WILLIAM HENRY BRUNE III

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EDUCATION: Ph.D. (Physics) Johns Hopkins University, Baltimore, Maryland, June 1978
Thesis Title: Ultraviolet Observations of Hot Stars and Diffuse Nighttime Line Emissions

M.A. (Physics) Johns Hopkins University, Baltimore, Maryland, May 1975

B.S. (Physics) Southwestern at Memphis, Memphis, Tennessee, June 1973

EXPERIENCE:

Positions Held

1/08-present	Distinguished Professor, Pennsylvania State University.
1/99-5/14	Head, Department of Meteorology, Pennsylvania State University.
6/93-present	Professor, Department of Meteorology, Pennsylvania State University.
8/88-6/93	Associate Professor, Department of Meteorology, Pennsylvania State University.
7/81-8/88	Research Associate in Chemical Physics, Harvard University.
7/78-7/81	Research Fellow in Chemical Physics, Harvard University.
9/73-6/78	Research Assistant, Johns Hopkins University.

Courses Taught

8/88-present Fundamentals of Atmospheric Science, Atmospheric Thermodynamics, Atmospheric Chemistry, Cloud Physics and Chemistry, The Middle Atmosphere, Instruments, Micrometeorology, First-year Seminar

Graduate Theses Supervised

Joseph C. King, M.S., 1991; James H. Mather, Ph.D., 1994; Leon Perkowski, M.S., 1995; David Usinski, M.S., 1995; Ching Fong, Ph.D., 1996; Thomas A. Kovacs, Ph.D., 1999; Ian C. Faloona, Ph.D., 2000; Angelique Oliger, M.S., 2002; Terry Shirley, M.S., 2004; Andrew Metcalf, M.S., 2005, Christopher Beatty, M.S., 2006; Margaret Root, M.S., 2007; Eunha Kang, Ph.D., 2007; Jingqiu Mao, Ph.D., 2007; Amber Ortega, M.S., 2008; Shuang Chen, M.S. 2009; Maria Cazorla, Ph.D. 2010; Shuang Chen, Ph.D., 2011, James B. Simpas, Ph.D., 2012, Tiffany Samuelson, M.S. 2012, Bianca Baier, M.S. 2014, Philp Feiner, M.S. 2015, Bianca C. Baier, Ph.D., 2016.

Post-doctoral Associates Mentored

Philip Stevens, 1989-1994; David Tan, 1995-1999; Hartwig Harder, 1999-2002; Monica Martinez, 1999-2002; Xinrong Ren, 2001-2007; Chitral Naik, 2005-2006; Zhong Chen, 2006-2008; Jingqiu Mao, 2008; Diana van Duin, 2009-2010; Hugo Romero, 2010-2011; Shuang Chen 2011-2013; David Miller 2014 - present.

CURRENT RESEARCH EXPERTISE AND INTERESTS:

Understanding atmospheric oxidation chemistry, especially OH and HO_2, by instrument development, observations, laboratory studies, and modeling

Exploring environmental pollution and its consequences

Studying the photochemistry of gas-phase and particle-phase chemical species

Developing the concept of measuring atmospheric OH reactivity and analyzing the measurements from towers and aircraft

Measuring the ozone production rate

Developing the concept of Potential Aerosol Mass and using it to improve the understanding of atmospheric aerosol particles

Characterizing secondary organic aerosol particle size distributions and chemistry, particularly as a function of aging

Quantifying model and measurement uncertainties and sensitivities to input parameters

AWARDS:

Phi Beta Kappa, Southwestern at Memphis, 1973

NASA Group Achievement Awards 1987, 1989, 1990, 1991, 1994, 1995, 1997, 1998, 2001, 2005, 2008, 2017

Wilson Research Award, College of Earth and Mineral Sciences, Penn State University, 1994

Henry G. Houghton Award, American Meteorological Society, 1999

Fellow - American Geophysical Union, 2003

Fellow – American Meteorological Society, 2006

College of Earth and Mineral Sciences Miller Faculty Fellowship, 2008-2013

Visiting Distinguished Professor, University of L'Aquila, Italy, September – November 2010

Fellow - American Association for the Advancement of Science, 2013

International Visiting Research Scholar Award, Peter Wall Institute for Advanced Studies, University of British Columbia, Vancouver, BC, 2013-2014

PROFESSIONAL AFFILIATIONS:

American Geophysical Union, member, 1981-present

American Assoc. for the Advancement of Science, member, 1990-present

American Meteorological Society, member, 1998-present

American Chemical Society, member, 2012 – present

American Association for Aerosol Research, 2012 - 2013

ACADEMIC GOVERNANCE:

Head, Department of Meteorology, Pennsylvania State University, January 1999 – May 2014

Member, College of Earth and Mineral Sciences Executive Council, January 1999 – May 2014

Member, College of Earth and Mineral Sciences Faculty Advisory Committee, 1997-1998; 2002 – 2010 (administrative representative)

Chair, EMS Associate Dean for Research Search Committee, 2000.

Member, EMS Dean Search Committee, 2002.

Chair, EMS Environment Institute Director Search Committee, 2002-2003.

Chair, Department of Geography Head Search Committee, 2005-2006.

Member, Advisory Committee, Earth and Environmental Systems Institute, 2005-2014.

ADMINISTRATIVE ACHIEVEMENTS (as Head of the Department of Meteorology):

Served as department head for 15 years, 5 months

Negotiated the hiring of 16 new faculty members

Oversaw the increase of research funding from about $4m/yr to more than $8m/yr

Initiated a Meteorology alumni group, a graduate student advisory committee, a fixed-term and research faculty advisory committee, and an external advisory board to get more advice from as many department constituents as possible

Fostered the improvement in many indicators of graduate program quality

Championed the development of an interactive all on-line four-course Certificate of Achievement in Weather Forecasting and supported more interactive on-line courses and programs

Continually worked to improve the diversity of the faculty, staff, and student population

Invested time and resources to build a forward-thinking program in solutions to weather and climate risk

PROFESSIONAL AND PUBLIC SERVICE: (Bold indicates current service):

Reviewer for numerous journal and book manuscripts, proposals, and promotion and tenure cases.

Member, NASA EOS AO Evaluation Peer Review Instrument Panel II, October 24-28 1988.

Chapter Coordinator, Scientific Assessment of Ozone Depletion: 1991, World Meteorological Organization, Global Ozone Research and Monitoring Project--Report No. 25, 1991.

Lead Author, The Atmospheric Effects of Stratospheric Aircraft: Interim Assessment Report of the NASA High-Speed Research Program, June 1993.

Member, Organizing Committee for the 7th BOC Priestley Conference, Lewisburg, PA, 24-27 June 1994.

Lead Author, Interim Assessment of the Atmospheric Effects of Stratospheric Aircraft Program in NASA, December 1995.

Organized and led a workshop on the use of balloons for Observations from the Middle Stratosphere, Washington, DC, 10-11 January 1995.

Organized and led a workshop on the use of balloons for Observations from the Middle Stratosphere, Moffett Field, CA, 23 October 1995.

Member, Atmospheric Effects of Aircraft Program Advisory Panel, October 1992-January 1995.

Guest Editor, ASHOE/MAESA Special Section, J. Geophys. Res., D. July 1995 – July 1996.

Mission Scientist, Observations from the Middle Atmosphere (OMS) 1995 - 2000. (a program designed to use scientific balloons for stratospheric measurements, part of the Upper Atmospheric Research Program and the Atmospheric Effects of Aircraft Program at NASA)

Chair, Observations from the Middle Stratosphere Science Meeting, Boulder, CO, 17-19 February, 1998.

Member, NCAR Observing Facilities Advisory Panel, January 1998 – April 2001.

Lead Author, NASA Atmospheric Effects of Stratospheric Aircraft, 1998 Assessment.

Lead Co-Chair, 1999 Gordon Conference on Atmospheric Chemistry, 1997 - 1999.

Associate Editor, J. Geophys. Res., D., January 1997 – December 2001.

Chair, Atmospheric Chemistry Technical Section, American Geophysical Union, January 1998 – January 2004.

Co-Mission Scientist, NASA SOLVE, an Arctic stratosphere mission, October 1999 - March 2000.

Member, Scientific Steering Committee, University of Michigan's PROPHET project, 1998 – 2001.

Member, NASA Ballooning Operations External Independent Readiness Review Panel, June-September 2000.

Invited external reviewer, US Global Change Research Program Long-Range Plan, November 2000 - February 2001.

Lead co-convener, IAMAS Symposium 7.5 on HO_x, RO_x radicals and related species in the planetary boundary layer, nighttime chemistry, and vertical mixing, Innsbruck, Austria, July 10-18 2001.

Member, Scientific Steering Committee, NASA INTEX field study, 2001- 2006.

Member, NCAR Atmospheric Chemistry Division Review Panel, October 2001.

Chair, NCAR Atmospheric Technology Division Review Panel, October 2001.

Member, program committee, Workshop on Interactions of Urban Pollution with the Regional and Global Environment, NASA Goddard Space Flight Center, May 2002.

UCAR member representative from Penn State, July 2002 - present

Member, program committee, HIAPER Workshop, NCAR, November 2002.

Invited participant, NRC Workshop on the Environment, National Academy of Sciences, Irvine, CA, November 2002.

Invited panelist, Climate Change Science Program Planning Workshop, Washington, DC, December 3-5 2002.

Member, External Review Panel for the Department of Meteorology, University of Maryland, January 2003.

Director, International Summer School on Atmospheric and Oceanic Sciences, L'Aquila, Italy, 20-25 September 2004.

Member, Science Committee, Mexico City Metropolitan Area study, 2003.

Member, External Review Pranel for the School of Earth and Atmospheric Sciences, Georgia Institute of Technology, October 2003.

Member, NOAA Atmospheric Chemistry and Climate Proposal Review Panel, November, 2003.

Member, Advisory Council for Environmental Research of the Forschungszentrum Juelich Gmbh, Germany, February 2004 – February 2006.

Member, NASA INTEX Proposal Review Panel, March 2004.

Member, NSF HIAPER Instrumentation Proposal Review Panel, May 2004.

Member, Advisory Committee for Geosciences, National Science Foundation, April 2004 – October 2006.

Chair, Advisory Committee for Geosciences, National Science Foundation, April 2005 – October 2006.

Member, NOAA Atmospheric Chemistry and Climate Proposal Review Panel, October 2004.

Candidate for Councilor, American Meteorological Society (lost election), 2005.

Candidate for President-Elect, Atmospheric Sciences Section, American Geophysical Union (lost election), 2005.

Member, External Advisory Committee for NCAR Earth Observing Laboratory (EOL), January 2006 – October 2010; December 2011 – September 2016.

Member, NCAR EOL Facilities Assessment Subcommittee on Airborne Measurements, May 2006 – June 2008.

Director, International Summer School for Atmospheric and Oceanic Sciences, Aerosols and climate change, 22-26 September 2008, University of L'Aquila, Italy.

Member, NSF Geosciences Directorate Strategic Vision Working Group, October 2006 – October 2009.

Chair, External Advisory Committee for Interdisciplinary Science and Environmental Technology Cooperative Science Center, North Carolina A&T, Greensboro, NC, March 2007- October 2011.

Member, NASA Aura Science proposal panel review, Baltimore, MD, September 2007.

Member, Search Committee for the Assistant Director of the NSF Geosciences Directorate, April – November 2007.

Member, External Review Panel for the Department of Atmospheric Science, University of Albany, September 2007.

Member, External Advisory Committee for NCAR Earth Systems Science Laboratory (ESSL), June 2008 – 2009.

Member, Fellows Committee, American Meteorological Society, January 2009 – October 2011.

Member, Visiting Committee for the NASA University Research Center at Howard University, November 2008 – December 2013.

Chair, External Review Committee, Department of Atmospheric Sciences, Texas A&M University, College Station, Texas, March 2009.

Member, NASA Senior Panel Review, Washington, DC, May 2009.

Member, External Review Committee, Department of Atmospheric and Oceanic Sciences, University of Colorado, March 2010.

Member, Technical Committee for the International Conference on Atmospheric Chemical Mechanisms (ACM-III), May – December 2010.

Member, External Advisory Committee for NCAR Earth Systems Laboratory, June 2010 – July 2011; January 2012 – December 2014.

Member, Search Committee for the NCAR Earth Observing Laboratory Assistant Director, March 2010 – August 2010.

Member, NASA Earth Sciences Directorate External Review, NASA Langley Research Center, Hampton, VA, 1-3 November 2011.

Member, Technical Committee, International Conference on Atmospheric Chemical Mechanisms (ACM-III), April - December 2012.

Session chair, International Conference on Atmospheric Chemical Mechanisms (ACM-III) Meeting, Davis CA, December 2012.

Associate Editor, Journal of Atmospheric Chemistry, 2013 – present.

Member, External Advisory Committee for NCAR ACCORD, December 2013 – present.

Co-Chair, UCAR Strategic Planning Goal #2 Team, "Enable and support NCAR in fulfilling its scientific mission", March-August, 2014.

Member, Committee of "Abilitazione scientifica nazionale", an Italian faculty promotion review committee for the sectors of astronomy, astrophysics, and earth and planetary sciences, August 2014 – present.

Guest Associate Editor, DC3 Special Collection, Journal of Geophysical Research, April 2014 – June 2015.

Co-Convener, 1st OH Reactivity Specialists Uniting Meeting, Mainz Germany, 13-15 October, April 2014 – October 2014.

Co-Chief Editor, Journal of the Atmospheric Sciences, January 2015 – present.

Member, NRC committee on "Future of Atmospheric Chemistry Research", November 2014 – December 2016

Co-converner, Mario Molina Symposium, American Meteorological Society Annual Meeting, New Orleans, LA, July 2015- January 2016.

Member, Search Committee for the Assistant Director of the NSF Geosciences Directorate, February – June 2016.

Member, External Advisory Committee for NCAR ACCOM, April 2015 – present.

Member, Advisory Board of Professors, Earthquake and Environmental Hazards PhD program, University "G. d'Annunzio" of Chieti-Pescara, Chieti, Italy. March 2017 – present.

PUBLICATIONS, REFEREED (210 publications, h-index: 58 (Web of Science)):

Feldman, P.D. and W.H. Brune, 1976: Carbon production in comet West 1975, *Ap. J.*, **209**, L45.

Brune, W.H., P.D. Feldman, R.C. Anderson, W.G. Fastie and R.C. Henry, 1978: Midlatitude oxygen ultraviolet nightglow. *Geophys. Res. Lett.*, **5**, 383.

Brune, W.H., P.D. Feldman and G.H. Mount, 1978: A search for far-ultraviolet emission from Sirius B. *Ap. J.*, **225**, L67.

Brune, W.H., G.H. Mount and P.D. Feldman, 1979: Vacuum ultraviolet spectrophotometry and effective temperatures of hot stars. *Ap. J.*, **227**, 884.

Anderson, R.C., W.H. Brune, R.C. Henry, P.D. Feldman and W.G. Fastie, 1979: The spectrum of the diffuse cosmic ultraviolet background. *Ap. J.*, **233**, L39.

Anderson, R.C., R.C. Henry, W.H. Brune, P.D. Feldman and W.G. Fastie, 1979: Far ultraviolet studies. V. Rocket observation of the diffuse cosmic background. *Ap. J.,* **234**, 415.

Feldman, P.D., W.H. Brune and R.C. Henry, 1981. Possible detection of far-ultraviolet line emission from hot interstellar gas. *Ap. J.*, **249**, L51.

Friedl, R.R., W.H. Brune and J.G. Anderson, 1983. Radiative and predissociative lifetimes of the v'=0 level of the $A^2\sum^+$ state of SH and SD from chemical and spectroscopic studies. *J. Chem. Phys.,* **79***,* 4227.

Brune, W.H., J.J. Schwab and J.G. Anderson, 1983. Laser magnetic resonance, resonance fluorescence, and resonance absorption studies of the reaction kinetics of $O + OH \rightarrow H + O_2$, $O + HO_2 \rightarrow OH + O_2$, $N + OH \rightarrow H + NO$, and $N + HO_2 \rightarrow$ products at 300 K between 1 and 5 torr. *J. Phys. Chem.*, **87**, 4503.

Schwab, J.J., D.W. Toohey, W.H. Brune and J.G. Anderson, 1984: Reaction kinetics of $O + ClO \rightarrow Cl + O_2$ between 252 – 347 K. *J. Geophys. Res.*, **89**, 9581.

Brune, W.H., E.M. Weinstock, J.J. Schwab, R.M. Stimpfle and J.G. Anderson, 1985: Stratospheric ClO: In situ detection and a new approach. *Geophys. Res. Lett*., **12**, 441.

Friedl, R.R., W.H. Brune, and J.G. Anderson, 1985: The kinetics of SH with NO_2, O_3, O_2, and H_2O_2. *J. Phys. Chem*., **89**, 5505.

Brune, W.H. and J.G. Anderson, 1986: *In situ* observations of midlatitude stratospheric ClO and BrO. *Geophys. Res. Lett*., **13**, 1391.

Toohey, D.W., W.H. Brune and J.G. Anderson, 1987: Mechanism and kinetics of $Br + HO_2 \rightarrow HBr + O_2$ and $Br + H_2O_2 \rightarrow$ products over the temperature range 260 – 390 K. *J. Phys. Chem*., **91**, 1215.

Hazen, N.L., E. Thompson, W.H. Brune and J.G. Anderson, 1987: Long extensive reeling in the stratosphere—A progress report. *Adv. Space Res*., **7** (7), 97.

Toohey, D.W., W.H. Brune, and J.G. Anderson, 1988: Rate constant for the reaction Br + O3 $\rightarrow$ BrO + O_2. Kinetics and mechanisms for 248 to 418 K. *Int. J. Chem. Kin*., **20**, 131.

Brune, W.H., E.M. Weinstock and J.G. Anderson, 1988: Midlatitude ClO below 22 km altitude: Measurements with a new aircraft-borne instrument. *Geophys. Res. Lett*., **15**, 144.

Brune, W.H., D.W. Toohey, J.G. Anderson, W.L. Starr, J.F. Vedder and E.F. Danielsen, 1988: In situ northern mid-latitude observations of ClO, O_3, and BrO in the wintertime lower stratosphere. *Science*, **242**, 558.

Schwab, J.J., W.H. Brune and J.G. Anderson, 1989: Kinetics and mechanism of OH + HO_2 reaction. *J. Phys. Chem*., **93**, 1030.

Abbatt, J.P.D., D.W. Toohey, F.F. Fenter, P.S. Stevens, W.H. Brune, and J.G. Anderson, 1989: Kinetics and mechanism of X + ClNO XCl + NO (X = Cl, F, Br, OH, O, N) from 220 K to 450 K. Correlation of reactivity and activation energy with electron affinity of X. *J. Phys. Chem*., **93**, 1022.

Stevens, P.S., W.H. Brune and J. G. Anderson, 1989: Kinetics of F + H_2O/D_2O over the temperature range 240-373 K. Experimental and theoretical evidence for a tunneling mechanism. *J. Phys. Chem*., **93**, 4068.

Brune, W.H., J.G. Anderson and K.R. Chan, 1989: In situ observations of BrO over Antarctica: ER-2 aircraft results from 54°S to 72°S latitude. *J. Geophys. Res*., **94**, 16, 639.

Anderson, J.G., W.H. Brune, S.A. Lloyd, D.W. Toohey, S.P. Sander, W.L. Starr, M. Loewenstein and J.R. Podolske, 1989: Kinetics of O_3 destruction by ClO and BrO within the Antarctic vortex: An analysis based on in-situ ER-2 data. *J. Geophys. Res*., **94**, 11, 480.

Anderson, J.G., W.H. Brune, M.J. Proffitt, 1989: Ozone destruction by chlorine radicals within the Antarctic vortex: The spatial and temporal evolution of ClO – O_3 anticorrelation based on in-situ ER-2 data. *J. Geophys. Res*., **94**, 11, 465.

Brune, W.H., D.W. Toohey, J.G. Anderson and K.R. Chan, 1990: In situ observations of ClO in the Arctic stratosphere: ER-2 aircraft results from 59 N to 80 N latitude. *Geophys. Res. Lett*., **17**, 505.

Brune, W.H., D.W. Toohey, S.A. Lloyd and J.G. Anderson, 1990: The sunrise and sunset variation of ClO in the lower stratosphere. *Geophys. Res. Lett*., **17**, 509.

Toohey, D.W., J.G. Anderson, W.H. Brune and K.R. Chan, 1990: In situ measurements of BrO in the Arctic stratosphere. *Geophys. Res. Lett*., **17**, 513.

Jones, R.L., S. Solomon, D.S. McKenna, L.R. Pode, W.H. Brune, D.W. Toohey, J.G. Anderson and D.W. Fahey, 1990: The polar stratospheric cloud event of January 24: Part 2, photochemistry. *Geophys. Res. Lett*., **17**, 541.

McKenna, D.S., R.L. Jones, L.R. Poole, S. Solomon, D.W. Fahey, K.K. Kelly, M.H. Proffitt, W.H. Brune, M. Loewenstein and K.R. Chan, 1990: *Geophys. Res. Lett*., **17**, 553.

Mather, J.H. and W.H. Brune, 1990: Heterogeneous chemistry on liquid sulfate aerosols: A comparison of in situ measurements with zero-dimensional model calculations. *Geophys. Res. Lett*., **17**, 1283.

Kawa, S.R., D.W. Fahey, S. Solomon, W.H. Brune, M.H. Proffitt, D.W. Toohey, D.E. Anderson, Jr., L.C. Anderson and K.R. Chan, 1990: Interpretation of aircraft measurements of NO, ClO, and O_3 in the stratosphere. *J. Geophys. Res.*, **95**, 18,597.

Anderson, J.G., W.H. Brune and D.W. Toohey, 1991: Free radicals within the Antarctic vortex: The role of CFCs in Antarctic ozone loss. *Science*, **251**, 39.

Toohey, D.W., W.H. Brune, K.R. Chan and J.G. Anderson, 1991: In situ measurements of midlatitude ClO in winter. *Geophys. Res. Lett*., **18**, 21-24.

Brune, W.H., 1991: Stratospheric chemistry. U.S. Report to the IUGG for the 1987-1990 quadrenium. *Review of Geophys*., Supplement, U.S. National Report 1987-1990, 12-24.

Brune, W.H., J.G. Anderson, D.W. Toohey, D.W. Fahey, S.R. Kawa, R.L. Jones, D.S. McKenna, and L.R. Poole, 1991: The potential for ozone depletion in the Arctic polar stratosphere. *Science*, **252**, 1260.

King, J.C., W.H. Brune, D.W. Toohey, J.M. Rodriguez, W.L. Starr and J.F. Vedder, 1991: Measurements of ClO and O_3 from 21 N to 61 N in the lower stratosphere during during February, 1988. Implications for heterogeneous chemistry. *Geophys. Res. Lett*., **18**, 2273-2276.

Brune, W.H., R.A. Cox, R. Turco, G. Brasseur, W.A. Matthews, X. Zhou, A. Douglass, R.J. Zander, M. Prendez, J.M. Rodriguez, B.N. Subbaraya and A. O'Neill, 1991: Chapter 4. Stratospheric Processes: Observations and Interpretation, *Scientific Assessment of Ozone Depletion*, 1991, WMO/WNEP.

Schoebert, M.R., A.R. Douglass, R.S. Stolarski, P.A. Newman, L.R. Lait, D.W. Toohey, L. Avallone, J.G. Anderson, W.H. Brune, D.W. Fahey and K. Kelley, 1993: The evolution of ClO and NO along air parcel trajectories. *Geophys. Res. Lett*., **20**, 2511-2514.

Avallone, L.M., D.W. Toohey, W.H. Brune, R.J. Salawitch, A.E. Dessler and J.G. Anderson, 1993: Balloon-borne insitu measurements of ClO and Ozone: Implications for heterogeneous chemistry and mid-latitude ozone loss. *Geophys. Res. Lett*., **20**, 1795-1798.

Stevens, P.S., J.H. Mather, and W.H. Brune, 1994: Measurement of OH and HO_2 by laser-induced fluorescence at low pressure, *J. Geophys. Res*., **99**, 3543-3557.

Wahner, A., M. Geller, F. Arnold, W. Brune, D. Caroille, A. Douglass, C. Johnson, D. Lister, J. Pyle, R. Ramaronson, D. Rind, F. Rohrer, U. Schumann, and A. Thompson, 1994: Chapter 11. Subsonic and Supersonic Aircraft Emissions. *Scientific Assessment of Ozone Depletion: 1994*, World Meteorological Organization, Global Ozone Research and Monitoring Project, Report No. 37, February 1995.

Pavloski, C., W. Brune and G. Young, 1995: Developing an Undergraduate Laboratory in Atmospheric Physics, *Bull. Am. Met. Soc*., **76**, 235-240.

Brune, W.H., P.S. Stevens, and J.H. Mather, 1995: Measuring OH and HO_2 in the troposphere by laser-induced fluroescence at low pressure. *J. Atmos. Sci*., **52**, 3328-3336.

Lamb, D., Moyle, A.M., and W.H. Brune, 1996: The environmental control of individual aqueous particles in a cubic electrodynamic levitation system. *Aerosol Sci. and Tech*., **24**, 263-278.

Tuck, A.F., W.H. Brune, and R.S. Hipskind, 1997: Airborne Southern Hemisphere ozone experiment/measurements for assessing the effects of stratospheric aircraft (ASHOE/MAESA): A road map. *J. Geophys. Res*., **102**, 3901-3904.

Cantrell, C.A., R.E. Shetter, J.G. Calvert, and F.L. Eisele, E. Williams, K. Baumann, W.H. Brune, P.S. Stevens, and J.H. Mather, 1997: Peroxy radicals from photostationary state deviations and steady state calculations during the tropospheric OH photochemistry experiment at Idaho Hill, CO, 1993. *J. Geophys. Res*., **102**, 6369-6378.

Mather, James H., Philip S. Stevens, and William H. Brune, 1997: OH and HO_2 measurements using laser-induced fluorescence, 1997. *J. Geophys. Res*., **102**, 6427-6436.

Stevens, P.S., J.H. Mather, and W.H. Brune, F. Eisele, D. Tanner, A Jefferson, C. Cantrell, R. Shetter, S. Sewall, A Fried, B. Henry, E. Williams, K. Baumann, P. Goldan, and W. Kuster, 1997: HO_2/OH and RO_2/HO_2 ratios during the tropospheric OH photochemistry experiment: Measurement and theory. *J. Geophys. Res*., **102**, 6379-6391.

Fong, Ching and William H. Brune, 1997: A laser induced fluorescence instrument for measuring tropospheric NO_2. *Rev. Sci. Instrum*., **68 (11)**, 4253-4262.

Brune, W.H., I.C. Faloona, D. Tan, A.J. Weinheimer, T. Campos, B.A. Ridley, S.A. Vay, J.E. Collins, G.W. Sachse, L. Jaegle and D.J. Jacobs, 1998: Airborne in situ OH and HO_2 observations in cloud-free troposphere and lower stratosphere during SUCCESS. *Geophys. Res. Letters*, **25**, 1701-1704.

Jaegle, L., D.J. Jacob, W.H. Brune, D. Tan, I.C. Faloona, A.J. Weinheimer, B.A. Ridley, T.L. Campos, and G.W. Sachse, 1998: Sources of HO_x and production of ozone in the upper troposphere over the United States. *Geophys. Res. Letters*, **25**, 1709-1712.

Campos, T.L., A.J. Weinheimer, J. Zheng, D.D. Montzka, J.G. Walega, F.E. Grahek, S.A. Vay, J.E. Collins, Jr., L.O. Wade, G.W. Sachse, B.E. Anderson, W.H. Brune, D. Tan, I. Faloona, S.L. Baughcum, and B.A. Ridley, 1998: Measurement of NO and NO_y emission indices during SUCCESS. *Geophys. Res. Lett.*, **25**, 1713-1716.

Tan, D., I. Faloona, W.H. Brune, A. Weinheimer, T. Campos, B. Ridley, S. Vay, J. Collins, and G. Sachse, 1998: In situ measurements of HO_x in aircraft exhaust plumes and contrails during SUCCESS. *Geophys. Res. Lett.*, **25**, 1721-1724.

Brune, W.H., D. Tan, I. Faloona, L. Jaegle, D. Jacob, B. Heikes, J. Snow, Y. Kondo, R. Shetter, G. Sachse, B. Anderson, G. Gregory, S. Vay, H. Singh, D. Davis, J. Crawford, D. Blake, 1999: OH and HO_2 chemistry in the North Atlantic free troposphere. *Geophys. Res. Lett*., **26**, 3077-3080.

Jaegle, L., D. Jacob, W. Brune, I. Faloona, D. Tan, Y. Kondo, G. Sachse, B. Anderson, G. Gregory, S. Vay, H. Singh, D. Blake, R. Shetter, 1999: Ozone production in the upper troposphere and the influence of aircraft during SONEX: Approach of NOx-saturated conditions. *Geophys. Res. Lett*., **26**, 3081-3084.

Newman, P.A., D.W. Fahey, W. H. Brune, M.J. Kurylo, 1999: Preface, Special Section on POLARIS. *J. Geophys. Res*., **104**, 26,481-26,496.

Faloona, I., D. Tan, W. Brune, L. Jaegle, D. Jacob, Y. Kondo, M. Koike, R. Chatfield, R. Pueschel, G. Ferry, G. Sachse, S. Vay, B. Anderson, J. Hannon, H. Fuelberg, Observations of HO_x and its relationship with NO_x in the upper troposphere during SONEX. *J. Geophys. Res*., **105**, 3771-3783, 2000.

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RESEARCH SUPPORT

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Brune, W.H., 1986: Detection of Atmospheric Halogen Radicals, National Center for Atmospheric Research, Boulder, CO, 20 November 1986.

Brune, W.H., 1987: Halogen Radicals in the Stratosphere, NASA Ames Research Center, Moffett Field, CA, 10 November 1987.

Brune, W.H., 1988: The Antarctic Ozone Hole: Truth and Consequences, Peyton Nallie Rhodes Annual Physics Lecture Series, Rhodes College, Memphis, TN, April 1988.

Brune, W.H., 1988: The Antarctic Ozone Hole: Detection and Interpretation of a New Atmosphere, Pennsylvania State University Branch of the American Meteorological Society, Penn State University, University Park, PA, 7 September 1988.

Brune, W.H., 1989: Observations of perturbed chemistry in the Antarctic and Arctic stratospheres, 133rd CMS Fluorocarbon Science Meeting, Fluorocarbon Progress Panel, CMA, Stresa, Italy, April 1989.

Brune, W.H., 1989: From Freon to Ozone Holes: The Role of Chlorine in the Stratosphere, EG&G Idaho Science Seminar, Idaho Falls, ID, April, 1989.

Brune, W.H., 1989: From Freon to Ozone Holes: The Role of Chlorine in the Stratosphere, IUP Annual Sigma Xi Banquet, Indiana University of Pennsylvania, Indiana, PA, 26 April 1989.

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Brune, W.H., 1989: Climate, Freon, and Ozone Change. Two lectures presented at Southeast Missouri State University, Cape Girardeau, MO, November 1989.

Brune, W.H., 1990: Present measurement capabilities for radicals. Lower Stratospheric Measurements Issues: A Workshop, NASA Ames Research Center, October 1990.

Brune, W.H., 1990: Halogen Photochemistry in the Springtime Polar Vortices, NOAA/ERL Aeronomy Laboratory, Boulder CO, 21 March 1990.

Brune, W.H., 1991: The Antarctic Ozone Hole: Truth and Consequences, Petroleum and Natural Gas Engineering Department 590 Seminar Series, Penn State University, University Park, PA, January 1991.

Brune, W.H., 1991: Holes in the Poles: Looking for the Link between CFCs and Ozone Depletion , Zoological Society of Philadelphia Workshop on Polar Regions: Fragile Frontiers for Teachers at the Philadelphia Zoo, Philadelphia, PA, April 1991.

Brune, W.H., 1991: Impacts of Atmospheric Chemistry on Global Change, EMS College presentation to the Penn State University Board of Trustees, Penn State University, University Park, PA, September 1991.

Brune, W.H., 1993: Stratospheric Ozone Depletion, Geophysical Information for Teachers Workshop, Baltimore, MD, May 24, 1993.

Brune, W.H., 1993: Earth's Fragile Ozone Layer, Maryland Science Center, May 25, 1993.

Brune, W.H., 1993: Issues in Stratospheric Photochemistry: Recent Findings and Research Goals, 1993 AGU Spring Meeting, May 1993.

Brune, W.H., 1993: In situ Measurements of Stratospheric Trace Gases. Course on diagnostic tools in atmospheric physics, July, 1993.

Brune, W.H., P.S. Stevens, J.H. Mather, 1993: Measurements of Tropospheric OH and HO_2 with Laser Induced Fluorescence at Low Pressures. Course in diagnostic tools in atmospheric physics. July 1993.

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Brune, W.H., 1993: Earth's Fragile Ozone Layer, Public Lecture at the Exploratorium, December 8, 1993.

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Brune, W.H., 1995: The link between stratospheric ozone and chlorofluorocarbons, employees of Shavers Creek Nature Center, Penn State University, University Park, PA, 27 January 1995.

Brune, W.H., 1995: The chemical evolution of the polar stratosphere: A status report, American Meteorological Society 75th Meeting, Dallas, TX, 18 January 1995.

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