

Donald James Wuebbles

The Harry E. Preble Professor of Atmospheric Sciences
University of Illinois

Biography

Donald J. Wuebbles is the Harry E. Preble Professor of Atmospheric Sciences at the University of Illinois. He is a professor in the Department of Atmospheric Sciences as well as an affiliate professor in both the Department of Civil and Environmental Engineering and in the Department of Electrical and Computer Engineering. He was Head of the Department of Atmospheric Sciences from 1994 until 2006, and was the first Director of the School of Earth, Society, and Environment, from 2006 to 2008.. He was also the first Director of the Environmental Council at the University of Illinois, from 1996 until August 1999; as Director, he held a Dean’s level position and was responsible for the oversight and development of educational and research programs across the University of Illinois relating to the environment. Professor Wuebbles earned his B.S. (1970) and M.S. (1972) degrees in Electrical Engineering from the University of Illinois. He received his Ph.D. in Atmospheric Sciences from the University of California at Davis in 1983. Professor Wuebbles spent many years as a research scientist and group leader at the Lawrence Livermore National Laboratory before returning to the University of Illinois to be Head of the Department of Atmospheric Sciences in 1994.

Dr. Wuebbles returned to the University in June 2017 after being on special assignment through the National Science Foundation as Senior Advisor for the Geosciences Directorate. For 1.7 years, until mid-January 2017, he was Assistant Director with the Office of Science and Technology Policy of the Executive Office of the President in Washington DC. In coordination with the U.S. Global Change Research Program, he has been co-leading the preparation of the Climate Science Special Report, part of the sustained assessment process for the 4th National Climate Assessment (NCA4) that provides a comprehensive assessment of the science of climate change with a special focus on the United States. He is also serving on the steering committee for NCA4 and is Coordinating Lead Author for Chapter 1 of NCA4.

At the University of Illinois, Dr. Wuebbles led the development of the School of Earth, Society, and Environment, and was its first director. He also has led the development of two highly successful undergraduate programs, one in Atmospheric Sciences, and the other, an interdisciplinary major, in Earth, Society and Environment Sustainability (ESES). The ESES major is held as a model for interdisciplinary environmental sustainability programs across the nation. Dr. Wuebbles also led the development of an online major in Environmental Sustainability that was transitioned to largely become an online version of the ESES major.

Professor Wuebbles is the author of over 500 scientific articles, most of which relate to the interactions of atmospheric chemistry and physical processes affecting atmospheric composition (e.g., tropospheric and stratospheric ozone, urban air quality), resulting radiative forcing on climate, and the effects on the climate system resulting from both human activities and natural phenomena. His research emphasizes the development and use of mathematical models of the chemical and physical processes in the atmosphere that affect all of these processes. Through his research, Professor Wuebbles has had a number of important science contributions and “firsts” during his career. Some of his early contributions include studies of the importance of both temperature feedback and multiple scattering on stratospheric composition, and a study demonstrating “diurnal” behavior of trace gases during a solar eclipse that led to a NASA measurement campaign during a solar eclipse. He developed one of the first comprehensive urban air quality models (which was used in the first study of its kind showing the VOC-limited (VOC = volatile organic compounds) behavior of ozone formation in the San Francisco area and one of the first two-dimensional models for studying atmospheric chemistry. In the last 1970s, he authored the most complete analysis of the effects of nuclear tests on stratospheric ozone done to date.

Professor Wuebbles’ research has had a direct impact on policies to protect the ozone layer. His early 1980s analyses of a broad range of halocarbon future scenarios had a significant impact on early ozone policy considerations. During that time period, he also developed the concept of Ozone Depletion Potentials used in most policymaking aimed at protection of the ozone layer (e.g., the Montreal Protocol and its amendments, the U.S. Clean Air Act). He coauthored a series of papers on trends in stratospheric ozone, including the first to statistically prove that a decrease in stratospheric ozone was occurring in the early 1980s. These papers led to Professor Wuebbles and

colleagues receiving the Stratospheric Ozone Protection Award from the U.S. Environmental Protection Agency in 2005. Professor Wuebbles also coauthored the 1986 paper that provided the basic principles explaining the existence of the Antarctic ozone hole. Professor Wuebbles' graphic of the effects of our evolving understanding of atmospheric chemistry and physics on ozone perturbations during the 1970s and 1980s is still used extensively to point out the historical process of learning in science. His 1991 paper on the relationship between solar flux variations and upper stratospheric ozone changes was the first to capture these interactions accurately. More recently, he also developed the revised concept for ODPs to account for the effects of short-lived halocarbons on ozone. For these many accomplishments, Professor Wuebbles was elected a member of the International Ozone Commission in 2000 (and reelected in 2004, 2008 and 2102 as Director of Communications for the IO3C). IN 2016, he was elected to the SPARC (Stratosphere-Troposphere Processes and Their Role in Climate) Scientific Steering Group (which is under the auspices of the WMOs World Climate Research Programme).

As a convening lead author on the first and second international assessments of climate change sponsored by the UN's Intergovernmental Panel on Climate Change (IPCC), Professor Wuebbles co-authored development of the Global Warming Potentials concept being used in policy considerations on greenhouse gases and their potential effects on climate; this concept is included in the Kyoto Protocol and most carbon trading applications. In a paper combining observations with theory, Professor Wuebbles and colleagues provided the first analysis showing that observed trends in lower stratospheric temperature could be explained in terms of the observed trends in ozone and carbon dioxide. Mostly with his students, Professor Wuebbles has used satellite-based trends of several gases to show that the dynamics of the stratosphere is being changed by climate change and that changes in climate could have a significant impact on air quality in the U.S. More recently he and his students have done a number of published research studies on the changes occurring in the intensity of severe weather event sunder a changing climate.

Professor Wuebbles has been a lead author on a number of national and international assessments related to concerns about stratospheric ozone (including the WMO published Scientific Assessment of Ozone Depletion: 2014; he was recently asked to be a lead author on the 2018 WMO assessment) and about climate change, and is also a lead author on several assessments of the effects of current and projected subsonic and supersonic aircraft on the global environment. He chaired a major workshop on the aviation effects on climate for the FAA and NASA in 2006 that resulted in a new research program in the U.S. to better understand these issues. In 2007, he co-chaired the Climate Panel for a major workshop for the UN's International Civil Aviation Organization. Dr. Wuebbles has also led committees reviewing various programs in the U.S. Department of Energy and at its national laboratories. Dr. Wuebbles was a leader in assessments of the potential impacts of climate change on the Great Lakes region, the U.S. Northeast, and the city of Chicago, and is coauthor of the 2009 assessment of the understanding of potential climate impacts of climate change on the United States that was done for the U.S. Government (the 2nd National Climate Assessment). He also chaired the Global Environmental Change Focus Group for the American Geophysical Union from 2009-2012 that accounts for a major fraction of AGU membership.

Amongst his honors, Prof. Wuebbles is a Fellow of the American Association for the Advancement of Science, the American Geophysical Union, and the American Meteorological Society. Dr. Wuebbles is a Faculty Fellow in the National Center for Supercomputing Applications. He has been a Coordinating Lead Author and contributed to a number of the reports of the international Intergovernmental Panel on Climate Change (IPCC), which was awarded the Nobel Peace Prize in 2007. Professor Wuebbles was also a Coordinating Lead Author for the more recent major international IPCC assessment of climate change published in 2013 He also served on the Federal Advisory Committee and the Executive Secretariat Committee for the 3rd U.S. National Climate Assessment published in 2014, and was Convening Lead Author on the science of climate change chapter and two appendices. He was also a member of a small team for the U.S. National Academy of Sciences that prepared a special report on climate done jointly with the UK Royal Society. He co-led the chapter on policy considerations for the 2014 WMO-UNEP international assessment of stratospheric ozone and contributed to the Assessment for Decision-Makers summary. Dr. Wuebbles was the recipient of the 2014 Cleveland Abbe Award for Distinguished Service to the Atmospheric Sciences from the American Meteorological Society. He was also a coauthor of the book Engineering Response to Climate Change that has been awarded The Choice Outstanding Academic Title Award in 2014 by the American Library Association. He recently received the Cozzarelli Prize from the Proceedings of the National Academy of Sciences for a research paper published in 2014 (Lin et al.) and the 2014 Choice Award for Outstanding Academic Titles for the book Engineering Response to Climate Change that he co-wrote with other scientists and engineers.

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Nationality

Citizenship: United States of America

Education

B.S., 1966-1970, University of Illinois, Urbana
M.S., 1970-1972, University of Illinois, Urbana
Ph.D., 1976-1983, University of California, Davis

Honors or Awards

NOAA Special Achievement Award, 1972
NASA Group Achievement Award, 1982
Eta Kappa Nu (Scholastics Honorary)
Sigma Tau (Scholastics Honorary)
Phi Eta Sigma (Scholastics Honorary)
Tau Beta Pi (Scholastics Honorary)
American Men and Women of Science, 1982-present
Who's Who in Frontier Science and Technology, 1983-present
Who's Who in California, 1984-1995
International Who's Who of Contemporary Achievement, 1984-present
Men of Achievement, 1985-present
Who's Who in the West, 1986-1995
LLNL Special Achievement Award for Best Journal Paper, 1991
Who's Who in America, 1993-present
LLNL Special Achievement Award for Best Book Publication, 1993
Dictionary of International Biography, 1994-present
Who's Who in the World, 1994-present
Who's Who in the Midwest, 1995-present
Five Thousand Personalities of the World, 1996-present
2000 Outstanding People of the 20th Century, 1997-present
Who's Who in Science and Engineering, 1998-present
Lexington's Who's Who, 1999-present
International Directory of Distinguished Leadership, 2000-present
2000 Outstanding Scientists of the 20th Century, 2000-present
UCAR Advocate for Science Award, 2000
2000 Outstanding Scientists of the 21st Century, 2001-present
Who's Who in the 21st Century, 2001-present
2000 Outstanding Intellectuals of the 21st Century, 2001-present.
Outstanding People of the 21st Century, 2001-present
One Thousand Great Scientists, 2002-present
Who's Who of Professionals, 2002-present
Fellow, North American Academy of Arts and Sciences, 2002-present
UCAR Champion of Science Award, 2002
Who's Who of Professional Management, 2003-present
Who's Who Executive and Professional Registry, 2003-present
Empire Who's Who, 2003-present
Strathmore's Who's Who, 2003-present
2003 UCAR Science Advocate of the Year
University of Illinois Alumni Discretionary Award to Faculty, 2003
Faculty Fellow, National Center for Supercomputing Applications, 2003-2007

Who's Who in Sciences Higher Education, 2004-present
 Who's Who Among America's Teachers, 2003-present
 United's Who's Who, 2004-present
 Manchester's Who's Who, 2004-present
 2005 Stratospheric Ozone Protection Award, U.S. Environmental Protection Agency
 2005 UCAR Science Advocate of the Year Award
 2006 NASA Honor Group Achievement Award
 2006 UCAR Science Advocate of the Year Award
 List of Teachers Ranked as Excellent, UIUC, 2005, 2007, 2013
 2007 NASA Group Achievement Award as member of the Upper Atmosphere Research Satellite science team
 2007 UCAR Science Advocate of the Year Award
 Received personalized plaque for contributions to the award of the 2007 Nobel Peace Prize to the Intergovernmental Panel on Climate Change (served as Coordinating Lead Author and made other contributions to a number of international assessments relating to climate change)
 Fellow, American Association for the Advancement of Science (named in October 2007)
 Director of Communications (elected office), International Ozone Commission, 2008-present
 Member (Elected by academia peers), Board of Trustees, University Corporation for Atmospheric Research, 2008-2012
 Fellow, American Geophysical Union (named in January 2009)
 Paul Harris Fellow, Rotary International, 2010-present
 Fellow, American Meteorological Society (named in September, 2011)
 2014 Cleveland Abbe Award, American Meteorological Society (received in February 2014)
 The 2014 Choice Outstanding Academic Title Award from the American Library Association for the coauthored book *Engineering Response to Climate Change*; awarded in February 2015.
 2014 Cozzarelli Prize from the Proceedings of the National Academy of Sciences for Lin et al. paper ; awarded in February 2015.
 2014 Editors' Citation for Excellence in Refereeing – EOS, American Geophysical Union; March 2015.
 2015 Stephen Schneider Lecture, American Geophysical Union, San Francisco, December 2015.
 2017 Presidential Forum lecture for the American Meteorological Society, Feb. 2017.

Professional Employment

1970–1972

Research Assistant, University of Illinois, Urbana

1972–1973

Atmospheric Scientist, Aeronomy Lab., National Oceanic and Atmospheric Administration, Boulder, CO

1973–1994

Atmospheric Scientist, University of California, Lawrence Livermore National Laboratory, Livermore, CA

1987–1994

Group Leader, Global Radiation, Chemical, and Dynamical Interactions, University of California, Lawrence Livermore National Laboratory, Livermore CA

1994-present

Professor, Department of Atmospheric Sciences, University of Illinois, Urbana, IL

1996-1999

Director, The Environmental Council, University of Illinois, Urbana, IL

1994-1996, 2000-2006

Head, Department of Atmospheric Sciences, University of Illinois, Urbana, IL

2006-2008

Executive Coordinator / Director, School of Earth, Society, and Environment, University of Illinois, Urbana, IL

2009-present

Harry E. Preble Professor of Atmospheric Sciences, University of Illinois, Urbana, IL

2015-2017

Asst. Director, Office of Science and Technology Policy, Executive Office of the President, Washington DC

2015-present

Senior Advisor, National Science Foundation, Arlington, VA

Professional Affiliations

Member, American Geophysical Union
 Member, American Meteorological Society
 Member, American Association for the Advancement of Science
 Member, American Chemical Society
 Member, Sigma Xi

Highlights of Professional Activities (past 5 years)

Member Representative, University Corporation for Atmospheric Research, 1994-present
 Member, Advisory Board, Aspen Global Change Institute, 1997-present
 Member, Science Team, Biomass Burning and Lightning Emissions atmospheric measurement campaigns, sponsored by Japan, 2000-present
 Member and officer, International Ozone Commission, 2000-2016
 Member, Federal Aviation Administration's Research Engineering and Development Advisory Committee, Energy and Environment Subcommittee, 2007-present
 Chair, Committee of Visitors, review of Climate Change Research Program, Department of Energy, April 2007.
 Member, UCAR Board of Trustees (elected October 2008), 2008-2012
 President, AGU Global Environmental Change Focus Group, 2009-2013
 Member, American Geophysical Union Council, 2009-2012
 Member, UIUC Vice-Chancellor For Research, Energy Advisory Committee, 2009-present
 Guest Editor, Journal of Great Lakes Research, 2009-2010
 2009 Chancellor's Lecture, University of Illinois, October 6, 2009
 Member, American Geophysical Union Strategic Planning Task Force, 2009
 Lead author, WMO-UNEP assessment on stratospheric ozone, 2009-2011
 Editor-in-Chief, Insciences Journal on Climate Change, 2010-present
 Coordinating Lead Author, IPCC international climate assessment, 2010-2014
 Member, Federal Advisory Committee, U.S. National Climate Assessment, 2011-2014
 Member, Executive Secretariat, U.S. National Climate Assessment, 2011-2014
 Coordinating Lead Author, U.S. National Climate Assessment, 2011-2014
 AGU Council Leadership Team, 2012-2013
 Member, Committee on Admissions and Academic Standards, College of Liberal Arts and Sciences, University of Illinois, 2012-present
 Member, NCAR CESM Advisory Board, 2012-2013
 Joint U.S. National Academy of Science and UK Royal Society Committee on Climate Change, 2013- 2014.
 AGU Fellows Program Review Task Force, 2013-present
 Member, Steering Committee, UIUC Institute for Sustainability, Energy, and Environment, 2013-present
 Member, Steering Committee, University of Illinois Inequality Initiative, 2013-present
 Member, AMS Committee on Effective Communication of Weather and Climate Information (CECWCI), 2013-present
 Member, AGU Special Task Force on Awards, 2013-2014
 Lead author, WMO-UNEP assessment on stratospheric ozone, 2012-2014
 Coordinating Lead Author, Climate Science Special Report, U.S. National Climate Assessment, 2016-present
 Member, SPARC Scientific Steering Group, World Climate Research Programme, 2016-present
 Member, national steering committee, 4th National Climate Assessment, 2016-present
 Lead author, WMO-UNEP 2018 assessment on stratospheric ozone, 2017-present

Highlights of Public Engagement (last 5 years) (last updated February 2017 but very incomplete)

Special talk at Chicago Botanical Gardens for World Environment Day, June 2, 2012.
 Special talk to the U.S. Department of Agriculture, Washington DC, June 7, 2012 (broadcast throughout the U.S.).
 Talk to executives at State Farm Insurance, June 11, 2012.
 Keynote talk at the International Laser and Radar Conference, Helios, Greece, June 25, 2012.
 Cited in The Week magazine, July 2012

Interview with PBS Newshour, July 2012
I serve on national advisory committees for the Federal Aviation Administration and for the Union of Concerned Scientists
Half hour television interview for WILL PBS, October 2012
Talk at G8 Exascale Projects meeting, November 2012
Invited talk at Advisory Board meeting of the Illinois Soybean Assn., December 2012
Invited talk at AGU Annual Meeting, December 2012
Invited talk at AMS annual meeting, January 2012
Talk at St. Louis Zoo, February 2013
Talk at Monsanto Corp., February 2013
Invited talk at AAAS annual meeting, February 2013
Seminar at Illinois State Water Survey, January 22, 2013.
Invited presentation at St. Louis Zoo, St. Louis, MO, February 5, 2013.
Keynote presentation at Conference on Agriculture and Climate Change, Monsanto Corporation (near St. Louis), February 6, 2013.
Invited presentation at the AAAS Annual Meeting, Boston, February 15-20, 2013.
Presentation to Physicists for a Responsible Society, Chicago, February 20, 2013.
Special presentation at the annual severe weather conference at Fermi National Laboratory, Chicago area, April 6, 2013.
Seminar at Illinois State University to kickoff their new annual event on climate change, April 15, 2013.
One of the keynote talks at The Big Data Workshop, University of Illinois, May 9, 2013.
Seminar at ITW Corporation in Chicago, June 5, 2013
June 6, 2013, presentation on climate change in downtown Chicago (with Tom Skilling of WGN TV).
Invited speaker and attendee at the Snowmass, CO special Climate Change Impacts and Integrated Assessment (CCI/IA) Workshop on July 23-27, 2013. This workshop brought together scientists, economists, and experts across a wide range of disciplines.
September 9, 2013, seminar at North Carolina state University.
September 11, 2013, seminar at Duke University.
October 7, 2013, invited keynote presentation at the Tri-Agency (NSF, NASA, and DOE) Educators Conference.
November 3-7, 2013, presentation at the WCRP Regional Climate Conference in Brussels, Belgium.
Keynote presentation at conference on Frontiers in Statistics and Forecasting in Taipei, Taiwan on December 16-19, 2013
November 16, 2013, invited speaker at special conference on climate and ethics at Chicago Loyola University.
Invited special presentation (with the head of FEMA) at the annual meeting of the American Meteorological Society, February 4, 2014.
Invited presentation on challenges in climate science at the annual meeting of the American Association for the Advancement of Science, February 14, 2014.
Invited presentation at Conference on Effects of Climate Change on the East Coast, Arlington, VA, February 26, 2014
March 9, 2014, seminar at Chicago Loyola University retreat center.
Invited keynote presentation at An International Symposium on Diagnosis and Early Warning of Urban Weather/Climate Extremes, Nanjing, China, March 19, 2014.
Invited presentation at G8 Exascale Computing Forum, Kobe, Japan, March 26, 2014.
Invited presentation at Severe Weather Forum, Fermi Lab, April 5, 2014.
Invited presentation at Conference on Societal Impacts on Natural Hazards, April 17, 2014.
May 6, 2014; Presentation at the White House for the release of the National Climate Assessment.
May 7-8, three presentations at the U.S. Congress (one at the House and two at the Senate).
Invited presentation at 2nd annual Blue Waters Conference, Champaign, May 13, 2014.
Special presentation on climate change at the Museum of Science and Industry, June 4, 2014.
Special presentation to be given at the Chicago Botanical Gardens for their World Environment Day, June 7, 2014.
Op-ed in Chicago Tribune, June 2014.
Special presentation on climate change given at the Museum of Science and Industry, Chicago, June 4, 2014.
Special presentation given at the Chicago Botanical Gardens for their World Environment Day, June 7, 2014.

Invited talk at the AMS Broadcast Meteorologists Conference, Lake Tahoe, CA, June 18, 2014.
 Invited seminar at Los Alamos National Lab, Los Alamos, NM, July 2014.
 Invited talk at Agriculture and Temperature Workshop, Ames, IA, August 2014.
 Invited talk at AGCI meeting on Frontiers in Global Change Science, Aspen, CO, August 2014.
 Invited talk at special workshop on agriculture and climate, St. Louis, September 2014.
 Seminar at Boeing, Seattle, September 2014.
 Special seminar at Bradley University, Peoria, September 22, 2014.
 Keynote talk, Pan Pacific Conference on Climate Change, Taipei, Taiwan, October 2014.
 Talk at ASCENT meeting, Alexandria, VA, October 2014.
 Invited talk at DOE Workshop on Climate, Washington, DC, October, 2014.
 Special seminar at Illinois College, Jacksonville, November 2014.
 Keynote talk at workshop held at Morton Arboretum, November 2014.
 Invited talk, ICAO workshop on aviation and the environment, Alexandria, VA, February, 2015
 Seminar at McHenry College, Crystal Lake, IL, February 2015.
 Invited talk, Fermi National Lab, March 2015.
 Keynote talk, U.S.-Iran workshop on climate change, Irvine, CA, March 2015.
 Invited talk, Blue Waters Annual Workshop, Oregon, May 2015.
 Stephen Schneider Lecture, American Geophysical Union, December 2015
 Invited talk, Fermi National Lab, March 2016.
 Keynote Talk, international meeting on transportation led by the National Academy of Sciences, Brussels, June 2016.
 Invited talk, American Geophysical Union Annual Meeting, San Francisco, December 2016.
 Invited talk, meeting of the Transportation Research Board of the National Academy of Sciences, Washington, DC, January 2017.
 Presidential Forum, American Meteorological Society Annual Meeting, Seattle, January 2017.
 Session chair, AAAS meeting, Boston, March 2017.
 Live interview on WGN-TV, April 2017.
 Invited speaker, Severe Storms Colloquium, FermiLab, April 2017.
 Panel for The Atlantic Monthly special event on climate and health in Chicago, April 2017.
 Panel on The Signal and the Noise: A Response to Nate Silver, Northwestern University, April 2017
 Panel for Earth Day, Chicago Botanic Garden, April 2017.
 Talk at Blue Waters Symposium, Oregon, May 2017
 Plus many other speeches and talks too numerous to list.
 Also additional interviews with newspapers, television and radio.

Publications, Book Chapters, and Reports (>500 total)

- Snyder, R.B., D.J. Wuebbles, J.E. Pearson, and B.E. Ewing, 1971: A study of environmental pollution by lead, State of Illinois, Institute for Environmental Quality, IIEQ Document 71-7.
 Shimazaki, T. and D.J. Wuebbles, 1972: Time-dependent two-dimensional parameterized model. *Proceedings of the Second Conference on the Climatic Impact Assessment Program*, DOT Report DOT-TSC-OST-73-4, p. 291–297.
 Wuebbles, D.J., T. Shimazaki, and C.F. Sechrist, Jr., 1972: A mathematical model for the radon density distribution in the 1–20 km region. *Aeronomy Report No. 46*, University of Illinois, 58 pp.
 Shimazaki, T., and D.J. Wuebbles, 1973: On the theoretical model for vertical ozone density distributions in the mesosphere and upper stratosphere. *Pure and Applied Geophysics*, 106–108, 1446–1463.
 Shimazaki, T., D.J. Wuebbles, and T. Ogawa, 1973: A two-dimensional theoretical model for stratospheric ozone density distributions in the meridional plane, National Oceanic and Atmospheric Administration, NOAA Technical Report ERL 279-OD 9.
 Wuebbles, D.J., and J.S. Chang, 1975: Sensitivity of time-varying parameters in stratospheric modeling. *Journal of Geophysical Research*, 80, 2637–2642.
 Wuebbles, D.J., J.S. Chang, and F.M. Luther, 1976: The diurnal model of chlorine chemistry in the stratosphere. *Proceedings of the International Conference on the Stratosphere and Related Problems*, Logan, UT, September 15–17.
 Chang, J.S., D.J. Wuebbles, and D.D. Davis, 1977: A theoretical model of global tropospheric OH distributions. Lawrence Livermore National Laboratory report UCRL-78392, Rev.1.

- Duewer, W.H., D.J. Wuebbles and J.S. Chang, 1977: Effect of NO photolysis on NO_x mixing ratios. *Nature*, 265, 523–525.
- Duewer, W.H., D.J. Wuebbles, H.W. Ellsaesser, and J.S. Chang, 1977: NO_x catalytic ozone destruction: Sensitivity to rate coefficients. *Journal of Geophysical Research*, 82, 2599–2605.
- Luther, F.M., D.J. Wuebbles, and J.S. Chang, 1977: Temperature feedback in a stratospheric Model. *Journal of Geophysical Research*, 82, 4935–4942.
- Wuebbles, D.J., 1977: A reexamination of potential space shuttle effects on the stratosphere. Lawrence Livermore National Laboratory report UCID-17689 (this version appeared in EIS for NASA use of space shuttle).
- Ackerman, M., D. Frimout, C. Muller, and D.J. Wuebbles, 1978: Stratospheric methane measurements and predictions. *Pure and Applied Geophysics*, 117, 367–380.
- Duewer, W.H., D.J. Wuebbles, and J.S. Chang, 1978: The effects of a massive pulse injection of NO_x into the stratosphere. LLNL report UCRL-80397, also published in *Proceedings of the WMO Symposium on the Geophysical Aspects and Consequences of Changes in the Composition of the Stratosphere*, WMO No.511.
- Luther, F.M., D.J. Wuebbles, W.H. Duewer, and J.S. Chang, 1978: Effect of multiple scattering on species concentrations and model sensitivity. *Journal of Geophysical Research*, 17, 254–272.
- MacCracken, M.C., D.J. Wuebbles, J.J. Walton, W.H. Duewer, and K.E. Grant, 1978: The Livermore regional air quality model: I. Concept and development. *Journal of Applied Meteorology*, 17, 254–272.
- Wuebbles, D.J., 1978: A theoretical study of solar eclipse effects on the stratosphere. Proceedings of the AMS Meeting on Meteorology of the Upper Atmosphere, October 24–27, Boston, MA; Lawrence Livermore National Laboratory report UCRL-80963.
- Wuebbles, D.J., 1978: A reexamination of potential space shuttle effects on the stratosphere. Appendix D of *Revised Estimates for Ozone Reduction by Shuttle Operation*, NASA Tech. memorandum 58209.
- Wuebbles, D.J., and F.M. Luther, 1978: Preliminary study of solar power satellites program potential effect on stratospheric chemistry. Lawrence Livermore National Laboratory/G-Division Report UASG 78-41.
- Chang, J.S., W.H. Duewer, and D.J. Wuebbles, 1979: The atmospheric nuclear tests of the 50s and 60s: A significant test of ozone depletion theories. *Journal of Geophysical Research*, 84, 1755–1765.
- Hudson, R.D., and E.I. Reed, 1979: The stratosphere: Present and future. NASA RP-1049, 1979 (contributing author of major international assessment on ozone).
- Luther, F.M., J.S. Chang, W.H. Duewer, J.E. Penner, R.L. Tarp and D.J. Wuebbles, 1979: Potential environmental effects of aircraft emissions. Lawrence Livermore National Laboratory report UCRL-52861; also available from Federal Aviation Administration as FAA-EE-79-23.
- Wuebbles, D.J., and J.S. Chang, 1979: One-dimensional coupled transport and chemical kinetics model of the stratosphere. *Proceedings of NATO Advanced Study Institute on Atmospheric Ozone: Its Variation and Human Influences*.
- Wuebbles, D.J., and J.S. Chang, 1979: A theoretical study of stratospheric trace species variations during a solar eclipse. Lawrence Livermore National Laboratory Report UCRL-80936, *Geophysical Research Letters*, 6, 179–182.
- Duewer, W.H., and D.J. Wuebbles, 1980: Effects of speculative reactions and mechanisms on predicted ozone perturbations. *Proceedings of 14th Informal Conference on Photochemistry*, Newport Beach, CA, March 30–April 3; also available as Lawrence Livermore National Laboratory report UCRL-83950.
- Wuebbles, D.J., and W.H. Duewer, 1980: Effects of recent kinetics measurements on our understanding of chemical processes in the troposphere and stratosphere. Published in *Proceedings of 14th Informal Conference on Photochemistry*, Newport Beach, CA, March 30–April 3; also available as Lawrence Livermore National Laboratory report UCRL-83960.
- Wuebbles, D.J., and J.S. Chang, 1980: A study of the effectiveness of the Cl_x catalytic ozone loss mechanisms. Presented at and published in the *Proceedings of the Quadrennial International Ozone Symposium*, Boulder, CO, August 4–9; also available as Lawrence Livermore National Laboratory report UCRL-84071.
- Wuebbles, D.J., 1980: Impact of new OH+HNO₃ rate measurement on models of atmospheric chemistry. Lawrence Livermore National Laboratory report UCID-18727.
- Wuebbles, D.J., 1980: A summary of current two-dimensional transport-kinetics models. Lawrence Livermore National Laboratory G-Division report UASG 80-25.
- Wuebbles, D.J., 1980: A comparison study between 2-D models. Lawrence Livermore National Laboratory report UASG 80-21.

- Wuebbles, D.J., 1980: The treatment of dynamical processes in two-dimensional models of the troposphere and stratosphere. Lawrence Livermore National Laboratory report UCID-18771.
- Wuebbles, D.J., and R.L. Tarp, 1980: Potential changes to stratospheric ozone from possible chlorofluorocarbon production scenarios. Lawrence Livermore National Laboratory report UCID-18583.
- Wuebbles, D.J., and R.L. Tarp, 1980: Sensitivity of quantum yield for O¹(D) production from ozone photolysis. Lawrence Livermore National Laboratory report UCID-18734.
- Luther, F.M., J.S. Chang, D.J. Wuebbles, and J.E. Penner, 1981: Ozone depletion calculations. *Proceedings of the NATO Advanced Research Institute on the Effect of Solar Ultraviolet Radiation in Marine Ecosystems*, also Lawrence Livermore National Laboratory report UCRL-85814.
- Wine, P.H., A.R. Ravishankara, N.M. Kreutter, R.C. Shah, J.M. Nicovich, R.L. Thompson, and D.J. Wuebbles, 1981: Rate of reaction of OH with HNO₃. *Journal of Geophysical Research*, 86, 1105–1112.
- Wuebbles, D.J., 1981: World Meteorological Organization, The stratosphere 1981: theory and measurements. WMO Global Ozone Research and Monitoring Project, Report No. 11 (contributing author).
- Wuebbles, D.J., 1981: The relative efficiency of a number of halocarbons for destroying stratospheric ozone. Lawrence Livermore National Laboratory report UCID-18924.
- Wuebbles, D.J., 1981: Scenarios for future anthropogenic emission of trace gases in the stratosphere. Lawrence Livermore National Laboratory report UCID-18997.
- Wuebbles, D.J., 1981: A summary of the LLNL one-dimensional transport-kinetics model of the troposphere and stratosphere. Lawrence Livermore National Laboratory report UCID-19185.
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- Wuebbles, D.J., 2017: Health Impacts in a Changing Climate. Chapter 10 in *One Health*, Wiley, in press.
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- He, H., X.-Z. Liang, and D. J. Wuebbles, 2017: Effects of emissions change, climate change and long-range transport on regional modeling of future U.S. particulate matter pollution. *Atmos. Environ.*, submitted.
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RESEARCH GRANTS AND CONTRACTS (Incomplete; not updated entirely)

Title: ANALYSIS OF ODPS AND GWPS FOR SELECTED IODINE COMPOUNDS (ENVIRONMENTAL TECHNOLOGY & EDUCATION CENTER)

Source of Support: US Air Force Office of Scientific Research (AFOSR)

Date & Period: 9/1/1995 1 yr

Amount: \$20,000

Title: OZONE DEPLETION POTENTIAL FOR CHLOROBROMETHANE (ENVIRO TECH - INTERNATIONAL)

Source of Support: Misc Commercial (Domestic) Corporations

Date & Period: 10/18/1995 .5 yr

Amount: \$18,000

Title: EXTENSION OF MODEL VALIDATION & SENSITIVITY STUDIES FOR DETERMINING AIRCRAFT.....

Source of Support: NASA

Date & Period: 2/08/96 .2 yr

Amount: \$10,000

Title: ASSESSING THE ROLE OF COUPLING BETWEEN CHEMISTRY & CLIMATE

Source of Support: NASA

Date & Period: 2/20/96 1 yr

Amount: \$91,110

Title: COORDINATION STUDIES WITH PNNL'S GLOBAL CHANGE ASSESSMENT MODEL: INTEGRATED SCIENCE MODELING & APPLICATIONS TO THE HUMAN DIMENSION

Source of Support: U.S. Dept Energy

Date & Period: 3/19/1996 3 yrs

Amount: \$140,562

Title: INDICES FOR OZONE & CLIMATE CHANGE: ANALYSES & NEW APPROACHES

Source of Support: US Environmental Protection Agency (EPA)

Date & Period: 5/16/1996 3 yrs

Amount: \$60,000

Title: MODELING STUDIES TO REDUCE UNCERTAINTIES IN EVALUATION OF SUBSONIC & HSCT AIRCRAFT EFFECTS ON THE GLOBAL ATMOSPHERE

Source of Support: NASA

Date & Period: 8/13/1996 3 yrs

Amount: \$187,681

Title: ASSESSING THE ROLE OF COUPLING BETWEEN CHEMISTRY & CLIMATE

Source of Support: NASA

Date & Period: 11/15/1996 1 yr

Amount: \$95,176

Title: CHEMICAL TRANSPORT MODELING OF THE GLOBAL ATMOSPHERE FOR ENVIRONMENTAL PROBLEMS EVALUATION COMPARISONS AND INITIAL....

Source of Support: US Environmental Protection Agency (EPA)

Date & Period: 1/14/1997 3 yrs

Amount: \$312,334

Title: EFFECTS OF METHANE EMISSIONS ON GLOBAL CLIMATE & THEIR ROLE IN GREENHOUSE GAS ABATEMENT STRATEGIES

Source of Support: US Environmental Protection Agency (EPA)

Date & Period: 1/31/1997 1 yr

Amount: \$100,000

Title: ADVANCED INTEGRATED SCIENCE MODELING CAPABILITY FOR INTEGRATED ASSESSMENT STUDIES

Source of Support: NSF/Natl Science Fdn

Date & Period: 2/13/1997 3 yrs

Amount: \$280,000

Title: INDICIES FOR OZONE & CLIMATE CHANGE: ANALYSES & NEW APPROACHES

Source of Support: US Environmental Protection Agency (EPA)

Date & Period: 3/25/1997 1 yr

Amount: \$115,000

Title: REEXAMINING GLOBAL WARMING POTENTIALS FOR A COMMON FRAMEWORK (ALTERNATIVE FLUOROCARBONS ENV. ACCEPTABILITY STUDY-AFEAS)

Source of Support: Misc Associations

Date & Period: 5/7/1997 1 yr

Amount: \$45,040

Title: UNCERTAINTY & INTEGRATED CLIMATE ASSESSMENT MODELS (HARVARD UNIV)

Source of Support: U.S. Department of Energy

Date & Period: 5/19/1997 2.2 yrs

Amount: \$27,647

Title: GREENHOUSE GASES RISK MANAGEMENT PROJECT

Source of Support: Electric Power Research Inst (EPRI)

Date & Period: 5/20/1997 .8 yr

Amount: \$10,000

Title: EVALUATING PEM-TROPICS OBSERVATIONS: UNCERTAINTY ANALYSES & EFFECTS OF DEEP CONVECTIVE MIXING ON TROPOSPHERIC CHEMISTRY

Source of Support: NASA

Date & Period: 1/9/1998 3 yrs

Amount: \$166,393

Title: ASSESSING THE ROLE OF COUPLING BETWEEN CHEMISTRY & CLIMATE

Source of Support: NASA

Date & Period: 1/28/1998 1 yr

Amount: \$95,000

Title: INDICES FOR OZONE & CLIMATE CHANGE: ANALYSES & NEW APPROACHES

Source of Support: US Environmental Protection Agency (EPA)

Date & Period: 5/12/1998 1 yr

Amount: \$30,000

Title: EVALUATING INTERACTIONS BETWEEN CHEMICAL & CLIMATE PROCESSES IN THE TROPOSPHERE & STRATOSPHERE

Source of Support: NASA

Date & Period: 6/17/1998 3 yrs

Amount: \$168,770

Title: EFFECTS OF METHANE EMISSIONS ON GLOBAL CLIMATE & THEIR ROLE IN GREENHOUSE GAS ABATEMENT STRATEGIES

Source of Support: US Environmental Protection Agency (EPA)

Date & Period: 6/19/1998 1 yr

Amount: \$138,414

Title: REDUCING UNCERTAINTIES IN UNDERSTANDING THE POTENTIAL EFFECTS OF HSCT AIRCRAFT ON THE GLOBAL ATMOSPHERE

Source of Support: NASA Goddard Space Flight Ctr

Date & Period: 8/17/1998 2 yrs

Amount: \$100,000

Title: RESEARCH TO IMPROVE MODELING CAPABILITIES FOR DETERMINING OZONE DEPLETION POTENTIALS FOR N...(GREAT LAKES CHEMICAL COMP)

Source of Support: Great Lakes Chemical

Date & Period: 12/22/1998 1 yr

Amount: \$95,000

Title: TRACE GASES IN THE GLOBAL ATMOSPHERE: EFFECTS ON OZONE & CLIMATE

Source of Support: US Environmental Protection Agency (EPA)

Date & Period: 4/16/1999 3 yrs

Amount: \$300,000

Title: GREENHOUSE GASES RISK MANAGEMENT PROJECT.

Source of Support: Electric Power Research Inst (EPRI)

Date & Period: 7/19/1999 .8 yrs

Amount: \$1,470

Title: EFFECTS OF METHANE EMISSIONS ON GLOBAL CLIMATE & THEIR ROLE IN GREENHOUSE GAS ABATEMENT STRATEGIES

Source of Support: US Environmental Protection Agency (EPA)

Date & Period: 9/27/1999 1 yr

Amount: \$116,000

Title: BIOGEOCHEMICAL CYCLES & CLIMATE CHANGE: POTENTIAL FEEDBACKS & INTERACTIONS (NASA AT WASHINGTON)

Source of Support: NASA

Date & Period: 3/14/2000 1 yr

Amount: \$22,000

Title: ATMOSPHERIC MODELING TO SUPPORT STATISTICAL TREND ANALYSIS (EPA SBC - UNIVERISTY OF CHICAGO)

Source of Support: US Environmental Protection Agency (EPA)

Date & Period: 3/9/2001 5 yrs

Amount: \$40,000

Title: BIOGEOCHEMICAL CYCLES & CLIMATE CHANGE: POTENTIAL FEEDBACKS & INTERACTIONS

Source of Support: NASA

Date & Period: 3/13/2001 1 yr

Amount: \$22,000

Title: TRACE GASES IN THE GLOBAL ATMOSPHERE: EFFECTS ON OZONE & CLIMATE

Source of Support: US Environmental Protection Agency (EPA)

Date & Period: 6/8/2001 3 yrs

Amount: \$50,000

Title: EVALUATING INTERACTIONS BETWEEN CHEMICAL AND CLIMATE PROCESS IN THE TROPOSPHERE AND STRATOSPHERE

Source of Support: NASA

Date & Period: 8/15/2001 .7 yr

Amount: \$20,000

Title: MODELING THE EFFECTS OF AVIATION ON THE ATMOSPHERE

Source of Support: US Environmental Protection Agency (EPA)

Date & Period: 9/19/2001 .6 yr

Amount: \$24,950

Title: PARAMETRIC STUDIES OF THE POTENTIAL EFFECTS ON GLOBAL ATMOSPHERIC CHEMISTRY & CLIMATE FROM SUPERSONIC (GULF STREAM AEROSPACE CORP.)

Source of Support: GULF STREAM AEROSPACE CORP

Date & Period: 11/13/2001 1 yr

Amount: \$80,000

Title: PARAMETRIC STUDIES OF AIRCRAFT EFFECTS ON OZONE

Source of Support: NASA

Date & Period: 4/18/2002 .4 yr

Amount: \$40,000

Title: TRACE GASES IN THE GLOBAL ATMOSPHERE: EFFECTS ON OZONE & CLIMATE

Source of Support: US Environmental Protection Agency (EPA)

Date & Period: 5/2/2002-12/31/06

Amount: \$380,000

Title: BIOGEOCHEMICAL CYCLES & CLIMATE CHANGE: POTENTIAL FEEDBACKS & INTERACTIONS

Source of Support: NASA

Date & Period: 5/28/2002 1 yr

Amount: \$24,000

Title: STUDIES FOR BOEING TO BETTER UNDERSTAND THE EFFECTS FROM AIRCRAFT EMISSIONS ON OZONE & CLIMATE

Source of Support: Boeing

Date & Period: 5/28/2002 1 yr

Amount: \$144,980

Title: METHODOLOGY FOR ANALYSES OF REGIONAL CLIMATE CHANGE: APPLICATION TO THE US MIDWEST/GREAT LAKES REGION (UNIVERSITY OF CALIFORNIA)

Source of Support: U.S. Energy-Misc

Date & Period: 8/19/2002 1 yr

Amount: \$19,695

Title: IMPACTS OF GLOBAL CLIMATE & EMISSION CHANGES ON U.S. AIR QUALITY

Source of Support: US Environmental Protection Agency (EPA)

Date & Period: 9/6/2002 3 yrs

Amount: \$900,000

Title: PARAMETRIC STUDIES WITH TWO DIMENSIONAL MODEL

Source of Support: NASA

Date & Period: 9/26/2002 .5 yr

Amount: \$75,000

Title: DEVELOPMENT OF AN UNDERGRADUATE MAJOR IN THE EARTH SYSTEM, ENVIRONMENT AND SOCIETY (UNIVERSITIES SPACE RSRCH ASSOC)

Sponsor: NASA

Date & Period: 12/20/2002 2 yrs

Amount: \$70,000

Title: ASSESSMENT OF AIRPORT EMISSIONS IMPACT OF AIR QUALITY IN THE CHICAGO AREA

Source of Support: NASA

Date & Period: 6/25/2003 3 yrs

Amount: \$484,588

Title: STUDIES FOR BOEING TO BETTER UNDERSTAND THE EFFECTS FROM AIRCRAFT EMISSION SON ONZONE AND CLIMATE (BOEING)

Source of Support: Boeing

Date & Period: 8/21/2003 2.6 yrs

Amount: \$111,093

Title: EVALUATING INTERACTIONS BETWEEN CHEMICAL AND CLIMATE PROCESSES IN THE TROPOSPHERE AND STRATOSPHERE

Source of Support: NASA

Date & Period: 2/17/2004 1.9 yrs

Amount: \$60,001

Title: ATMOSPHERIC IMPACT OF CF31 REPLACING CF3BR FOR SUPPRESSING IN-FLIGHT FIRES IN ENGING NACELLES

Source of Support: US Dept of Commerce (DOC)

Date & Period: 4/15/2004 .6 yr

Amount: \$24,999

Title: EVALUATING INTERACTIONS BETWEEN CHEMICAL AND CLIMATE PROCESSES IN THE TROPOSPHERE AND STRATOSPHERE

Source of Support: Science Applications Intl Corp

Date & Period: 7/14/2004 .8 yr

Amount: \$60,001

Title: STATISTICAL APPLICATIONS FOR CLIMATE CHANGE PROJECTIONS

Source of Support: CISES/University of Chicago (through EPA)

Period: 01/05 3 yrs

Amount: \$185,842

Title: CLOSING THE LOOP: SPATIAL DEMOGRAPHIC-ECONOMIC IMPACTS ON FUTURE AIR POLLUTION EMISSIONS

Source of Support: Environmental Protection Agency

Period: 01/05 3.25 yrs

Amount: \$749,999

Title: STUDIES FOR BOEING TO BETTER UNDERSTAND THE EFFECTS FROM AIRCRAFT EMISSIONS ON OZONE & CLIMATE

Source of Support: Boeing

Period: 12/05 2 yrs

Amount: \$420,754

Title: HONEYWELL FLUOROCARBONS

Source of Support: Honeywell Specialty Materials Grp

Date & Period: 4/18/2006 4.5 yr (likely to be renewed)

Amount: \$174,361

Title: ENVIRO Tech - Ozone depletion Potential Studies for n-Propyl Bromide
Source of Support: Albemarle Corp
Date & Period: 5/1/2006 .5 yr
Amount: \$50,000

Title: VOLPE
Source of Support: Volpe Natl Transportation Systems Ctr
Date & Period: 5/4/2006 .5 yr
Amount: \$25,000

Title: OZONE DEPLETION POTENTIAL STUDIES FOR TRICHLOROETHYLENE AND PERCHLOROETHYLENE
Source of Support: ENVIRO Tech Intl Inc
Date & Period: 6/22/2006 1.1 yr
Amount: \$20,000

Title: ASSESSMENT OF POTENTIAL CLIMATE CHANGE IMPACTS ON THE CHICAGO AREA
Source of Support: Global Philanthropy Partnership
Date & Period: 1/18/2007 1 yr
Amount: \$165,000

Title: Ozone Depletion Potentials for Short-Lived Compounds
Source of Support: Honeywell Corporation
Amount: \$155,000
Covered: June 2006 to June 2010 (to be extended; currently discussing new statement of work)

Title: Advancing Hydrologic Science through Synthesis: Water Cycle Dynamics in a Changing Environment
Source of Support: NSF
Amount: \$875,000
Covered: May 2007 to May 2011

Title: CMG Collaborative Research: Statistical Evaluation of Model-Based Uncertainties Leading to Improved
Climate Change Projections at Regional to Local Scales
Source of Support: NSF
Amount: \$900,000
Covered: October 2007 to October 2010

Title: Evaluation of the Potential Environmental Impacts from Large-Scale Use and Production of Hydrogen in
Energy and Transportation Applications
Source of Support: Department of Energy
Amount: \$600,000
Covered: October 2007 to June 2010

Title: Studies for Boeing to Better Understand the Effects for Aircraft Emissions on Ozone & Climate
Source of Support: The Boeing Company
Amount \$72,041
Covered: September 2009 to September 2010 (in process of getting another \$69,633 added; likely to be extended
further with new support)

Title: Virtual Observatory for Sustainability of Intensively Managed Environmental Systems
Source of Support: University of Illinois – IACAT program
Amount: \$500,000
Covered: June 2008 to September 2012

Title: Climate Metrics and Aviation: Analysis of Current Understanding and Uncertainties
Source of Support: Volpe National Transportation Systems (FAA)
Amount; \$50,000
Covered: September 2007 to August 2008

Title: Water Cycle Dynamics in a Changing Environment Advancing Hydrologic Science Through Synthesis
Source of Support: NSF
Amount; \$750,000
Covered: June 2007 to December 2013

Title: New analyses of climate impacts on Midwest agriculture and hydrology
Source of Support: ECI
Amount; \$25,000
Covered: June 2009 to June 2010

Title: Consequences of Global Climate and Emissions Changes on U.S. Water Quality: An Integrated Modeling Assessment
Source of Support: US EPA
Amount: \$800,000
Covered: May 2009 to May 2012

Title: Development and Evaluation of Climate Metrics for Aviation Based on Climate-Chemistry Modeling Analyses
Source of Support: FAA
Amount: \$200,000
Covered: September 2013 to May 2014

Title: Using Petascale Computing Capabilities to Address Climate Change Uncertainties
Source of Support: NSF
Amount: \$18,963 (plus millions of dollars of petascale computing time)
Covered: April 2011 to April 2015

Title: Enabling Climate Simulation at Extreme Scale
Source of Support: NSF, for G8 organization
Amount: \$450,000 (our part at UIUC)
Covered: April 2011 to April 2014

Title: Studies for Boeing to Better Understand the Effects for Aircraft Emissions on Ozone & Climate
Source of Support: The Boeing Company
Amount: Over \$1Million since began
Covered: latest two projects went from December 2012 to March 2014

Title: Using CMIP5 Results in Climate Analyses for the United States
Source of Support: NASA
Amount: \$250, 770
Covered: May 2012 to February 2015

Title: High Resolution Earth System Modeling for International Climate Assessment Using Blue Waters Capabilities
Source of Support: NSF PRAC (Bob Rauber is PI while I am in DC)
Amount: \$15,000 (plus millions of dollars of petascale computing time on Blue Waters)
Covered: August 2015 to August 2016 (new proposal submitted; we also have new support directly from NCSA)

Title: Climate Change Impacts to Department of Defense Installations
Source of Support: SERDP (project coordinated with Argonne National Laboratory) (Bob Rauber is PI while I am in DC)

Amount: \$264,970

Covered: August 2012 to June 2016

Title: Evaluation of FAA Climate Tools

Source of Support: FAA (Bob Rauber is PI while I am in DC)

Amount: \$180,000

Covered: September 2014 to August 2016 (to be renewed in August 2016)

Title: Particulate Matter Prediction and Source Attribution for U.S. Air Quality Management in a Changing World

Source of Support: EPA (Bob Rauber is PI while I am in DC)

Amount: \$790,000 (part to UIUC)

Covered: April 2016 to April 2019

Title: An Investigation into Current and Future Trends in Severe Thunderstorms and their Environments

Source of Support: NOAA NCEI (through CICS cooperative agreement) (Jeff Trapp is PI while I am in DC)

Amount: \$150,000

Covered: July 2015 to June 2018

Title: Scaling Mixing State to Predict Properties of Carbonaceous Aerosols: From Laboratory to Field to Climate Models

Source of Support: Los Alamos National Laboratory (Nicole Riemer is PI while I am in DC)

Amount: \$165,315

Covered: August 2015 to July 2018