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Education

Harvard University, Cambridge, Massachusetts
Ph.D., Physical Chemistry; June 1993
M.A., Physical Chemistry; June 1990

Massachusetts Institute of Technology, Cambridge, Massachusetts
S.B., Life Sciences; May 1988

Honors and Awards

NASA Group Achievement Award for the Tropical Composition, Cloud and Climate Coupling (TC4) Project; 2008
University of Colorado Provost's Faculty Achievement Award; 2007
Antarctica Service Medal; 2006
NASA Group Achievement Award for the Aura Project; 2005
NASA Group Achievement Award for the Cirrus Regional Study of Tropical Anvils and Cirrus Layers - Florida Area Cirrus Experiment (CRYSTAL-FACE); 2003
NASA Group Achievement Award for the SAGE III Ozone Loss and Validation Experiment (SOLVE); 2001
Presidential Early Career Award for Scientists and Engineers (PECASE); 2000
NSF CAREER Award; 1999
NASA Atmospheric Chemistry Modeling and Analysis Program Paper of the Month; September 1997 (for Avallone and Prather, 1997)
EPA Early Career Award; 1996
NOAA Outstanding Scientific Paper Award; 1995 (for Fahey *et al.*, 1993)
NASA Graduate Student Fellowship in Global Change Research; 1991-1993
Certificate of Distinction in Teaching, Harvard University; 1991
National Merit Scholarship; 1984-1988

Professional Experience (*italics indicate courses taught*)

Professor, University of Colorado; 2011 – present
Department of Atmospheric and Oceanic Sciences (ATOC) and Laboratory for Atmospheric and Space Physics (LASP)

Director, Miramontes Arts and Sciences Program, University of Colorado; 2009 – present
Lead academic excellence program for ~100 undergraduates from underrepresented populations, including student recruitment and retention activities, hiring of instructors, budget management and fund-raising
An Interdisciplinary Look at the Environment; College Algebra

Associate Director of Advising, Academic Advising Center, University of Colorado; 2005-2009
Serve as liaison for and supervisor of 19 professional academic advisors in the natural sciences who advise > 8000 undergraduates

Research and decide student petitions regarding exceptions to academic rules and university deadlines
Represent the College of Arts and Sciences on internal campus and external system committees

Associate Professor, University of Colorado; 2003-2011

Department of Atmospheric and Oceanic Sciences (ATOC) and Laboratory for Atmospheric and Space Physics (LASP)

Critical Issues in Climate and Policy, Atmospheric Instrumentation Laboratory (graduate level), Atmospheric Chemistry (graduate level), Our Changing Environment (non-scientists), Advanced Atmospheric Chemistry (graduate level)

Develop novel lightweight, low-power instrumentation for measuring ozone on unattended platforms, including long-duration stratospheric balloons
Improve and carry out measurements of cloud ice water content via tunable diode laser spectroscopy
Participate in studies of tropical and midlatitude cirrus cloud properties (MidCiX, TC4, PUMA)
Develop and deploy instrumentation for studying boundary layer ozone fluxes and ozone budget

Sabbatical Fellowship, Air Quality Group, Environmental Defense; 2003-04

Provide scientific expertise and data analysis for environmental advocacy group's work on fine particulate matter (PM_{2.5}) air quality standards (NAAQS) and proposed Interstate Air Quality Rule

Assistant Professor, University of Colorado; 1996-2003

Program in Atmospheric and Oceanic Sciences (PAOS/ATOC) and Laboratory for Atmospheric and Space Physics (LASP)

Controversies in Atmospheric Science, Air Chemistry and Pollution, Atmospheric Chemistry (graduate level), Weather and the Atmosphere, Policy Implications of Climate Controversies, Policy Responses to Global Environmental Change (graduate level), Designing, Making and Interpreting Atmospheric Measurements (graduate level)

Develop instrumentation to measure particulate water; participate in NASA's CRYSTAL-FACE experiment
Develop instrumentation for studying tropospheric dynamics, to fly on commercial aircraft; participate in NASA's SAGE III Ozone Loss and Validation Experiment (SOLVE)
Develop instrumentation to measure halogen oxides in the troposphere; participate in Polar Sunrise 2000 experiment and Winfly 2002
Study tropical lower stratospheric dynamics using satellite data
Science co-investigator for EOS/High Resolution Dynamic Limb Sounder (HIRDLS) chemistry and validation issues

Adjunct Professor, Concordia University; 1995-6

Introduction to Earth Science (2 semesters)

Lecturer, University of California at Irvine; 1995-6

General Chemistry 1A, 1C

Postgraduate Researcher, University of California, Irvine; 1993-1996

Measure reactive halogens in Arctic troposphere
Analyze UARS data to study tropical photochemistry
Develop chemistry module for chemical transport model to investigate stratospheric trace gas correlations
Reanalyze in situ measurements of BrO to study stratospheric bromine photochemistry

Research Assistant, Harvard University; 1988-1993

Study the effects of heterogeneous chemistry on active chlorine

Co-investigator for measurements of ClO and BrO from the NASA ER-2 aircraft; AASE II campaign

Build and deploy lightweight balloon-borne ClO instrument

Teaching Fellow, Harvard University; 1988, 1989, 1991

Accelerated General Chemistry, Statistical Mechanics, Biological Thermodynamics

Teaching Fellow, Harvard University Extension School; 1988-9

General Chemistry, Chemistry Laboratory

Research Assistant, Massachusetts Institute of Technology; 1985-1988

Determine 3-D structure of proteins in solutions using 2-D NMR

Investigate statistical mechanical models of DNA denaturation

Field Studies**Instrumentation Development and Education in Airborne Science 4 (IDEAS 4)**, October 2011

PI for measurements of total water aboard the NCAR C-130 aircraft

Mid-latitude Airborne Cirrus Properties Experiment (MACPEX), March – April 2011

PI for measurements of ice water content from the NASA WB-57F aircraft, to study microphysical properties of a variety of midlatitude cirrus clouds

Colorado Airborne Multi-phase Cloud Study (CAMPS), December 2010 – February 2011

Mission scientist for cloud microphysical measurements from Wyoming King Air and PI of condensed water measurements; campaign to study mixed-phase clouds over complex topography in conjunction with DOE StormVEx project

Concordiasi, August – November 2010

PI for measurements of ozone made from long-duration stratospheric balloons launched from McMurdo Station Antarctica, into the developing “ozone hole”

Stratosphere-Troposphere Analyses of Regional Transport (START08), April-June 2008

PI for measurements of ice water content from NSF/NCAR Gulfstream G-V aircraft, to study cloud properties associated with the extra-tropical tropopause layer

Tropical Composition, Cloud and Climate Coupling (TC4), July/August 2007

PI for measurements of ice water content from NASA WB-57F aircraft, to study microphysical properties and formation mechanisms of tropical cirrus clouds.

Plume Ultrafast Measurements Acquisition (PUMA), May and July 2005, December 2006

PI for measurements of ice water content and fast-response ozone from NASA WB-57F aircraft, to study dynamics of dispersion of the Space Shuttle plume

Winfly 2004, August-November 2004

PI for ground-based in situ measurements of NO, NO₂, and O₃ to study boundary layer ozone chemistry in Antarctica

Plume Ultrafast Measurements Acquisition (PUMA), May 2004

PI for measurements of ice water content from NASA WB-57F aircraft, to study dynamics of rocket plume mixing

Midlatitude Cirrus Experiment (MidCiX), April/May 2004

PI for measurements of ice water content from the NASA WB-57F aircraft

Instrumentation Development and Education in Airborne Science 3 (IDEAS 3),

August/September 2003

PI for flight-testing of modified NO_x instrumentation aboard the NCAR C-130 aircraft

ICEX03, April 2003

PI for ground-based in situ measurements of NO, NO₂ and O₃ to study boundary-layer ozone depletion in the Beaufort Sea region of the Arctic from ONR ice camp

Winfly 2002, August-October 2002

PI for ground-based in situ measurements of ClO, BrO, NO, NO₂, and O₃ to study boundary layer ozone depletion in Antarctica

Cirrus Regional Study of Tropical Anvils and Cirrus Layers - Florida Area Cirrus Experiment (CRYSTAL-FACE), July 2002

PI for in situ measurements of particulate water from NASA WB-57 aircraft

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

PI for in situ measurements of CO₂ from the NCAR C-130 aircraft

Transport and Chemical Evolution over the Pacific (TRACE-P), 2001

Co-I for in situ measurements of NO and NO₂ from NASA DC-8 aircraft

Rocket Impacts on Stratospheric Ozone (RISO), 2000

PI for in situ measurements of CO₂ from NASA WB-57 aircraft; Space Shuttle plume intercept

SAGE III Ozone Loss and Validation Experiment (SOLVE), 1999-2000

PI for in situ measurements of O₃, total H₂O, CO₂, and halocarbons on the NASA DC-8 aircraft

Alert 2000 Polar Sunrise Experiment, 2000

PI for in situ ground-based measurements of BrO and ClO

Carbon Dioxide Budget and Rectification Airborne Study (COBRA), 1999

PI for in situ measurement of O₃ on the UND Cessna Citation aircraft

Atmospheric Chemistry of Combustion Emissions Near the Tropopause (ACCENT), 1999

PI for in situ measurements of CO₂ from NASA WB-57 aircraft; rocket plume intercepts

Arctic Tropospheric Ozone Chemistry (ARCTOC), 1996

Co-PI for in situ ground-based measurements of BrO and ClO

Airborne Arctic Stratospheric Expedition II (AASE II), 1991-1992

Co-PI for in situ measurements of ClO and BrO from the NASA ER-2 aircraft

Ballooning experience:

Stratospheric ClO measurements: Texas, 1990; New Mexico, 1991; Ozonesondes, Antarctica, 2002

Instrument Development**Lightweight, low-power ozone analyzer for balloons and UAVs**

Measures atmospheric ozone every 1 to 10 minutes with a precision of 10 ppb; weighs 2.8 kg and uses less than 5W power; designed, 2007; built, 2007; deployed, 2010; provisional patent granted.

Personal ozone exposure monitor

Lightweight device for measuring and recording individual exposure to ozone. Weighs 0.5 kg and runs on AA batteries; designed, 2006; built, 2006; tested, 2006.

Fast-response ozone analyzer

Measures atmospheric ozone at 10 Hz with precision of 3-5 ppb; designed, 2004; built 2004; deployed (at surface for flux studies, Winfly 2004; on PUMA, WB-57), 2004, 2005, 2006.

Autonomous gas chromatograph

Measures CFCs- 11, -12, -113, CCl₄, CH₃CCl₃, and Halon 1211 with 4-minute resolution; designed, 1998; built, 1999; deployed (on SOLVE, DC-8), 2000.

Carbon dioxide analyzer

Measures CO₂ with 0.1 ppm precision in 0.2-1 sec; designed, 1998; built, 1998; deployed (on ACCENT, WB-57; on SOLVE, DC-8; on RISO, WB-57; on IDEAS, C-130), 1999, 2000, 2002.

Tunable diode laser spectrometer

Measures H₂O evaporated from particulate phase with a detection limit of less than 0.1 mg m⁻³; designed, 1999; built, 1999; deployed (on SOLVE, DC-8; on CRYSTAL-FACE, MidCiX, PUMA, WB-57), 2000, 2002, 2004, 2005, 2006.

Lightweight ozone detector

Measures O₃ with 5 ppb precision in 2 sec; designed, 1998; built, 1999; deployed (on COBRA, Citation; on SOLVE, DC-8), 1999, 2000.

Ground-based halogen oxide detector

Measures ClO and BrO in boundary layer, with 10-minute response; designed, 1996; built, 1996; deployed (on ARCTOC '96, Alert2000 and Winfly 2002), 1996, 2000, 2002.

Lightweight balloon-borne halogen oxide instrument

Measures ClO and BrO from scientific balloon platform; weighs less than 100 lbs.; Design is basis for subsequent instruments in use by Harvard, UC Irvine, and FZ Jülich; designed, 1990; built 1990; initially deployed, 1991.

Advisors

Undergraduate: William Thilly, Massachusetts Institute of Technology

Graduate: James G. Anderson, Harvard University

Postdoctoral: Michael J. Prather, University of California at Irvine

Advisees and Employees**Graduate Students:**

Degrees Completed: *(thesis title in italics)*

Sean M. Davis (Ph.D., 2007) – *Airborne in situ measurements of cirrus cloud total water using a laser hygrometer and intercomparisons with satellite observations*; now Postdoctoral Researcher at NOAA Earth Systems Research Laboratory Chemical Sciences Division

Alicia Frazier (M.S., 2006) – *The development of an algorithm to process Antarctic ozone flux data*; now Physical Science Researcher in the Air Pollution Control Division of Colorado Department of Public Health and Environment

Amelia (Gates) Colarco (Ph.D., 2003) – *Airborne in situ measurements of carbon dioxide: Instrument development and applications to rocket plume chemistry and dynamics*; now Research Associate at NASA Goddard Space Flight Center Global Modeling and Assimilation Office

A. Gannet Hallar (Ph.D., 2003) – *Use of tunable diode laser closed path hygrometer for the measurement of total water in tropopause cirrus*; now Director of Storm Peak Laboratory (Steamboat Springs) and Assistant Research Professor at Desert Research Institute

Kristi M. Hines (M.S., 2000) – *Seasonal patterns of ozone variability in the lower stratosphere and upper troposphere*; current whereabouts unknown

Rachel Humphrey (M.S., 2008) – *Analysis of cloud observations from aircraft campaigns*; now Meteorology Instructor at Front Range Community College, Westminster, CO

Lars E. Kalnajs (Ph.D., 2009) – *Development of rugged ozone instrumentation and its application to Antarctic tropospheric ozone depletion events*; now Postdoctoral Researcher, University of Colorado

Matthew Lippis (M.S. EE, 2003) – *Design of electronics for fast-response ozone instrument*; now Senior Systems Engineer at Gen Probe, San Diego

Laura C. Patrick (M.S., 2000) – *Development of trace gas climatologies for a priori component retrieval algorithms for HIRDLS measurements*; now Research Technician at NOAA Earth System Research Laboratory Global Monitoring Division

Erin S. Whitney – *Measurements of water vapor using tunable diode laser spectroscopy*; now Research Scientist at National Renewable Energy Laboratory (completed Ph.D. with another advisor)

Current Students:

Samuel Dorsi (Ph.D. candidate, ATOC) – *Measurements of cloud water content in mixed-phase clouds*

Anna Luebke (Ph.D. student, ATOC) – *Development of a cirrus cloud ice-water-content climatology*

Kim Trenbath (Ph.D. candidate, ATOC) – *Atmospheric science education – Understanding students'*

conceptions of climate change science
 Heather Walsh (Ph.D. candidate, ATOC) – Analysis of ozone observations made from long-duration stratospheric balloons launched over Antarctica

Postdoctoral Researchers:

Sean Davis, Jan – Aug 2008; analysis of cloud water observations from TC4 campaign; now Postdoctoral Researcher at NOAA Earth Systems Research Laboratory Chemical Sciences Division
 Leah Goldfarb, Jan 1997 – May 1998; laboratory instrument development and analysis of UARS trace gas data; now Science Officer at International Council for Science, Paris, France
 Lars Kalnajs, Apr 2009 – present; design, testing and deployment of novel lightweight ozone instruments
 Barkley Sive, Aug 1999 – Mar 2000; design, development and calibration of airborne autonomous gas chromatograph; now Assistant Professor at Appalachian State University

Undergraduate Students:

Lauren Fitzpatrick, Aug 2001 – May 2002; now managing pharmacist at Target, Thornton, CO
 Tara Fortin, Apr – Aug 1996; now research scientist at NOAA Earth System Research Laboratory, Chemical Sciences Division
 Jessica (Howell) Holowitz, May – Dec 2001; whereabouts unknown
 Anna Luebke, Sep 2007 – Aug 2008; now graduate student in Atmospheric and Oceanic Sciences, University of Colorado
 Stacey (McIlwaine) Quesada, May 1998 – Mar 2000; completed Honors thesis *summa cum laude*; now research programmer at Alion Science and Technology
 Diana Thatcher, June-Aug 2011; senior atmospheric sciences major at University of Michigan
 Sarah Thompson, Jan – Dec 1999; whereabouts unknown
 William Wood, Aug – Dec 2001; now Algebra and Technology teacher, St. John the Evangelist School, Loveland, CO
 Dylan Yaney, Jan – Aug 1999; now engineer at Agilent Technologies

Professional/Engineer:

Gregg Allison, Zachary Castleman, Tawnya Ferbiak, Hiroyuki Kosai, Steven Lane

Professional Service

Campus and University

Member, University of Colorado Faculty Council Women's Committee, 2010 – present
 Member, Boulder Campus Advising Exploratory Group, 2011 – 12
 Participant, panel for Regional Accreditation Committee visit, 2010
 Member of search committee for director of Student Academic Services Center, 2010
 Member, Office of Orientation Program Review Committee, 2010
 Member of Provost's Faculty Achievement Award Selection Committee, 2008
 Member of Student Information System Replacement Project Academic Administrator Work Team – assessed requirements and evaluated vendor products, 2006-07
 Member, Energy Education Review Committee, 2006-07
 University of Colorado faculty representative to the Science Coalition's "Science Day" – made presentations to Colorado's senators and Congressmen, 2000
 Member, Circulatory Shuttle Study Committee, 1999
 Panelist, Faculty Research Opportunities program, "Supporting Environmental Research", 2 April 1998
 Faculty participant, Admissions Office Yield Enhancement Project, 1997

College

Member, Prehealth Advisory Committee, 2010 - present
 Member, Arts and Sciences Support of Education Through Technology (ASSETT) Advisory Committee, 2009- present
 Representative to Department of Higher Education Faculty-to-Faculty Conference, 2008
 Member, College of Arts and Sciences, Appeals Committee on Academic Rules and Policies, 2003-04
 Member, College of Arts and Sciences Curriculum Committee, 1998-2000
 Member, College of Arts and Sciences Core Curriculum Task Force, 1998-2000
 Member, College of Arts and Sciences Degree Audit Task Force, 1999-2000
 Member, College of Arts and Sciences Dean's Advancement Fund Committee, 1998-99

Unit

Chair, ATOC Graduate Admissions Committee, 2012
 Advisor, ATOC undergraduate minor, 2008-2011
 Member, ATOC Primary Unit Evaluation Committee (for tenure and reappointment), 2008; 2009; 2010
 Chair, ATOC Course Fees Committee, 2004
 Member, ATOC Comprehensive Exam Committee, 2002-03
 Chair, ATOC Distinguished Lecture Series Committee, 2001-02
 Member, ATOC Curriculum Committee, 2000-03
 Departmental representative to Arts and Sciences Council, 1998-2000
 Chair, ATOC Graduate Student Concerns Committee, 1998-2000
 Member, ATOC Director's Advisory Committee, Fall 1998
 Member, PAOS Admissions Committee, 1997; 2000

Member, LASP Project Development Committee, 2010-present
 Co-chair, LASP Curriculum Review Committee, 2002-03
 Member, LASP Education and Public Outreach Committee, 2001-present

Member, Comps II committee, Jeffrey Hicke (APAS), Amelia Gates (ATOC), Laura Patrick (ATOC), Gannet Hallar (ATOC), Yannick Meillier (ATOC), John Ortega (ATOC), Cynthia Shaw (ATOC), Scott Gregory (ATOC), Derek Brown (ATOC), Josh McGrath (ATOC), Sherri Heck (ATOC), Tanya Phillips (ATOC), Sam Dorsi (ATOC), Heather Walsh (ATOC), Anna Luebke (ATOC), Samuel LeBlanc (ATOC)
 Chair, Comps II committee, Kari Klein (ATOC), Odele Coddington (ATOC), Carl Schmitt (ATOC), John Wong (ATOC)
 Member, Advancement to Candidacy committee, Lihua Wang (Mechanical Engineering)
 Member, Ph.D. committee, Michael Mills (APAS); Brian Berland (Chemistry); Leah Goldfarb (Chemistry); Andrew Fusco (APAS); Madhurima Das (Civil Engineering); Laura Iraci (Chemistry); Rashid Khosravi (APS); Carla Kegley-Owen (Chemistry); Krishna Foster (Chemistry); Lori Del Negro (Chemistry); Lihua Wang (Mechanical Engineering); Amelia Gates (ATOC); Gannet Hallar (ATOC); Alice Delia (ATOC); Brett Thornton (Chemistry); Yannick Meillier (ATOC); Cynthia Singleton (ATOC); Florence Bocquet (ATOC); Sean Davis (ATOC); Allison Aiken (Chemistry); Lars Kalnajs (ATOC); Odele Coddington (ATOC); Carl Schmitt (ATOC); Josh McGrath (ATOC); Derek Brown (ATOC); Kelly Baustian (ATOC)
 Member, M.S. committee, Kristi Hines (ATOC); Cindy Copeland (Environmental Studies); Alicia Frazier (ATOC); Kim Trenbath (ATOC)
 Member, Honors thesis committee, Margaret Wilson (Chemistry); John Paul Farrar (EPOB); Stacey McIlwaine (ATOC); Andrew Luxen (Political Science); Diane Strassberg (Individually structured major – atmospheric sciences); Christy Long (Chemistry); Timothy Im (Political Science); Deepika Patel (Psychology)

Professional Community

Professional Societies:

Co-chair, 15th Conference on the Middle Atmosphere (June 2009), 2008-9
 Chair, American Meteorological Society, Committee on the Middle Atmosphere, 2007-9
 Associate editor, *Journal of Geophysical Research - Atmospheres*, 2001-2006
 Member, American Meteorological Society, Committee on the Middle Atmosphere, 1997-2000; 2005-6
 Member, American Geophysical Union, Sullivan Award Committee (news journalism award), 2004-5
 Member, American Geophysical Union, Committee on Atmospheric Chemistry, 1998-2004
 American Geophysical Union Atmospheric Sciences Section Secretary, 2000-2002
 Member, American Geophysical Union Spring Meeting Program Committee, 2001, 2002
 Co-convenor and co-chair of special session, “Studies of Atmospheric Chemistry and Dynamics Using Multiple Datasets”, at December 1995 American Geophysical Union Meeting
 Session Chair, NASA Atmospheric Effects of Aviation Annual Meeting, 1997
 Session Chair, AMS Middle Atmospheres Meeting, 1998; 2000
 Session Chair, AGU Fall Meeting, 2001; 2003
 Volunteer scientist, Science-by-Mail program, 1993-1996

Review or assessment panels:

External Reviewer, European Commission Global Earth Observation and Monitoring project, 2010
 NASA Upper Atmospheric Research Program proposal review panel, 2010
 NASA Earth Science Technology Office proposal review panels, 2007; 2010
 Member, NCAR Observational Facilities Assessment Panel, 2005-2008
 Member, NCAR Atmospheric Chemistry Division Director Search Committee, 2006-07
 Member, NSF Facilities Assessment Study Committee, Emerging Technologies subcommittee, 2006-2007
 Reviewer of EPA/National Park Service Draft Report, “Big Bend Regional Aerosol and Visibility Observational Study (BRAVO)”, 2004
 NASA Tropospheric Composition Program proposal review panel, 2003
 NASA Global Tropospheric Experiment Future Directions Advisory Panel, 2000
 NSF proposal review panels, Office of Education and Human Resources; Office of International Science and Engineering, 1999; 2004; 2010
 NASA Global Tropospheric Experiment proposal review panel, 2000
 Reviewer (mail and panel) for the Stratospheric Processes and their Relationship to Climate (SPARC) Water Vapor Assessment (WAVAS), 2000
 NASA Satellite Remote Sensing proposals review panel, 1997

Manuscript and proposal reviewing:

Reviewer of manuscripts for *AGU Monograph Series, Environmental Science and Technology, Geophysical Research Letters, Global Biogeochemical Cycles, Journal of Atmospheric Chemistry, Journal of Atmospheric and Oceanic Technology, The Journal of the Atmospheric Sciences, Journal of Geophysical Research, Monthly Weather Review, Review of Scientific Instruments, Science, Atmospheric Environment, Atmospheric Chemistry and Physics, Atmospheric Measurement Technologies, EOS Transactions of AGU*
 Reviewer of proposals for California Institute of Technology President’s Fund; NASA Subsonic Assessment; NASA Atmospheric Chemistry Modeling and Analysis Program; NASA High Speed Research Program; NASA Tropospheric Composition Program; NASA Radiation Sciences Program; NASA Upper Atmospheric Research Program; National Science Foundation Division of Geosciences; National Science Foundation Office of Polar Programs; National Science Foundation Division of Education and Human Resources; National Science Foundation Atmospheric Sciences Division; Swiss Federal Science Foundation; UK Natural Environment Research Council; Helmholtz Gemeinschaft; Canadian Foundation for Climate and Atmospheric Sciences; Academy of Finland; Royal Society of New Zealand; NOAA Postdoctoral Program; Natural Sciences and Engineering Research Council of Canada; University of Colorado Innovative Seed Grant program
 Reviewer of NCAR textbook, “Atmospheric Chemistry and Global Change”, 1999
 Reviewer of United Nations Environment Programme/World Meteorological Organization 1998

Assessment of Stratospheric Ozone
 Reviewer of NASA Atmospheric Effects of Aviation Interim Assessment, 1996

Memberships:

Member, American Geophysical Union, 1989-present
 Member, American Meteorological Society, 1996-present
 Member, National Academic Advising Association, 2006-present

Research Funding

Completed Awards:

- National Science Foundation**, *In situ measurement of halogen oxides in the arctic troposphere*, 4/96-3/97, \$23,619 (sole investigator)
- Environmental Protection Agency**, Early Career Research Award, *Development of lightweight instrumentation for measurements of long-lived trace gases*, 12/96-11/02, \$466,074 (sole investigator)
- National Aeronautics and Space Administration**, Atmospheric Effects of Aviation/Subsonic Assessment, *Measurements of long-lived trace gases from commercial aircraft platforms: Instrument development*, 1/97-2/02, \$1,211,062 (sole investigator)
- National Aeronautics and Space Administration**, UARS Mission Science Investigations, *Studies of Tropical/Mid-Latitude Exchange Using UARS Observations*, 10/97-9/01, \$160,000 (sole investigator)
- National Science Foundation**, *PECASE: In situ measurements of halogen oxides in the troposphere and enhancement of graduate education in atmospheric sciences*, 4/99 - 4/05, \$553,031 (sole investigator)
- National Aeronautics and Space Administration**, Earth System Science Fellowship Program, *In Situ Measurements of Carbon Dioxide in the Upper Troposphere and Lower Stratosphere*, 9/99 - 8/02, \$66,000 (for Amelia Gates)
- National Aeronautics and Space Administration**, Cirrus Regional Study of Tropical Anvils and Cirrus Layers - Florida Area Cirrus Experiment (CRYSTAL-FACE), *Measurements of "total water" and carbon dioxide from the NASA WB-57 for CRYSTAL-FACE*, 11/01-10/03, \$219,971 (sole investigator).
- University of Colorado Outreach Council**, *The Weather Outside Our Windows* (development of a case-based weather curriculum for middle-school and teacher training), 9/03-8/04, \$4987, (co-investigator with S. Laursen, CIRES).
- National Aeronautics and Space Administration**, Investigations that Contribute to the NASA Earth Science Enterprise's Multidisciplinary Research in Climate, Chemistry, and Global Modeling, *Improvements to In Situ Measurements of Ice Water Content using Tunable Diode Laser Spectroscopy*, 11/03-10/04, \$153,955 (includes supplement for MidCiX, sole investigator).
- National Science Foundation**, *Small Grant for Exploratory Research: Measurements in Exhaust Plumes of Rockets in Conjunction with WAVE*, 5/05-4/06, \$153,386 (co-investigator with D. Toohey)
- University of Colorado Council on Research and Creative Work**, *Development of a Personal Exposure Monitor for Ozone*, 8/06-12/06, \$7000.
- National Aeronautics and Space Administration**, Earth System Science Fellowship Program, *Comparison of In Situ and Remotely Sensed Measurements of Cirrus Cloud Properties*, 9/06 - 8/08, \$72,000 (for Sean Davis)
- National Aeronautics and Space Administration**, Atmospheric Composition Element A.9 – Tropical Composition, Cloud, and Climate Coupling, *In Situ Measurements of Cloud Ice Water Content During TC4 in Support of Satellite Validation*, 5/07-4/09, \$290,181 (sole investigator).
- National Science Foundation**, *Collaborative Research: Stratosphere-Troposphere Analyses of Regional Transport (START) Experiment 2008*, 9/07-8/09, \$329,790, (University of Colorado PI; co-investigators D. Hurst and F. Moore).
- Department of Transportation, Federal Aviation Administration**, *Development of a White Paper on*

- UT/LS Chemical Processes for the Aviation Climate Change Research Initiative*, 8/07-7/08, \$35,422 (co-investigator with D. Toohey)
- University of Colorado Leadership Education for Advancement and Promotion (LEAP), Individual Growth Grant**, *Assessment of Undergraduate Math Preparation and Subsequent Performance in Math and Science Courses*, 1/08-12/08, \$8650.
- Pennsylvania State University**, *Construction of ozone sensors for MOPS*, 3/11-7/11, \$22,646 (sole investigator).
- University of Colorado Provost's Innovative Grant Program**, *Laser-Based Ultraviolet Photometer for the Characterization of Ozone Pollution Damage to Crops, Pastures and Forests*, 7/10-6/11, \$37,300 (sole investigator).
- University of Colorado Provost's Innovative Grant Program**, *Ozone Exposure of Older Low-Income Adults Living in Urban Neighborhoods: Building Knowledge and Partnerships for Environmental Justice*, 7/10-6/11, \$42,800 (co-I with J. Milford).

Current Awards:

- National Science Foundation**, ADVANCE program, *Atmospheric Science Collaborations and Enriching Networks (ASCENT)*, 9/08-8/11, \$278,850, (co-PI with A.G. Hallar and L. Edwards, DRI).
- National Science Foundation**, Office of Polar Programs, *In situ Measurements of Stratospheric Ozone from Long Duration Balloons during Concordiasi*, 2/09-5/12, \$533,416 (sole investigator).
- National Science Foundation**, *Collaborative Research: Colorado Airborne Multi-Phase Cloud Study (CAMPS)*, 6/10-5/13, \$387,282 (lead investigator, with M. Shupe); in-kind support for Wyoming King Air operations, \$232,800.
- University of Colorado Integrating STEM Project**, *Undergraduate Students' Climate Change Conceptions*, Chancellor's Award for Excellence in STEM Education - Graduate Award for Kim Trenbath, 8/11-12/11, \$10,000.
- National Aeronautics and Space Administration**, Atmospheric Composition Element A.16 – Midlatitude Airborne Cirrus Properties Experiment (MACPEX), *Measurements of Ice Water Content During MACPEX and Comparisons to Remotely Sensed Cloud Microphysical Properties*, 9/10-8/13 \$436,397 (sole investigator).
- National Science Foundation**, Office of Polar Programs, *Collaborative Research: Augmenting the Ross Island-area Automatic Weather Station network to develop a tropospheric ozone climatology*, 7/11-6/14, \$525,203 (CU PI; co-Is M. Seefeldt, L. Kalnajs and M. Lazzara).
- University of Colorado Outreach Committee**, *CU-STARs: Science, Technology and Astronomy Recruits*, 7/11-6/12, \$7300 (co-I with E. Ellingson and D. Duncan).
- National Science Foundation**, Physical and Dynamical Meteorology, *Measurements of Total Water on the Gulfstream G-V for DC3*, 1/12 – 12/14, \$374,112 (sole investigator).
- Environmental Protection Agency**, *Direct measurement of ozone production in a small network – instrument improvement, deployment, and assessment of value*, 9/11 – 8/14, \$480,000 (CU component \$36,000), (collaborator, PI = W. Brune, Penn State).

Pending Proposals:

none

Publications

Peer-reviewed journal articles (* indicates student or postdoc of L.M. Avallone)

D.W. Fahey, S.R. Kawa, E.L. Woodbridge, P. Tin, J.C. Wilson, H.H. Jonsson, J.E. Dye, D. Baumgardner, S. Borrmann, D.W. Toohey, L.M. Avallone, M.H. Proffitt, J. Margitan, M. Loewenstein, J.R. Podolske, R.J. Salawitch, S.C. Wofsy, M.K.W. Ko, D.E. Anderson, M.R. Schoeberl, and K.R. Chan, **1993**, In situ measurements constraining the role of sulphate aerosols in mid-latitude ozone depletion, *Nature*, 363, 509.

D.W. Toohey, L.M. Avallone, M.R. Schoeberl, P.A. Newman, L.R. Lait, D.W. Fahey, E.L. Woodbridge, and J.G. Anderson, **1993**, The seasonal evolution of reactive chlorine in the northern hemisphere stratosphere, *Science*, 261, 1134.

P. Newman, L.R. Lait, M. Schoeberl, E.R. Nash, K. Kelly, D.W. Fahey, R. Nagatani, D. Toohey, L. Avallone, and J. Anderson, **1993**, Stratospheric meteorological conditions in the arctic polar vortex, 1991 to 1992, *Science*, 261, 1143.

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L. M. Avallone, A. G. Hallar, H. Thiry and L. Edwards, Supporting the retention and advancement of women in the atmospheric sciences: Results from a recent three-year study, to be submitted to *EOS*, January 2012.

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L.M. Avallone, **1993**, In situ measurements of ClO and implications for the chemistry of inorganic chlorine in the lower stratosphere, Ph.D. thesis, Department of Chemistry, Harvard University.

L.M. Avallone, D.W. Toohey, T. J. Fortin*, and K. A. McKinney, **1997**, In situ observations of BrO and ClO during ARCTOC '96, in Arctic Tropospheric Ozone Chemistry (ARCTOC): Results from Field, Laboratory and Modelling Studies, U. Platt and E. Lehrer (eds.), Final Report to the European Union, Heidelberg.

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J. Milford and L. Avallone, **2004**, *The Role of Sulfate in Fine Particle Pollution Health Effects*, technical report submitted to John Graham, director of OMB's Office of Information and Regulatory Affairs on behalf of Environmental Defense, 27 October 2004.

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F. Rabier, A. Bouchard, A. Doerenbecher, V. Guidard, F. Karbou, V.-H. Peuch, N. Semane, C. Genthon, G. Picard, A. Hertzog, F. Vial, P. Cocquerez, T. Hock, D. Parsons, J. Powers, K. Romberg, J. VanAndel, T. Deshler, C. R. Mechoso, J. Haase, and L. Avallone, **2007**, *The CONCORDIASI Project over Antarctica during the International Polar Year (IPY)*, Proceedings of the Joint 2007 EUMETSAT Meteorological Satellite Conference and the 15th Satellite Meteorology & Oceanography Conference of the American Meteorological Society; September 2007.

D. Toohey, L. Avallone and M. Ross, **2009**, *Chapter 1. Aviation-Climate Change Research Initiative Subject-Specific White Paper on UT/LS Chemistry and Transport* in "Aviation and the Environment", J.C. Goodman, ed., Nova Publishers.

Invited Talks and Seminars

Interrelationships between atmospheric chemistry and transport: Studies of trace gas correlations and mixing between the tropics and midlatitudes, Earth System Science seminar series, University of California at Irvine, 8 May 1996.

Measurements of ozone-depleting processes in the arctic troposphere, Laboratory for Atmospheric and Space Physics (LASP) seminar, University of Colorado, 19 September 1996.

Constraints on stratospheric chemistry and dynamics from observations of long-lived trace gases, Analytical and Atmospheric Chemistry seminar, University of Colorado, 3 March 1997.

Measurements of BrO in the Arctic Troposphere during ARCTOC '96, Laboratory for Atmospheres seminar, Goddard Space Flight Center, 3 October 1997.

Autonomous Instrumentation for Measurements of Trace Gases from Commercial Aircraft Platforms, invited talk, Federation of Analytical Chemistry and Spectroscopy Societies, Providence, RI, 30 October 1997.

Autonomous Instrumentation for Measurements of Trace Gases from Commercial Aircraft Platforms, Earth System Science seminar, University of California at Irvine, 26 November 1997.

Constraints on Stratospheric Chemistry and Dynamics from Observations of Long-lived Trace Gases, Analytical Chemistry seminar, University of Maryland at College Park, 2 December 1997.

Autonomous Instrumentation for Measurements of Trace Gases from Commercial Aircraft Platforms, Department of Meteorology seminar, University of Maryland, 5 January 1998.

Development of Instrumentation for Measurements from Commercial Aircraft, NOAA Aeronomy Laboratory seminar, 4 March 1998.

Assessing the Role of Dynamics in Tropospheric Chemistry: Measurements from Commercial Aircraft Platforms, invited talk, Telluride Summer Research Workshop on Uncertainties in Tropospheric Chemistry, 7 August 1998.

TOTCAP: Tropospheric Ozone and Tracers from Commercial Aircraft Platforms, Laboratory for Atmospheric and Space Physics seminar, University of Colorado, 24 September 1998.

TOTCAP: Tropospheric Ozone and Tracers from Commercial Aircraft Platforms, Program in Atmospheric and Oceanic Sciences seminar, University of Colorado, 2 October 1998.

Understanding Atmospheric Ozone: Measurements from Balloons and Aircraft, Laboratory for Atmospheric and Space Physics seminar for non-scientists, 21 October 1998.

In Situ Measurements of BrO in the High Latitude Boundary Layer, Institute for Environmental Physics seminar (Institut für Umweltphysik), University of Bremen, Germany, 1 July 1999.

Technology for Measurements of Atmospheric Free Radicals by Resonance Fluorescence, Laboratory for Atmospheric and Space Physics Technology Colloquium, University of Colorado 13 June 2000.

The Tropospheric Ozone and Tracers from Commercial Aircraft Platforms (TOTCAP) Instrumentation: First Results, NASA Ames Earth Science seminar, 10 August 2000.

Trace Gas Observations at the High Latitude Winter Tropopause with a New Aircraft Instrument, Atmospheric and Oceanic Sciences seminar, University of Wisconsin, 31 October 2000.

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Adventures in the Arctic: Applications of Physical Chemistry to Understanding What Depletes Tropospheric Ozone, Chemistry Department Seminar, Williams College, 21 September 2001.

Measurements in Arctic Cirrus and Rocket Plumes: New Insights into Particle Sizes and Composition, Program in Atmospheric and Oceanic Sciences seminar, 14 November 2001.

Uncertainties in Halogen Oxide Measurements and Kinetic Parameters and their Implications for Calculation of Ozone Loss Rates, invited overview talk at the Arctic Ozone Loss Workshop, Potsdam, Germany, 5 March 2002.

In situ Measurements in Rocket Plumes and Arctic Cirrus: New Insights into Particle Size and Composition, Scripps Institute of Oceanography Climate seminar, University of California at San Diego, 21 March 2002.

In situ Measurements in Rocket Plumes and Arctic Cirrus: New Insights into Particle Size and Composition, Laboratory for Atmospheric and Space Physics seminar, University of Colorado, 24 April 2002.

Air Pollution: The Sea Salt Connection, Crary Science Lecture Series, McMurdo Station, Antarctica, 25 September 2002.

Air Pollution: The Sea Salt Connection, Science Lecture Series, Scott Base, Antarctica, 27 September 2002.

Air Pollution in Antarctica, Laboratory for Atmospheric and Space Physics non-technical seminar series, 16 December 2002.

In Situ Measurements of Halogen Oxides at High Latitude Surface Sites, NOAA Climate Monitoring and Diagnostics Laboratory seminar, 25 September 2003.

In Situ Measurements of Ice Water Content in Tropical and Polar Cirrus, NASA Langley Research Center Atmospheric Chemistry and Dynamics Branch seminar, 8 October 2003.

In Situ Measurements of Halogen Oxides at High Latitude Surface Sites, NASA Ames Earth Sciences seminar, 2 June 2004.

Stratospheric Ozone Depletion, Sunday Lecture Series, McMurdo Station, Antarctica, 10 October 2004.

Ozone Chemistry in the High-Latitude Boundary Layer, Crary Science Lecture Series, McMurdo Station, Antarctica, 27 October 2004.

In situ measurement needs for studying chemistry in the high-latitude boundary layer, 2005 Polar Technology Conference, Mountain View, CA, April 2005.

Ozone Chemistry in the High Latitude Boundary Layer, Program in Atmospheric and Oceanic Sciences Seminar, 28 September 2005.

Tropospheric Ozone Depletion Events: What We've Learned in the Past Decade, LASP Seminar, 23 February 2006.

Tropospheric Ozone Depletion Events: What we've learned in the past decade, seminar given at The Instituted for Integrative and Multidisciplinary Earth Studies (TIIMES) and Atmospheric Chemistry Division (ACD) at NCAR, 1 June 2006.

Ozone Holes, Smog and Space Shuttles: Measuring ozone throughout the atmosphere, public lecture given at LASP, 6 March 2007.

In situ measurements in rocket and Space Shuttle exhaust plumes: What we've learned about stratospheric chemistry and dynamics, LASP Seminar, 6 November 2008.

The Storm Peak Lab Cloud Property Validation Experiment (StormVEx), Atmospheric Sciences Seminar, University of Wyoming, 5 May 2009.

The Status of UT/LS Water Vapor Measurements, NCAR Earth Observing Laboratory Technology Development Facility retreat, 29 October 2009.

Temperature, Relative Humidity and Wind Measurements in Clouds, Workshop on In Situ Airborne Instrumentation: Addressing and Solving Measurement Problems in Ice Clouds, Seaside, OR, 25 July 2010.

Exploring the Antarctic Ozone Hole using Long-duration Balloons, LASP/ATOC seminar, 29 October 2010.

Airborne Observations in Rocket and Space Shuttle Exhaust Plumes: Lessons about atmospheric chemistry and dynamics, University of Wyoming Department of Atmospheric Sciences seminar, 15 February 2011.

Keynote presentation for Wyoming chapter of the American Chemical Society; year-end awards banquet, 21 April 2011.

Exploring the Antarctic "Ozone Hole" Using Long-Duration Balloons, invited talk at Forschungszentrum Juelich, IEK-7 Colloquium series, 13 October 2011.

UCO_z Measurements during Concordiasi, talk given at the Concordiasi Science Team Meeting, 21 October 2011.

Exploring the Antarctic "Ozone Hole" using Long-Duration Balloons, invited seminar given at the School of Earth Sciences, University of Melbourne (Australia), 4 November 2011.

Talks/Meeting Abstracts

L.M. Avallone, D.W. Toohey, and J.G. Anderson, *High pressure discharge-flow measurement of the equilibrium constant for $Cl + O_2 \leftrightarrow ClOO$ from 150 - 210 K*, poster presented at the American Geophysical Union Spring Meeting, Baltimore, MD; May 1991.

L.M. Avallone, J.G. Anderson, and D.W. Toohey, *A midlatitude balloon-borne ClO profile: Implications for lower stratospheric chemistry*, talk presented at the NASA High Speed Research Program Annual Meeting, Virginia Beach, VA; May 1992.

L.M. Avallone, J.G. Anderson, W.H. Brune, M. Loewenstein, J. Podolske, M.H. Proffitt, and D.W. Toohey, *In situ measurements of ClO at midlatitudes: Is there an effect from Mt. Pinatubo?*, talk presented at the American Geophysical Union Fall Meeting, San Francisco, CA; December 1992.

L.M. Avallone, J.G. Anderson, W.H. Brune, and D.W. Toohey, *An assessment of uncertainties for in situ measurements of ClO*, poster presented at the American Geophysical Union Spring Meeting, Baltimore, MD; May 1993.

L.M. Avallone and D.W. Toohey, *Stratospheric bromine photochemistry*, talk presented at the Pacific Conference on Applied Spectroscopy, American Chemical Society Western Regional Meeting, Pasadena, CA; October 1993.

L.M. Avallone and D. W. Toohey, *Reanalysis of in situ BrO measurements: A review of progress*, talk presented at the Methyl Bromide State of the Science Workshop, Washington DC; October 1993.

L.M. Avallone, M.J. Prather, D.R. Blake, and F.S. Rowland, *Simulation of relative loss frequencies of halocarbons in the lower stratosphere*, talk presented at the NASA Atmospheric Effects of Aircraft Program Annual Meeting, Virginia Beach, VA; June 1994.

L.M. Avallone, D.W. Toohey, D.W. Fahey, and E.L. Woodbridge, *The partitioning of inorganic chlorine at 20 km deduced from simultaneous measurements of ClO and NO during AASE II*, talk presented at the NASA Atmospheric Effects of Aircraft Program Annual Meeting, Virginia Beach, VA; June 1994.

L.M. Avallone and M.J. Prather, *Stratospheric trace gas correlations: Relationship between fluxes and lifetimes*, talk presented at the American Geophysical Union Fall meeting, San Francisco, CA; December 1994.

L.M. Avallone and M. J. Prather, *Simulation of relative loss frequencies of halocarbons in the stratosphere*, poster presented at the Southern California Informal Photochemistry Conference, Irvine, CA; February 1995.

L.M. Avallone, M.J. Prather, A. E. Roche, and J.M. Russell III, *Investigations of the photochemical evolution of trace species*, poster presented at the UARS Science Team Meeting, Pasadena, CA; March 1995.

L.M. Avallone, J.L. Neu, D.W. Toohey, and D.W. Fahey, *Halogen oxides in the lower stratosphere: Measurement uncertainties and tests of photochemistry*, poster presented at the International Conference on Ozone in the Lower Stratosphere, Halkidiki, Greece; May 1995.

L. M. Avallone and D. W. Toohey, *Reanalysis of in situ measurements of BrO in the lower stratosphere*, poster presented at the Methyl Bromide State of the Science Workshop, Monterey, CA; June 1995.

L.M. Avallone, M.J. Prather, A.E. Roche, and J.M. Russell III, *Does midlatitude air enter the tropics? Investigations with UARS data*, talk presented at the American Geophysical Union Fall meeting, San Francisco, CA; December 1995.

L. M. Avallone, T. J. Fortin, D. W. Toohey, and K. A. McKinney, *In situ BrO observations during the ARCTOC '96 campaign*, talk presented at the ARCTOC Science Team Meeting, Heidelberg, Germany; September 1996.

L. M. Avallone, *A proposal to develop instrumentation for measurements from commercial aircraft*, poster presented at the Atmospheric Effects of Aviation Annual Meeting, Virginia Beach, VA; March 1997.

L. M. Avallone, *Instrument development for measurements from commercial aircraft*, poster presented at the IGAC/SPARC/GAW Conference on Global Measurement Systems for Atmospheric Composition, Toronto, Canada; May 1997.

T. J. Fortin, L. M. Avallone, K. A. McKinney, and D. W. Toohey, *In situ observations of BrO in the Arctic troposphere during ARCTOC '96*, poster presented at the 1997 Methyl Bromide State of the Science Workshop, Monterey, CA; June 1997.

L. M. Avallone, T. J. Fortin, D. W. Toohey, and K. A. McKinney, *In situ measurements of boundary layer BrO and ClO during ARCTOC '96*, talk presented at the Fall American Geophysical Union Meeting; San Francisco, CA; December 1998.

L. M. Avallone and D. W. Toohey, *Measurement of the absolute rate constant for the reaction $O + NO_2$ over the temperature range 216 to 413 K*, poster presented at the Spring American Geophysical Union Meeting, Boston, MA; June 1999.

A.M. Gates, D.W. Toohey, and L.M. Avallone, *Measurements of carbon dioxide in the plume of a Delta-II rocket*, talk presented at the ACCENT Science Team Meeting, Boulder, CO; July 1999.

L.C. Sparling, L. Patrick, and L.M. Avallone, *Coping with small scale variability in data validation*, poster presented at the NASA Workshop on Integration of Satellite Calibration/Validation and Research-oriented Field Missions in the Next Decade, Snowmass, CO; August 1999.

E.S. Whitney and L.M. Avallone, *Atmospheric water vapor measurements in the upper troposphere using a tunable diode laser hygrometer*, poster presented at the ASTAIRE Workshop on Atmospheric Effects of Aircraft in the Upper Troposphere and Lower Stratosphere, Bergen, Norway; August 1999.

S.K. McIlwaine, L. Patrick, and L.M. Avallone, *Investigations of stratospheric variability and circulation using UARS data*, poster presented at the UARS Science Team Meeting, Virginia Beach, VA; October 1999.

S.K. McIlwaine and L.M. Avallone, *Studies of stratospheric tropical-midlatitude transport using UARS data*, poster presented at the American Meteorological Society Middle Atmospheres Meeting, Long Beach, CA; January 2000. (won best student paper award)

L.C. Sparling and L.M. Avallone, *Small-scale variability and the problem of data validation*, talk presented at the Spring American Geophysical Union Meeting, Washington, DC; May 2000.

L.M. Avallone, D.R. Blake, A.M. Gates, R.D. May, B.C. Sive, D.W. Toohey, and E.S. Whitney, *The Tropospheric Ozone and Tracers from Commercial Aircraft Platforms (TOTCAP) Instrumentation: First Results*, poster presented at the 2000 Atmospheric Effects of Aviation Annual meeting, Snowmass, CO; June 2000.

L.M. Avallone and A.G. Hallar, *Trace gas correlations in the tropopause region as observed from the NASA DC-8 during SOLVE*, talk and poster presented at the SOLVE-THESEO Science Team Meeting, Palermo, Italy; September 2000.

A.M. Gates, L.M. Avallone, D.W. Toohey, and S. A. Vay, *The Tropospheric Ozone and Tracers from Commercial Aircraft Platforms (TOTCAP) carbon dioxide measurement during the SOLVE campaign: Data comparison and a dynamical study*, poster presented at the SOLVE-THESEO Science Team Meeting, Palermo, Italy; September 2000.

E.S. Whitney, L. M. Avallone, J.R. Podolske, R. Herman, G. Sachse, E. Jensen, R. D. May, and B. Anderson, *An examination of "total water" measurements from a closed-path tunable diode laser hygrometer aboard the NASA DC-8 aircraft during the SOLVE campaign*, poster presented at the SOLVE-THESEO Science Team Meeting, Palermo, Italy; September 2000.

L.M. Avallone, *In situ measurements of BrO and ClO for Polar Sunrise 2000*, Polar Sunrise Experiment Alert 2000 Science Team Meeting, Rome, Italy; October 2000.

L.M. Avallone and J.D. Fuentes, *In situ observations of bromine oxide at two high latitude surface sites during springtime ozone depletion episodes*, talk presented at the Fall American Geophysical Union Meeting, San Francisco, CA; December 2000.

K.M. Hines, D. Toohey, and L. Avallone, *Seasonal patterns of ozone variability in the lower stratosphere and upper troposphere*, talk presented at the Fall American Geophysical Union Meeting, San Francisco, CA, December 2000.

A.M. Gates, L.M. Avallone, D.W. Toohey, A. Rutter, A.R. Hopkins, P.D. Whitefield, D. E. Hagen, and M.N. Ross, *In situ carbon dioxide measurements in rocket plumes during ACCENT*, talk presented at the Fall American Geophysical Union Meeting, San Francisco, CA; December 2000.

L.C. Patrick and L.M. Avallone, *Suitability of the zonal mean for use in climatologies and atmospheric chemistry models*, poster presented at the Fall American Geophysical Union Meeting, San Francisco, CA; December 2000.

B. Thornton, L. Avallone, W. Brune, D. Toohey, H. Harder, M. Martinez-Harder, and J. Simpas, *Latitudinal and seasonal variability of ClO in the lowermost stratosphere*, poster presented at the Fall American Geophysical Union Meeting, San Francisco, CA; December 2000.

D.M. Krank, L.M. Avallone, W.H. Brune, K.A. McKinney, D. Toohey, and H. Voemel, *Trends in inorganic bromine in the lower stratosphere based on in situ measurements of BrO in the Arctic*, poster presented at the Spring American Geophysical Union Meeting, Boston, MA; May 2001.

L.M. Avallone, A.M. Gates, and A.G. Hallar, *Trace gas correlations near the high-latitude tropopause with measurements from a new suite of instruments*, talk presented at the Spring American Geophysical Union Meeting, Boston, MA; May 2001.

D.W. Toohey, B.F. Thornton, L.M. Avallone, M.N. Ross, E. Richard, and K. Kelly, *Measurements of Cl, ClO, and CO₂ in the exhaust plume of the space shuttle*, talk presented at the Spring American Geophysical Union Meeting, Boston; MA, May 2001.

L.M. Avallone, A.M. Gates, and A.G. Hallar, *Trace gas correlations near the high-latitude tropopause with measurements from a new suite of instruments*, talk presented at the International Association of Meteorology and Atmospheric Sciences (IAMAS) Meeting, Innsbruck, Austria; July 2001.

L.M. Avallone and S.K. McIlwaine, *An investigation of mixing into the tropical stratosphere using UARS data*, poster presented at the Upper Atmosphere Research Satellite Science Team Meeting, Greenbelt, MD, September 2001.

P.J. Popp, R.S. Gao, J.A. Neuman, M.J. Northway, J.C. Holecek, D.W. Fahey, C. Wiedinmyer, C.A. Brock, B.A. Ridley, J.G. Walega, F.E. Grahek, J.C. Wilson, J.M. Reeves, D.W. Toohey, L.M. Avallone, B.F. Thornton, A.M. Gates, M.N. Ross, and P.F. Zittel, *The emission and chemistry of reactive nitrogen species in the plume of an Athena II rocket*, talk presented at the Fall American Geophysical Union Meeting, San Francisco, CA; December 2001.

D. Toohey, L. Avallone, A. Gates, B. Thornton, E. Richard, and K. Kelly, *Insights into stratospheric chemistry and transport from ultra-fast measurements in rocket plumes*, talk presented at the Fall American Geophysical Union Meeting, San Francisco, CA; December 2001.

L.M. Avallone, *Measurements of active chlorine in the high latitude boundary layer during springtime*, talk presented at the Fall American Geophysical Union Meeting, San Francisco, CA; December 2001.

L.M. Avallone, *An assessment of the uncertainties in in situ measurements of ClO and BrO*, poster presented at the Arctic Ozone Loss Workshop, Potsdam, Germany; March 2002.

D. Toohey, K. McKinney, H. Voemel, and L. Avallone, *The temporal trend in bromine based on in situ measurements of BrO in the Arctic from 1989 to 2000*, poster presented at the Arctic Ozone Loss Workshop, Potsdam, Germany; March 2002.

B. Thornton, D. Toohey, L. Avallone, H. Harder, M. Martinez, J. Simpas, W. Brune, M. Avery, E. Richard, and M. Proffitt, *In situ measurements of ClO near the tropopause*, poster presented at the European Geophysical Society Meeting, Nice, France; April 2002.

D.W. Toohey and L.M. Avallone, *A comparison of in situ and remote measurements of ClO in the perturbed polar vortex*, talk presented at the Spring American Geophysical Union Meeting, Washington, DC; May 2002.

A.G. Hallar, L.M. Avallone, R.L. Herman, B.E. Anderson, and A.J. Heymsfield, *Measurements of ice water content in tropopause region arctic cirrus during SOLVE (SAGE III Ozone Loss and Validation Experiment)*, talk presented at the Fall American Geophysical Union Meeting, San Francisco, CA; December 2002.

A.G. Hallar, L.M. Avallone, R.L. Herman, and T. J. Garrett, *Contrast and comparisons of in situ measurements of IWC, extinction and size distributions during two cirrus cloud case studies (7/9/2002 and 7/11/2002)*, poster presented at the CRYSTAL-FACE Science Team Meeting, Salt Lake City, UT; February 2003.

L.M. Avallone, A.G. Hallar, R.L. Herman, and T. L. Thompson, *Measurements of ice water content in very thin cirrus*, talk presented at the CRYSTAL-FACE Science Team Meeting, Salt Lake City, UT; February 2003.

A.G. Hallar, L. M. Avallone, R. L. Herman and T. J. Garrett, *Measurements of ice water content and extinction, and calculated effective radius in tropical cirrus during CRYSTAL-FACE*, poster presented at the American Geophysical Union - European Geophysical Society Joint Meeting, Nice, France; April 2003.

B. Thornton, D. Toohey, L. Avallone, Y. Kondo, M. Koike, N. Takegawa, H. Harder, M. Martinez, J. Simpas, and W. Brune, *Drivers of Arctic near-tropopause ClO enhancements*, talk presented at the American Geophysical Union - European Geophysical Society Joint Meeting, Nice, France; April 2003.

D. Toohey and L. Avallone, *A chemical explanation for mid-winter ozone loss in the arctic stratosphere*, talk presented at the American Geophysical Union - European Geophysical Society Joint Meeting, Nice, France; April 2003.

D. Kinnison, J. Gille, J. Barnett, J. Alexander, L. Avallone, M. Coffey, T. Eden, A. Gettleman, R. Khosravi, A. Lambert, H. Lee, L. Lyjak, S. Massie, B. Nardi, C. Randall, B. Randel, and V. Yudin, *The High Resolution Dynamics Limb Sounder (HIRDLS) validation plan*, talk presented at the American Geophysical Union Meeting, San Francisco, December 2003.

L. M. Avallone and A. G. Hallar, *Measurements of ice water content in low-latitude cirrus clouds*, poster presented at the American Geophysical Union Meeting, San Francisco, December 2003.

L.M. Avallone, *Measurements from in-service aircraft: What are the possibilities?* Talk presented at the SOFIA Upper Deck Science Workshop, NASA Ames Research Center, June 2004.

L. Kalnajs, L. Avallone, and S. Davis, *Ozone surface flux measurements over the Antarctic snow pack*, talk presented at the American Geophysical Union Meeting, New Orleans, May 2005.

L. Kalnajs, S. Davis, and L. Avallone, *Analysis of halogens in Antarctic snow and their role in boundary layer ozone depletion events*, poster presented at the American Geophysical Union Meeting, New Orleans, May 2005.

S. M. Davis and L. M. Avallone, *Comparison of in situ measurements of cirrus ice water content during the MidCiX campaign*, poster presented at the American Geophysical Union Meeting, New Orleans, May 2005.

L. E. Kalnajs, L. M. Avallone, and S. M. Davis, *Evidence for local heterogeneous destruction of boundary layer ozone based on Antarctic field observations*, poster presented at the American Geophysical Union Meeting, San Francisco, December 2005.

G.L. Kok, D. Baumgardner, L. M. Avallone, L. E. Kalnajs, R. L. Herman, M. N. Ross, T. L. Thompson, and D. W. Toohey, *In situ microphysical measurements in rocket plumes with the Cloud and Aerosol Spectrometer (CAS)*, poster presented at the American Geophysical Union Meeting, San Francisco, December 2005.

S. M. Davis, L. M. Avallone, A. G. Hallar, and W. Engblom, *Comparison of in situ measurements of cirrus cloud ice water content during the MidCiX field campaign*, poster presented at the American Geophysical Union Meeting, San Francisco, December 2005.

L. M. Avallone and L. E. Kalnajs, *Development of a fast-response ultraviolet absorption ozone sensor: Design and first results*, poster presented at the American Geophysical Union Meeting, San Francisco, December 2005.

D.W. Toohey, M. N. Ross, L. M. Avallone, S. Baccus, D. Baumgardner, S. M. Davis, R. L. Herman, L. E. Kalnajs, G. L. Kok, T. L. Thompson, R. Troy, *The PUMA 2004 and 2005 Campaigns: Overview and Motivation*, poster presented at the American Geophysical Union Meeting, San Francisco, December 2005.

S. Laursen, L. Avallone, J. P. Hacker, W. Schreiber-Abshire, and B. Hendrickson, *Weather Outside our Window: Data-Rich, Inquiry-Based Case Studies on Rocky Mountain Front Range Weather*, poster presented at the 2006 American Meteorological Society Annual Meeting (15th Symposium on Education), 29 January 2006.

L. M. Avallone, S. Laursen, J. Hacker, W. Abshire, and B. Hendrickson, *The Weather Outside our Window: Teacher Education Through Inquiry-Based Case Studies on Rocky Mountain Front Range Weather*, talk presented at The Seventh International Conference on School and Popular Meteorological and Oceanographic Education, Boulder, CO; 5 July 2006.

S. M. Davis, B. H. Kahn, L. M. Avallone, and K. G. Meyer, *Comparison of In Situ and Satellite Measurements of Cirrus Microphysical and Radiative Properties*, talk presented at the American Geophysical Union Meeting, San Francisco, December 2006.

S. M. Davis, L. M. Avallone, D. W. Toohey and M. N. Ross, *Rocket exhaust plume measurements and their potential use in constraining the accuracy of water vapor measurements*, talk presented at the Upper Troposphere Relative Humidity workshop, Karlsruhe, Germany, June 2007.

S. M. Davis, B. H. Kahn, Q. Yue, K. G. Meyer, Z. Zhang, K. S. Schmidt, and L. M. Avallone, *Comparison of in situ and satellite measurements of cirrus microphysical and radiative properties*, talk presented at the American Meteorological Society 14th Conference on the Middle Atmosphere, August 2007.

S. M. Davis and L. M. Avallone, *In situ measurements of subvisual cirrus from the WB-57 aircraft during TC4*, poster presented at the American Geophysical Union Meeting, San Francisco, December 2007.

A. S. O'Brien, T. F. Hanisco, J. M. St. Clair, E. M. Weinstock, J. B. Smith, R. L. Herman, R. F. Troy, L. E. Christensen, S. M. Davis, L. M. Avallone, and J. G. Anderson, *Evaluation of the New HOxotope Total Water Isotopologues Instrument Performance During TC4 Through Instrument Intercomparison*, poster presented at the American Geophysical Union Meeting, San Francisco, December 2007.

S. M. Davis and L. M. Avallone, *In situ measurements of subvisual cirrus from the WB-57 aircraft during TC4*, talk presented at the Tropical Composition, Cloud and Climate Coupling (TC4) Science Team Meeting, Virginia Beach, February 2008.

S.M. Davis, B.H. Kahn, L.M. Avallone, and K.G. Meyer, *Consistency between AIRS and MODIS thin cirrus optical thickness retrievals and in situ extinction measurements: example from MidCiX*, talk presented at the Tropical Composition, Cloud and Climate Coupling (TC4) Science Team Meeting, Virginia Beach, February 2008.

S. M. Davis and L. M. Avallone, *In Situ Measurements of “enhanced” total water and ice water content with the University of Colorado Closed-path Laser Hygrometer (CLH) during TC^d*, talk presented at the Tropical Composition, Cloud and Climate Coupling (TC4) Science Team Meeting, Virginia Beach, February 2008.

L. E. Kalnajs and L. M. Avallone, *Investigating the Role of Spatial Heterogeneity in Assessing Exposure to Airborne Pollutants*, poster presented at the University of Colorado Energy Initiative Symposium, 17 November 2008.

L. M. Avallone, L. E. Kalnajs, D. W. Toohey and M. N. Ross, *Measurements of unexpected ozone loss in a nighttime Space Shuttle exhaust plume: Implications for geo-engineering projects*, poster presented at the Fall American Geophysical Union Meeting, San Francisco, December 2008.

L. M. Avallone, L. C. Geiger and A. E. Luebke, *Mathematics preparation and success in introductory college science courses*, talk presented at the Fall American Geophysical Union Meeting, San Francisco, December 2008.

D. W. Toohey, L. M. Avallone, and M. N. Ross, *A novel method for assessing the accuracies of in situ measurements of water vapor in the UT/LS*, poster presented at the Fall American Geophysical Union Meeting, San Francisco, December 2008.

A. S. O’Brien, T. F. Hanisco, J. M. St. Clair, E. M. Weinstock, J. B. Smith, L. M. Avallone, S. M. Davis and J. G. Anderson, *HOxotope Total Water Isotopologues Instrument Performance and Results from TC4*, poster presented at the Fall American Geophysical Union Meeting, San Francisco, December 2008.

L. Kalnajs and L. M. Avallone, *A New Low Power, Light Weight, UV Ozone Photometer for use During the Concordiasi Antarctic Long Duration Stratospheric Balloon Campaign*, poster presented at the Balloon and Airship Workshop, Boulder, CO, 26 October 2009.

L. Kalnajs and L. M. Avallone, *A New Low Power, Light Weight, UV Ozone Photometer for use During the Concordiasi Antarctic Long Duration Stratospheric Balloon Campaign*, poster presented at the Fall American Geophysical Union Meeting, San Francisco, December 2009.

L. Avallone, L. Kalnajs and R. Schofield, *In situ measurements of stratospheric ozone from long-duration balloons during Concordiasi*, talk given at the Concordiasi workshop, Toulouse, France, 29 March 2010.

A. E. Luebke, M. Kraemer and L. M. Avallone, *Development of a Climatology for Cirrus Cloud Ice Water Content and Its Application to Climate Model Parameterizations*, poster presented at American Meteorological Society 13th Conference on Cloud Physics, Portland, OR, June 2010.

A. Hertzog, F. Rabier, Ph. Cocquerez, S. A. Cohn, L. Avallone, T. Deshler, J. Haase, B. Briot, F. Danis, F. Vial, A. Bouchard, A. Doerenbecher, V. Guidard, D. Puech, H. Cole, J. Fox, T. Hock, D. Parsons, J. VanAndel, and L. Kalnajs, *Concordiasi, a long-duration balloon campaign dedicated to the polar atmosphere*, invited talk at COSPAR general assembly, July 2010.

L. E. Kalnajs, L. M. Avallone, T. Deshler and P. Cocquerez, *The first long-term in situ measurements of ozone depletion in the Antarctic ozone hole*, talk at the American Meteorological Society 16th Conference on the Middle Atmosphere, Seattle, WA, January 2011.

L. M. Avallone, A. G. Hallar and G. Chirokova, *Colorado Airborne Multi-Phase Cloud Study (CAMPS)*, talk given at the DOE Atmospheric System Research 2011 Science Team Meeting, March 2011.

G. Mace, L. Avallone, M. Shupe, R. Marchand, S. Matrosov, G. Hallar, I. McCubbin, C. Long and P. Lawson, *The Storm Peak Lab Cloud Property Validation Experiment: Description and Early Results*, poster presented at the DOE Atmospheric System Research 2011 Science Team Meeting, March 2011.

L. M. Avallone, L. E. Kalnajs, R. Schofield, P. Cocquerez, A. Herzog, F. Danis, M. Minois, J. Nicot, P. van der Gaathen and H. Deckelman, *In Situ Measurements of Polar Stratospheric Ozone from Long Duration Balloons during Concordiasi*, talk presented at the 2011 Network for Detection of Atmospheric Composition Change symposium, Il de la Reunion, November 2011.

G. Chirokova, A. G. Hallar, D. Lowenthal, I. McCubbin, L. Avallone, G. Mace, J. R. French, L. D. Oolman, *Vertical properties of mixed-phase clouds from in-situ ground and airborne measurements during simultaneous CAMPS and StormVEx field campaigns*, talk given at the Fall American Geophysical Union Meeting, San Francisco, December 2011.

S. W. Dorsi and L. M. Avallone, *Airborne observations of mixed phase clouds in the southern Rockies*, poster given at the Fall American Geophysical Union Meeting, San Francisco, December 2011.

A.G. Hallar, L. M. Avallone, L. M. Edwards and H. Thiry, *Mentors, networks and resources for early career female atmospheric scientists*, invited talk presented at the American Geophysical Union Meeting, San Francisco, December 2011.

H. Thiry, L. Edwards, A. Hallar and L. Avallone, *Survey Says...! Women rising above challenges in atmospheric sciences through ASCENT*, poster presented at the American Geophysical Union Meeting, San Francisco, December 2011.

L. M. Edwards, A. G. Hallar, L. M. Avallone and H. Thiry, *ASCENT: Mentorship, Networking and Resources for Women in Atmospheric Science*, talk to be presented at the American Meteorological Society Annual Meeting, New Orleans, January 2012.

L. E. Kalnajs, L. M. Avallone, M. A. Lazzara, M. E. Seefeldt and J. E. Thom, *A new autonomous sensor network for measurements of atmospheric composition in Antarctica*, talk to be presented at the IPY 2012 meeting, Montreal, Canada, April 2012.