol Precursor Emissions, *Environmental Science & Technology*, **46**, **11**, 5696–5703, DOI: 10.1021/es204205m.
- Matrosov, S.Y., G. G. Mace, R. Marchand, M. D. Shupe, A. G. Hallar, I. B. McCubbin, 2012: Influence of Ice Hydrometeor Habits on Scanning Polarimetric Cloud Radar Measurements, *J. of Atmospheric and Oceanic Technology*, **29**, 989-1008.
- Baustian, K. J., D. J. Cziczo, M. E. Wise, K. A. Pratt, G. Kulkarni, A. G. Hallar, and M. A. Tolbert, 2012: Importance of aerosol composition, mixing state, and morphology for heterogeneous ice nucleation: A combined field and laboratory approach, *J. of Geophysical Research*, **117**, D06217, doi:10.1029/2011JD016784.
- Bowers, R.M., I. B. McCubbin, A.G. Hallar, N. Fierer, 2012: Seasonal variability in airborne bacterial communities at a high-elevation site in the Colorado Rocky Mountains, *Atmospheric Environment*, **50**, 41–49.
- Hallar, A.G., G. Chirokova, I.B. McCubbin, T.H. Painter, C. Wiedinmyer, C. Dodson, 2011: Atmospheric Bioaerosols Transported Via Dust Storms in Western United States, *Geophysical Res. Letters*, **38**, L17801, doi:10.1029/2011GL048166.
- Hallar, A.G., I. B. McCubbin, J. M. Wright, 2011: CHANGE: A Place-Based Curriculum for Understanding Climate Change at Storm Peak Laboratory, Colorado, *Bulletin of the American Meteorological Society*, doi: 10.1175/2011BAMS3026.1.
- Hallar, A.G., D. H. Lowenthal, G. Chirokova. C. Wiedinmyer, R.D. Borys, 2011: Persistent Daily New Particle Formation at a Mountain-Top Location, *Atmospheric Environment*, doi:10.1016/j.atmosenv.2011.04.044.
- Hoyle, C.R., M. Boy, N.M. Donahue, J.L. Fry, M. Glasius, A. Guenther, A.G. Hallar, K. Huff Hartz, M.D. Petters, T. Petäjä, T. Rosenoern, and A.P. Sullivan, 2010: Anthropogenic influence on biogenic secondary organic aerosol. *Atmos. Chem. Phys.*, **10**, 19515-19566.
- Strawa, A.W., T.W. Kirchstetter, A.G. Hallar, G.A. Ban-Weiss, J.P. McLaughlin, R.A. Harley, and M.M. Lunden, 2010: Optical and physical properties of primary on-road vehicle particle emissions and their implications for climate change. *J. of Aerosol Science*, **41**, 36-50.
- Hallar, A.G., I.B. McCubbin, B. Hallar, R. Levine, W. Stockwell, J. Lopez, J. Wright, 2010: Science in the Mountains: A Unique Research Experience to Enhance Diversity in the Geosciences. *J. GeoScience Education*, **58**, 2, 213-220.
- Samy, S., L.R. Mazzoleni, S. Mishra, B. Zielinska, and A.G. Hallar, 2010: Water-soluble organic compounds at a mountain-top Site in Colorado, USA. *Atmos. Environ.*, **44**, 1663-1671.
- de Wekker, S.F.J., A. Ameen, G. Song, B.B. Stephens, A.G. Hallar, and I.B. McCubbin, 2009: A preliminary investigation of boundary layer effects on daytime atmospheric CO₂ concentrations at a mountaintop location in the Rocky Mountains. *Acta Geophysica*, doi:10.2478/s11600-009-0033-6.
- Wiedinmyer, C., R.M. Bowers, N. Fierer, E. Horanyi, M. Hannigan, A.G. Hallar, I. McCubbin, K. Baustian, 2009: The contribution of biological particles to observed particulate organic carbon at a remote high altitude site. *Atmos. Environ.*, **43**, 4278–4282.
- Fain, X., D. Obrist, A. G. Hallar, I. McCubbin, and T. Rahn, 2009: High levels of reactive gaseous mercury observed at a high elevation research laboratory in the Rocky Mountains, *Atmos. Chem. Phys.*, **9**, 8049-8060.
- Bowers, R.M., C.L. Lauber, C. Wiedinmyer, M. Hamady, A.G. Hallar, R. Fall, R. Knight, and N. Fierer, 2009: Characterization of Airborne Microbial Communities at a High-Elevation Site and their Potential to Act as Atmospheric Ice Nuclei, *Applied and Environmental Microbiology*, **75** (15), 1–2, doi:10.1128/AEM.00447-09.

- Obrist D., A.G. Hallar, I. McCubbin, B.B. Stephens, and T. Rahn, 2008: Measurements of atmospheric mercury at Storm Peak Laboratory in the Rocky Mountains: Evidence for long-range transport from Asia, boundary layer contributions, and plant mercury uptake. *Atmos. Environ.*, doi:10.1016/j.atmosenv.2008.06.051.
- Davis, S., A. G. Hallar, L. M. Avallone, T. Campos, B. Engblom, 2006: Measurement of total water with a tunable diode laser hygrometer: Inlet analysis calibration procedure, and ice water content determination. *J. Atmos. and Oceanic Technol.*, **24**(3), 463–475.
- Hallar, A.G., A.W. Strawa, B. Schmid, E. Andrews, J. Ogren, P. Sheridan, R. Ferrare, D. Covert, R. Elleman, H. Jonsson, K. Bokarius, A. Luu, 2006: ARM Aerosol Intensive Operating Period: Comparison of aerosol scattering during coordinated flights. *J. of Geophysical Research*, doi: 2005JD006250RR.
- Thornton, B.F., D.W. Toohey, L.M. Avallone, A. G. Hallar, H. Harder, M. Martinez, J. B. Simpas, W. H. Brune, M. Koike, Y. Kondo, N. Takegawa, B. E. Anderson, M. A. Avery, 2005: Variability of active chlorine in the lowermost Arctic stratosphere. *J. of Geophysical Research*, **110**, D22304, doi:10.1029/2004JD005580.
- Strawa, A.W., R. Elleman, A.G. Hallar, D. Covert, K. Ricci, R. Provencal, T. Owano, H. Jonsson, B. Schmid, A. Luu, K. Bokarius, E. Andrews, 2005: In-Situ Measurement of Aerosol Optical Properties Made During the DOE Aerosol IOP: 1. Comparison of Extinction and Scattering Coefficients. *J. of Geophysical Research* doi: 2005JD006056.
- Schmid, B., R. Ferrare, C. Flynn, R. Elleman, D. Covert, A. Strawa, E. Welton, D. Turner, H. Jonsson, J. Redemann, J. Eilers, K. Ricci, A. G. Hallar, M. Clayton, J. Michalsky, A. Smirnov, B. Holben, J. Barnard, 2005: How well can we measure the vertical profile of tropospheric aerosol extinction? *J. of Geophysical Research* doi: 2005JD005837.
- Lopez, J., A. Fridlind, H-J Jost, M. Loewenstein, A. Ackerman, T. Campos, E. Weinstock, D. Sayres, J.B. Smith, J. Pittman, A. G. Hallar, L. Avallone, S. Davis, R. Herman, 2005: CO signatures in subtropical convective clouds and anvils during CRYSTAL-FACE: Constraining entrainment rates with observations. *J. of Geophysical Research*, doi: 2005JD006104.
- Hallar, A.G., L.M. Avallone, R.L. Herman, B.E. Anderson, and A.J. Heymsfield, 2004: Measurements of ice water content in tropopause region arctic cirrus during the SAGE III Ozone Loss and Validation Experiment (SOLVE). *J. of Geophysical Research*, **109** (D17203) doi 10.1029/2003JD004348.
- Kondo, Y., O.B. Toon, H. Irie, B. Gamblin, M. Koike, N. Takegawa, M.A. Tolbert, P.K. Hudson, A.A. Viggiano, L.M. Avallone, A.G. Hallar, B.E. Anderson, G.W. Sachse, D.E. Hunton, J.O. Balentine, and T.M. Miller, 2003: Uptake of nitric acid on cirrus cloud particles in the upper troposphere and lowermost stratosphere. *Geophys. Res. Lett.*, **30**(4), doi:10.1029/2002GL016539.

Technical Reports:

- Mace, J., S. Matrosov, B. Orr, M. Shupe, R. Coulter, A. Sedlacek, A.G Hallar, L. Avallone, I. McCubbin, C. Long, R. Marchand, and P. Lawson, 2010: STORMVEX: The Storm Peak Lab Cloud Property Validation Experiment Science and Operations Plan, US Dept. of Energy, DOE/SC-ARM-10-021.

Invited Talks:

- Hallar, A.G., Effects of Bark Beetle Infestation on Secondary Organic Aerosol Precursors, presented at the 2014 Biogenic Hydrocarbons & the Atmosphere Gordon Research Conference, Girona, Spain, July 1, 2014.
- Hallar, A.G., Chemical, Biological, and Hygroscopic Properties of Aerosol Organics at Storm Peak Laboratory, presented at the Department of Atmospheric and Oceanic Science, University of Wisconsin, Madison, November 18, 2013.

Hallar, A.G., Chemical, Biological, and Hygroscopic Properties of Aerosol Organics at Storm Peak Laboratory, presented at the Department of Atmospheric Science, Colorado State University, Fort Collins, Colorado May 9, 2013.

Hallar, A.G., R. Bowers, I. B. McCubbin, C. Wiedinmyer, V. Samburova, Recent Primary Biological Aerosol Measurements at Storm Peak Laboratory presented at Department of Earth, Atmospheric and Planetary Sciences Massachusetts Institute of Technology, January 28, 2013.

Hallar, A.G., L.M. Avallone; L.M. Edwards; H. Thiry, Mentors, Networks, and Resources for Early Career Female Atmospheric Scientists (Invited), AbstractED21E-06 presented at 2011 Fall Meeting, AGU, San Francisco, Calif., 5-9 Dec.

Hallar A.G., D. Lowenthal, I. McCubbin, and G. Chirokova, Persistent Daily New Particle Formation at a Mountain-Top Location, Brookhaven National Laboratory Atmospheric Science Division Science Seminar, July 2011.

Hallar, A.G.: ADVANCE Distinguished Lecture Series: Spring 2010: Initiating Positive Professional Relationships among Women in Atmospheric Science via ASCENT, National Science Foundation, March 19, 2010.

Hallar, A.G., 2010: Physics Symposium, Science and Outreach at Storm Peak Laboratory, Michigan Technical University, September 2010.

Hallar, A.G.: Persistent Daily Aerosol Nucleation Events at Mountain-Top Location, AAAR 28th Annual Conference, Minneapolis, MN, October 2009.

Hallar, A.G., D. Obrist, I. McCubbin, T.A. Rahn, Research in Transport of Asian Pollution at Storm Peak Laboratory, Paul Scherrer Institut (PSI), Labor für Atmosphärenchemie, Switzerland, August 2008.

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Hallar, A.G.: Current Research Opportunities at Storm Peak Laboratory, NCAR, Boulder, CO, May 2007.

Hallar, A.G., I.B. McCubbin, GeoScience Research at Storm Peak; Presented at National Science Foundation Opportunities for Enhancing Diversity in GeoScience Principal Investigator Meeting, Washington D.C., October 2007.

Other Publications:

Hallar, A.G., C. Wiedinmyer, I.B. McCubbin, R. M. Bowers, N. Fierer, L. Mazzoleni, B. Christner, D. Obrist, X. Faïn, 2010: A High Altitude Interdisciplinary Field Campaign - The Storm Peak Aerosol and Cloud Characterization Study (SPACCS08), Newsletter of the Mountain Research Initiative, no. 2, April 2009.

Strawa, A.W., A.G. Hallar, R. Castaneda, K. Ricci, A. P. Luu, R. Provencal, A. Bucholtz, B. Schmid, D. Covert, R. Elleman, W.P. Arnott, 2004: Cavity Ring Down Measurement of Aerosol Scattering, Extinction, and Absorption during DOE Aerosol Intensive Operating Period. Manuscript presented at Air and Waste Management Conference, April 2004, Research Triangle Park, NC.

Hallar, A.G., and A.W. Strawa, 2004: In situ Measurements of Aerosol Optical Properties With An Emphasis on Spectral Properties of Carbonaceous Aerosols. Proceedings SOFIA Upper Deck Science Opportunities Workshop, NASA Ames Research Center, Moffett Field, CA, June 22-23, 2004.

Conference Presentations, and Proceedings:

Blossey, P.N., M. Moore, Z. Kuang, A. Muhlbauer, D. Lowenthal, A. G. Hallar, I. McCubbin, R. David, R. Borys, A. Wiegele, M. Schneider, C. Risi, Isotopic Fractionation in Snow (IFRACS) at Storm Peak Laboratory, Abstract 76988 presented at 2015 Fall Meeting, AGU, San Francisco, Calif., 12-16 Dec.

- Kassianov, E., M. Pekour, C. Flynn, L. Berg, J. Beranek, A. Zelenyuk, J. Barnard, A. G. Hallar, A. McComiskey, P. Rasch, What Can AMF Observations Tell Us about Super-micron Particles?, Abstract 78948 presented at 2015 Fall Meeting, AGU, San Francisco, Calif., 12-16 Dec.
- Hallar, A., R. Petersen, E. Andrews, J. Ogren, J. Michalsky, I. McCubbin, N. Molotch, J. Hand, Comparable Role in Dust and Biomass-Burning to Aerosol Optical Depth at a Colorado Mountain-top Site. Abstract 84705 presented at 2015 Fall Meeting, AGU, San Francisco, Calif., 12-16 Dec.
- Mazzoleni, L.R., V. Samburova, Y. Zhao, M.M. Dalbec, D.M.A. Habib, M.A. Brege, P. Saranjampour, A.G. Hallar, B. Zielinska, and D. Lowenthal, Ultrahigh resolution mass spectrometry fragmentation analysis for functional groups and structural insights of WSOC collected at the Storm Peak Laboratory, presented at European Aerosol Conference (EAC 2015) in Milan, Italy, 6-12 September 2015.
- Hallar, A.G., R. Peterson, E. Andrews, J. Michalsky, I. B. McCubbin, J. Ogren, Multiyear Measurements of Aerosols at Storm Peak Laboratory, a Colorado Mountain-Top Site, presented at the 2015 NOAA ESRL Global Monitoring Annual Conference, Boulder, CO, 19-20 May.
- David, R. O., Lowenthal, D. H., Hallar, A., McCubbin, I. B., Avallone, L., Mace, G., Wang, Z., 2015: Ice Formation and Growth in Orographically-Enhanced Mixed-Phase Clouds, Abstract EGU2015-7776, European Geosciences Union General Assembly 2015: Vienna, Austria, April 17, 2015
- David, R., D. Lowenthal, A. G. Hallar, I. McCubbin, L. Avallone, G. Mace, Z. Wang, 2014: Ice Formation and Growth in Orographically-Enhanced Mixed-Phase Clouds. Abstract EGU2015-7776 presented at European Geosciences Union General Assembly 2015, Vienna, Austria 17 April.
- Glasius, M., A. M. K. Hansen, K. Kristensen, T. Kristensen, I. McCubbin, A. G. Hallar, T. Petäjä, J. D. Surratt, D. R. Worton, M. Kulmala and A. H. Goldstein, 2014: Organosulfates and Carboxylic Acids in Secondary Organic Aerosols in Coniferous Forests in Rocky Mountains (USA), Sierra Nevada Mountains (USA) and Northern Europe (Finland and Denmark). Abstract A21J-3159 presented at 2014 Fall Meeting, AGU, San Francisco, Calif., 15-19 Dec.
- David, R., D. Lowenthal, A. G. Hallar, I. McCubbin, L. Avallone, G. Mace, Z. Wang, 2014: A Comparison between Airborne and Mountaintop Cloud Microphysics. Abstract A24C-06 presented at 2014 Fall Meeting, AGU, San Francisco, Calif., 15-19 Dec.
- Samburova, V., A. Murray, A. G. Hallar, X. Yang, B. Zielinska, 2014: Analysis of Atmospheric Biological Particles with High Resolution Microscopy Techniques, Abstract 7BA.5 presented at the American Association for Aerosol Research (AAAR) 33rd Annual in Orlando, Florida. October 2014.
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- Hallar, A.G., I. B. McCubbin, K. Huff-Hartz, C. Heald, A. Berg, 2014: Effects of Mountain Pine Beetle Infestation on SOA Precursors, presented at the 2014 Symposium on Atmospheric Chemistry and Physics at Mountain Sites, Steamboat Springs, Colorado, 11-15 Aug.
- Hallar, A.G., D. H. Lowenthal, S. L. Clegg, V. Samburova, N. Taylor, L. R. Mazzoleni, B. K. Zielinska, T. B. Kristensen, I. B. McCubbin, 2014: Chemical, Biological, and Hygroscopic Properties of Aerosols at Storm Peak Laboratory, presented at the 2014 Symposium on Atmospheric Chemistry and Physics at Mountain Sites, Steamboat Springs, Colorado, 11-15 Aug.
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- Stephens, B. A. Watt, S. Burns, A. Desai, D. Bowling, J. Ehleringer, J. Lin, A. Andrews, A. G. Hallar, and I. McCubbin, 2014: The Diurnal Cycle of Atmospheric CO₂ at Mountain Locations, presented at the 2014 Symposium on Atmospheric Chemistry and Physics at Mountain Sites, Steamboat Springs, Colorado, 11-15 Aug.
- Andrews, E., Ogren, J.A., Bonasoni, P., Marinoni, A., Cuevas, E., Rodríguez, S., Sun, J.Y., Baltensperger, U., Weingartner, E., Collaud Coen, M., Sharma, S., Macdonald, A.M., Leaitch, W.R., Lin, N.-H., Laj, P., Sellegri, K., Arsov, T., Kalapov, I., Hallar, A. G., Ries, L., Jefferson, A., Sheridan, P.J., Bergin, M., Strellis, B., Bukowicki, N., L. Valle, G. Torres, Andrade, M., Velarde, F., Moreno, I., Wiedensohle, A. Krejci, R., 2014: Temporal variability of aerosol properties at high altitude sites – a lag-autocorrelation analysis, presented at the 2014 Symposium on Atmospheric Chemistry and Physics at Mountain Sites, Steamboat Springs, Colorado, 11-15 Aug.
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- McMeeking, G., G. L. Kok, M. D. Petters, T. Wright, J. Hader, I. B. Mccubbin, A. G. Hallar, C. H. Twohy, D. W. Toohey, P. J. DeMott, C. McCluskey, D. Baumgardner, 2014: Recent fluorescence-based measurements of biological particles with WIBS-4A, Abstract 373 presented at the 94th AMS meeting, Phoenix, Arizona, 4-8 January.
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- Toohey, P. J. DeMott, C. McCluskey, D. Baumgardner, Real-time Measurements of Biological Particles at Several Continental Sites using the WIBS-4A, Abstract A11B-0029 presented at 2013 Fall Meeting, AGU, San Francisco, Calif., 9-13 Dec.
- Zhao, Y., L. R. Mazzoleni, V. Samburova, A. G. Hallar, B. Zielinska, D. H. Lowenthal, S. Kohl, Multivariate Analysis of Water-Soluble Organic Carbon Molecular Formulas in Daily Samples, Abstract A31D-0122 presented at 2013 Fall Meeting, AGU, San Francisco, Calif., 9-13 Dec.
- Mazzoleni, L.R., D. M. Ashraf Habib, Y. Zhao, M. Dalbec, V. Samburova, A. G. Hallar, B. Zielinska, D. Lowenthal, Functional Groups and Structural Insights of Water-Soluble Organic Carbon using Ultrahigh Resolution FT-ICR Tandem Mass Spectrometry, Abstract A33I-04 presented at 2013 Fall Meeting, AGU, San Francisco, Calif., 9-13 Dec.
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- Hallar, A.G.; I. B. Mccubbin; S. E. Lynds; C. Dodson; Demonstrate the Model and Evaluation of Geoscience Research At Storm Peak (GRASP), a Field Research Experience Designed to Enhance Diversity in the Geosciences, Abstract ED54A-06 presented at 2012 Fall Meeting, AGU, San Francisco, Calif., 3-7 Dec.
- Yu, H.; Vijay P. Kanawade; Yi You; Anna G. Hallar; Ian B. Mccubbin; Galina Chirokova; Arthur J. Sedlacek; Stephen R. Springston; Jian Wang; Chongai Kuang; Yin-Nan Lee; Robert L. McGraw; Jyri Mikkila; Shanhu Lee, Observations of Sub-3 nm Particles and Sulfuric acid Concentrations during Aerosol Life Cycle Intensive Observation Period 2011 in Long Island, New York, Abstract A53K-0293 presented at 2012 Fall Meeting, AGU, San Francisco, Calif., 3-7 Dec.
- Hallar, A.G.; Ian B. Mccubbin; Igor Novosselov; Riley Gorder, A High Elevation Aerosol Manifold Modeling Study and Inter-comparison, Abstract A51A-0016 presented at 2012 Fall Meeting, AGU, San Francisco, Calif., 3-7 Dec.
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- Andrews, E., P. Massoli, A.G. Hallar, A. Sedlacek, A. Freedman, J. A. Ogren and P. Sheridan, Absorption closure filter-based absorption instruments compared to extinction-scattering measurements; presented at the European Aerosol Conference, Granada, Spain, September 2012.
- Ogren, J.A., M. Collaud Coen, A. Asmi, E. Andrews, P.P. Aalto, E. Asmi, U. Baltensperger, W. Birmili, N. Bukowiecki, D. Day, M. Fiebig, A.M. Fjaeraa, H. Flentje, A.G. Hallar, Amar Hamed, A. Hyvärinen, A. Jefferson, S. G. Jennings, N. Kivekäs, G. Kouvarakis, M. Kulmala, H. Lihavainen, C. Lund Myhre, W. C. Malm, N. Mihapopoulos, J. V. Molenaar, C. O'Dowd, B. A. Schichtel, P. Sheridan, A. Virkkula, E. Weingartner, R. Weller, Alfred Wiedensohler, and P. Laj, Aerosol decadal trends: In-situ measurements of

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- Hansen, C, A. G. Hallar, K. C. King, N. Nauslar, and M. Kaplan, Graduate Field Courses at Storm Peak Laboratory – An Interdisciplinary Approach Combining Snow Hydrology and High Resolution Atmospheric Modeling, presented at the 15th Conference on Mountain Meteorology, Steamboat Springs, CO, August 2012.
- Chirokova, G.; A. G. Hallar, D. Lowenthal, I. McCubbin, L. Avallonne, G. G. Mace, M. Shupe, and L. D. Oolman, Vertical distribution of liquid water in mixed-phase clouds from in-situ ground and airborne measurements during simultaneous CAMPS and StormVEx field campaigns, presented at the 15th Conference on Mountain Meteorology, Steamboat Springs, CO, August 2012.
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- Sedlacek, Arthur III, A. G Hallar, P Massoli, SR Springston, A Freedman, Optical and Microphysical Properties of Ambient Aerosol in Steamboat Springs, presented at the AAAR 30th Annual Conference Orlando, FL, October 3-7, 2011.

- Saranjampour, P., Vera Samburova, A. Gannet Hallar, Douglas Lowenthal, Barbara Zielinska, Lynn R Mazzoleni, Ultrahigh-resolution FT-ICR mass spectrometric identification of water-soluble AOM in nonurban organic aerosols, presented at the 242nd American Chemical Society National Meeting & Exposition, August 28-September 1, 2011, Denver, Colorado.
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- Kristensen, Thomas Bjerring; Heike Wex, Bettina Nekat, Dominik van Pinxteren, Katrin Mildenerger, Frank Stratmann, Jacob K. Nøjgaard, Christian B. Koch, Anna G. Hallar, Thomas F. Mentel, Merete Bilde Hygroscopic properties of HULIS from different environments, presented at the European Aerosol Conference, September 4-9, 2011, Manchester, England.
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- Mace, G., Avallone, L., Shupe, M., Marchand, R., Matrosov, S., Hallar, A. G., McCubbin, I., Long, C., and Lawson, P.; The Storm Peak Lab Cloud Property Validation Experiment: description and early results; Atmospheric System Research (ASR) Science Team Meeting, March 28-April 1, 2011, San Antonio, Texas.
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- Hallar, A.G., Presented research summary of *Storm Peak Laboratory for Mountain Research Initiative Workshop*, Faculty Club at the University of California, Berkeley, December 12, 2010.
- Baustian, K.J., M.E. Wise, D.J. Cziczo, A.G. Hallar, and M.A. Tolbert, Abstract A23E-04, Importance of Chemical Composition for Ice Nucleation: A Combined Field and Laboratory Approach, presented at *2010 Fall Meeting, AGU*, San Francisco, CA, December 13-17, 2010.
- Edwards, L.M., A.G. Hallar, L.M. Avallone, and H. Thiry, Abstract ED13A-0598, Increasing retention of early career female atmospheric scientists. Presented at *2010 Fall Meeting, AGU*, San Francisco, CA, December 13-17, 2010.
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- Vargas, W., and A.G. Hallar, 2009: Research Opportunities for Undergraduate Students at Storm Peak Laboratory, *Eos Trans. AGU*, **90**(52), Fall Meet. Suppl. Abstract: ED53B-0548.
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