

## **HANS MOOSMÜLLER**

Research Professor

Atmospheric Sciences Division, Desert Research Institute, University of Nevada System

### **EDUCATION**

Ph.D.	Physics	1988	Colorado State University, Fort Collins, CO
DIPLOM (M.S.)	Physics	1982	Ludwigs-Maximilians Universität, München

### **RESEARCH EXPERIENCE**

Dr. Moosmüller's interests include experimental and theoretical research in optical spectroscopy as well as its applications to atmospheric and aerosol physics. Currently, his research focuses on development and application of real time, *in situ* measurement methods for aerosol light absorption, scattering, extinction, and asymmetry parameter, and new optical remote sensing techniques. These measurement methods are being used both for ambient air monitoring and for vehicle, fugitive dust, and biomass burning emission studies. His latest research interest is aerosol morphology and its influence on aerosol optical properties with a focus on fractal-like chain aggregates found in combustion particles. Dr. Moosmüller has also participated in the planning, fieldwork, and data analysis of several major air quality studies. During his first three years at DRI, he was responsible for the airborne ozone lidar research program under a cooperative agreement with the USEPA.

Before joining DRI, Dr. Moosmüller was at Colorado State University where he investigated Brillouin light scattering of spin waves and millimeter-wave effective line widths in thin metal films. He also did research on high-spectral-resolution lidar and coherent light scattering techniques. This work included the development of supersonic flow measurement techniques and the investigations of spectral line shapes. His earlier work at the Ludwigs-Maximilians Universität in Munich and the Max Planck Institute for Quantum Optics in Garching focused on laser remote sensing.

### **PROFESSIONAL EXPERIENCE**

2006 – Present	Graduate Faculty <i>Chemistry Department, University of Nevada, Reno, NV</i> <i>Chemical Physics Program, University of Nevada, Reno, NV</i>
2000 – Present	Research Professor <i>Desert Research Institute, University of Nevada System, Reno, NV</i>
1995 – Present	Graduate Faculty <i>Physics Department, University of Nevada, Reno, NV</i> <i>Atmospheric Sciences Program, University of Nevada, Reno, NV</i>
1995 – 2000	Associate Research Professor <i>Desert Research Institute, University of Nevada System, Reno, NV</i>
1991 – 1995	Assistant Research Professor <i>Desert Research Institute, University of Nevada System, Reno/Las Vegas, NV</i>
1988 – 1990	Postdoctoral Research Associate <i>Magnetics Laboratory, Colorado State University, Fort Collins, CO</i>

- 1982 – 1988 Graduate Research and Teaching Assistant  
*Geoscience Center, Nonlinear Optics Laboratory, and Physics Department, Colorado State University, Fort Collins, CO*
- 1980 – 1982 Graduate Research Assistant  
*Physics Department, Ludwigs-Maximilians Universität, München, Germany and Max Planck Institute for Quantum Optics, Garching, Germany*
- Summer 1979 Intern  
*IBM München, Germany*
- Summer 1977 Intern  
*Bayer Dormagen, Germany*

## PROFESSIONAL ACTIVITIES

### Postdoctoral Adviser

- 2009 – Present Dr. Rajan K. Chakrabarty
- 2006 – 2007 Dr. Daniel Obrist  
*currently Associate Research Professor, Desert Research Institute, NSHE*
- 2003 - 2005 Dr. Claudio Mazzoleni  
*currently Assistant Professor, Physics Dept., Michigan Tech. University*

### Graduate Student Adviser

- 2007 – Present Mr. Guoxun Tian (Physics)
- 2004 – 2008 Dr. Rajan K. Chakrabarty (M.S. in Atmospheric Sciences, 2006; Ph.D. in Chemical Physics, 2008)  
*currently Postdoctoral Research Associate, Desert Research Institute, NSHE*
- 1999 – 2003 Dr. Claudio Mazzoleni (Ph.D. in Atmospheric Sciences, 2003)  
*currently Assistant Professor, Physics Dept., Michigan Tech. University*
- 1999 – 2003 Dr. Ravi Varma (Ph.D. in Atmospheric Sciences, 2003);  
*currently Assistant Professor, Physics Dept., Nat. Inst. of Tech. Calicut, India*
- 1994 – 1997 Dr. Joseph D. Vance (M.S. in Atmospheric Sciences, 1997)  
*currently CEO, Citruslaser LLC, Fort Collins, CO*

### Conferences

- Chair, Session 4B: Recent Advances in Biomass Burning Emissions – Source Modeling and Measurement/Aerosol Exposure, *Annual Meeting of the American Association for Aerosol Research (AAAR)*, Minneapolis, MN, October 26-30, 2009.
- Chair, Poster Session 3B: Recent Advances in Biomass Burning Emissions – Wildfire Emissions and Impacts, *Annual Meeting of the American Association for Aerosol Research (AAAR)*, Minneapolis, MN, October 26-30, 2009.
- Chair, Session 2B: Recent Advances in Biomass Burning Emissions – Wildfire Emissions and Impacts, *Annual Meeting of the American Association for Aerosol Research (AAAR)*, Minneapolis, MN, October 26-30, 2009.
- Chair, Session 1B: Recent Advances in Biomass Burning Emissions – Aerosol Characterization, *Annual Meeting of the American Association for Aerosol Research (AAAR)*, Minneapolis, MN, October 26-30, 2009.
- Organizer, Special Symposium on Recent Advances in Biomass Burning Emission Measurement and Modeling, *Annual Meeting of the American Association for Aerosol Research (AAAR)*, Minneapolis, MN, October 26-30, 2009.

Technical Program Committee, *Annual Meeting of the American Association for Aerosol Research (AAAR)*, Minneapolis, MN, October 26-30, 2009.

Chair, Biomass Burning Emissions Session, *Aerosol and Atmospheric Optics: Visual Air Quality and Radiation Balance Conference*, Air & Waste Management Association, Moab, UT, April 28 - May 2, 2008.

Chair, Poster/Oral Session, *Aerosol Workshop on Climate Prediction Uncertainties, Second International Conference on Global Warming and the Next Ice Age*, Santa Fe, NM, July 17-21, 2006.

Chair, Aerosols and Climate Session, *Second International Conference on Global Warming and the Next Ice Age*, Santa Fe, NM, July 17-21, 2006.

Chair, Mercury Detection Session, *61<sup>st</sup> Northwest Regional Meeting of the American Chemical Society*, Reno, NV, June 25-28, 2006.

Chair, Atmospheric Science Session, *61<sup>st</sup> Northwest Regional Meeting of the American Chemical Society*, Reno, NV, June 25-28, 2006.

Chair, Session 2, Optical Monitoring Methods, *Regional and Global Perspectives on Haze: Causes, Consequences, and Controversies (Visibility Specialty Conference)*, Asheville, NC, October 25-29, 2004.

Topic Leader, Topic #8: What New and Innovative Sampling, Analytical, and Interpretive Techniques are Needed to Determine the Properties and Sources of Carbonaceous Aerosol in the Atmosphere? *International Workshop for the Development of Research Strategies for the Sampling and Analysis of Organic and Elemental Carbon Fractions in Atmospheric Aerosol (OC/EC Workshop)*, Durango, CO, March 4-5, 2003.

Chair, Session 106: Remote Sensing of Chemical Species in the Atmosphere, *87th Annual Meeting of the Air & Waste Management Association*, Cincinnati, OH, June 19-24, 1994.

Co-Chair, Session 21: Atmospheric Spectroscopy and Source Emissions Characterization, *II, International Symposium on Optical Sensing for Environmental Monitoring*, Atlanta, GA, October 12-14, 1993.

### **Awards**

Gillies, J. A., N. Lancaster, H. D. Kuhns, H. Moosmüller, E. McDonald, D. Gillette, and W. Nickling (2004). SERDP project (CP-1191) "Characterizing and Quantifying Local and Regional Particulate Matter Emissions from Department of Defense Installations", SERDP Compliance Project of the Year.

### **Select Committees**

Member, External Review Committee, Los Alamos National Laboratory (LANL) Laboratory Directed Research and Development (LDRD), Resolving the Aerosol-Climate-Water Puzzle (2005-2007)

Member, Adjunct Science Team, Department of Energy's Atmospheric Science Program (2005-present)

Chair, Bylaws Committee, Atmospheric Sciences Program, University of Nevada, Reno (2005-present)

Chair, Desert Research Institute's Emeritus Committee (2008-present)

Member, Desert Research Institute's Emeritus Committee (2006-present)

Member, Desert Research Institute's Research Affairs Council (2003-2007)

Chair, Desert Research Institute, Division of Atmospheric Sciences' Promotion Committee (2003-2006)

Member, Desert Research Institute's Library Committee (2002-2008)

Member, Desert Research Institute's Senior Research Council (2000-present)

Member, Air & Waste Management Association's Technical Committee AB-2, Chemistry (1993-2002)

Member, Desert Research Institute's Faculty Senate (1998-2001)

Member, American Meteorological Society's Committee on Laser Atmospheric Studies (1995-1998)

### **Editor**

Special Issue of "Atmospheric Chemistry and Physics" in 2010 entitled "Measurement and Modeling of Aerosol Emissions from Biomass Burning"

### **Manuscript Review**

Aerosol and Air Quality Research

Aerosol Science and Technology

American Institute of Aeronautics and Astronautics (AIAA) Journal

Applied Optics

Atmospheric Chemistry and Physics

Atmospheric Environment

Atmospheric Measurement Techniques

Computers and Electronics in Agriculture

Environmental Engineering Science

Environmental Monitoring and Assessment

Environmental Science and Technology

Geophysical Research Letters

Geotechnical Testing Journal

Jordan Journal of Physics

Journal of Aerosol Science

Journal of Applied Meteorology

Journal of Geophysical Research

Journal of Quantitative Spectroscopy and Radiative Transfer

Journal of the Air & Waste Management Association

Optics Express

Optics Letters  
Science of the Total Environment  
Sensor Letters  
Society of Automotive Engineers (SAE) Transactions

### **Proposal Review**

Army Research Office (ARO)  
Austrian Science Fund (FWF)  
Department of Energy (DoE)  
Department of Energy (DoE), SBIR  
Department of Defense (DoD), EPSCoR Program  
Los Alamos National Laboratory (LANL)  
National Aeronautics and Space Administration (NASA)  
National Aeronautics and Space Administration (NASA), EPSCoR Program  
National Aeronautics and Space Administration (NASA), ROSES Panel  
National Oceanic and Atmospheric Administration (NOAA)  
National Oceanic and Atmospheric Administration (NOAA), SBIR  
National Science Foundation (NSF)  
Research Corporation  
U.S. Civilian Research and Development Foundation

### **Membership**

Air & Waste Management Association  
American Association for Aerosol Research  
American Geophysical Union  
Optical Society of America

## **PUBLICATIONS**

### **Peer Reviewed Publications**

- 77) Fäin, X., H. Moosmüller, and D. Obrist (2009). Toward a Real-Time Measurement of Atmospheric Mercury Concentrations Using Cavity Ring-Down Spectroscopy. *Atm. Chem. Phys. Discuss.*, **9**, 22143-22175, *Atm. Chem. Phys.*, in review.
- 76) Lewis, K. A., W. P. Arnott, H. Moosmüller, R. K. Chakrabarty, C. M. Carrico, S. M. Kreidenweis, D. E. Day, W. C. Malm, A. Laskin, J.-L. Jimenez, J. A. Huffman, I. M. Ulbrich, T. B. Onasch, A. Trimborn, L. Lui, and M. I. Mishchenko (2009). Reduction in Biomass Burning Aerosol Light Absorption upon Humidification: Roles of Inorganically-Induced Hygroscopicity, Particle Collapse, and Photoacoustic Heat and Mass Transfer. *Atm. Chem. Phys. Discuss.*, **9**, 15247-15294, *Atm. Chem. Phys.*, in review.
- 75) Chan, T. W., L. Huang, W. R. Leitch, S. Sharma, J. R. Brook, J. G. Slowik, J. P. D. Abbatt, P. C. Brickell, J. Liggio, S.-M. Li, and H. Moosmüller (2009). Determination of OM/OC Ratios and Specific Attenuation Coefficients (SAC) in Ambient Fine PM at a Rural Site in Southern Ontario: Implications for Different Emission Sources, Particle Aging, and Radiative Forcing. *Atm. Chem. Phys. Discuss.*, **9**, 14315-14359, *Atm. Chem. Phys.*, in review.
- 74) Lewis, J. M., D. W. Martin, R. M. Rabin, and H. Moosmüller (2009). Verner Suomi: Pragmatic Visionary. *Bull. Amer. Meteor. Soc.*, accepted for publication.

- 73) Zhu, D., N. J. Nussbaum, H. D. Kuhns, M.-C. O. Chang, D. Sodeman, S. Uppupalli, H. Moosmüller, and J. G. Watson (2009). In-Plume Emissions Test-Stand (IPETS) 2: Emission Factors for 10 kW to 100 kW U.S. Military Generators Measured with an In-Plume Measurement System. *J. Air & Waste Manage. Assoc.*, accepted for publication.
- 72) Nussbaum, N. J., D. Zhu, H. D. Kuhns, C. Mazzoleni, M.-C. O. Chang, H. Moosmüller, and J. G. Watson (2009). The In-Plume Emissions Test-Stand: A Novel Instrument for the Real-Time Measurement of Combustion Exhaust. *J. Air & Waste Manage. Assoc.*, accepted for publication.
- 71) Petters, M. D., C. M. Carrico, S. M. Kreidenweis, A. J. Prenni, P. J. DeMott, J. L. Collett, Jr., and H. Moosmüller (2009). Cloud Condensation Nuclei Activity of Biomass Burning Aerosol. *J. Geophys. Res.*, **114**, doi:10.1029/2009JD012353, in press.
- 70) Gyawali, M., W. P. Arnott, K. Lewis, and H. Moosmüller (2009). In Situ Aerosol Optics in Reno, NV, USA during and after the Summer 2008 California Wildfires and the Influence of Absorbing and Non-Absorbing Organic Coatings on Spectral Light Absorption. *Atm. Chem. Phys.*, **9**, 8007-8015.
- 69) McMeeking, G. R., S. M. Kreidenweis, S. Baker, C. M. Carrico, J. C. Chow, J. L. Collett Jr., W. M. Hao, A. S. Holden, T. W. Kirchstetter, W. C. Malm H. Moosmüller, A. P. Sullivan, and C. E. Wold (2009). Emissions of Trace Gases and Aerosols during the Open Combustion of Biomass in the Laboratory. *J. Geophys. Res.*, **114**, doi:10.1029/2009JD011836, in press.
- 68) Moosmüller, H. and W. P. Arnott (2009). Particle Optics in the Rayleigh Regime. *J. Air & Waste Manage. Assoc.*, **59**, 1028-1031.
- 67) Tian, G., H. Moosmüller, and W. P. Arnott (2009). Simultaneous Photoacoustic Spectroscopy of Aerosol and Oxygen A-band Absorption for the Calibration of Aerosol Light Absorption Measurements. *Aerosol Sci. Tech.*, **43**, 1084-1090.
- 66) DeMott, P. J., M. D. Petters, A. J. Prenni, C. M. Carrico, S. M. Kreidenweis, J. L. Collett, Jr., and H. Moosmüller (2009). Ice Nucleation Behavior of Biomass Combustion Particles at Cirrus Temperatures. *J. Geophys. Res.*, **114**, D16205, doi:10.1029/2009JD012036 (13 pages).
- 65) Chakrabarty, R. K., M. A. Garro, S. Chancellor, C. Herald, and H. Moosmüller (2009). *FracMAP*: A User-Interactive Package for Performing Simulation and Orientation-Specific Morphology Analysis of Fractal-Like Solid Nano-Agglomerates. *Comp. Phys. Comm.*, **180**, 1376-1381.
- 64) Chakrabarty, R. K., H. Moosmüller, W. P. Arnott, M. A. Garro, G. Tian, J. G. Slowik, E. S. Cross, J.-H. Han, P. Davidovits, T. B. Onasch, and D. R. Worsnop. (2009). Low Fractal Dimension Cluster-Dilute Soot Aggregates from a Premixed Flame. *Phys. Rev. Lett.*, **102**, 235504 (4 pages).
- 63) Moosmüller, H., R. K. Chakrabarty, and W. P. Arnott (2009). Aerosol Light Absorption and its Measurement: A Review. *J. Quant. Spectrosc. Radiat. Transfer*, **110**, 844-878.
- 62) Petters, M. D., M. T. Parsons, A. J. Prenni, P. J. DeMott, S. M. Kreidenweis, C. M. Carrico, A. P. Sullivan, G. R. McMeeking, E. Levin, C. E. Wold, J. L. Collett, Jr., and H. Moosmüller (2009). Ice Nuclei Emissions from Biomass Burning. *J. Geophys. Res.*, **114**, doi:10.1029/2008JD011532, (10 pages).

- 61) Chakrabarty, R. K., H. Moosmüller, M. A. Garro, W. P. Arnott, J. G. Slowik, E. S. Cross, J.-H. Han, P. Davidovits, T. B. Onasch, and D. R. Worsnop (2008). Morphology Based Particle Segregation by Electrostatic Charge. *J. Aerosol Sci.*, **39**, 785-792.
- 60) Lewis, K., W. P. Arnott, H. Moosmüller, and C. E. Wold (2008). Strong Spectral Variation of Biomass Smoke Light Absorption and Single Scattering Albedo Observed with a Novel Dual-Wavelength Photoacoustic Instruments. *J. Geophys. Res.*, **113**, doi:10.1029/2007JD009699 (14 pages).
- 59) Obrist, D., H. Moosmüller, R. Schürmann, L.-W. A. Chen, and S. M. Kreidenweis (2008). Particulate-Phase and Gaseous Elemental Mercury Speciation During Biomass Combustion: Controlling Factors and Correlation with Particulate Matter Emissions. *Environ. Sci. Technol.*, **42**, 721-727.
- 58) Chakrabarty, R. K., H. Moosmüller, W. P. Arnott, M. A. Garro, J. G. Slowik, E. S. Cross, J.-H. Han, P. Davidovits, T. B. Onasch, and D. R. Worsnop (2007). Light Scattering and Absorption by Fractal-Like Carbonaceous Chain Aggregates: Comparison of Experiment and Approximate Calculations. *Appl. Opt.*, **46**, 6990-7006.
- 57) Mazzoleni, C., H. D. Kuhns, H. Moosmüller, J. Witt, N. J. Nussbaum, M.-C. O. Chang, G. Parthasarathy, S. K. K. Nathagoundenpalayam, G. Nikolic, and J. G. Watson (2007). A Case Study of Real-World Tailpipe Emissions for School Buses Using a 20% Biodiesel Blend. *Sci. Total Environ.*, **385**, 146-159.
- 56) Chen, L.-W. A., H. Moosmüller, W. P. Arnott, J. C. Chow, J. G. Watson, R. A. Susott, R. E. Babbitt, C. E. Wold, E. N. Lincoln, and W. M. Hao (2007). Emissions from Laboratory Combustion of Wildland Fuels: Emission Factors and Source Profiles. *Environ. Sci. Technol.*, **41**, 4317-4325.
- 55) Li, W., J. F. Collins, T. D. Durbin, T. Huai, A. Ayala, G. Full, C. Mazzoleni, N. J. Nussbaum, D. Obrist, D. Zhu, H. D. Kuhns, and H. Moosmüller (2007). Detection of Gasoline Vehicles with Gross PM Emissions. *SAE Tech. Pap. Ser.*, **SP-2089**, 2007-01-1113 (13 pages).
- 54) Mazzoleni, L. R., B. Zielinska, and H. Moosmüller (2007). Emissions of Levoglucosan, Methoxy Phenols, and Organic Acids from Prescribed Burns, Wildland Fuels, and Residential Wood Combustion, *Environ. Sci. Technol.*, **41**, 2115-2122.
- 53) Slowik, J. G., E. S. Cross, J.-H. Han, P. Davidovits, T. B. Onasch, J. T. Jayne, L. R. Williams, M. R. Canagaratna, D. R. Worsnop, R. K. Chakrabarty, H. Moosmüller, W. P. Arnott, J. P. Schwarz, R.-S. Gao, D. W. Fahey, G. L. Kok, and A. Petzold (2007). An Inter-Comparison of Instruments Measuring Black Carbon Content of Soot Particles. *Aerosol Sci. Tech.*, **41**, 295-314.
- 52) Chakrabarty, R. K., H. Moosmüller, W. P. Arnott, M. A. Garro, and J. W. Walker (2006). Structural and Fractal Properties of Particles Emitted by Spark Ignition Engines. *Environ. Sci. Technol.*, **40**, 6647-6654.
- 51) Chen, L.-W. A., H. Moosmüller, W. P. Arnott, J. G. Watson, and P. Mousset-Jones (2006). Novel Approaches to Measure Diesel Emissions. *J. Mine Vent. Soc. South Africa*, **59**, 40-45.

- 50) Abu-Rahmah, A., W. P. Arnott, and H. Moosmüller (2006). Integrating Nephelometer with a Low Truncation Angle and an Extended Calibration Scheme. *Meas. Sci. Tech.*, **17**, 1723-1732.
- 49) Chakrabarty, R. K., H. Moosmüller, M. A. Garro, W. P. Arnott, J. W. Walker, R. A. Susott, R. E. Babbitt, C. E. Wold, E. N. Lincoln, and W. M. Hao (2006). Particle Emissions from Laboratory Combustion of Wildland Fuels: Particle Morphology and Size. *J. Geophys. Res.*, **111**, doi:10.1029/2005JD006659 (16 pages).
- 48) Chen, L.-W. A., H. Moosmüller, W. P. Arnott, J. C. Chow, J. G. Watson, R. A. Susott, R. E. Babbitt, C. E. Wold, E. N. Lincoln, and W. M. Hao (2006). Particle Emissions from Laboratory Combustion of Wildland Fuels: *In-Situ* Optical and Mass Measurements. *Geophys. Res. Lett.*, **33**, doi:10.1029/2005GL024838 (4 pages).
- 47) Arnott, W. P., J. W. Walker, H. Moosmüller, R. A. Elleman, H. H. Jonsson, G. Buzorius, W. C. Conant, R. C. Flagan, and J. H. Seinfeld (2006). Photoacoustic Insight for Aerosol Light Absorption Aloft from Meteorological Aircraft and Comparison with Particle Soot Absorption Photometer Measurements: DOE Southern Great Plains Climate Research Facility and the Coastal Stratocumulus Imposed Perturbation Experiments. *J. Geophys. Res.*, **111**, doi:10.1029/2005JD005964 (16 pages).
- 46) Moosmüller, H., R. Varma, W. P. Arnott, H. D. Kuhns, V. Etyemezian, and J. A. Gillies (2005). Scattering Cross Section Emission Factors for Visibility and Radiative Transfer Applications: Military Vehicles Traveling on Unpaved Roads. *J. Air & Waste Manage. Assoc.*, **55**, 1743-1750.
- 45) Arnott, W. P., B. Zielinska, C. F. Rogers, J. Sagebiel, K. Park, J. C. Chow, H. Moosmüller, J. G. Watson, K. Kelly, D. Wagner, A. Sarofim, J. Lighty, and G. Palmer (2005). Evaluation of 1047-nm Photoacoustic Instruments and Photoelectric Aerosol Sensors in Source-Sampling of Black Carbon Aerosol and Particle-Bound PAHs from Gasoline and Diesel Powered Vehicles. *Environ. Sci. Technol.*, **39**, 5398-5406.
- 44) Moosmüller, H., R. Varma, and W. P. Arnott (2005). Cavity Ring-Down and Cavity-Enhanced Detection Techniques for the Measurement of Aerosol Extinction. *Aerosol Sci. Tech.*, **39**, 30-39.
- 43) Arnott, W. P., K. Hamasha, H. Moosmüller, P. J. Sheridan, and J. A. Ogren (2005). Towards Aerosol Light-Absorption Measurements with a 7-Wavelength Aethalometer: Evaluation with a Photoacoustic Instrument and 3-Wavelength Nephelometer, *Aerosol Sci. Tech.*, **39**, 17-29.
- 42) Sheridan P. J., W. P. Arnott, J. A. Ogren, E. Andrews, D. B. Atkinson, D. S. Covert, H. Moosmüller, A. Petzold, B. Schmidt, A. W. Strawa, R. Varma, and A. Virkkula (2005). The Reno Aerosol Optics Study: An Evaluation of Aerosol Absorption Measurement Methods. *Aerosol Sci. Tech.*, **39**, 1-16.
- 41) Mazzoleni, C., H. Moosmüller, H. D. Kuhns, R. E. Keislar, P. W. Barber, D. Nikolic, N. J. Nussbaum, and J. G. Watson (2004). Correlation between Automotive CO, HC, NO, and PM Emission Factors from On-Road Remote Sensing: Implications for Inspection and Maintenance Programs. *J. Transportation Res. D*, **9**, 477-496.
- 40) Barber, P. W., H. Moosmüller, R. E. Keislar, H. D. Kuhns, C. Mazzoleni, and J. G. Watson (2004). On-Road Measurement of Automotive Particle Emissions by Ultraviolet Lidar and Transmissometer: Theory. *Meas. Sci. Tech.*, **15**, 2295-2302.

- 39) Chow, J. C., J. G. Watson, L.-W. A. Chen, W. P. Arnott, H. Moosmüller, and K. Fung (2004). Equivalence of Elemental Carbon by Thermal/Optical Reflectance and Transmittance with Different Temperature Protocols. *Environ. Sci. Technol.*, **38**, 4414-4422.
- 38) Chen, L.-W. A., J. C. Chow, W. P. Arnott, H. Moosmüller, and J. G. Watson (2004). Modeling Reflectance and Transmittance of Quartz-Fiber Filter Samples Containing Elemental Carbon Particles: Implications for Thermal/Optical Analysis. *J. Aerosol Sci.*, **35**, 765-780.
- 37) Mazzoleni, C., H. D. Kuhns, H. Moosmüller, R. E. Keislar, P. W. Barber, N. F. Robinson, J. G. Watson, and D. Nikolic (2004). On-Road Vehicle Particulate Matter and Gaseous Emission Distributions in Las Vegas, Nevada, Compared with Other Areas. *J. Air & Waste Manage. Assoc.*, **54**, 711-726.
- Mazzoleni, C., H. D. Kuhns, H. Moosmüller, R. E. Keislar, P. W. Barber, N. F. Robinson, J. G. Watson, and D. Nikolic (2004). Re: On-Road Vehicle Particulate Matter and Gaseous Emission Distributions in Las Vegas, Nevada, Compared with Other Areas. *J. Air & Waste Manage. Assoc.*, **54**, 1339.
- 36) Kuhns, H. D., C. Mazzoleni, H. Moosmüller, D. Nikolic, R. E. Keislar, P. W. Barber, Z. Li, V. Etyemezian, and J. G. Watson (2004). Remote Sensing of PM, NO, CO, and HC Emission Factors for On-Road Gasoline and Diesel Engine Vehicles in Las Vegas, NV. *Sci. Total Environ.*, **322**, 123-137.
- 35) Moosmüller, H., C. Mazzoleni, P. W. Barber, H. D. Kuhns, R. E. Keislar, and J. G. Watson (2003). On-Road Measurement of Automotive Particle Emissions by Ultraviolet Lidar and Transmissometer: Instrument. *Environ. Sci. Technol.*, **37**, 4971-4978.
- 34) Moosmüller, H. and W. P. Arnott (2003). Angular Truncation Errors in Integrating Nephelometry. *Rev. Sci. Instrum.*, **74**, 3492-3501.
- 33) Varma R., H. Moosmüller, and W. P. Arnott (2003). Toward an Ideal Integrating Nephelometer. *Opt. Lett.*, **28**, 1007-1009.
- 32) Raspet, R., W. V. Slaton, W. P. Arnott, and H. Moosmüller (2003). Evaporation – Condensation Effects on Resonant Photoacoustics of Volatile Aerosols. *J. Atmos. Oceanic Technol.*, **20**, 685-695.
- 31) Arnott, W. P., H. Moosmüller, P. J. Sheridan, J. A. Ogren, R. Raspet, W. V. Slaton, J. L. Hand, S. M. Kreidenweis, and J. L. Collett, Jr. (2003). Photoacoustic and Filter-Based Ambient Aerosol Light Absorption Measurements: Instrument Comparison and the Role of Relative Humidity. *J. Geophys. Res.*, **108**, 4034-4044, doi:10.1029/2002JD002165.
- 30) She, C. Y., J. D. Vance, B. P. Williams, D. A. Krueger, H. Moosmüller, D. Gibson-Wilde, and D. Fritts (2002). Lidar Studies of Atmospheric Dynamics Near Polar Mesopause. *EOS, Transactions, American Geophysical Union*, **83**, 289-293.
- 29) Moosmüller, H., W. P. Arnott, C. F. Rogers, J. L. Bowen, J. A. Gillies, W. R. Pierson, J. F. Collins, T. D. Durbin, and J. M. Norbeck (2001). Time Resolved Characterization of Diesel Particulate Emissions. 2. Instruments for Elemental and Organic Carbon Measurements. *Environ. Sci. Technol.*, **35**, 1935-1942.

- 28) Moosmüller, H., W. P. Arnott, C. F. Rogers, J. L. Bowen, J. A. Gillies, W. R. Pierson, J. F. Collins, T. D. Durbin, and J. M. Norbeck (2001). Time Resolved Characterization of Diesel Particulate Emissions. 1. Instruments for Particle Mass Measurements. *Environ. Sci. Technol.*, **35**, 781-787.
- 27) Arnott, W. P., H. Moosmüller, and J. W. Walker (2000). Nitrogen Dioxide and Kerosene-Flame Soot Calibration of Photoacoustic Instruments for Measurement of Light Absorption by Aerosols. *Rev. Sci. Instrum.*, **71**, 4545-4552.
- 26) Arnott, W. P., H. Moosmüller, C. F. Rogers, T. Jin, and R. Bruch (1999). Photoacoustic Spectrometer for Measuring Light Absorption by Aerosol: Instrument Description. *Atmos. Environ.*, **33**, 2845-2852.
- 25) Moosmüller, H., W. P. Arnott, C. F. Rogers, J. C. Chow, C. A. Frazier, L. E. Sherman, and D. L. Dietrich (1998). Photoacoustic and Filter Measurements Related to Aerosol Light Absorption during the Northern Front Range Air Quality Study (Colorado 1996/1997). *J. Geophys. Res.*, **103**, 28149-28157.
- 24) Moosmüller, H. (1998). Brewster's Angle Porro Prism: A Different Use for a Pellin-Broca Prism. *Engineering & Laboratory Notes*, a supplement to *Opt. Photon. News*, **9**, 5, 3pp. and *Appl. Opt.*, **37**, 8140-8141.
- 23) Vance, J. D., C. Y. She, and H. Moosmüller (1998). Continuous-Wave, All-Solid-State, Single-Frequency 400-mW Source at 589 nm Based on Doubly Resonant Sum-Frequency Mixing in a Monolithic Lithium-Niobate Resonator. *Appl. Opt.*, **37**, 4891-4896.
- 22) Moosmüller, H., J. A. Gillies, C. F. Rogers, D. W. DuBois, J. C. Chow, J. G. Watson, and R. Langston (1998). Particulate Emission Rates for Unpaved Shoulders along a Paved Road. *J. Air & Waste Manage. Assoc.*, **48**, 398-407.
- 21) Moosmüller, H. and J. D. Vance (1997). Sum-Frequency Generation of Continuous-Wave Sodium D<sub>2</sub> Resonance Radiation. *Opt. Lett.* **22**, 1135-1137.
- 20) Moosmüller, H and T. D. Wilkerson (1997). Combined Raman-Elastic Backscatter Lidar Method for the Measurement of Backscatter Ratios. *Appl. Opt.* **36**, 5144-5147.
- 19) Moosmüller, H., W. P. Arnott, and C. F. Rogers (1997). Methods for Real Time, *In Situ* Measurement of Aerosol Light Absorption. *J. Air & Waste Manage. Assoc.*, **47**, 157-166.
- 18) Arnott, W. P., J. A. Lightfoot, R. Raspet, and H. Moosmüller (1996). Radial Wave Thermoacoustic Engines: Theory and Examples for Refrigerators and High-Gain Narrow-Bandwidth Photoacoustic Spectrometers. *J. Acoust. Soc. Am.*, **99**, 734-745.
- 17) Moosmüller, H. and W. P. Arnott (1996). Folded Jamin Interferometer: A Stable Instrument for Refractive Index Measurements. *Opt. Lett.*, **21**, 438-440.
- 16) Arnott, W. P., H. Moosmüller, R. E. Abbott, and M. D. Ossofsky (1995). Thermoacoustic Enhancement of Photoacoustic Spectroscopy: Theory and Measurements of the Signal to Noise Ratio. *Rev. Sci. Instrum.*, **66**, 4827-4833.
- 15) Moosmüller, H. (1994). Optical Absorption in Nitrogen due to Raman Scattering. *J. Opt. Soc. Am. B*, **11**, 286-289.
- 14) Kovalev, V. A. and H. Moosmüller (1994). Distortion of Particulate Extinction Profiles Measured by Lidar in a Two-Component Atmosphere. *Appl. Opt.*, **33**, 6499-6507.

- 13) Moosmüller, H., J. R. Truedson, and C. E. Patton (1991). Oscillations in the Stokes-Anti-Stokes Ratio in Brillouin Scattering from Magnons in Thin Permalloy Films. *J. Appl. Phys.*, **69**, 5721-5723.
- 12) Moosmüller, H. and C. Y. She (1991). Equal Intensity and Phase Contours in Focused Gaussian Laser Beams. *IEEE J. Quantum Electron.*, **27**, 869-874.
- 11) Moosmüller, H., K. D. McKinstry, and C. E. Patton (1990). Microwave Effective Linewidth in Thin Metal Films. *J. Appl. Phys.*, **67**, 5521-5523.
- 10) Moosmüller, H., C. Y. She, and W. M. Huo (1989). Optical Stark Effect in the Four-Wave Mixing and Stimulated Raman Spectra of N<sub>2</sub>. *Phys. Rev. A*, **40**, 6983-6998.
- 9) Moosmüller, H., S. B. Anderson, and C. Y. She (1989). Generation of Four-Wave Mixing and Stimulated Raman Signals in Focused Gaussian Beams. *Phys. Rev. A*, **40**, 6977-6982.
- 8) Moosmüller, H., D. A. Krueger, and C. Y. She (1988). Stark-Induced Phase Modulation in Coherent Raman Spectroscopy. *Phys. Rev. A*, **38**, 6210-6214.
- 7) She, C. Y., H. Moosmüller, and G. C. Herring (1988). Coherent Light Scattering Spectroscopy for Supersonic Flow Measurements. *Appl. Phys.*, **B46**, 283-297.
- 6) Moosmüller, H. and C. Y. She (1987). Simultaneous Four-Wave Mixing and Stimulated Raman Spectroscopy: Effects of Doppler Broadening and Neighboring Lines. *J. Opt. Soc. Am. B*, **4**, 1977-1983.
- 5) Moosmüller, H. (1986). Determination of Gas Concentrations and Temperature in the Exhaust of a Power Plant with a CW Chemical HF Laser. *Appl. Phys.*, **B40**, 29-33.
- 4) She, C. Y., G. C. Herring, H. Moosmüller, and S. A. Lee (1985). Stimulated Rayleigh-Brillouin Gain Spectroscopy. *Phys. Rev. A*, **31**, 3733-3740.
- 3) Moosmüller, H., G. C. Herring, and C. Y. She (1984). Two-Component Velocity Measurements in a Supersonic Nitrogen Jet with Spatially Resolved Inverse Raman Spectroscopy. *Opt. Lett.*, **9**, 536-538.
- 2) Herring, G. C., H. Moosmüller, S. A. Lee, and C. Y. She (1983). Flow Velocity Measurements with Stimulated Rayleigh-Brillouin-Gain Spectroscopy. *Opt. Lett.*, **8**, 602-604.
- 1) She, C. Y., G. C. Herring, H. Moosmüller, and S. A. Lee (1983). Stimulated Rayleigh-Brillouin Gain Spectroscopy in Pure Gases. *Phys. Rev. Lett.*, **51**, 1648-1651.

## Patents

- 9) Chakrabarty, R. K. and H. Moosmüller (2009). Morphology Engineering of Aggregates. United States Patent, pending.
- 8) Chakrabarty, R. K., H. Moosmüller, M. A. Garro, and C. Herald (2008). Simulation and Orientation-Specific Morphology Analysis of Solid Nano-Agglomerates. United States Patent, pending.
- 7) Chakrabarty, R. K., H. Moosmüller, and W. P. Arnott (2007). Morphology Selection of Particles Using Electrostatic Charge. United States Patent, pending.
- 6) Moosmüller, H. and W. P. Arnott (2005). Instrument for Measuring the Aerosol Asymmetry Parameter. United States Patent, pending.

- 5) Moosmüller, H. and W. P. Arnott (2007). Low Truncation Loss, Non-Reciprocal Nephelometer with Integrating Sphere. United States Patent, No. 7,173,697.
- 4) Arnott, W. P. and H. Moosmüller (2005). Method and Apparatus for Photoacoustic Measurements. United States Patent, pending.
- 3) Moosmüller, H., W. P. Arnott, and R. Varma (2004). Integrating Sphere Integrating Nephelometer with Truncation Reduction Tubes. United States Patent, pending.
- 2) Arnott, W. P., H. Moosmüller, and J. W. Walker (2003). Photoacoustic Instrument for Measuring Particles in a Gas. United States Patent, No. 6,662,627.
- 1) Moosmüller, H. and R. E. Keislar (2003). Vehicle Particulate Sensor System. United States Patent, No. 6,542,831.

### **Book Chapters and Selected Published Proceedings**

- 22) Mazzoleni, C., H. Kuhns, and H. Moosmüller (2008). Pollution Reduction Using Biofuels: From the Laboratory to the Real World. In New Research on Biofuels, J. H. Wright and D. A. Evans (editors), ISBN: 978-1-60456-828-8, Nova Science Publishers, Hauppauge, NY.
- 21) Moosmüller, H. (2004). Innovative Methods: Develop Instrumentation and Procedures for Raman Scattering Measurements. In Recommended Research Strategies from the International Workshop for the Development of Research Strategies for the Sampling and Analysis of Organic and Elemental Carbon Fractions in Atmospheric Aerosol, APACE Workshop Series, 40-47.
- 20) Moosmüller, H., W. P. Arnott, and C. F. Rogers (1998). Real Time, *in Situ* Measurement of Aerosol Light Absorption with a New Photoacoustic Instrument: Quantification of Black and Elemental Carbon. In Laser Applications to Chemical and Environmental Analysis, Technical Digest, Optical Society of America, Washington DC, 167-169.
- 19) Moosmüller, H. and W. P. Arnott (1996). A Novel Interferometer for the Measurement of Optical Absorption. In Proceedings of the 9<sup>th</sup> International Conference on Photoacoustic and Photothermal Phenomena, *Progress in Natural Science*, **6**, S207-208.
- 18) Arnott, W. P. and H. Moosmüller (1996). Thermoacoustic Enhancement of the Signal to Noise Ratio in Photoacoustic Spectrometers. In Proceedings of the 9th International Conference on Photoacoustic and Photothermal Phenomena, *Progress in Natural Science*, **6**, S409-410.
- 17) Arnott, W. P., H. Moosmüller, R. E. Abbott, and M. D. Osssofsky (1995). Signal-to-Noise Ratio of Thermoacoustic Enhanced Photoacoustic Spectrometers. In Proceedings of the 129th Meeting of the Acoustical Society of America, in *J. Acoust. Soc. Am.*, **97**, S3409.
- 16) Moosmüller, H., W. P. Arnott, and C. F. Rogers (1994). Methods for Real Time, *In Situ* Measurement of Aerosol Light Absorption. In Aerosols and Atmospheric Optics: Radiative Balance and Visual Air Quality. Proceedings of an International Specialty Conference, Air & Waste Management Association / American Geophysical Union, **VIP-41A**, 45-56.
- 15) McElroy, J. L., C. M. Edmonds, D. H. Bundy, H. Moosmüller, R. M. Jorgensen, and R. J. Alvarez II (1994). Airborne UV-DIAL Urban Plume Measurements. In Proceedings of the Seventeenth International Laser Radar Conference, Sendai, Japan, 100-103.

- 14) Wilkerson, T. D. and H. Moosmüller (1994). A New Lidar Method Utilizing Elastic and Raman Scattering for the Measurement of Backscattering and Extinction Profiles. In Tunable Diode Laser Spectroscopy, Lidar, and DIAL Techniques for Environmental and Industrial Measurement, A. Fried, D. K. Killinger, and H. I. Schiff, eds., *Proc. SPIE* **2112**, 177-186.
- 13) McElroy, J. L., H. Moosmüller, R. M. Jorgensen, C. M. Edmonds, R. J. Alvarez II, and D. H. Bundy (1994). Airborne UV-DIAL Urban Plume Measurements. In Tunable Diode Laser Spectroscopy, Lidar, and DIAL Techniques for Environmental and Industrial Measurement, A. Fried, D. K. Killinger, and H. I. Schiff, eds., *Proc. SPIE* **2112**, 251-260.
- 12) Moosmüller, H., R. J. Alvarez II, R. M. Jorgensen, C. M. Edmonds, D. H. Bundy, and J. L. McElroy (1994). An Airborne UV-DIAL System for Ozone Measurements: Field Use and Verification. In Optical Sensing for Environmental Monitoring. Proceedings of an International Specialty Conference, Air & Waste Management Association, Pittsburgh, PA, **SP-89**, 413-422.
- 11) Moosmüller, H., R. J. Alvarez II, C. M. Edmonds, R. M. Turner, D. H. Bundy, and J. L. McElroy (1993). Airborne Ozone Measurements with the USEPA UV-DIAL. In Optical Remote Sensing of the Atmosphere Technical Digest, Optical Society of America, Washington, D. C., **5**, 176-179.
- 10) Moosmüller, H., D. Diebel, D. H. Bundy, M. P. Bristow, R. J. Alvarez II, V. A. Kovalev, C. M. Edmonds, R. M. Turner, and J. L. McElroy (1992). Ozone Measurements with the U.S. EPA UV-DIAL: Preliminary Results. In Sixteenth International Laser Radar Conference, M. P. McCormick, ed., *NASA Conference Publication*, **3158**, 95-98.
- 9) Kovalev, V. A. and H. Moosmüller (1992). A Variable Phase Function Approach for the Inversion of Lidar Return Signals. In Sixteenth International Laser Radar Conference, M. P. McCormick, ed., *NASA Conference Publication*, **3158**, 607-610.
- 8) Moosmüller, H., D. Diebel, D. H. Bundy, M. P. Bristow, C. M. Edmonds, R. M. Turner, V. A. Kovalev, R. P. Haas, and J. L. McElroy (1991). The U.S. EPA Airborne UV-DIAL System. In Technical Digest on Optical Remote Sensing of the Atmosphere, Optical Society of America, Washington, D. C., **18**, 253-255.
- 7) She, C. Y., R. J. Alvarez II, H. Sun, H. Moosmüller, and D. A. Krueger (1988). High-Spectral-Resolution Lidar Technique for Backscatter Ratio and Atmospheric Temperature Profiling. In Proceedings of the 14th International Laser Radar Conference, Consiglio Nazionale delle Ricerche, Firenze, Italy, 339-342.
- 6) Moosmüller, H. and C. Y. She (1987). Simultaneous Four-Wave Mixing and Stimulated Raman Spectroscopy: Effects of Doppler Broadening and Neighboring Lines. In Advances in Laser Science III: Proceedings of the Third International Laser Science Conference, A. C. Tam, J. L. Gole, and W. C. Stwalley, eds., Springer Verlag, Berlin, Heidelberg, Germany.
- 5) She, C. Y., R. J. Alvarez II, H. Moosmüller, and D. A. Krueger (1987). Implementing a New High-Spectral-Resolution Lidar Technique for Backscatter Ratio and Atmospheric Temperature Profiling. In Topical Meeting on Laser and Optical Remote Sensing: Instrumentation and Techniques Technical Digest Series, Optical Society of America, Washington, D. C., **18**, 316-319.

- 4) Moosmüller, H. and C. Y. She (1986). Ac Stark-Broadening in Coherent Raman Spectra Obtained with Focused Gaussian Beams. In Spectral Line Shapes Vol. 4: Proceedings of the Eighth International Conference on Spectral Line Shapes, R. J. Exton, ed., A. Deepak Publishing, Hampton, VA, 571-572.
- 3) She, C. Y., H. Moosmüller, G. C. Herring, S. Y. Tang, and S. A. Lee (1985). Rayleigh-Brillouin Gain Spectroscopy in Gases. In Laser Spectroscopy VII: Proceedings of the Seventh International Conference on Laser Spectroscopy, T. W. Hänsch, Y. R. Shen, eds., Springer Verlag, Berlin, Heidelberg, Germany, 227-228.
- 2) Moosmüller, H., G. C. Herring, and C. Y. She (1984). Spatially Resolved Two-Component Flow Measurements with Inverse Raman Spectroscopy. In Proceedings of the Conference on Lasers and Electro-Optics, 104-106.
- 1) She, C. Y., G. C. Herring, H. Moosmüller, and S. A. Lee (1984). Stimulated Rayleigh-Brillouin Gain Spectroscopy in Pure Gases and Gas Mixtures. In Proceedings of the Thirteenth International Quantum Electronics Conference, *J. Opt. Soc. Am. B*, **1**, 546.

### Reports

- 28) Moosmüller, H. and W. P. Arnott (2009). Characterizing Particulate Matter Emissions by Wildland Fires Relevant to Visibility Impairment and PM Non-Attainment (J8R07060005). Final report prepared for the Joint Fire Science Program (JFSP) through the US National Park Service (NPS).
- 27) Watson, J. G., J. W. Miller, H. Moosmüller, H. D. Kuhns, J. C. Chow, O. Chang, N. Nussbaum, C. Mazzoleni, D. Zhu, P. W. Barber, M. R. Kemme, D. R. Cocker (2008). Characterization of Off-Road Diesel Emissions of Criteria Pollutants (WP-1336). Final report prepared for the Department of Defense's Strategic Environmental Research and Development Program.
- 26) Moosmüller, H. (2008). Contributions to Final Report of Nevada NSF EPSCoR RING-TRUE III Award Number: 0447416.
- 25) Kreidenweis, S. M. and H. Moosmüller (2008). Laboratory Measurements of Aerosol Scattering and Extinction Properties. Final report prepared for Western Regional Center of the Department of Energy's National Institute for Climatic Change Research.
- 24) Arnott, W. P. and H. Moosmüller (2007). Development of an Instrument for Multi-Spectral Measurement of Atmospheric Light Absorption (ATM-0340423). Final report prepared for National Science Foundation, Division of Atmospheric Sciences, Major Research Instrumentation Program.
- 23) Engelbrecht, J., E. V. McDonald, H. Moosmüller, J. A. Gillies, and J. R. McConnell (2007). Acquisition of an X-Ray Diffractometer (EAR-0521619). Final report prepared for National Science Foundation, Division of Atmospheric Sciences, Major Research Instrumentation Program.
- 22) Moosmüller, H. and H. D. Kuhns (2007). Remote Sensing of PM, CO, HC, and NO<sub>x</sub> Vehicle Emissions. Final report prepared for California Air Resources Board, Research Division.
- 21) Moosmüller, H., W. P. Arnott, L.-W. A. Chen, J. W. Walker, and Lynn Rinehart (2005). Optical Properties of Particulate Matter Emitted by Fires (Pilot Study). Final Report for the Joint Venture Agreement 03-JV-11222049-102 between the USDA Forest Service,

- Rocky Mountain Research Station, Research Work Unit Number 4404 and the Desert Research Institute.
- 20) Gillies, J. A., W. P. Arnott, V. Etyemezian, H. D. Kuhns, H. Moosmüller, D. DuBois, D. Nickolic, S. Ahonen, G. Schwemmer, D. A. Gillette, W. G. Nickling, T. Wilkerson, R. Varma (2005). Characterizing and Quantifying Local and Regional Particulate Matter Emissions from Department of Defense Installations. Final Report prepared for SERDP Project CP-1191.
  - 19) Kuhns, H., C. Mazzoleni, M.-C. Chang, J. C. Chow, G. Parthasarathy, V. Etyemezian, H. Moosmüller, P. W. Barber, N. Nussbaum, S. Kumar, K. Nathagoundenpalayam, S. Kohl, D. Nikolic, J. Watson (2004). Meridian School Bus Biodiesel Evaluation Study. Final report prepared for Community Planning Agency of Southwest Idaho.
  - 18) Arnott, W. P. and H. Moosmüller (2003). 2003 Aerosol IOP at DOE's ARM Site. Final Report prepared for Department of Energy, Pacific Northwest National Laboratory.
  - 17) Arnott, W. P. and H. Moosmüller (2003). In Situ Aerosol Absorption Measurement Characterization Experiment. Final Report prepared for Department of Energy, Pacific Northwest National Laboratory.
  - 16) Moosmüller, H. and W. P. Arnott (2003). Development of Instrumentation to Measure Atmospheric Light Extinction and its Scattering and Absorption Components. Final Report prepared for National Science Foundation, Major Research Instrumentation Program, Project ATM-9871192.
  - 15) Keislar, R. E., P. W. Barber, H. D. Kuhns, C. Mazzoleni, H. Moosmüller, N. F. Robinson, and J. G. Watson (2002). Measurement of Diesel Particulate Emissions by UV Lidar Remote Sensing in Denver, CO, February 21-22, 2001. Final Report prepared for Coordinating Research Council, Inc. (CRC) Project E-56-1.
  - 14) Arnott, W. P. and H. Moosmüller (2000). Photoacoustics of Aerosols. Final Report prepared for Office of Naval Research through University of Mississippi, National Center for Physical Acoustics.
  - 13) Arnott, W. P. and H. Moosmüller (2000). Aerosol Light Absorption Measurements. Final Report prepared for Department of Energy, Pacific Northwest National Laboratory.
  - 12) Arnott, W. P. and H. Moosmüller (2000). BRAVO: Special Aerosol Light Absorption and Extinction Measurements. Final Report prepared for CIASTA and National Park Service.
  - 11) Moosmüller, H., M. A. Wetzel, and V. Isakov (2000). Analysis of Atmospheric Effects on Airborne Hyperspectral Remote Sensing. Final Report prepared for Department of Energy under Sub-Contract to DOE/Bechtel's Center for Excellence in Remote Sensing.
  - 10) Moosmüller, H., W. P. Arnott, C. F. Rogers, J. L. Bowen, J. Gillies, W. R. Pierson, J. F. Collins, T. D. Durbin, and J. M. Norbeck (2000). Simple Particulate Emission Measuring System. Final Report prepared for Department of Energy, Office of Automotive Technology.
  - 9) Moosmüller, H. (1999). CEDAR: An Operational CW Solid-State Laser System for Temperature and Wind Measurements in the Mesopause. Final Report prepared for National Science Foundation.

- 8) Watson, J. G., J. C. Chow, H. Moosmüller, M. Green, N. Frank, and M. Pitchford (1998). Guidance for Using Continuous Monitors in PM<sub>2.5</sub> Monitoring Networks. Final Report prepared for Environmental Protection Agency, Office of Air Quality Planning and Standards.
- 7) Fujita, E. M., J. L. Bowen, M. C. Green, and H. Moosmüller (1997). 1997 Southern California Ozone Study (SCOS97) Quality Assurance Plan. Final Report prepared for State of California, Air Resources Board, Research Division.
- 6) Moosmüller, H. (1997). Approaching an Ultimate Lidar for Temperature and Wind Measurements in the Mesopause Region (CEDAR). Final Report prepared for National Science Foundation.
- 5) Arnott, W. P., H. Moosmüller, and C. F. Rogers (1997). Advanced Methods to Measure Light Absorption by Aerosol Particles. Final Report prepared for Environmental Protection Agency, Office of Exploratory Research.
- 4) Watson, J. G., J. C. Chow, J. A. Gillies, H. Moosmüller, C. F. Rogers, D. DuBois, and J. Derby (1997). Effectiveness Demonstration of Fugitive Dust Control Methods for Public Unpaved Roads and Unpaved Shoulders on Paved Roads. Final Report, DRI Document No. 685-5200.2F1. Prepared for California Regional Particulate Air Quality Study (CRPAQS).
- 3) Fujita, E. M., M. C. Green, R. E. Keislar, D. R. Koracin, H. Moosmüller, and J. G. Watson (1996). 1997 Southern California Ozone Study (SCOS97) Field Study Plan. Prepared for State of California, Air Resources Board, Research Division.
- 2) Moosmüller, H. (1994). Analysis of UV-DIAL Data Acquired During the 1993 COAST Study. Final Report prepared for Texas Natural Resource Conservation Commission.
- 1) Elvidge, C. D., L. K. Shaulis, M. C. Green, and H. Moosmüller (1994). Basic Research Cooperative in Remote Sensing. Final Report prepared for U.S. Environmental Protection Agency, Environmental Monitoring Systems Laboratory.

#### **Other Publications**

- 5) Moosmüller, H., S. M. Kreidenweis, J. L. Collett Jr., W. M. Hao, and W. C. Malm (2007). Characterization of Particle Emissions from Laboratory Combustion of Wildland Fuels. Newsletter of the Integrated Land Ecosystem – Atmosphere Processes Study (iLEAPS), **4**, 22-23.
- 4) Moosmüller, H. and J. Vance (1996). A CW Solid-State Laser System for Mesopause Diagnostics. *The CEDAR Post* **29**, 28-29.
- 3) Wilkerson, T. D. and H. Moosmüller (1993). A New Lidar Method Utilizing Elastic and Raman Scattering for the Measurement of Backscattering and Extinction Profiles. *University of Maryland Technical Note BN-1152*, University of Maryland, College Park, Maryland, 11 pages.
- 2) Moosmüller, H. (1988). Simultaneous Four-Wave Mixing and Stimulated Raman Spectroscopy: Stark and Doppler Broadening. Ph.D. Dissertation, Department of Physics, Colorado State University, Adviser: C. Y. She, 159 pages.

- 1) Moosmüller, H. (1981). Gleichzeitige Bestimmung von Temperatur und Konzentration gasförmiger Bestandteile von Kaminabgasen mit Hilfe eines kontinuierlichen Wasserstofffluorid-Lasers. Diplomarbeit (M.S. Thesis), Sektion Physik, Ludwigs-Maximilians Universität München, Adviser: H. Walther, 69 pages.

## PRESENTATIONS

- 237) Kreidenweis, S. M., P. J. DeMott, M. D. Petters, A. J. Prenni, C. M. Carrico, C. E. Wold, J. L. Collett, Jr., H. Moosmüller, W. C. Malm, and W. M. Hao (2010). Ice nucleation Behavior of Particles Generated in Open Burning of Biomass. *90<sup>th</sup> American Meteorological Society Annual Meeting*, Atlanta, GA, January 17-21, 2010.
- 236) Kreidenweis, S. M., G. R. McMeeking, W. P. Arnott, S. Baker, C. M. Carrico, J. C. Chow, J. L. Collett, Jr., W. M. Hao, A. S. Holden, T. W. Kirchstetter, E. J. T. Levin, K. A. Lewis, L. Mack, W. C. Malm, H. Moosmüller, A. P. Sullivan, and C. E. Wold (2009). The Fire Lab at Missoula Experiment (FLAME): Measurements of Trace Gases and Aerosols during the Open Combustion of Biomass in the Laboratory. *4<sup>th</sup> International Fire Ecology and Management Congress: Fire as a Global Process*, Savannah, GA, November 30 - December 4, 2009.
- 235) Lewis, J. M., D. W. Martin, R. M. Rabin, and H. Moosmüller (2009, **invited**). Verner Suomi: Pragmatic Visionary. *50<sup>th</sup> Anniversary Meteorological Satellite Experiment Symposium*, Madison, WI, November 2, 2009.
- 234) Malm, W. C., J. L. Collett, Jr., S. M. Kreidenweis, B. A. Schichtel, H. Moosmüller, W. M. Hao, and C. M. Carrico (2009, **invited**). Measurements Needed to Understand the Role of Biomass Burning within the Regulatory Framework of the Environmental Protection Agency and the Federal Land Managing Community. *28<sup>th</sup> Annual Conference of the American Association for Aerosol Research*, Minneapolis, MN, October 26-30, 2009.
- 233) Moosmüller, H., J. Engelbrecht, W. P. Arnott, J. A. Gillies, and M. Skiba (2009). Single Scattering Albedo of Fine Mineral Dust Aerosols Controlled by Iron Concentration. *28<sup>th</sup> Annual Conference of the American Association for Aerosol Research*, Minneapolis, MN, October 26-30, 2009.
- 232) Tian, G., H. Moosmüller, and W. P. Arnott (2009). Measuring the Aerosol Asymmetry Parameter  $g$ : Instrument Description and Initial Measurements. *28<sup>th</sup> Annual Conference of the American Association for Aerosol Research*, Minneapolis, MN, October 26-30, 2009.
- 231) Tian, G., H. Moosmüller, and W. P. Arnott (2009). Calibration of Photoacoustic Aerosol Absorption Measurements with Simultaneous Spectroscopy of the Oxygen A-Band. *28<sup>th</sup> Annual Conference of the American Association for Aerosol Research*, Minneapolis, MN, October 26-30, 2009.
- 230) Gyawali, M., W. P. Arnott, and H. Moosmüller (2009). Wavelength Dependence of Aerosol Light Absorption: Diurnal and Seasonal Variation in Reno, NV. *28<sup>th</sup> Annual Conference of the American Association for Aerosol Research*, Minneapolis, MN, October 26-30, 2009.

- 229) Chakrabarty, R. K., H. Moosmüller, W. P. Arnott, M. A. Garro, G. Tian, J. G. Slowik, E. S. Cross, J.-H. Han, P. Davidovits, T. B. Onasch, and D. R. Worsnop (2009). Low Fractal Dimension Carbonaceous Aggregates from a Premixed Flame. *28th Annual Conference of the American Association for Aerosol Research*, Minneapolis, MN, October 26-30, 2009.
- 228) Chakrabarty, R. K., H. Moosmüller, L.-W. A. Chen, W. P. Arnott, K. A. Lewis, C. Mazzoleni, M. Dubey, C. E. Wold, W. M. Hao, and S. M. Kreidenweis (2009). Brown Carbon in Smoldering Biomass Aerosols. *28th Annual Conference of the American Association for Aerosol Research*, Minneapolis, MN, October 26-30, 2009.
- 227) Chakrabarty, R. K., S. Chancellor, H. Moosmüller, C. M. Herald, and K. M. Ehlers (2009). Morphological Analysis of Fractal-Like Aerosol Agglomerates in Two and Three Dimensions. *28th Annual Conference of the American Association for Aerosol Research*, Minneapolis, MN, October 26-30, 2009.
- 226) Mack, L., T. Lee, J.-L. Jimenez, S. M. Kreidenweis, J. L. Collett, Jr., H. Moosmüller, C. E. Wold, J. R. Kimmel, T. B. Onasch, W. M. Hao, and W. C. Malm (2009). Elemental Analysis of Aerosol Mass Spectrometer Measurements Of Laboratory Biomass Burning Aerosols. *28<sup>th</sup> Annual Conference of the American Association for Aerosol Research*, Minneapolis, MN, October 26-30, 2009.
- 225) Levin, E. J. T., L. Mack, C. M. Carrico, G. R. McMeeking, S. M. Kreidenweis, C. E. Wold, H. Moosmüller, W. P. Arnott, W. M. Hao, J. L. Collett, Jr., and W. C. Malm (2009). Optical Properties of Biomass Burning Smoke Aerosols. *28th Annual Conference of the American Association for Aerosol Research*, Minneapolis, MN, October 26-30, 2009.
- 224) Arnott, W. P. and H. Moosmüller (2009). Multispectral Photoacoustic Analysis of Atmospheric Aerosol. *15<sup>th</sup> International Conference on Photoacoustic and Photothermal Phenomena*, Leuven, Belgium, July 19-23, 2009.
- 223) Moosmüller, H., X. Fain, and D. Obrist (2009). Cavity Ring-Down Spectroscopy for Measurement of Gaseous Elemental Mercury Concentrations and Fluxes. *9<sup>th</sup> International Conference on Mercury as a Global Pollutant*, Guiyang, China, June 7-12, 2009
- 222) Gyawali, M., W. P. Arnott, I. Arnold, K. A. Lewis, G. Parades-Miranda, H. Moosmüller, R. K. Chakrabarty, G. Kok, J. W. Walker, and D. Baumgardner (2009). Wavelength Dependence of Aerosol Light Absorption. *Annual Science Team Meeting of the Department of Energy Atmospheric Science Program (DOE ASP)*, Santa Fe, NM, February 25–27, 2009.
- 221) Moosmüller, H. (2009, **invited**). Measurement of Aerosol Optical Properties: Principles and Applications. *Seminar, National Space Science and Technology Center, University of Alabama in Huntsville*, Huntsville, AL, February 18, 2009.
- 220) Obrist, D., J. Fritsche, X. Fain, and H. Moosmüller (2008). Ecosystem Level Mercury Exchange. *National Science Foundation (NSF) Workshop on Reducing the Uncertainty in Measurements of Atmospheric Mercury*, Seattle, WA, October 23-25, 2008.
- 219) Mack, L., D. Obrist, H. Moosmüller, K. A. Lewis, W. P. Arnott, G. R. McMeeking, E. J. T. Levin, S. M. Kreidenweis, C. E. Wold, W. M. Hao, J. L. Collett, Jr., and W. C. Malm (2008). Optical Closure Experiments for Biomass Smokes Aerosols. *27<sup>th</sup> Annual*

- Conference of the American Association for Aerosol Research*, Orlando, FL, October 20-24, 2008.
- 218) Parades-Miranda, G., W. P. Arnott, and H. Moosmüller (2008). Photoacoustic and Aethalometer Measurements of Aerosol Light Absorption in the Presence of Secondary Organic Aerosol: Mexico City, Las Vegas and Reno, Nevada, and the DOE ARM Site In Oklahoma. *9<sup>th</sup> International Conference on Carbonaceous Particles in the Atmosphere (ICCPA)*, Berkeley, CA, August 12-14, 2008.
- 217) Chakrabarty, R. K., H. Moosmüller, H., L.-W. A. Chen, C. Mazzoleni, P. Chylek, M. Dubey, W. P. Arnott, K. Lewis, and W. M. Hao (2008). Morphology and Effective Refractive Indices of Aerosols Emitted from High-Moisture-Content Biomass Combustion. *9<sup>th</sup> International Conference on Carbonaceous Particles in the Atmosphere (ICCPA)*, Berkeley, CA, August 12-14, 2008.
- 216) Chakrabarty, R. K., M. A. Garro, H. Moosmüller, and C. Herald (2008). *FracMAP: A Graphical User-Interactive Package for Performing Simulation and Morphological Analysis of Fractal-Like Aerosol Agglomerates*. *9<sup>th</sup> International Conference on Carbonaceous Particles in the Atmosphere (ICCPA)*, Berkeley, CA, August 12-14, 2008.
- 215) Tian, G., H. Moosmüller, and W. P. Arnott (2008). Calibration of Photoacoustic Aerosol Absorption Measurements with Oxygen A-Band Spectroscopy. *9<sup>th</sup> International Conference on Carbonaceous Particles in the Atmosphere (ICCPA)*, Berkeley, CA, August 12-14, 2008.
- 214) Lewis, K., W. P. Arnott, and H. Moosmüller (2008). Photoacoustic Evidence for Strong Spectral Variation of Biomass Smoke Light Absorption and Single Scattering Albedo. *9<sup>th</sup> International Conference on Carbonaceous Particles in the Atmosphere (ICCPA)*, Berkeley, CA, August 12-14, 2008.
- 213) McMeeking, G. R., A. P. Sullivan, P. J. DeMott, S. M. Kreidenweis, J. L. Collett, Jr., T. W. Kirchstetter, M. M. Lunden, H. Moosmüller, W. P. Arnott, K. Lewis, W. M. Hao, and W. C. Malm (2008). The Light Attenuation Spectral Dependence of Organic Carbon Emitted by Biomass Burning. *9<sup>th</sup> International Conference on Carbonaceous Particles in the Atmosphere (ICCPA)*, Berkeley, CA, August 12-14, 2008.
- 212) McMeeking, G. R., C. M. Carrico, M. D. Petters, M. Parsons, A. J. Prenni, A. P. Sullivan, P. J. DeMott, S. M. Kreidenweis, J. L. Collett, Jr., T. W. Kirchstetter, M. M. Lunden, H. Moosmüller, W. P. Arnott, K. Lewis, S. Baker, C. E. Wold, W. M. Hao, and W. C. Malm (2008). Characterization of Emissions from the Laboratory Combustion of Wildland Plant Species. *9<sup>th</sup> International Conference on Carbonaceous Particles in the Atmosphere (ICCPA)*, Berkeley, CA, August 12-14, 2008.
- 211) Moosmüller, H. (2008). Mercury and Chemical Imaging Sensor Research at the Desert Research Institute. *Advisory Board Meeting of NSF EPSCoR RING-TRUE III Sensor Technology*, Reno, NV, July 30, 2008.
- 210) Moosmüller, H. (2008, **invited**). Light Absorption. *Conference on “Light Scattering: Mie and More – Commemorating 100 Years Mie’s 1908 Publications”*, *Gesellschaft für Aerosol Forschung (GAeF) Annual Meeting*, Karlsruhe, Germany, July 3-4, 2008.
- 209) Chakrabarty, R. K., H. Moosmüller, H., L.-W. A. Chen, C. Mazzoleni, P. Chylek, M. Dubey, W. P. Arnott, K. Lewis, and W. M. Hao (2008). Determination of Effective Refractive Indices of Aerosols Emitted from High-Moisture-Content Biomass

- Combustion Using Mie Theory. *Conference on "Light Scattering: Mie and More – Commemorating 100 Years Mie's 1908 Publications"*, *Gesellschaft für Aerosol Forschung (GAeF) Annual Meeting*, Karlsruhe, Germany, July 3-4, 2008.
- 208) Lewis, K., W. P. Arnott, and H. Moosmüller (2008). Multiwavelength Photoacoustic Measurements of Light Absorption and Scattering by Biomass Smoke. *Conference on "Light Scattering: Mie and More – Commemorating 100 Years Mie's 1908 Publications"*, *Gesellschaft für Aerosol Forschung (GAeF) Annual Meeting*, Karlsruhe, Germany, July 3-4, 2008.
- 207) Moosmüller, H., W. P. Arnott, L.-W. A. Chen, R. K. Chakrabarty, D. Obrist, K. Lewis, C. Mazzoleni, C. E. Wold, E. N. Lincoln, and W. M. Hao (2008). Aerosol Optical Properties During Flaming and Smoldering Phases of Laboratory Combustion of Wildland Fuels. *Conference on "Light Scattering: Mie and More – Commemorating 100 Years Mie's 1908 Publications"*, *Gesellschaft für Aerosol Forschung (GAeF) Annual Meeting*, Karlsruhe, Germany, July 3-4, 2008.
- 206) Tian, G., H. Moosmüller, and W. P. Arnott (2008). Simultaneous Photoacoustic Measurements of Aerosol and Oxygen A-Band Light Absorption. *Conference on "Light Scattering: Mie and More – Commemorating 100 Years Mie's 1908 Publications"*, *Gesellschaft für Aerosol Forschung (GAeF) Annual Meeting*, Karlsruhe, Germany, July 3-4, 2008.
- 205) Moosmüller, H., L.-W. A. Chen, W. P. Arnott, G. R. McMeeking, and S M. Kreidenweis (2008). Repeatability of PM Emissions during Laboratory Combustion of Wildland Fuels. *Aerosol and Atmospheric Optics: Visual Air Quality and Radiation Balance Conference*, Air & Waste Management Association, Moab, UT, April 28 - May 2, 2008.
- 204) Moosmüller, H., L. Mack, D. Obrist, W. P. Arnott, and S M. Kreidenweis (2008). Cavity Ring Down Measurements of Extinction from Smoke Generated through Laboratory Combustion of Wildland Fuels. *Aerosol and Atmospheric Optics: Visual Air Quality and Radiation Balance Conference*, Air & Waste Management Association, Moab, UT, April 28 - May 2, 2008.
- 203) Moosmüller, H. and D. DuBois (2008, **invited**). Aerosol Optical Properties and Visibility Impairment in the Southwestern US. *DRI's Environmental Seminar Series*, Desert Research Institute, Reno, NV, April 25, 2008.
- 202) Moosmüller, H. (2008, **invited**). Optical Properties of Aerosols. *Seminar, Department of Chemistry, University of Nevada, Reno*, Reno, NV, April 18, 2008.
- 201) Moosmüller, H., W. P. Arnott, L.-W. A. Chen, D. Obrist, R. K. Chakrabarty, C. E. Wold, W. M. Hao, and S. M. Kreidenweis (2008). Particle Emissions from Flaming and Smoldering Laboratory Combustion of Wildland Fuels. *NASA Fire Science Workshop*, Adelphi, MD, February 20-22, 2008.
- 200) Chakrabarty, R. K., H. Moosmüller, M. A. Garro, W. P. Arnott, J. G. Slowik, E. S. Cross, J.-H. Han, P. Davidovits, T. B. Onasch, and D. R. Worsnop (2007). Experimental Validation of Light Scattering and Absorption Theories of Fractal-Like Carbonaceous Aerosol Agglomerates. *2007 Fall Meeting of the American Geophysical Union*, San Francisco, CA, December 10-14, 2007.
- 199) Mazzoleni, C., M. Dubey, R. K. Chakrabarty, H. Moosmüller, T. B. Onasch, M. Zavala, S. C. Herndon, C. E. Kolb (2007). Diurnal Cycles of Aerosol Optical Properties at Pico

- Tres Padres: Evidences for Changes in Particle Morphology and Secondary Aerosol Formation. *2007 Fall Meeting of the American Geophysical Union*, San Francisco, CA, December 10-14, 2007.
- 198) Moosmüller, H. (2007). Aerosol Optical Properties Relevant for Climate Change: Sensor Design and Applications. University of Nevada, Reno, “Biosensors and Chemical Sensors” Graduate Course, Reno, NV, October 31, 2007.
- 197) Arnott, W. P., K. Lewis, G. Parades-Miranda, S. Winter, D. Day, R. K. Chakrabarty, L.-W. A. Chen, and H. Moosmüller (2007). Relative Humidity Influence on Aerosol Light Absorption and Scattering by Biomass Burning Aerosol. *26<sup>th</sup> Annual Conference of the American Association for Aerosol Research*, Reno, NV, September 24-28, 2007.
- 196) Chakrabarty, R. K., M. A. Garro, H. Moosmüller, and C. Herald (2007). *FracMAP: A Graphical User-Interactive Package for Performing Simulation and Morphological Analysis of Fractal-Like Aerosol Agglomerates*. *26<sup>th</sup> Annual Conference of the American Association for Aerosol Research*, Reno, NV, September 24-28, 2007.
- 195) Chakrabarty, R. K., H. Moosmüller, W. P. Arnott, M. A. Garro, J. G. Slowik, E. S. Cross, J.-H. Han, P. Davidovits, T. B. Onasch, and D. R. Worsnop (2007). Shape Selection of Aerosol Particles Using Electrostatic Classifiers. *26<sup>th</sup> Annual Conference of the American Association for Aerosol Research*, Reno, NV, September 24-28, 2007.
- 194) McMeeking, G. R., C. M. Carrico, E. Levin, S. M. Kreidenweis, J. L. Collett, Jr., H. Moosmüller, W. P. Arnott, C. E. Wold, W. M. Hao, and W. C. Malm (2007). Measurements of Smoke Aerosol Size Distributions and Refractive Indices During a Series of Laboratory Biomass Burning Experiments. *26<sup>th</sup> Annual Conference of the American Association for Aerosol Research*, Reno, NV, September 24-28, 2007.
- 193) McMeeking, G. R., A. P. Sullivan, S. M. Kreidenweis, J. L. Collett, Jr., T. W. Kirchstetter, M. M. Lunden, L.-W. A. Chen, D. Obrist, H. Moosmüller, J. C. Chow, C. E. Wold, W. M. Hao, D. E. Day, and W. C. Malm (2007). A Comparison of Thermal-Optical Carbon Measurement Methods for Aerosols Emitted by a Series of Controlled Biomass Burning Experiments. *26<sup>th</sup> Annual Conference of the American Association for Aerosol Research*, Reno, NV, September 24-28, 2007.
- 192) Mack, L., D. Obrist, H. Moosmüller, K. A. Lewis, W. P. Arnott, G. R. McMeeking, E. Levin, S. M. Kreidenweis, C. E. Wold, W. M. Hao, J. L. Collett, Jr., and W. C. Malm (2007). Experimental and Theoretical Closure Experiments for Biomass Smokes Using Extinction Cells, Photoacoustics, and Nephelometry. *26<sup>th</sup> Annual Conference of the American Association for Aerosol Research*, Reno, NV, September 24-28, 2007.
- 191) Mazzoleni, C., M. Dubey, R. K. Chakrabarty, H. Moosmüller, P. Chylek, T. B. Onasch, M. Zavala, S. C. Herndon, C. E. Kolb (2007). Diurnal Evolution of Aerosol Optical Properties and Morphology at Pico Tres Padres: A Phenomenological Analysis. *IUGG XXIV General Assembly*, Perugia, Italy, July 2-13, 2007.
- 190) Engelbrecht, J., H. Moosmüller, W. P. Arnott, J. A. Gillies, and M. Skiba (2007). Mineralogy and Optical Properties of Resuspended Desert Dusts. *Symposium on Mineral Dust Cycle and its Impact on Clouds and Radiation at the IAMAS Scientific Assembly, IUGG XXIV General Assembly*, Perugia, Italy, July 2-13, 2007.
- 189) Mazzoleni, C., R. K. Chakrabarty, M. Dubey, H. Moosmüller, P. Chylek, T. B. Onasch, M. Zavala, S. C. Herndon, C. E. Kolb (2007). Diurnal Evolution of Aerosol Optical

- Properties and Morphology at Pico Tres Padres: A Phenomenological Analysis. 2007 AGU Joint Assembly, Acapulco, Mexico, May 22-25, 2007.
- 188) Li, W., J. F. Collins, T. D. Durbin, T. Huai, A. Ayala, G. Full, C. Mazzoleni, N. J. Nussbaum, D. Obrist, D. Zhu, H. D. Kuhns, and H. Moosmüller (2007). Detection of Gasoline Vehicles with Gross PM Emissions. *2007 SAE World Congress*, Detroit, MI, April 16-19, 2007.
- 187) Huai, T., J. F. Collins, A. Ayala, T. D. Durbin, W. Li, G. Full, C. Mazzoleni, N. J. Nussbaum, D. Obrist, D. Zhu, H. D. Kuhns, and H. Moosmüller (2007). Comparison of Remote Sensing Devices with Gravimetric Measurements of Light-Duty Gasoline PM Emissions. *17<sup>th</sup> CRC On-Road Vehicle Emissions Workshop*, San Diego, CA, March 26-28, 2007.
- 186) Chen, L.-W. A., R. K. Chakrabarty, H. Moosmüller, W. P. Arnott, J. G. Watson, and J. C. Chow (2007). Nanoparticle Emission from Biomass Burning? *Symposium on PM Formation in Fuel Combustion, 233<sup>rd</sup> American Chemical Society National Meeting*, Chicago, IL, March 25-29, 2007.
- 185) Collins, J. F., W. Lei, T. D. Durbin, T. Huai, A. Ayala, G. Full, C. Mazzoleni, N. J. Nussbaum, D. Obrist, D. Zhu, H. D. Kuhns, and H. Moosmüller (2007). Detection of High PM Emitters. *Smog Check Technology Forum and Roundtable Discussion of the South Coast Air Quality Management District*, Diamond Bar, CA, March 21, 2007.
- 184) K. A. Lewis, W. P. Arnott, and H. Moosmüller (2006). Multiwavelength Photoacoustic Measurements of Light Absorption and Scattering by Wood Smoke. *2006 Fall Meeting of the American Geophysical Union*, San Francisco, CA, December 11-15, 2006.
- 183) Arnott, W. P., K. A. Lewis, G. Parades-Miranda, S. Winter, D. Day, R. K. Chakrabarty, H. Moosmüller, J.-L. Jimenez, I. Ulbrich, A. Huffman, T. B. Onasch, A. Trimborn, S. M. Kreidenweis, C. M. Carrico, C. E. Wold, E. N. Lincoln, P. Freeborn, W. M. Hao, and G. R. McMeeking (2006). Observations of Aerosol Light Scattering, Absorption and Particle Morphology as a Function of Relative Humidity. *2006 Fall Meeting of the American Geophysical Union*, San Francisco, CA, December 11-15, 2006.
- 182) Obrist, D., H. Moosmüller, C. E. Wold, E. N. Lincoln, P. Freeborn, W. M. Hao and S. M. Kreidenweis (2006). Speciated Mercury Emissions from Laboratory Combustion of Wildland Fuel. *Tahoe Research Symposium*, Incline Village, NV, October 18-20, 2006.
- 181) K. Lewis, W. P. Arnott, and H. Moosmüller (2006, **invited**). Multiwavelength Photoacoustic Measurements of Light Absorption and Scattering by Wood Smoke. *Science Talk, Division of Atmospheric Sciences, Desert Research Institute, Nevada System of Higher Education*, Reno, NV, September 27, 2006.
- 180) Arnott, W. P., K. A. Lewis, G. Parades-Miranda, S. Winter, D. E. Day, R. K. Chakrabarty, H. Moosmüller, J.-L. Jimenez, I. Ulbrich, A. Huffman, T. B. Onasch, A. Trimborn, S. M. Kreidenweis, C. M. Carrico, C. E. Wold, E. N. Lincoln, P. Freeborn, and W. M. Hao (2006, **invited**). Observations of the Reduction of Aerosol Light Absorption and Increase of Aerosol Light Scattering for Biomass Burning for Increasing Relative Humidity. *Science Talk, Division of Atmospheric Sciences, Desert Research Institute, Nevada System of Higher Education*, Reno, NV, September 27, 2006.

- 179) Huang, L., P. Tans, K. Higuchi, D. Worthy, T. Chan, A. Shashkov, H. Moosmüller, W. M. Hao, B. Chen (2006). Carbon Cycle and Environmental Changes on Regional Scales: What We Can Learn From High Precision Isotope Measurements in Atmospheric CO<sub>2</sub>. *7<sup>th</sup> International Symposium on Environmental Geochemistry (7<sup>th</sup> ISEG)*, Beijing, China, September 24-27, 2006.
- 178) Chen, L.-W. A., H. Moosmüller, W. P. Arnott, R. A. Susott, R. E. Babbitt, C. E. Wold, E. N. Lincoln, and W. M. Hao (2006). Emission Factors for Carbon Monoxide, Elemental Carbon, and Light Absorption from Laboratory Combustion of Wildland Fuels. *International Aerosol Conference*, St. Paul, MN, September 10-15, 2006.
- 177) Chakrabarty, R. K., H. Moosmüller, M. A. Garro, W. P. Arnott, J. G. Slowik, E. S. Cross, J.-H. Han, P. Davidovits, T. B. Onasch, and D. R. Worsnop (2006). *Ex-Situ* Measurement of Flame Generated Soot Morphology and Calculation of Soot Optical Properties Using Rayleigh-Debye-Gans Approximation Theory for Fractal Aggregates. *Conference on Visibility, Aerosol, and Atmospheric Optics*, Vienna, Austria, September 3-6, 2006.
- 176) Moosmüller, H. and W. P. Arnott (2006). An Instrument for the Measurement of the Aerosol Asymmetry Parameter *g*. *Conference on Visibility, Aerosol, and Atmospheric Optics*, Vienna, Austria, September 3-6, 2006.
- 175) Chakrabarty, R. K., H. Moosmüller, M. A. Garro, and W. P. Arnott (2006). Characterization of Morphology and Structural Properties of Particles Emitted from the Laboratory Combustion of Wildland Fuels. *Conference on Visibility, Aerosol, and Atmospheric Optics*, Vienna, Austria, September 3-6, 2006.
- 174) Moosmüller, H., W. P. Arnott, L.-W. A. Chen, R. K. Chakrabarty, R. A. Susott, R. E. Babbitt, C. E. Wold, E. N. Lincoln, and W. M. Hao (2006). Particle Emissions from Laboratory Combustion of Wildland Fuels: Time Evolution of Aerosol Optical Properties and the Transition from Flaming to Smoldering Combustion. *Conference on Visibility, Aerosol, and Atmospheric Optics*, Vienna, Austria, September 3-6, 2006.
- 173) Chakrabarty, R. K., H. Moosmüller, L.-W. A. Chen, C. Mazzoleni, P. Chylek, M. Dubey, W. P. Arnott, K. Lewis, and W. M. Hao (2006). Experimental Determination of Effective Refractive Indices of Aerosols Emitted from High-Moisture-Content Biomass Combustion. *Aerosol Workshop on Climate Prediction Uncertainties, Second International Conference on Global Warming and the Next Ice Age*, Santa Fe, NM, July 17-21, 2006.
- 172) Moosmüller, H. and W. P. Arnott (2006, **invited**). *In Situ* Measurements of Shortwave Aerosol Optical Properties Relevant for Climate Change. *Aerosol Workshop on Climate Prediction Uncertainties, Second International Conference on Global Warming and the Next Ice Age*, Santa Fe, NM, July 17-21, 2006.
- 171) K. Lewis, W. P. Arnott, and H. Moosmüller (2006). Multi-wavelength Photoacoustic Measurements of Light Absorption and Scattering by Wood Smoke. *Aerosol Workshop on Climate Prediction Uncertainties, Second International Conference on Global Warming and the Next Ice Age*, Santa Fe, NM, July 17-21, 2006.

- 170) Moosmüller, H., W. P. Arnott, L.-W. A. Chen, R. K. Chakrabarty, D. Obrist, K. Lewis, C. Mazzoleni, C. E. Wold, E. N. Lincoln, and W. M. Hao (2006). Particle Emissions from Laboratory Combustion of Wildland Fuels: Aerosol Optical Properties During Flaming and Smoldering Combustion Phases. *Second International Conference on Global Warming and the Next Ice Age*, Santa Fe, NM, July 17-21, 2006.
- 169) Arnott, W. P., K. Lewis, G. Parades-Miranda, S. Winter, D. Day, R. K. Chakrabarty, H. Moosmüller, J.-L. Jimenez, I. Ulbrich, A. Huffman, T. B. Onasch, A. Trimborn, S. M. Kreidenweis, C. M. Carrico, C. E. Wold, E. N. Lincoln, P. Freeborn, and W. M. Hao (2006). Observations of the Reduction of Aerosol Light Absorption and Increase of Aerosol Light Scattering for Biomass Burning for Increasing Relative Humidity. *Aerosol Workshop on Climate Prediction Uncertainties, Second International Conference on Global Warming and the Next Ice Age*, Santa Fe, NM, July 17-21, 2006.
- 168) Moosmüller, H. and D. Obrist (2006, **invited**). Development of a Real-Time Cavity Ring Down Laser Absorption Spectroscopy (CRLAS) Sensor to Measure Atmospheric Mercury Concentrations and Fluxes. *61<sup>st</sup> Northwest Regional Meeting of the American Chemical Society*, Reno, NV, June 25-28, 2006.
- 167) Chakrabarty, R. K., H. Moosmüller, M. A. Garro, W. P. Arnott, J. G. Slowik, E. S. Cross, J.-H. Han, and P. Davidovits (2006). Comparison of *In Situ* Measurements and Rayleigh-Debye-Gans Theory for Optical Properties of Flame Generated Monodisperse Soot Particles. *99<sup>th</sup> Annual Conference of the Air & Waste Management Association*, New Orleans, LA, June 20-23, 2006.
- 166) Kuhns, H. D., C. Mazzoleni, D. Nikolic, N. J. Nussbaum, H. Moosmüller, J. G. Watson, M. C. Chang, G. Parthasarathy, J. Witt, and S. K. K. Nathagoundenpalayam (2006). A Real-World Case Study of Tailpipe Emissions for School Buses Using a Biodiesel Blend. *2<sup>nd</sup> International Scientific Symposium on Environment and Transport*, Reims, France, June 12-14, 2006.
- 165) Obrist, D. and H. Moosmüller (2006, **invited**). Development and Application of Micrometeorological Methods and Sensors to Measure Gaseous Hg Exchange. *Science Talk, Division of Atmospheric Sciences, Desert Research Institute, Nevada System of Higher Education*, Reno, NV, April 26, 2006.
- 164) Chakrabarty, R. K., H. Moosmüller, M. A. Garro, W. P. Arnott, J. G. Slowik, E. S. Cross, J.-H. Han, and P. Davidovits (2006). Structural and Optical Properties of Flame Generated Monodisperse Soot Particles. *Carbon Emission Characterization and Inventory Workshop*, Reno, NV, April 18-19, 2006.
- 163) Chakrabarty, R. K., H. Moosmüller, W. P. Arnott, J. W. Walker, V. A. Kovalev, R. A. Susott, and W. M. Hao (2006). Investigation into the Morphology of Particles Emitted from the Laboratory Combustion of Wildland Fuels. *Carbon Emission Characterization and Inventory Workshop*, Reno, NV, April 18-19, 2006.
- 162) Chen, L.-W. A., H. Moosmüller, J. C. Chow, J. G. Watson, and W. P. Arnott (2006). Particle Emissions from Laboratory Combustion of Wildland Fuels: Emission Factors and Source Profiles. *Carbon Emission Characterization and Inventory Workshop*, Reno, NV, April 18-19, 2006.

- 161) Moosmüller, H. (2006, **invited**). Measuring Aerosol Optical Properties Relevant for Climate Change. *Colloquium, Department of Physics, Colorado State University*, Fort Collins, CO, March 27, 2006.
- 160) Chakrabarty, R. K., H. Moosmüller, M. A. Garro, W. P. Arnott, J. G. Slowik, E. S. Cross, J.-H. Han, and P. Davidovits (2005). *In Situ* Measurement of Optical Properties of Flame Generated Monodisperse Soot Particles and Comparison with Rayleigh-Debye-Gans Scattering Theory. *2005 Fall Meeting of the American Geophysical Union*, San Francisco, CA, December 5-9, 2005.
- 159) Miller, J. W., J. G. Watson, D. R. Cocker III, H. Moosmüller, M. C. Chang, H. D. Kuhns, and N. Helgeson (2005). Characterization of Off-Road Diesel Emissions of Criteria Pollutants: SERDP Project CP-1336. *Partners in Environmental Technology Technical Symposium and Workshop*, Washington, DC, November 29 - December 1, 2005.
- 158) Moosmüller, H. (2005). Sensor Research at the Desert Research Institute. *Advisory Board Meeting of NSF EPSCoR RING-TRUE III Sensor Technology*, Reno, NV, November 17, 2005.
- 157) Davidovits, P., J. G. Slowik, E. S. Cross, J.-H. Han, T. B. Onasch, J. T. Jayne, L. R. Williams, M. R. Canagaratna, D. R. Worsnop, R. K. Chakrabarty, H. Moosmüller, W. P. Arnott, J. P. Schwarz, R.-S. Gao, D. W. Fahey, and G. L. Kok (2005, **invited**). Inter-Comparison of Instruments Measuring Black Carbon Content of Soot Particles. *Annual Science Team Meeting of the Department of Energy Atmospheric Science Program (DOE ASP)*, Alexandria, VA, October 31 – November 1, 2005.
- 156) Moosmüller, H. and W. P. Arnott (2005). Measuring the Aerosol Asymmetry Parameter. *24<sup>th</sup> Annual Conference of the American Association for Aerosol Research*, Austin, TX, October 17-21, 2005.
- 155) Chakrabarty, R. K., H. Moosmüller, W. P. Arnott, J. W. Walker, V. A. Kovalev, R. A. Susott, and W. M. Hao (2005). Emissions from the Laboratory Combustion of Wildland Fuels: Characterization of Particle Morphology. *24<sup>th</sup> Annual Conference of the American Association for Aerosol Research*, Austin, TX, October 17-21, 2005.
- 154) Chakrabarty, R. K., W. P. Arnott, H. Moosmüller, J. W. Walker, and M. Garro (2005). Emissions from Spark Ignition Engines: Characterization of Particle Morphology. *24<sup>th</sup> Annual Conference of the American Association for Aerosol Research*, Austin, TX, October 17-21, 2005.
- 153) Abu-Rahmah, A., W. P. Arnott, and H. Moosmüller (2005). Integrating Nephelometer with Low Truncation Angle and Fast Time Response and a Novel Calibration Scheme. *24<sup>th</sup> Annual Conference of the American Association for Aerosol Research*, Austin, TX, October 17-21, 2005.
- 152) Abu-Rahmah, A., H. Moosmüller, and W. P. Arnott (2005). Calibration of Photoacoustic Measurements of Aerosol Light Absorption Using the Oxygen A-Band and a Tunable Diode Laser. *24<sup>th</sup> Annual Conference of the American Association for Aerosol Research*, Austin, TX, October 17-21, 2005.
- 151) Arnott, W. P., H. Moosmüller, and J. Brook (2005). Ultrasensitive Measurement of Aerosol Light Absorption by the Photoacoustic Method. *24<sup>th</sup> Annual Conference of the American Association for Aerosol Research*, Austin, TX, October 17-21, 2005.

- 150) Chen, L.-W. A., H. Moosmüller, W. P. Arnott, J. G. Watson, and P. Mousset-Jones (2005). Novel Approaches to Measure Diesel Emissions. *Mining Diesel Emissions Conference (MDEC 2005)*, Toronto/Markham, Ontario, Canada, October 12-14, 2005.
- 149) Huang, L. A. Shashkov, K. Higuchi, H. Moosmüller, D. Worthy, D. Lavoué, W. M. Hao, D. Chan, A. Chivulescu, and M. Ernst (2005). Identifying Biomass Burning in Atmospheric CO<sub>2</sub> via Isotope Measurements. *7<sup>th</sup> International Carbon Dioxide Conference (ICDC7)*, Boulder, CO, September 25-30, 2005.
- 148) Slowik, J. G., E. S. Cross, J.-H. Han, P. Davidovits, T. B. Onasch, J. T. Jayne, L. R. Williams, M. R. Canagaratna, D. R. Worsnop, R. K. Chakrabarty, H. Moosmüller, W. P. Arnott, J. P. Schwarz, R.-S. Gao, D. W. Fahey, G. L. Kok (2005). Inter-Comparison of Instruments Measuring Black Carbon Content and Optical Properties of Soot Particles. *Eighth Biennial Atmospheric Chemistry Colloquium for Emerging Senior Scientists (ACCESS VIII)*, Yellowstone National Park, WY, September 4-9, 2005.
- 147) Miller, J. W., J. G. Watson, D. R. Cocker III, H. Moosmüller, H. D. Kuhns, M. C. Chang, C. Mazzoleni, M. Kemme, N. L. Helgeson, B. Holden, C. Scarbro (2005). Characterization of Off-Road Diesel Emissions of Criteria Pollutants. *SERDP & ESTCP Spring FY 2005 In Progress Review, Compliance Thrust Area*, Arlington, VA, June 14-16, 2005.
- 146) Mazzoleni, C., H. D. Kuhns, N. J. Nussbaum, H. Moosmüller, P. W. Barber, M. C. Chang, G. Parthasarathy, D. Nikolic, and J. G. Watson (2005). Intercomparison between In-Plume and Cross-Plume Systems Measuring On-Road PM, and Gases Fuel-Based Emission Factors for Driving-By Vehicles. *15<sup>th</sup> CRC On-Road Vehicle Emissions Workshop*, San Diego, CA, April 4-6, 2005.
- 145) Kuhns, H. D., C. Mazzoleni, N. J. Nussbaum, H. Moosmüller, M. C. Chang, G. Parthasarathy, D. Nikolic, J. G. Watson, and J. Witt (2005). Comparison of PM, NO, CO, and HC Emissions from an In-Use School Bus Fleet Using 20% Biodiesel and Winter Blend Fuel. *15<sup>th</sup> CRC On-Road Vehicle Emissions Workshop*, San Diego, CA, April 4-6, 2005.
- 144) Chen, L.-W. A., H. Moosmüller, W. P. Arnott, J. C. Chow, J. G. Watson, R. A. Susott, V. Kovalev, and W. M. Hao (2004). Variability of Physical and Optical Properties of Particles Emitted from Combustion of Wildland Fuels. *2004 Fall Meeting of the American Geophysical Union*, San Francisco, CA, December 13-17, 2004.
- 143) Kuhns, H. D. J. G. Watson, H. Moosmüller, P. W. Barber, C. Mazzoleni, M. C. Chang, M. Kemme, J. W. Miller, and D. R. Cocker III (2004). New Approaches for Determining Emission Factors from Off-Road Diesel Engines: SERDP Project CP-1336. *Partners in Environmental Technology Technical Symposium and Workshop*, Washington, DC, November 30 - December 2, 2004.
- 142) Gillies, J. A., W. P. Arnott, V. Etyemezian, D. A. Gillette, H. D. Kuhns, H. Moosmüller, W. G. Nickling, J. Allwine, and R. Hashmonay (2004). Characterizing and Quantifying Fugitive Dust Emissions from Department of Defense Sources Including Unique Military Activities. *Partners in Environmental Technology Technical Symposium and Workshop*, Washington, DC, November 30 - December 2, 2004.
- 141) Lawson, D. R., P. Gabele, R. Snow, W. P. Arnott, E. M. Fujita, D. E. Campbell, J. W. Walker, and H. Moosmüller (2004). Second-by-Second Gas-Phase And PM Emissions

- Data and their Relationship to Mobile Source Air Toxics Emissions from Gasoline Vehicles in DOE's Gasoline/Diesel PM Split Study. *2004 CRC Mobile Source Air Toxics Workshop*, Scottsdale, AZ, November 30 – December 2, 2004.
- 140) Arnott, W. P., H. Moosmüller, P. J. Sheridan, J. O. Ogren (2004). Insights on Aerosol Light Absorption Methods Gained from the Reno Aerosol Optics Experiment. *Regional and Global Perspectives on Haze: Causes, Consequences, and Controversies (Visibility Specialty Conference)*, Asheville, NC, October 25-29, 2004.
- 139) Varma, R., H. Moosmüller, W. P. Arnott, J. W. Walker, H. D. Kuhns, V. Etyemezian, and J. A. Gillies (2004). Emission Factors of Scattering Cross Section for Visibility Impairment from Fugitive Dust Sources. *Regional and Global Perspectives on Haze: Causes, Consequences, and Controversies (Visibility Specialty Conference)*, Asheville, NC, October 25-29, 2004.
- 138) Moosmüller, H., W. P. Arnott, L. R. Rinehart, R. A. Susott, V. Kovalev, and W. M. Hao (2004). Characterization of Visibility Relevant Fire Emissions from Several Wildland Fuels. *Regional and Global Perspectives on Haze: Causes, Consequences, and Controversies (Visibility Specialty Conference)*, Asheville, NC, October 25-29, 2004.
- 137) Rinehart, L. R., D. E. Campbell, H. Moosmüller, J. C. Chow, and B. Zielinska (2004). Semi-Volatile Organic Compound Characterization of Biomass Combustion Emission for Prescribed Burns, Wildland Fuels, and Residential Wood Combustion. *Regional and Global Perspectives on Haze: Causes, Consequences, and Controversies (Visibility Specialty Conference)*, Asheville, NC, October 25-29, 2004.
- 136) Moosmüller, H., W. P. Arnott, and R. Varma (2004). Measurement of Atmospheric Extinction with Cavity Ring Down and Cavity Enhanced Detection. *Regional and Global Perspectives on Haze: Causes, Consequences, and Controversies (Visibility Specialty Conference)*, Asheville, NC, October 25-29, 2004.
- 135) Mazzoleni, C., H. Moosmüller, H. D. Kuhns, P. W. Barber, D. Nikolic, N. J. Nussbaum, M. C. Chang, R. E. Keislar, and J. G. Watson (2004). On-Road Particulate Matter Emissions from Vehicles by Ultraviolet Backscattering and Extinction Measurements. *Regional and Global Perspectives on Haze: Causes, Consequences, and Controversies (Visibility Specialty Conference)*, Asheville, NC, October 25-29, 2004.
- 134) Moosmüller, H., W. P. Arnott, and R. Varma (2004). A New Integrating Nephelometer with Reduced Truncation Losses. *Regional and Global Perspectives on Haze: Causes, Consequences, and Controversies (Visibility Specialty Conference)*, Asheville, NC, October 25-29, 2004.
- 133) Nikolic, D., H. D. Kuhns, H. Moosmüller, J. Xu, J. A. Gillies, S. Ahonen, V. Etyemezian, and M. Pitchford (2004). PI-SWERL: A Novel Method for Quantifying Windblown Dust Emissions. *23<sup>rd</sup> Annual Conference of the American Association for Aerosol Research*, Atlanta, GA, October 4-8, 2004.
- 132) Kuhns, H. D., C. Mazzoleni, H. Moosmüller, N. J. Nussbaum, M. C. Chang, J. C. Chow, P. W. Barber, and J. G. Watson (2004). Measurement of In-Use Vehicle Particulate Matter Exhaust Using Extractive In-Plume Monitoring. *23<sup>rd</sup> Annual Conference of the American Association for Aerosol Research*, Atlanta, GA, October 4-8, 2004.

- 131) Moosmüller, H., C. Mazzoleni, P. W. Barber, H. D. Kuhns, R. E. Keislar, and J. G. Watson (2004). An Ultraviolet Lidar and Transmissometer for the On-Road Measurement of Automotive Particle Emissions. *23<sup>rd</sup> Annual Conference of the American Association for Aerosol Research*, Atlanta, GA, October 4-8, 2004.
- 130) Mazzoleni, C., H. D. Kuhns, H. Moosmüller, N. J. Nussbaum, M. C. Chang, D. Nikolic, P. W. Barber, R. E. Keislar, and J. G. Watson (2004). On-Road Measurement of Automotive PM Emissions with In-plume and Cross-Plume Systems. *23<sup>rd</sup> Annual Conference of the American Association for Aerosol Research*, Atlanta, GA, October 4-8, 2004.
- 129) Arnott, W. L.-W. A. Chen, J. C. Chow, E. M. Fujita, M. Green, H. Moosmüller, J. G. Watson, and B. Zielinska (2004). Empirical Insights on the Relationship of Elemental Carbon and Black Carbon from Photoacoustic Light Absorption Measurements. *8<sup>th</sup> International Conference on Carbonaceous Particles in the Atmosphere*, Vienna, Austria, September 14-16, 2004.
- 128) Lawson, D. R., P. Gabele, R. Snow, N. Clark, W. S. Wayne, R. D. Nine, E. M. Fujita, B. Zielinska, W. P. Arnott, D. E. Campbell, J. W. Walker, H. Moosmüller, J. Schauer, and C. Christensen (2004). DOE's Gasoline/Diesel PM Split Study. *10<sup>th</sup> Diesel Engine Emissions Reduction (DEER) Conference*, Coronado, CA, August 29 – September 2, 2004.
- 127) Kuhns, H. D., C. Mazzoleni, H. Moosmüller, D. Nikolic, R. E. Keislar, P. W. Barber, V. Etyemezian, J. G. Watson (2004). Spatial Analysis of Remotely Sensed Emissions from Light Duty Gasoline Vehicle in Clark County, Nevada. *97<sup>th</sup> Annual Conference of the Air & Waste Management Association*, Indianapolis, IN, June 22-25, 2004.
- 126) Gillies, J. A., W. P. Arnott, V. Etyemezian, D. A. Gillette, H. D. Kuhns, E. McDonald, H. Moosmüller, W. G. Nickling, G. Schwemmer, and T. D. Wilkerson (2004). Characterizing and Quantifying Local and Regional Particulate Matter Emissions from Department of Defense Installations. *SERDP & ESTCP Spring FY 2004 In Progress Review, Compliance Thrust Area*, Arlington, VA, May 3-7, 2004.
- 125) Miller, J. W., J. G. Watson, D. R. Cocker III, H. Moosmüller, H. D. Kuhns, P. W. Barber, M. Kemme, N. L. Helgeson, B. Holden, C. Scarbro (2004). Characterization of Off-Road Diesel Emissions of Criteria Pollutants. *SERDP & ESTCP Spring FY 2004 In Progress Review, Compliance Thrust Area*, Arlington, VA, May 3-7, 2004.
- 124) Gillies, J. A., V. Etyemezian, and H. Moosmüller (2004). Particulate Matter Emissions for Dust from Unique Military Activities. *Strategic Environmental Research & Development Program (SERDP) Scientific Advisory Board Meeting*, San Diego, CA, March 30-31, 2004.
- 123) Miller, J. W., J. G. Watson, H. Moosmüller, H. D. Kuhns, D. R. Cocker III, G. Croll (2003). Characterization of Off-Road Diesel Engines and Emissions of Regulated and Non-regulated Pollutants. *Partners in Environmental Technology Technical Symposium and Workshop*, Washington, DC, December 2-4, 2003.

- 122) Gillies, J. A., W. P. Arnott, V. Etyemezian, D. A. Gillette, H. D. Kuhns, E. McDonald, H. Moosmüller, W. G. Nickling, G. Schwemmer, and T. D. Wilkerson (2003). Characterizing and Quantifying Local and Regional Particulate Matter Emissions from Department of Defense Installations. *Partners in Environmental Technology Technical Symposium and Workshop*, Washington, DC, December 2-4, 2003.
- 121) Strawa, A. W., R. Castaneda, R. Provencal, B. Paldus, K. Ricci, B. Schmid, J. Redemann, T. Owano, D. Baer, A. Bucholtz, H. Jonsson, D. Covert, R. Elleman, W. P. Arnott, H. Moosmüller, D. Atkinson, R. Ferrare, J. Ogren, P. Sheridan (2003). Airborne In-Situ Measurement of Aerosol Extinction and Scattering Over Monterey, CA and DOE CART Site. *22<sup>nd</sup> Annual Conference of the American Association for Aerosol Research*, Anaheim, CA, October 20-24, 2003.
- 120) Mazzoleni, C., H. Moosmüller, P. W. Barber, H. D. Kuhns, R. E. Keislar, and J. G. Watson (2003). Ultraviolet Lidar and Transmissometer for the On-Road Measurement of Automotive Particle Emission Factors. *22<sup>nd</sup> Annual Conference of the American Association for Aerosol Research*, Anaheim, CA, October 20-24, 2003.
- 119) Mazzoleni, C., H. D. Kuhns, H. Moosmüller, R. E. Keislar, P. W. Barber, D. Nikolic, N. F. Robinson, and J. G. Watson (2003). On-Road Remote Sensing Measurement of Automotive Particulate and Gaseous Emissions in Las Vegas, NV. *22<sup>nd</sup> Annual Conference of the American Association for Aerosol Research*, Anaheim, CA, October 20-24, 2003.
- 118) Etyemezian, V., S. Ahonen, J. A. Gillies, H. D. Kuhns, H. Moosmüller, D. Nikolic, and M. Pitchford (2003). PI-SWIRL: A New Technique for Measuring Wind Blown Dust Emission Potential. *NARSTO Workshop on Innovative Methods for Emission-Inventory Development and Evaluation*, Texas, Austin; October 14-17, 2003.
- 117) Moosmüller, H., C. Mazzoleni, P. W. Barber, H. D. Kuhns, R. E. Keislar, and J. G. Watson (2003). On-Road Measurement of Automotive Particle Emission Factors by Ultraviolet Lidar and Transmissometer. *NARSTO Workshop on Innovative Methods for Emission-Inventory Development and Evaluation*, Texas, Austin; October 14-17, 2003.
- 116) Mazzoleni, C., H. D. Kuhns, H. Moosmüller, R. E. Keislar, P. W. Barber, D. Nikolic, N. F. Robinson, and J. G. Watson (2003). Automotive Particulate Matter and Gaseous Emission Factors from On-Road Measurement in Las Vegas, NV. *NARSTO Workshop on Innovative Methods for Emission-Inventory Development and Evaluation*, Texas, Austin; October 14-17, 2003.
- 115) Moosmüller, H., R. Varma, W. P. Arnott, J. W. Walker, H. D. Kuhns, V. Etyemezian, and J. A. Gillies (2003). Emission Factors for Visibility Impairment from Fugitive Dust Emissions. *NARSTO Workshop on Innovative Methods for Emission-Inventory Development and Evaluation*, Texas, Austin; October 14-17, 2003.
- 114) Gillies, J. A., H. D. Kuhns, V. Etyemezian, D. Nikolic, H. Moosmüller, and W. P. Arnott (2003). Tower Based Real Time Monitoring System for Quantifying Fugitive Dust Emissions. *NARSTO Workshop on Innovative Methods for Emission-Inventory Development and Evaluation*, Texas, Austin; October 14-17, 2003.
- 113) Moosmüller, H., W. P. Arnott, and R. Varma (2003). A New Integrating Nephelometer for the Measurement of Mineral Dust Light Scattering Coefficients. *Second International Workshop on Mineral Dust*, Paris, France, September 10-12, 2003.

- 112) Moosmüller, H., and W. P. Arnott (2003, **invited**). Capabilities of the Photoacoustic Technique for the Measurement of Light Absorption by Mineral Dust. *Second International Workshop on Mineral Dust*, Paris, France, September 10-12, 2003.
- 111) Arnott, W. P., J. W. Walker, M. Green, H. Moosmüller, and V. Etyemezian (2003). Photoacoustic Insight on the Roles of Soot and NO<sub>2</sub> in Light Absorption at Las Vegas, NV, USA. *European Aerosol Conference*, Madrid, Spain, August 31 - September 5, 2003.
- 110) Kim, B. J., H. Moosmüller, R. Varma, R. A. Hashmonay, M. Kemme, W. P. Arnott, T. Logan, and J. Bosch (2003). An Innovative Method for Simultaneous Measurement of Visible Scattering and Absorption by Particulate Matter. *Environmental Security Technology Certification Program (ESTCP) Compliance Phase II Review Committee Meeting*, Washington, DC, September 3-4, 2003.
- 109) Mazzoleni, C., R. E. Keislar, H. D. Kuhns, H. Moosmüller, P. W. Barber, D. Nikolic, N. Robinson, J. G. Watson (2003). On-Road Optical Remote Sensing of Particulate Matter and Gaseous Emissions from Vehicles in the Las Vegas Area. *96<sup>th</sup> Annual Conference of the Air & Waste Management Association*, San Diego, CA, June 22-26, 2003.
- 108) Moosmüller, H (2003, **invited**). Aerosol Characterization Capabilities at the Desert Research Institute. *Workshop on Future Aerosol Measurement Needs at the USFS Fire Science Laboratory*, Missoula, MT, May 28-30, 2003.
- 107) Arnott, W. P., E. M. Fujita, D. E. Campbell, J. W. Walker, and H. Moosmüller (2003). Continuous Measurements of PM and Black Carbon during the DOE's Gasoline/Diesel PM Split Study. *13<sup>th</sup> CRC On-Road Vehicle Emissions Workshop*, San Diego, CA, April 7-9, 2003.
- 106) Strawa, A. W., B. Schmid, T. P. Owano, R. Provencal, R. Castaneda, B. A. Paldus, D. S. Baer, H. Moosmüller, W. P. Arnott, R. Varma, D. Atkinson, D. Covert, N. Ahlquist, P. Sheridan (2003). Continuous Wave Cavity Ring-Down Measurement of Aerosol Optical Properties. *13<sup>th</sup> ARM Science Team Meeting*, Broomfield, CO, March 31-April 4, 2003.
- 105) Moosmüller, H., W. P. Arnott, and R. Varma (2003). Measurement of Atmospheric Visibility with a High-Quality Cavity. *American Association for Aerosol Research Particulate Matter Meeting: Atmospheric Sciences, Exposure, and the Fourth Colloquium on PM and Human Health*, Pittsburgh, PA, March 31-April 4, 2003.
- 104) Chow, J. C., J. G. Watson, L.-W. A. Chen, H. Moosmüller, P. W. Barber, W. P. Arnott, W. R. Stockwell, B. Zielinska, K. K. Fung (2003, **invited**). Problems and Solutions for Measuring Black Carbon in Suspended Particles. *American Association for Aerosol Research Particulate Matter Meeting: Atmospheric Sciences, Exposure, and the Fourth Colloquium on PM and Human Health*, Pittsburgh, PA, March 31-April 4, 2003.
- 103) Moosmüller, H., W. P. Arnott, and R. Varma (2003). A New Integrating Nephelometer for Visibility Studies. *American Association for Aerosol Research Particulate Matter Meeting: Atmospheric Sciences, Exposure, and the Fourth Colloquium on PM and Human Health*, Pittsburgh, PA, March 31-April 4, 2003.

- 102) Arnott, W. P., H. Moosmüller, P. J. Sheridan, and J. A. Ogren (2003). Analysis of Aerosol Light Absorption Measurement Capabilities: The Reno Aerosol Optics Experiment. *American Association for Aerosol Research Particulate Matter Meeting: Atmospheric Sciences, Exposure, and the Fourth Colloquium on PM and Human Health*, Pittsburgh, PA, March 31-April 4, 2003.
- 101) Watson, J. G., W. Miller, H. Moosmüller, H. D. Kuhns, P. W. Barber, W. P. Arnott, J. C. Chow, B. Zielinska, D. R. Cocker (2003). Gas and Particle Emission Rates and Source Profiles from Non-Road Military Diesel Engines. *American Association for Aerosol Research Particulate Matter Meeting: Atmospheric Sciences, Exposure, and the Fourth Colloquium on PM and Human Health*, Pittsburgh, PA, March 31-April 4, 2003.
- 100) Watson, J. G., J. C. Chow, L.-W. A. Chen, H. Moosmüller, W. P. Arnott, D. J. Crow, K. K. Fung, P. Ouchida (2003). Equivalence of Carbon Fractions from Different Thermal Evolution Methods at the Fresno Supersite. *American Association for Aerosol Research Particulate Matter Meeting: Atmospheric Sciences, Exposure, and the Fourth Colloquium on PM and Human Health*, Pittsburgh, PA, March 31-April 4, 2003.
- 99) Moosmüller, H., C. Mazzoleni, R. E. Keislar, P. W. Barber, H. D. Kuhns, and J. G. Watson (2003). A Remote Sensor for Vehicle Exhaust Particulate Matter. *American Association for Aerosol Research Particulate Matter Meeting: Atmospheric Sciences, Exposure, and the Fourth Colloquium on PM and Human Health*, Pittsburgh, PA, March 31-April 4, 2003.
- 98) Kuhns, H. D., P. W. Barber, H. Moosmüller, and J. G. Watson (2003). Measurement of Particulate Matter Emissions Factors from In-Use Motor Vehicles Using Lidar. *American Association for Aerosol Research Particulate Matter Meeting: Atmospheric Sciences, Exposure, and the Fourth Colloquium on PM and Human Health*, Pittsburgh, PA, March 31-April 4, 2003.
- 97) Moosmüller, H. (2003, **invited**). What New and Innovative Sampling, Analytical, and Interpretive Techniques are Needed to Determine the Properties and Sources of Carbonaceous Aerosol in the Atmosphere? *International Workshop for the Development of Research Strategies for the Sampling and Analysis of Organic and Elemental Carbon Fractions in Atmospheric Aerosol (OC/EC Workshop)*, Durango, CO, March 3-5, 2003.
- 96) Mazzoleni, C., H. D. Kuhns, H. Moosmüller, R. E. Keislar, P. W. Barber, and J. G. Watson (2003). On Road UV Lidar and Transmissometer PM Remote Sensor. *International Workshop for the Development of Research Strategies for the Sampling and Analysis of Organic and Elemental Carbon Fractions in Atmospheric Aerosol (OC/EC Workshop)*, Durango, CO, March 4-5, 2003.
- 95) Arnott, W. P. and H. Moosmüller (2003). Photoacoustic Analysis of Aerosol Light Absorption and Black Carbon Soot Mass Concentration. *International Workshop for the Development of Research Strategies for the Sampling and Analysis of Organic and Elemental Carbon Fractions in Atmospheric Aerosol (OC/EC Workshop)*, Durango, CO, March 4-5, 2003.

- 94) Arnott, W. P., H. Moosmüller, P. J. Sheridan, and J. A. Ogren (2003). Aerosol Light Absorption Measurements During the Reno Aerosol Optics Experiment: Photoacoustic Measurements and a Multiple-Scattering Model for the Aethalometer Response. *International Workshop for the Development of Research Strategies for the Sampling and Analysis of Organic and Elemental Carbon Fractions in Atmospheric Aerosol (OC/EC Workshop)*, Durango, CO, March 4-5, 2003.
- 93) Keislar, R. E., H. D. Kuhns, H. Moosmüller, C. Mazzoleni, and J. G. Watson (2002). LIDAR Remote Sensing of Particulate Matter Emissions from On-Road Vehicles. *2002 Fall Meeting of the American Geophysical Union*, San Francisco, CA, December 6-10, 2002.
- 92) Moosmüller, H., W. P. Arnott, and R. Varma (2002). Sensitive Measurement of Atmospheric Aerosol Extinction in a High-Quality Cavity. *2002 Fall Meeting of the American Geophysical Union*, San Francisco, CA, December 6-10, 2002.
- 91) Arnott, W. P., H. Moosmüller, P. J. Sheridan, and J. A. Ogren (2002). Aerosol Light Absorption Measurements During the Reno Aerosol Optics Experiment: Photoacoustic Measurements and a Multiple-Scattering Model for the Aethalometer Response. *2002 Fall Meeting of the American Geophysical Union*, San Francisco, CA, December 6-10, 2002.
- 90) Petzold, A., H. Schloesser, A. Virkkula, P. Arnott, H. Moosmüller, P. Sheridan, J. Ogren (2002). New Approaches for Filter-based Measurements of Aerosol Light Absorption. *2002 Fall Meeting of the American Geophysical Union*, San Francisco, CA, December 6-10, 2002.
- 89) Strawa, A. W., T. Owano, H. Moosmüller, D. Atkinson, D. Covert, B. Schmid (2002). New Approaches to Aerosol Optical Extinction Measurement. *2002 Fall Meeting of the American Geophysical Union*, San Francisco, CA, December 6-10, 2002.
- 88) Sheridan, P. J., J. A. Ogren, W. P. Arnott, H. Moosmüller, D. Covert, N. Ahlquist, A. Virkkula, A. W. Strawa, B. Schmid, D. B. Atkinson, A. Petzold (2002). The Reno Aerosol Optics Study – Overview and Preliminary Results. *2002 Fall Meeting of the American Geophysical Union*, San Francisco, CA, December 6-10, 2002.
- 87) Miller, J. W., J. G. Watson, H. Moosmüller, H. D. Kuhns, D. R. Cocker III, and G. Croll (2002). New Approaches for Determining the Emission Factors of Off-Road Diesel Engines. *Partners in Environmental Technology Technical Symposium and Workshop*, Washington, DC, December 3-5, 2002.
- 86) Gillies, J. A., W. P. Arnott, V. Etyemezian, D. A. Gillette, H. D. Kuhns, E. McDonald, H. Moosmüller, W. G. Nickling, G. Schwemmer, and T. Wilkerson (2002). Characterizing and Quantifying Local and Regional Particulate Matter Emissions from Department of Defense Installations. *Partners in Environmental Technology Technical Symposium and Workshop*, Washington, DC, December 3-5, 2002.
- 85) Moosmüller, H. (2002, **invited**). Characterization of Automotive PM Emissions: On-Board, In-Plume, and Remote Techniques. *Second Workshop on the Watt Road Environmental Laboratory Initiative (WRELI)*, National Transportation Research Center (NTRC), Oak Ridge National Laboratory, Knoxville, TN, October 30, 2002.

- 84) Moosmüller, H., W. P. Arnott, and R. Varma (2002). Sensitive Measurement of Atmospheric Aerosol Extinction with Optical Cavities. *21<sup>st</sup> Annual Conference of the American Association for Aerosol Research*, Charlotte, NC, October 7-11, 2002.
- 83) Arnott, W. P. and H. Moosmüller (2002). Photoacoustic Analysis of Aerosol Light Absorption and Black Carbon Soot Mass Concentration. *21<sup>st</sup> Annual Conference of the American Association for Aerosol Research*, Charlotte, NC, October 7-11, 2002.
- 82) Varma, R., W. P. Arnott, H. Moosmüller, J. Gillies, H. D. Kuhns and V. Etyemezian (2002). A New Integrating Nephelometer for Aerosol Light Scattering Studies. *21<sup>st</sup> Annual Conference of the American Association for Aerosol Research*, Charlotte, NC, October 7-11, 2002.
- 81) Miller, J. W., J. G. Watson, D. R. Cocker III, H. Moosmüller, H. D. Kuhns, P. W. Barber, M. Kemme, N. L. Helgeson, and C. Scarbro (2002). Characterization of Off-Road Diesel Emissions of Criteria Pollutants. *Strategic Environmental Research & Development Program (SERDP) Scientific Advisory Board Meeting*, Falmouth, MA, September 17, 2002.
- 80) Kuhns H. D., P. W. Barber, R. E. Keislar, C. Mazzoleni, H. Moosmüller, D. Nikolic, N. Robinson, and J. G. Watson (2002). Southern Nevada Air Quality Study: Remote Sensing of Gaseous and Particle Emissions from On-Road Vehicles in Clark County, NV. *Clark County Department of Comprehensive Planning and Division of Air Quality Management*, Las Vegas, NV, August 2002.
- 79) Moosmüller, H. (2002, **invited**). Lidar Detection of Particulate Matter: Overview and Application to Automotive Emissions. *EPA Workshop on New Optical Remote Sensing Techniques for Air Quality Compliance and Air Toxics Detection*, Research Triangle Park, NC, July 29-31, 2002.
- 78) Moosmüller, H. (2002, **invited**). The Desert Research Institute's Optics and Acoustics Laboratory. *California Desert Air Working Group (CDAWG) 2002 Meeting*, Reno, NV, March 13-15, 2002.
- 77) Arnott, W. P., H. Moosmüller, P. J. Sheridan, J. A. Ogren, R. Raspet, and W. V. Slayton (2001). Influence of Relative Humidity on the Measurement of Aerosol Light Absorption: Results and Analysis of Particle Soot Absorption Photometer and Photoacoustic Instrument Data. *Conference on Global Radiation Balance - Aerosol Measurements and Models: Closure, Reconciliation and Evaluation*, Bend, OR, October 2-5, 2001.
- 76) Kuhns H. D., P. W. Barber, V. Etyemezian, B. Johnson, R. E. Keislar, C. Mazzoleni, H. Moosmüller, J. G. Watson, and A. A. Yimer (2001). Vehicle Emissions Remote Sensing in Clark County. *Air & Waste Management Association's Las Vegas Chapter Technical Conference*, Las Vegas, NV, May 2001.
- 75) Keislar, R. E., H. Moosmüller, C. Mazzoleni, H. D. Kuhns, A. A. Yimer, E. M. Fujita, and J. G. Watson (2001). Interpretation and Processing of Lidar Returns from On-Road Particulate Matter Emissions. *11<sup>th</sup> CRC On-Road Vehicle Emissions Workshop*, San Diego, CA, March 26-28, 2001.
- 74) Zhou, H., H. Moosmüller, and J. M. Norbeck (2001). Preliminary Modal Emission Model for Particulate Matter from Light Heavy Diesel Trucks. *11<sup>th</sup> CRC On-Road Vehicle Emissions Workshop*, San Diego, CA, March 26-28, 2001.

- 73) Sheridan, P. J., J. A. Ogren, W. P. Arnott, H. Moosmüller, J. W. Walker, and C. F. Rogers (2001). Comparison of Filter-Based and Suspended-State Aerosol Light Absorption Measurements and their Relative Humidity Dependence at the DOE-ARM Southern Great Plains, USA Site. *11<sup>th</sup> ARM Science Team Meeting*, Atlanta, GA, March 19-23, 2001.
- 72) Moosmüller, H., W. P. Arnott, R. Varma, and C. F. Rogers (2000, **invited**). New Optical Methods for Monitoring Atmospheric Visibility. *National Astronomy and Ionosphere Center Seminar*, Arecibo Observatory, Puerto Rico, December 1, 2000.
- 71) Moosmüller, H., W. P. Arnott, R. Varma, and C. F. Rogers (2000). New Methods for Measuring Ambient Aerosol Scattering, Absorption, and Extinction: A Closure Approach. *7<sup>th</sup> International Conference on Carbonaceous Particles in the Atmosphere*, San Juan, Puerto Rico, November 26-29, 2000.
- 70) Sheridan, P. J., J. A. Ogren, W. P. Arnott, H. Moosmüller, J. W. Walker, and C. F. Rogers (2000). Comparison of Filter-Based and Suspended-State Aerosol Light Absorption Measurements and their Relative Humidity Dependence at the DOE-ARM Southern Great Plains, USA Site. *7<sup>th</sup> International Conference on Carbonaceous Particles in the Atmosphere*, San Juan, Puerto Rico, November 26-29, 2000.
- 69) Arnott, W. P., H. Moosmüller, and C. F. Rogers (2000). Photoacoustic Measurements of Black Carbon: Visibility and Vehicle Exhaust Applications at 532 nm and 1047 nm Wavelengths. *7<sup>th</sup> International Conference on Carbonaceous Particles in the Atmosphere*, San Juan, Puerto Rico, November 26-29, 2000.
- 68) Moosmüller, H., W. P. Arnott, C. F. Rogers, J. L. Bowen, J. Gillies, W. R. Pierson, J. F. Collins, T. D. Durbin, and J. M. Norbeck (2000). Time Resolved Characterization of Diesel Particulate Emissions: Instruments for Particle Mass and Elemental and Organic Carbon Quantification. *7<sup>th</sup> International Conference on Carbonaceous Particles in the Atmosphere*, San Juan, Puerto Rico, November 26-29, 2000.
- 67) Moosmüller, H., W. P. Arnott, C. F. Rogers, J. L. Bowen, J. Gillies, W. R. Pierson, J. F. Collins, T. D. Durbin, and J. M. Norbeck (2000, **invited**). Time Resolved Characterization of Diesel Particulate Emissions. *University of California Riverside, CE-CERT Seminar*, Riverside, CA, November 2, 2000.
- 66) Vance, J., H. Moosmüller, D. Krueger, and C. Y. She (2000). A New All Solid-State Light Source at 589 nm. Four Corners Section of the American Physical Society, Fall Meeting, Fort Collins, CO, September 29-30, 2000
- 65) Arnott, W. P., H. Moosmüller, and C. F. Rogers (2000, **invited**). Photoacoustic Analysis of Black Carbon Combustion Aerosol. *Annual Meeting of the Federation of Analytical Chemistry and Spectroscopy Societies (FACSS)*, Nashville, TN, September 24-28, 2000.
- 64) Arnott, W. P., H. Moosmüller, J. W. Walker, C. F. Rogers, P. J. Sheridan, J. A. Ogren (2000). Light Absorption Measurements as a Function of Relative Humidity at the DOE-ARM Southern Great Plains, USA Site. *Conference on Visibility, Aerosols, and Atmospheric Optics*, Vienna, Austria, September 11-15, 2000.
- 63) Arnott, W. P., H. Moosmüller, C. F. Rogers, J. L. Hand, D. E. Sherman, S. G. Brown, S. M. Kreidenweis, and J. L. Collett, Jr. (2000). Light Absorption Measurements during the BRAVO Project at Big Bend National Park, Texas, Fall 1999. *Conference on Visibility, Aerosols, and Atmospheric Optics*, Vienna, Austria, September 11-15, 2000.

- 62) Moosmüller, H., W. P. Arnott, R. Varma, and C. F. Rogers (2000). Quality Assurance for the Measurement of Light Absorption by Ambient Aerosol Particles: A Closure Approach. *Conference on Visibility, Aerosols, and Atmospheric Optics*, Vienna, Austria, September 11-15, 2000.
- 61) Arnott, W. P., C. F. Rogers, J. C. Sagebiel, B. Zielinska, E. M. Fujita, and H. Moosmüller (2000). Evaluation of Aerosol-Bound PAHs and Elemental Carbon Aerosol in Diesel and Gasoline Vehicles. *10<sup>th</sup> CRC On-Road Vehicle Emissions Workshop*, San Diego, CA, March 27-29, 2000.
- 60) Moosmüller, H., W. P. Arnott, C. F. Rogers, J. L. Bowen, J. Gillies, W. R. Pierson, J. F. Collins, T. D. Durbin, and J. M. Norbeck (2000). Evaluation of Five Instruments for the Real-Time Measurement of Diesel Particulate Mass Emissions. *10<sup>th</sup> CRC On-Road Vehicle Emissions Workshop*, San Diego, CA, March 27-29, 2000.
- 59) Keislar, R. E., H. Moosmüller, C. Mazzoleni, H. D. Kuhns, V. Etyemezian, E. M. Fujita, and J. G. Watson (2000). Evaluation of Lidar Measurement of On-Road Particulate Matter Emissions. *10<sup>th</sup> CRC On-Road Vehicle Emissions Workshop*, San Diego, CA, March 27-29, 2000.
- 58) Vance, J. D., J. P. Sherman, V. M. Vasoli, D. A. Krueger, C. Y. She, F. X. Laberer, H. W. Dietel, and H. Moosmüller (1999). Transmitter Laser System for ALOMAR Na Lidar. *Fourteenth NSF CEDAR Meeting*, Boulder, CO, June 13-18, 1999.
- 57) Moosmüller, H., W. P. Arnott, C. F. Rogers, and R. Varma (1999, **invited**). New Optical Methods for Monitoring Atmospheric Visibility. *IMPROVE Steering Committee Meeting*, Reno, NV, June 10-11, 1999.
- 56) Arnott, W. P., H. Moosmüller, and C. F. Rogers (1999). Real Time, *in Situ* Measurement of Aerosol Light Absorption with a New Photoacoustic Instrument. *Strategic Environmental Research & Development Program (SERDP) Advisory Panel Meeting*, Reno, NV, May 27, 1999.
- 55) Keislar, R. E., H. Moosmüller, C. F. Rogers, H. D. Kuhns, E. M. Fujita, and J. G. Watson (1999). Measurement of On-Road Particulate Matter Emissions by Lidar. *9<sup>th</sup> CRC On-Road Vehicle Emissions Work Shop*, San Diego, CA, April 19-21, 1999.
- 54) Moosmüller, H., W. P. Arnott, and C. F. Rogers (1998). Extinction = Scattering + Absorption: The Goal of Local Experimental Closure in the Shortwave Spectral Region. *Gordon Research Conference on Solar Radiation & Climate*, Plymouth, NH, June 14-19, 1998.
- 53) Fujita, E. M., J. L. Bowen, M. C. Green, and H. Moosmüller (1998). The 1997 Southern California Ozone Study—NARSTO: Quality Assurance and Data Management. *91<sup>st</sup> Annual Meeting of the Air & Waste Management Association*, San Diego, CA, June 14-18, 1998.
- 52) Vance, J. D., C. Y. She, and H. Moosmüller (1998). A New Light Source for Sodium Resonance Lidar at Fort Collins. *Thirteenth NSF CEDAR Meeting*, Boulder, CO, June 7-12, 1998.

- 51) Vance, J. D., C. Y. She, and H. Moosmüller (1998). A CW, Tunable, All Solid State Source of Sodium Resonance Radiation: Current Status and Integration into the CSU Sodium Lidar. *Lidar Workshop of the Thirteenth NSF CEDAR Meeting*, Boulder, CO, June 7-12, 1998.
- 50) Arnott, W. P. and H. Moosmüller (1998, **invited**). Real Time, *in Situ* Measurement of Aerosol Light Absorption with a New Photoacoustic Instrument. *44<sup>th</sup> International Instrumentation Symposium*, Reno, NV, May 3-7, 1998.
- 49) Moosmüller, H., J. A. Gillies, C. F. Rogers, D. W. DuBois, J. C. Chow, J. G. Watson, and R. Langston (1998). Particulate Emission Rates for Unpaved Shoulders along a Paved Road. *Workshop on New Research Directions in Desert Surficial Processes and Landscape Dynamics on Military Lands*, Zzyzx, CA, April 25-30, 1998.
- 48) Moosmüller, H., W. P. Arnott, and C. F. Rogers (1998). Real Time, *in Situ* Measurement of Aerosol Light Absorption with a New Photoacoustic Instrument: Quantification of Black and Elemental Carbon. *Laser Applications to Chemical and Environmental Analysis*, Orlando, FL, March 9-11, 1998.
- 47) Arnott, W. P., H. Moosmüller, and C. F. Rogers (1998). Real Time, *in Situ* Measurement of Aerosol Light Absorption with a New Photoacoustic Instrument. *PM2.5: A Fine Particle Standard: A&WMA International Specialty Conference*, Long Beach, CA, January 28-30, 1998.
- 46) Moosmüller, H., W. P. Arnott, and C. F. Rogers (1997). Design and Field Evaluation of a Photoacoustic Instrument for the Real Time, *in Situ* Measurement of Aerosol Light Absorption. *16<sup>th</sup> Annual Conference of the American Association for Aerosol Research*, Denver, CO, October 13-17, 1997
- 45) Moosmüller, H., W. P. Arnott, and C. F. Rogers (1997). A Photoacoustic Instrument for the Real Time, *in Situ* Measurement of Aerosol Light Absorption: Design and Field Evaluation. *Sixth International Conference on Carbonaceous Particles in the Atmosphere*, Vienna, Austria, September 22-24, 1997.
- 44) Arnott, W. P., H. Moosmüller, and C. F. Rogers (1997). Real Time, *in Situ* Measurement of Aerosol Light Absorption with a New Photoacoustic Instrument. *Visual Air Quality, Aerosols and Global Radiation Balance: A&WMA/AGU International Specialty Conference*, Bartlett, NH, September 9-12, 1997.
- 43) Moosmüller, H., W. P. Arnott, and C. F. Rogers (1997). Measurements of Aerosol Light Absorption with the DRI Photoacoustic Instrument during NFRAQS. *Northern Front Range Air Quality Study Data Analysis Workshop*, Reno, NV, July 1-2, 1997.
- 42) Vance, J. D., H. Moosmüller, and C. Y. She (1997). Generation of 400-mW of Continuous-Wave Sodium D<sub>2</sub> Resonance Radiation by Sum-Frequency Mixing in a Monolithic Lithium-Niobate Resonator: Applications to Mesospheric Temperature and Wind Velocity Profiling by Lidar. *Twelfth NSF CEDAR Meeting*, Boulder, CO, June 8-14, 1997.
- 41) Moosmüller, H., J. A. Gillies, C. F. Rogers, D. W. DuBois, J. C. Chow, J. G. Watson, and R. Langston (1997). Particulate Emission Rates for Unpaved Shoulders along a Paved Road. *90<sup>th</sup> Annual Meeting of the Air & Waste Management Association*, Toronto, Canada, June 8-13, 1997

- 40) Moosmüller, H. and W. P. Arnott (1996). A Novel Interferometer for the Measurement of Optical Absorption. *9<sup>th</sup> International Conference on Photoacoustic and Photothermal Phenomena*, Nanjing, China, June 27-30, 1996.
- 39) Arnott, W. P. and H. Moosmüller (1996, **invited**). Thermoacoustic Enhancement of the Signal to Noise Ratio in Photoacoustic Spectrometers. *9<sup>th</sup> International Conference on Photoacoustic and Photothermal Phenomena*, Nanjing, China, June 27-30, 1996.
- 38) Vance, J. D. and H. Moosmüller (1996). Current Status of CW Sum Frequency Generation of Sodium Resonance Radiation for Lidar Applications. *Eleventh NSF CEDAR Meeting*, Boulder, CO, June 16-22, 1996.
- 37) Moosmüller, H., W. P. Arnott, and C. F. Rogers (1995). Methods for Real Time, *in Situ* Measurement of Aerosol Light Absorption. *Optical Remote Sensing for Environmental & Process Monitoring*, San Francisco, CA, September 25-27, 1995.
- 36) Moosmüller, H. (1995). A Solid State System for the Generation of CW Sodium Resonance Radiation. *Lidar Science and Technology Workshop of the Tenth NSF CEDAR Meeting*, Boulder, CO, June 25-30, 1995.
- 35) Vance, J. D. and H. Moosmüller (1995). Continuous Wave Sum Frequency Generation of Sodium Resonance Radiation for Lidar Applications. *Tenth NSF CEDAR Meeting*, Boulder, CO, June 25-30, 1995.
- 34) Arnott, W. P., H. Moosmüller, R. E. Abbott, and M. D. Osssofsky (1995). Signal-to-Noise Ratio of Thermoacoustic Enhanced Photoacoustic Spectrometers. *129<sup>th</sup> Meeting of the Acoustical Society of America*, Washington, D.C., May 30 - June 3, 1995.
- 33) Moosmüller, H., W. P. Arnott, and C. F. Rogers (1995). Methods for Real Time, *in Situ* Measurement of Aerosol Light Absorption. *Third Annual Symposium on Atmospheric Aerosol*, Riverside, CA, April 20, 1995.
- 32) Moosmüller, H. (1995). Atmospheric Remote Sensing with Lasers: Some DRI Projects. *DRI Sandwich Seminar*, Reno, NV, February 7, 1995.
- 31) Moosmüller, H., W. P. Arnott, and C. F. Rogers (1995). Novel Methods for the Measurement of Aerosol Light Absorption. *DRI Science Review*, Reno, NV, January 30, 1995.
- 30) Moosmüller, H., W. P. Arnott, and C. F. Rogers (1994). Methods for Real Time, *in Situ* Measurement of Aerosol Light Absorption. *A&WMA/AGU International Specialty Conference on Aerosols and Atmospheric Optics: Radiative Balance and Visual Air Quality*, Snowbird, UT, September 26-30, 1994.
- 29) McElroy, J. L., C. M. Edmonds, D. H. Bundy, H. Moosmüller, R. M. Jorgensen, and R. J. Alvarez II (1994). Airborne UV-DIAL Urban Plume Measurements. *Seventeenth International Laser Radar Conference*, Sendai, Japan, July 25-29, 1994.
- 28) Moosmüller, H. and T. D. Wilkerson (1994). A New Lidar Method for the Measurement of Backscatter Ratio Profiles. *87<sup>th</sup> Annual Meeting of the Air & Waste Management Association*, Cincinnati, OH, June 19-24, 1994.

- 27) Arnott, W. P., H. Moosmüller, R. G. Purcell, J. Lightfoot, R. Raspet, and H. E. Bass (1994, **invited**). Thermoacoustic Enhancement and Control of the Quality Factor in a Resonant Photoacoustic Cell for Measurement of Light Absorption by Aerosols and Gases. *127<sup>th</sup> Meeting of the Acoustical Society of America*, Cambridge, MA, June 6-10, 1994.
- 26) Moosmüller, H. and W. P. Arnott (1994). *In Situ* Measurement of Light Absorption by Aerosols. *Plume Visibility and Particulate Measurement Symposium*, Reno, NV, May 17-19, 1994.
- 25) Wilkerson, T. D. and H. Moosmüller (1993). A New Lidar Method Utilizing Elastic and Raman Scattering for the Measurement of Backscattering and Extinction Profiles. *Cloud Impacts on DOD Operations and Systems 1993 Conference*, Fort Belvoir, VA, November 16-19, 1993.
- 24) McElroy, J. L., H. Moosmüller, R. M. Jorgensen, C. M. Edmonds, R. J. Alvarez II and D. H. Bundy (1993). Influence of Summertime Weather Systems on Regional Ozone Concentrations. Paper No. 93-FM5-I.2, *A&WMA International Specialty Conference on Regional Photochemical Measurement and Modeling Studies*, San Diego, CA, November 8-12, 1993.
- 23) Wilkerson, T. D. and H. Moosmüller (1993). A New Lidar Method Utilizing Elastic and Raman Scattering for the Measurement of Backscattering and Extinction Profiles. *International Symposium on Optical Sensing for Environmental Monitoring*, Atlanta, GA, October 12-14, 1993.
- 22) Moosmüller, H., R. J. Alvarez II, R. M. Jorgensen, C. M. Edmonds, D. H. Bundy, and J. L. McElroy (1993, **invited**). An Airborne UV-DIAL System for Ozone Measurements: Field Use and Verification. *International Symposium on Optical Sensing for Environmental Monitoring*, Atlanta, GA, October 12-14, 1993.
- 21) McElroy, J. L., H. Moosmüller, R. M. Jorgensen, C. M. Edmonds, R. J. Alvarez II, and D. H. Bundy (1993). Airborne UV-DIAL Urban Plume Measurements. *International Symposium on Optical Sensing for Environmental Monitoring*, Atlanta, GA, October 12-14, 1993.
- 20) Wilkerson, T. D. and H. Moosmüller (1993). A New Lidar Method Utilizing Elastic and Raman Scattering for the Measurement of Backscattering and Extinction Profiles. *Eighth NSF CEDAR Workshop*, Boulder, CO, June 21-25, 1993.
- 19) Moosmüller, H., R. J. Alvarez II, R. M. Jorgensen, C. M. Edmonds, D. H. Bundy, D. Diebel, M. P. Bristow, and J. L. McElroy (1993). An Airborne Lidar System for Tropospheric Ozone Measurement. *86<sup>th</sup> Annual Meeting of the Air & Waste Management Association*, Denver, CO, June 13-18, 1993.
- 18) McElroy, J. L., H. Moosmüller, R. M. Jorgensen, C. M. Edmonds, R. J. Alvarez II, D. H. Bundy (1993). Airborne UV-DIAL Measurements of Ozone Distributions in Southeastern Michigan. *86<sup>th</sup> Annual Meeting of the Air & Waste Management Association*, Denver, CO, June 13-18, 1993.
- 17) Moosmüller, H., R. J. Alvarez II, C. M. Edmonds, R. M. Turner, D. H. Bundy, and J. L. McElroy (1993). Airborne Ozone Measurements with the USEPA UV-DIAL. *Optical Remote Sensing of the Atmosphere*, Salt Lake City, UT, March 8-12, 1993.

- 16) Kovalev, V. A. and H. Moosmüller (1992). A Variable Phase Function Approach for the Inversion of Lidar Return Signals. *Sixteenth International Laser Radar Conference*, Cambridge, MA, July 20-24, 1992.
- 15) Moosmüller, H., D. Diebel, D. H. Bundy, M. P. Bristow, R. J. Alvarez II, V. A. Kovalev, C. M. Edmonds, R. M. Turner, and J. L. McElroy (1992). Ozone Measurements with the U.S. EPA UV-DIAL: Preliminary Results. *Sixteenth International Laser Radar Conference*, Cambridge, MA, July 20-24, 1992.
- 14) Moosmüller, H., D. Diebel, D. H. Bundy, M. P. Bristow, C. M. Edmonds, R. M. Turner, V. A. Kovalev, R. P. Haas, and J. L. McElroy (1991). The U.S. EPA Airborne UV-DIAL System. *Optical Remote Sensing of the Atmosphere*, Williamsburg, VA, November 18-21, 1991.
- 13) Moosmüller, H., J. R. Truedson, and C. E. Patton (1990). Oscillations in the Stokes-Anti-Stokes Ratio in Brillouin Scattering from Magnons in Thin Permalloy Films. *35<sup>th</sup> Annual Conference on Magnetism and Magnetic Materials*, San Diego, CA, November, 1990.
- 12) Moosmüller, H., K. D. McKinstry, and C. E. Patton (1989). Microwave Effective Linewidth in Thin Metal Films. *34<sup>th</sup> Annual Conference on Magnetism and Magnetic Materials*, Boston, MA, November 27-December 1, 1989.
- 11) Moosmüller, H. (1989, **invited**). Coherent Light Scattering Spectroscopy for Supersonic Flow Measurements. Colloquium, Fraunhofer Institut für Atmosphärische Umweltforschung, Garmisch-Partenkirchen, Germany, September 25, 1989.
- 10) Moosmüller, H. and C. Y. She (1989). Optical Stark Effect in the FWMRS and SRS Spectra of Nitrogen. *Gordon Research Conference on Nonlinear Optics and Lasers*, Brewster Academy, Wolfeboro, NH, July 24-28, 1989.
- 9) Moosmüller, H., D. A. Krueger, and C. Y. She (1988). Stark Induced Phase Modulation in Coherent Raman Spectroscopy. *Annual Meeting of the Optical Society of America*, Santa Clara, CA, October 31-November 4, 1988.
- 8) She, C. Y., R. J. Alvarez II, H. Sun, H. Moosmüller, and D. A. Krueger (1988). High-Spectral-Resolution Lidar Technique for Backscatter Ratio and Atmospheric Temperature Profiling. *14<sup>th</sup> International Laser Radar Conference*, Innichen-San Candido, Italy, June 20-24, 1988.
- 7) Moosmüller, H. and C. Y. She (1987). Simultaneous Four-Wave Mixing and Stimulated Raman Spectroscopy: Effects of Doppler Broadening and Neighboring Lines. *Third International Laser Science Conference*, Atlantic City, NJ, November 2-6, 1987.
- 6) She, C. Y., R. J. Alvarez II, H. Moosmüller and D. A. Krueger (1987). Implementing a New High-Spectral-Resolution Lidar Technique for Backscatter Ratio and Atmospheric Temperature Profiling. *Topical Meeting on Laser and Optical Remote Sensing: Instrumentation and Techniques*, North Falmouth, MA, August 1987.
- 5) Moosmüller, H. and C. Y. She (1986). Ac Stark-Broadening in Coherent Raman Spectra Obtained with Focused Gaussian Beams. *Eighth International Conference on Spectral Line Shapes*, Williamsburg, VA, June 9-13, 1986.

- 4) She, C. Y., H. Moosmüller, G. C. Herring, S. Y. Tang, and S. A. Lee (1985, **invited**). Rayleigh-Brillouin Gain Spectroscopy in Gases. *Seventh International Conference on Laser Spectroscopy*, Maui, HI, June 24-28, 1985.
- 3) Moosmüller, H., G. C. Herring, and C. Y. She (1984). Spatially Resolved Two-Component Flow Measurements with Inverse Raman Spectroscopy. *Conference on Lasers and Electro-Optics*, Anaheim, CA, June 18-22, 1984.
- 2) Herring, G. C., H. Moosmüller, S. A. Lee, and C. Y. She (1984). Flow Velocity Measurement with Stimulated Rayleigh-Brillouin Gain Spectroscopy. *Conference on Lasers and Electro-Optics*, Anaheim, CA, June 18-22, 1984.
- 1) She, C. Y., G. C. Herring, H. Moosmüller, and S. A. Lee (1984). Stimulated Rayleigh-Brillouin Gain Spectroscopy in Pure Gases and Gas Mixtures. *Thirteenth International Quantum Electronics Conference*, Anaheim, CA, June 18-22, 1984.