

Curriculum Vitae Darin W. Toohey

Atmospheric and Oceanic Sciences
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Darin.Toohy@colorado.edu

Education

Harvard University, Cambridge, Massachusetts

Ph.D., Applied Physics, July 1988, Kinetic and Mechanistic Studies of Reactions of Bromine and Chlorine
Species Important in the Earth's Stratosphere
M.S., Applied Physics, June 1984

California State University, Fullerton, California

B.A., Physics, High Honors, with minor in Mathematics; May 1982
B.S., Chemistry, High Honors, with minor in Mathematics; May 1982

Professional

University of Colorado Boulder, Boulder, Colorado

Professor of Atmospheric and Oceanic Sciences; 2004-present
Erskine Faculty Fellow, University of Canterbury, Christchurch, New Zealand, 2018
Professor of Environmental Studies; 2004-2017
Director, Sustainability and Social Innovation Residential Academic Program, Spring 2013, 2014-2017
Director, Global Studies Residential Academic Program, 2013-2014
Director, Baker Residential Academic Program; 2005-2009
Associate Professor of Atmospheric and Oceanic Sciences and Environmental Studies; 1999-2004
Associate Professor of Environmental Studies; 1999-2004

United States Department of State, Washington DC

Jefferson Science Fellow, East Asian and Pacific Affairs; 2011-2012

University of California, Irvine, California

Associate Professor of Earth System Science and Chemistry; 1996-1999
Assistant Professor of Chemistry; 1992-1996
Assistant Professor of Earth System Science; 1991-1996

Harvard University, Cambridge, Massachusetts

Postdoctoral Fellow, Applied Physics; 1988-1991
Research Assistant, Applied Physics; 1982-1988
Teaching Assistant, Earth and Planetary Physics; 1983-1987

California State University, Fullerton, California

Undergraduate Research Assistant, Chemistry; 1980-1982
Teaching Assistant, Physics and Chemistry; 1980-1982

Teaching

(**Bold** denotes new courses developed, *italics* denote courses extensively modified)

University of Colorado at Boulder (29 undergraduate, 9 graduate)

Our Changing Environment, ATOC 1060 (S'99, F'00, S'02, S'06, F'07, S'09, F'09, F'10, S'13, F'17, S'21, S'22, F'22)

Atmospheric Chemistry, ATOC 5151 (F'14, F'16, F'19, F'21)

Laboratory Methods, ATOC 4500/5500 (F'20, F'22)

Air Chemistry and Pollution, ATOC 3500 (F'01, F'02, F'03, F'06, S'10, S'11, S'14, S'16, S'18)

Introduction to Sustainability, SUST 2800 (F'15)

Climate Change, Energy, and Foreign Policy, ATOC 7500 (F'12, S'20)

Instrumentation Lab, ATOC 7500 (S'07)

CU 101 - The Student Citizen, ARSC 1001 (F'07)

Remote Sensing of the Atmosphere, ATOC 5235 (S'04)

Introduction to Atmospheric Physics, ATOC 4710/5710 (F'99, S'03)

Thermodynamics of Atmospheres and Oceans, ASEN/ATOC 5225 (F'02)

Introduction to Atmospheric Dynamics, ATOC 4720/5720 (S'01)

University of Canterbury, Christchurch (1 undergraduate)

Atmospheric, Oceanic and Climate Dynamics, PHYS 319 (F'18)

Semester at Sea (2 undergraduate)

Introduction to Global Ecology (Summer '06)

Introduction to Biogeosciences (Summer '06)

University of California, Irvine (4 undergraduate, 7 graduate)

Honors ESS - Chemistry of the Environment, Earth System Science, H90 (1998)

Principles of Atmospheric Chemistry, Earth System Science 202 (1998)

Honors Chemistry - Chemistry of the Environment, Chemistry, H90 (1997)

Remote Sensing of the Environment, Earth System Science 233A (1996)

General Chemistry, Chemistry 1C (1996)

The Global Environment: Climate, Oceans, and Land, Physical Sciences 20F (1995)

Experimental Methods in Earth System Science, Earth System Science 231 A (1994)

The Global Environment: Atmospheric Pollution, Physical Sciences 20E (1994)

Atmospheric Pollution in the 1990s, Engineering Extension 434.32 (1994)

Principles of Atmospheric Chemistry, Chemistry 252 (1993)

Classical Dynamics with some Electricity and Magnetism, Chemistry 230 (1993)

Harvard University (5 undergraduate)

The Atmosphere, Science A-30 (1983, 1984, 1985, 1986, 1987)

California State University, Fullerton (2 undergraduate)

Fundamental Physics Laboratory, Physics 101 A (1981)

Fundamental Physics Laboratory, Physics 101 C (1980)

Honors and Awards

- ◆ Bank of America Achievement Award, 1978
- ◆ Graduated with High Honors, CSU Fullerton, 1982
- ◆ Outstanding Student, Department of Physics, CSU Fullerton, 1982
- ◆ American Chemical Society Outstanding Student, CSU Fullerton, 1982
- ◆ Lyle Wallace Service Award, Department of Chemistry, CSU Fullerton, 1982
- ◆ Certificate of Distinction in Teaching, Danforth Center for Teaching and Learning, Harvard University, 1985, 1986, and 1987
- ◆ Procter and Gamble Award, American Chemical Society, Division of Physical Chemistry; 1987

- ◆ NASA Group Achievement Award, AASE Campaign, 1989
- ◆ National Science Foundation, Young Investigator Award, 1992
- ◆ NASA Group Achievement Award, SPADE Campaign, 1993
- ◆ NOAA Outstanding Paper Award, 1994
- ◆ UC Irvine Nominee, NSF Presidential Faculty Fellow, 1996
- ◆ University of Colorado at Boulder, CIRES Visiting Faculty Fellow, 1997
- ◆ Outstanding Contributions to Undergraduate Education, Physical Sciences, UCI, 1998
- ◆ Antarctica Service Medal of the United States of America, 1999
- ◆ Distinguished Alumnus, Department of Chemistry, CSU Fullerton, 1999
- ◆ NASA Group Achievement Award, SOLVE Campaign, 2001
- ◆ NASA Group Achievement Award, UARS Science Team, 2007
- ◆ Certificate of Achievement, U.S. Department of State, 2012
- ◆ Recognition by the Ozone Secretariat, United Nations Environment Programme, 2012
- ◆ Faculty Recognition Award, Boulder Faculty Assembly, 2013
- ◆ CU Faculty of the Game, November 1, 2014
- ◆ ATOC Service Award for Assisting University Efforts to host a hub of the Future Earth International Secretariat, 2015
- ◆ ATOC Service Award for contributions to developing the draft of the proposal for an ATOC undergraduate major, 2015
- ◆ NASA Group Achievement Award, KORUS-AQ Campaign, 2017
- ◆ Erskine Faculty Fellowship, University of Canterbury, Christchurch, 2018
- ◆ American Geophysical Union Editors' Citation for Excellence in Reviewing, 2019

(Details for Darin Toohey)

Service

Professional

- ◆ Co-writer, UNDP proposal for O₃ measurements from “Southern Cone”, Buenos Aires, April, 1992
- ◆ Session Organizer and Chair, Fall AGU Meeting, San Francisco, CA, December 1992
- ◆ Session Chair, Fall AGU Meeting, San Francisco, CA, December 1992
- ◆ Session Organizer and Chair, Spring AGU Meeting, Baltimore, MD May 1993
- ◆ Session Organizer and Chair, Atmospheric Chemistry, ACS Meeting, Pasadena, CA, October 1993
- ◆ Session Chair, Methyl Bromide State of the Science Workshop, Washington DC, October 1993
- ◆ American Meteorological Society Committee on Middle Atmospheres, 1993-1996
- ◆ Session Chair, Satellite Data and Meteorology, AMS Meeting, Monterey, CA, October 1993
- ◆ Session Chair, Workshop on Chemical Physics in the Atmosphere, Telluride, CO, August 1994
- ◆ Co-organizer and Session Chair, Methyl Bromide Workshop, Monterey, CA, June 1995
- ◆ Organizer and Session Chair, Fall AGU Meeting, San Francisco, CA, December 1995
- ◆ Co-organizer, Stratospheric Ozone Depletion by Halogens: Recent Achievements and Continuing Challenges, AAAS Meeting, Washington DC, February 1996
- ◆ Panel Reviewer, NASA Assessment of the Effects of High-Speed Aircraft in the Stratosphere, 1998
- ◆ Chair, Communications Committee, AGU Atmospheric Sciences Section, 1998-2001
- ◆ Executive Committee, AGU Atmospheric Sciences Section, 1998-2002
- ◆ Observing Facilities Advisory Panel, NCAR, 1999-2002
- ◆ NSF SBIR Panel Reviewer, 1999
- ◆ Session Organizer, 2000 Conference on the Atmospheric Effects of Aviation, Snowmass, June 2000
- ◆ SPARC Water Vapor Assessment Review Panel, 2000
- ◆ NASA New Investigator Program, Panel Reviewer, 2000
- ◆ Chair, 2000 Conference on the Atmospheric Effects of Aviation, Snowmass, CO, June 2000
- ◆ Session Chair, IAMAS Meeting, Innsbruck, July, 2001
- ◆ Session Chair, Fall AGU Meeting, San Francisco, December 2001
- ◆ Session Chair, Spring AGU Meeting, Boston, MA, May 2001
- ◆ Session Chair, Spring AGU Meeting, Washington DC, May 2002
- ◆ Co-convener, Organizer, and Session Chair, Polar Ozone Workshop, Potsdam, Germany, March 2002
- ◆ Expert Reviewer, Arctic Climate Impact Assessment, 2003
- ◆ Editor, JGR Atmospheres, 2000-2005
- ◆ Co-organizer, Boulder Café Scientifique, 2005-2013
- ◆ Reviewer, Chapter 4, UNEP/WMO Scientific Assessment of Ozone Depletion, 2006
- ◆ Editorial Board, The Earth System Atlas, 2007-present
- ◆ Editor, Atmospheric Measurement Techniques, 2008-present
- ◆ Lead Author, Chapter 5, WMO Scientific Assessment of Ozone Depletion, 2010
- ◆ Review Panel, EPA Star Postdoctoral Fellowships, 2011
- ◆ Organizer, APEC High-Level Policy Dialogue on Open Governance and Economic Growth, Honolulu, HI, November 11, 2011
- ◆ Lead organizer of "APEC Workshop on Climate Change Adaptation in the Asia-Pacific: Observations and Modeling Tools for Better Planning," Singapore, August 23-24, 2012.
- ◆ Review Panel, Jefferson Science Fellows Program, 2013
- ◆ Review Panel, USAID, 2012, 2013, 2014
- ◆ Review Panel, NASA, 2009, 2012, 2014, 2016
- ◆ Review Panel, DFG (German Research Foundation), 2019

University (U.C. Irvine)

- ◆ Chemistry Department Group Housing Faculty Advisor, 1993
- ◆ Physical Sciences Machine Shop Committee, 1993-1994
- ◆ UCI Chemistry Graduate Admissions Committee, 1993-1995

- ◆ UCI PhD and Candidacy Exam Committees (ten from 1993-1998)
- ◆ UCI Earth System Science Department Graduate Researchers Award Committee, 1994-1995
- ◆ Chair, UCI Computer Policy Committee, 1995-1996
- ◆ UCI Computer Policy Committee, 1994-1996
- ◆ UCI Campus-Wide Information Systems Steering Committee, 1995-1996
- ◆ UCI Senate Executive Committee, 1995-1996
- ◆ ESS Faculty Search Committee, 1995, 1996, 1998
- ◆ Physical Sciences Instructional Computing Committee, UCI, 1996
- ◆ Faculty Panelist, Planning Your Research Career Workshop, UCI, May 15, 1996

University (CU Boulder)

- ◆ Director Search Committee, Program in Atmospheric and Oceanic Sciences (PAOS) (1999)
- ◆ Chair, Tenure Committee, PAOS (1999)
- ◆ Invited Panelist, Graduate School, Faculty Research Opportunities Program (2000)
- ◆ Tenure Committee, PAOS (2000)
- ◆ PAOS Self-Study Strategic Plan Committee (2000)
- ◆ Chair, Environmental Studies (ENVS) Self-Study Strategic Plan Committee (2000-2001)
- ◆ Biogeochemistry Faculty Search Committee, ENVS (2002)
- ◆ Co-organizer, PAOS/CDC Distinguished Lecture Series (2000-2001, 2002-2003)
- ◆ Executive Committee, PAOS (1999-2003)
- ◆ Graduate Admissions Committee, PAOS (1999, 2001-2002, 2002-2003)
- ◆ Executive Committee, ENVS (2000-2003)
- ◆ Graduate Student Advisor, PAOS (2002-2005)
- ◆ PAOS Comprehensive Exam Committee (2003-2005)
- ◆ Faculty Representative, PAOS Graduate Students Concerns (2003-2005)
- ◆ Graduate Student Advisor, PAOS (2003-2005)
- ◆ Curriculum Committee, ENVS (2000-2006)
- ◆ Invited panelist, Committee on Learning and Academic Support (2006)
- ◆ Chair, Faculty Search Committee, ENVS (2006-2007)
- ◆ Teaching Lab Development Committee, Department of Atmospheric and Oceanic Sciences (ATOC) (2006-2007)
- ◆ Provost's Task Force on Orientation (2007)
- ◆ Chair, ATOC Graduate Admissions Committee (2005-2008)
- ◆ Provost's Task Force for CU 101, Sub-group 3 (2006-2008)
- ◆ Member, Flagship 2030 Undergraduate Education Committee (2008)
- ◆ Chair, ATOC Undergraduate Curriculum Committee (2008)
- ◆ Invited Panelist, Academic Support Assistance Program, Supporting Your Student's Academics (2008)
- ◆ Sewall RAP Director Search Committee (2008)
- ◆ Chair, Promotion and Tenure Committee, ATOC (1999, 2005, 2006, 2009)
- ◆ Promotion and Tenure Committee, ATOC (1999, 2009)
- ◆ Residential Academic Program Council (2005-2009)
- ◆ Computer Committee, ATOC (2006-2009)
- ◆ Fulbright Scholarship Review Committee, CU Boulder (2006, 2009)
- ◆ Member of Review Committee, Council on Research and Creative Work (2009)
- ◆ Arts and Sciences, RAP Representative for ASSETT Steering Committee (2009)
- ◆ Chair, ENVS Sustainability Residential Academic Program Committee (2008-2009)
- ◆ Chair, ATOC Course Fees Committee (2006-2010)
- ◆ Chair, ATOC Comps I Exam Committee (2008-2010)
- ◆ Labs and Facilities Committee, ATOC (2009-2010)
- ◆ PAOS/ATOC Course Fees Committee (2003-2005, 2009-2010)
- ◆ Chair, Post-Tenure Review Committee, PAOS/ATOC (2003, 2006, 2008, 2013)
- ◆ Member, ATOC Awards Committee (2010-2013)
- ◆ ATOC Faculty Reappointment Committee, ATOC (2006, 2010, 2014)

- ◆ Co-organizer and Panel Moderator, CU Global Development and Education Symposium (2014)
- ◆ Co-author, CU proposal to host the Future Earth Global Secretariat (2014)
- ◆ CU Future Earth advisory committee (2013-2014)
- ◆ Judge, Big Ideas in Social Innovation Expo (2014)
- ◆ Chair, Search Committee, Global Studies RAP Program Coordinator (2014)
- ◆ Member, Office of Vice Chancellor for Research, Research Review Board (2012-2015)
- ◆ Member, Executive Committee, CU Mortenson Center (2013-2015)
- ◆ Member, Informal CU Global Development Visioning Group (2013-2015)
- ◆ Member, ENVS faculty Primary Unit Evaluation Committee (2014, 2015)
- ◆ Member, Faculty Search Committee, ENVS (2014-2015)
- ◆ Member, ATOC Space Committee (2014, 2015)
- ◆ Member, ATOC SEEC Amenities Committee (2015)
- ◆ INSTAAR Personnel Committee (2015)
- ◆ Award Selection Committee, COLABS Governor's Awards for High-Impact Research (2015)
- ◆ Member, Institutional Animal Care and Use Committee (IACUC) (2014, 2015, 2016)
- ◆ Chair, Sustainability and Social Innovation Instructor Search Committee (2015-2016)
- ◆ Chair, Residential Academic Program Instructor Reappointment Committee (2016, 2017)
- ◆ Member, SEEC Executive Steering Committee (2014-2017)
- ◆ Chair, ATOC Social Committee (2013-2018)
- ◆ Member, ATOC Comps I Exam Committee (2012, 2013, 2016, 2017, 2018)
- ◆ Member, ATOC Post-Tenure Review Committee (2018)
- ◆ Chair, ATOC Instructor Reappointment Committee (2019)
- ◆ Member, ATOC Fest and Distinguished Lecturer Committee (2019, 2020)
- ◆ Member, ATOC Student Admissions and Support Committee (2019, 2020)
- ◆ Chair, ATOC Comprehensive Exam I Committee (2020, 2021, 2022)
- ◆ Chair, ATOC Promotion to Full Professor Committee (2021)
- ◆ Representative for Association of Public and Land Grant Universities, Board on Oceans, Atmosphere, and Climate (BOAC) (2015-present)

Students and Postdoctorates Supervised

Undergraduate Students

- ◆ Anefiok Atuk (1986)
- ◆ Jean Andino (1987)
- ◆ Karena McKinney (1990-1991)
- ◆ Jason Low – UCI Chemistry (1994-1996)
- ◆ Dennis Ralutin – UCI Chemistry (1994)
- ◆ Jessica Neu – UCI Chemistry REU (1996)
- ◆ Dahlia Sokolov – UCI Engineering (1996)
- ◆ Steve Cordero – UCI Chemistry (1997)
- ◆ Sheila Manalang – UCI Chemistry (1997)
- ◆ Kiyono McRill – UCI Chemistry (1996)
- ◆ Jenny Yom – UCI Chemistry (1996)
- ◆ Tara Fortin – UCI Earth System Science (1995-1996)
- ◆ Nathan Johns - CU ATOC (2003)
- ◆ Diane Strassberg – CU ATOC (2005)
- ◆ Ian Moritz – CU Honors Program (2006)
- ◆ Arelis Rivera Giboyeaux – CU SMART Program (Summer 2009)
- ◆ Isatis Cintron – CU SMART Program (Summer 2013)
- ◆ Kayla Kaas – CU ENVS (UROP, Fall 2014)
- ◆ Ian Olley – CU ATOC (Independent Study, Spring, Fall 2015)
- ◆ William Luce – CU CE (Independent Study, Spring, Summer, 2015)
- ◆ Rachel Mooers – CU ATOC (Independent Study, Spring 2021, Senior Honor's Thesis, Fall 2021)

- ◆ Lavinia Toso (Visiting student from University of Milan, Summer-Fall 2022)

Graduate students

- ◆ James Pierson – UCI Chemistry (1992-1997)
- ◆ Karena McKinney – UCI Chemistry (1994-1998)
- ◆ Allison Conley – UCI Chemistry (1993)
- ◆ William Barney – UCI Chemistry (1993)
- ◆ Nancy Ciszkowski – UCI Chemistry (1996)
- ◆ Thomas Woyke – KFA Julich (1994)
- ◆ Amy Hankinson – CU PAOS (1999-2001)
- ◆ Alice Delia – CU PAOS (1999-2004)
- ◆ Brett Thornton – CU Chemistry (1999-2004)
- ◆ David Krank – CU PAOS (1999-2001)
- ◆ Kristi Hines – CU PAOS (2000)
- ◆ Jason Farmer – CU APS (1999-2001)
- ◆ Lars Kalnajs – CU PAOS (Summer 2003)
- ◆ Sherri Heck – CU PAOS (2005-2006,2013)
- ◆ Marsha Fisher – CU PAOS (2005-2007)
- ◆ Nick Facciola – (advised on research project, 2005-2006)
- ◆ Adriana Bailey – (advised on research project, 2009-2014)
- ◆ Anondo Mukherjee – CU ATOC (2014-2016)
- ◆ Stephanie Redfern – CU ATOC (August 2018)
- ◆ Bryan Rainwater – CU ATOC (2014-2022)
- ◆ Emily Wein – CU ATOC (2020-present)
- ◆ Joshua Mauss – CU ATOC (2022-present)

Postdoctorates

- ◆ Dr. Roy Dixon (1994)
- ◆ Dr. Troy Mazely (1995-1996)
- ◆ Dr. Hiroyuki Kosai (1996-2000)
- ◆ Dr. Holger Voemel (1999-2000)

Experience

Principal Investigator

- ◆ Balloon measurements of ClO, Palestine, TX (1990)
- ◆ Balloon measurements of ClO, Ft. Sumner, NM (1991)
- ◆ Development of fast-response CO₂ instrument for the ER-2 (1989-1992)
- ◆ Measurements of ClO and BrO, AASE II (1991-1992)
- ◆ Development of balloon-borne instrument for measurements of ClO and BrO (1993-1994)
- ◆ Measurements of ClO and BrO for SESAME, Kiruna, Sweden (1995)
- ◆ Development of balloon-borne CO₂ instrument for STRAT (1995)
- ◆ Development of a ClO instrument for measurements on the STRATO-2C aircraft (1996-1997)
- ◆ Development of a lightweight balloon-borne instrument for measurements of ClO and BrO (1995-1996)
- ◆ Balloon Measurements of ClO and BrO from Antarctica (1996)
- ◆ Balloon Measurements of ClO and BrO for ILAS-II Validations, Kiruna, Sweden (1997)
- ◆ Development of an ultra-fast instrument for measurements of ClO and Cl for the WB-57 (1997-1998)
- ◆ WB-57 Measurements of ClO for WAM, Houston (1998)
- ◆ WB-57 Measurements of ClO for RISO, Houston TX, Lancaster, CA (1998)
- ◆ WB-57 Measurements of ClO for ACCENT II, Houston, TX (1999)
- ◆ Development of CO₂ instrument for WB-57 (1999)
- ◆ Balloon measurements of ClO and BrO, Laramie, WY (1999)
- ◆ DC-8 Measurements of ClO for SOLVE (1999-2000)
- ◆ Balloon measurements of ClO and BrO for HALOZ-2000, Kiruna, Sweden (2000)

- ◆ WB-57 measurements of ClO and Cl for ACCENT III, Houston, TX, and Cape Canaveral, FL (2000)
- ◆ Balloon measurements of ClO and BrO from Te Anau, New Zealand (2001)
- ◆ Ground-based measurements of particle composition, PROPHET 2001, Pellston, MI (2001)
- ◆ Development of a Integrated System for Analyses of Aerosol Composition and Chemistry (1999-2004)
- ◆ Balloon Measurements of ClO and BrO, Kiruna, Sweden (2002)
- ◆ Measurements of particle composition, Palmer Elementary School (2002)
- ◆ Measurements of particle composition, O₃, NO_x, and CO₂, CELTIC (2003)
- ◆ WB-57 measurements of CO₂ for PUMA-A, Houston, TX and Cape Canaveral, FL (2004)
- ◆ WB-57 measurements of CO₂ and temp for PUMA-B, Houston, TX and Cape Canaveral, FL (2005)
- ◆ USFS Twin Otter measurements of fine particles, CO₂, and H₂O during MILAGRO, Veracruz, MX (2006)
- ◆ WB-57 measurements of CO₂ and temp for PUMA-C, Houston, TX and Cape Canaveral, FL (2006)
- ◆ Measurements of sub-micron particles at the USFS Fire Lab, Missoula, MT (2007)
- ◆ Measurements of sub-micron particles, CO₂, and H₂O, at Mauna Loa, HI, during WAWAIKI (2008)
- ◆ Measurements of sub-micron particle size and composition, Beltsville Air Quality Study, Maryland (2009)
- ◆ Measurements of sub-micron particles, CO₂, and H₂O, Hawaii (2010)
- ◆ C-130 measurements of sub-micron particles and isotopes of water for ICE-T, St. Croix (2011)
- ◆ Gulfstream V measurements of condensed water content, IDEAS, Broomfield CO (2013)
- ◆ C-130 measurements of condensed water content, ARISTO, Broomfield, CO (2015)
- ◆ Gulfstream V measurements of condensed water content, ORCAS, Punta Arenas, Chile (2016)
- ◆ DC-8 measurements of condensed water content, KORUS-AQ, Osan, Korea (2016)
- ◆ Gulfstream V measurements of condensed water content, ARISTO 2017, Broomfield, CO (2017)
- ◆ Gulfstream V measurements of condensed water content, SOCRATES, Hobart, Tasmania (2017-2018)
- ◆ C-130 measurements of sub-micron particles and cloud droplet residuals, WE-CAN, Boise, ID (2018)
- ◆ P-3 measurements of isotologues in condensed water and vapor, IMPACTS, Wallops Is., VA (2020)
- ◆ P-3 measurements of isotologues in condensed water and vapor, IMPACTS, Wallops Is., VA (2022)
- ◆ P-3 measurements of isotologues in condensed water and vapor, IMPACTS, Wallops Is., VA (2023)

Co-Investigator

- ◆ ER-2 measurements of ClO and BrO over the Arctic (1988)
- ◆ ER-2 measurements of ClO and BrO for AASE, (1988-1989)
- ◆ ER-2 measurements of CO₂ for SPADE, (1992)
- ◆ Ground-based measurements of ClO and BrO for ARCTOC '96, Ny Alesund, Spitsbergen, (1996)
- ◆ WB-57 measurements of CO₂ for ACCENT II, Houston (1999)
- ◆ Development of CO₂ instrument for DC-8 (1999)
- ◆ DC-8 measurements of CO₂ for SOLVE, (1999-2000)
- ◆ Ground-based measurements of ClO and BrO for PSE-2000, Alert, Canada, (2000)
- ◆ Ground-based measurements of particle composition, TexAQS, Houston, TX, (2000)
- ◆ WB-57 measurements of CO₂ for ACCENT III, Houston, TX, and Cape Canaveral, FL (2000)
- ◆ DC-8 measurements of NO and NO₂ during TRACE-P (2001)
- ◆ C-130 measurements of CO₂ for IDEAS, Broomfield, CO (2002)
- ◆ Measurements of CO₂, particle size composition, ASHRAE indoor AQS, Colorado (2005-2007)
- ◆ INTEX Ozone sonde Network Study, IONS (2006)
- ◆ C-130 measurements of fine particles during VOCALS, Chile (2008)
- ◆ C-130 measurements of fine particles during PLOWS (2009-2010)
- ◆ Gulfstream V measurements of fine particles during PREDICT, St. Croix, US Virgin Is. (2010)
- ◆ C-130 counterflow virtual impactor measurements of particles and water during ICE-T, St. Croix (2011)
- ◆ C-130 measurements of submicron aerosols, IDEAS-IV, Broomfield (2012)
- ◆ Gulfstream V measurements of cloud total water content, DC3, Kansas (2012)
- ◆ Gulfstream V measurements of droplet residuals, water isotologues, IDEAS, Broomfield CO (2013)
- ◆ 2ODIAK, ground-based measurements of aerosols and ice, McMurdo Sound, Antarctica (2014, 2015)
- ◆ Gulfstream V measurements of droplet residuals, ARISTO 2017, Broomfield CO (2017)
- ◆ Gulfstream V measurements of droplet residuals, SOCRATES, Hobart, Tasmania (2017-2018)
- ◆ C-130 measurements of super-micron particles, WE-CAN, Boise, ID (2018)

- ◆ Measurements of particles, CO₂, and H₂O generated by musical instruments, Boulder, CO (2020)
- ◆ Gulfstream V measurements of isotologues in condensed water, SPICULE, Broomfield, CO (2021)

Mission Planning

- ◆ Mission Scientist, HALOZ-2000 Campaign, Kiruna, Sweden (1999-2000)
- ◆ Mission Scientist, HALOZ-2001 Campaign, Lauder, New Zealand (2001)
- ◆ Mission Scientist, HALOZ-2002 Campaign, Kiruna, Sweden (2002)
- ◆ Project Scientist, PUMA-A, Houston, TX (2004)
- ◆ Project Scientist and Mission Manager, PUMA-B, Houston, TX/Cocoa Beach, FL (2005)
- ◆ Project Scientist and Mission Manager, PUMA-C, Houston, TX/Cocoa Beach, FL (2006)

Peer-Reviewed Publications and Reports

(111 from 1981 to present)

B.J. Finlayson-Pitts, T.E. Kleindienst, M.J. Ezell, and D.W. Toohey (1981), The Production of O(³P) and Ground State OH in the Reaction of Hydrogen Atoms with Ozone, **J. Chem. Phys.**, **74**, 4533-4543.

B.J. Finlayson-Pitts, D.W. Toohey, M.J. Ezell (1983), Relative Rate Constants for Removal of Vibrationally Excited OH(X²Π_i)_{v=9} by Some Small Molecules at Room Temperature, **Int. J. Chem. Kinet.**, **15**, 151-165.

B.J. Finlayson-Pitts, D.W. Toohey, M.J. Ezell (1984), Kinetics of Interaction of Vibrationally Excited OH(X²Π_i)_{v=9} with Simple Hydrocarbons at Room Temperature, **Int. J. Chem. Kinet.**, **17**, 613-628.

J.J. Schwab, D.W. Toohey, W.H. Brune, and J.G. Anderson (1984), Reaction Kinetics of O + ClO → Cl + O₂ Between 252-347 K, **J. Geophys. Res.**, **89**, 9581-9587.

D.W. Toohey, W.H. Brune, and J.G. Anderson (1986), Mechanism and Kinetics of Br + HO₂ → HBr + O₂ and Br + H₂O₂ → Products over the Temperature Range 260-390 K, **J. Phys. Chem.**, **91**, 1215-1222.

D.W. Toohey, W.H. Brune, and J.G. Anderson (1988), Rate Constant for the Reaction Br + O₃ → BrO + O₂ from 248 to 418 K: Kinetics and Mechanism, **Int. J. Chem. Kinet.**, **20**, 131-144.

D.W. Toohey and J.G. Anderson (1988), Formation of BrCl(³Π₀₊) in the Reaction of BrO with ClO, **J. Phys. Chem.**, **92**, 1705-1708.

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A. Heymsfield, A. Bansemer, G. Heymsfield, D. Noone, M. Grecu, and D. Toohey (2023), *Relationship of Multi-wavelength Radar Measurements to Ice Microphysics from the IMPACTS Field Program*, **J. Appl. Meteor. Clim.**, in press. <https://doi.org/10.1175/JAMC-D-22-0057.1>

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Invited Talks since 2010 (86 since from 1986 to 1999)

Using Rockets to Engineer Climate without Harming the Ozone Layer, The Academy for Lifelong Learning, Denver, CO, Mar. 3, 2010.

Climate Change in a Bottle, CU Science Wizards, University of Colorado, Dec. 4, 2010.

The Canary in the Coalmine: Why the Stratosphere is Still Relevant, Invited Seminar, University of Maryland, April 6, 2012.

Energy, Green Growth, and APEC, Invited lecture, Osgood Center for International Studies, April 2012.
The Canary in the Coalmine: Why the Stratosphere is Still Relevant, Invited Lecture, U.S. Department of State, April 24, 2012 (video and transcript available at <http://www.state.gov/e/stas/series/193969.htm>)

Saving the Earth's Ozone Layer: The (W)hole Story, Invited talk, The Royal Geographic Society of Hong Kong, August 3, 2012, Hong Kong.

In Situ Measurements of Aerosols and Trace Gases, Invited Talk, The Civic Exchange, Hong Kong, August 3, 2012

Energy, Air Pollution, Policy, and the Asia-Pacific Economic Cooperation, Invited talk for private sector representatives, U.S. Consulate General, Hong Kong, August 3, 2012

Serving as a Science Fellow in the U.S. Department of State, invited panelist, 2012-2013 Jefferson Science Fellow Orientation, National Academy of Sciences, Washington DC, August 20, 2012.

Context and Goals for the Workshop, Invited talk, APEC Workshop on Climate Change Adaptation in the Asia-Pacific: Observations and Modeling Tools for Better Planning, APEC/U.S. Department of State/ USAID, Singapore, August 23, 2012

Global Warming, Climate Change, and the Golden Age of Facts, Invited Lecture, U.S. Department of State, September 12, 2012.

Climate Change, Energy, and Economic Cooperation in the Asia-Pacific, Invited Seminar, Dept. of Meteorology, Penn State University, October 24, 2012.

Short-lived Climate Forcers: How They Get into the Atmosphere, Where They End Up, & What the Government is Doing to Get Rid of Them, Lecture for the "CU Science at the Cutting Edge" series, The Academy for Lifelong Learning, Denver, November 6, 2012.

Understanding Climate Change and the Redistribution of Heat, Winds, Water, and Worries, Invited Talk, U.S. Center, UN Framework Convention on Climate Change (UNFCCC) Conference of the Parties (COP18) in Doha, Qatar, November 28, 2012. Webcast with 4000 participants (video available at <http://www.ustream.tv/recorded/27347154>)

The Montreal Protocol: The Gift that Keeps on Giving, Invited Talk, American Geophysical Union Fall Meeting, San Francisco CA, December 5, 2012 (presented on behalf of Daniel Reifsnnyder, U.S. Department of State)

Climate Change, Energy, and Open Governance: My Year as an Economic Policy Analyst at the State Department, Café Scientifique, Boulder, CO, July 9, 2013

Exploring Measurements of Aerosols, Cloud Water Contents, and Stable Isotopes in Water, National Science Foundation, Arlington, VA, September 4, 2015.

My Year as a Jefferson Science Fellow, ATOC Forum, University of Colorado, Boulder, Friday, October 2, 2015.

Measurements to Unlock Mysteries of Atmospheric Clouds and Aerosols, Department of Physics and Chemistry, University of Canterbury, New Zealand, October 26, 2018.

Overview of CVI UHSAS Observations during SOCRATES, Southern Ocean Science Meeting, National Center for Atmospheric Research (NCAR), Boulder, CO, November 28, 2018.

D. Toohey (w/B. Rainwater, and C. Twohy), *Sub-Micron Particles In and Out of Clouds from the NCAR GV CVI Inlet*, Southern Ocean Atmospheric Research Workshop, Hobart, Australia, November 19, 2019.

D. Toohey, *Occam's Razor and the Ozone Hole*, Illinois Institute of Technology, Environmental Analytical Chem (CHEM-473-S01), April 19, 2021 (virtual)

Meeting Presentations since 2018 (173 from 1981 to 2017)

P. DeMott, C. McCluskey, K. Moore, A. Rauker, T. Hill, E. Levin, C. Twohy, D. Toohey, B. Rainwater, J. Stith, G. McFarquhar, R. Marchand, C. Bretherton, R. Wood, Y. Huang, S. Siems, M. University, S. Alexander, A. Gettelman, Alain Protat, R. Humphries, J. Ward, M. Keywood, S. Kreidenweis, *Spatial and Temporal Distributions of Ice Nucleating Particles over the Southern Oceans*, American Geophysical Union Fall Meeting, Washington, DC, December 10-14, 2018.

B. Rainwater, D. Toohey, C. Twohy, J. Jensen, J. Reeves, S. Beaton, *Evaluation of measurement bias of cloud water probes under icing conditions in the southern hemisphere during SOCRATES*, American Geophysical Union Fall Meeting, Washington, DC, December 10-14, 2018.

E. Fischer, J. Collett, A. Sullivan, P. DeMott, S. van den Heever, R. Schumacher, S. Murphy, J. Thornton, L. Hu, F. Flocke, D. Toohey, C. Twohy, S. Kreidenweis, and D. Farmer, *Leveraging the Data and Network of the Western Wildfire Experiment for Cloud Chemistry, Aerosol Absorption and Nitrogen (WE-CAN)*, American Geophysical Union Fall Meeting, Washington, DC, December 10-14, 2018.

E. Fischer, J. Collett, A. Sullivan, P. DeMott, S. van den Heever, R. Schumacher, S. Murphy, J. Thornton, L. Hu, F. Flocke, D. Toohey, C. Twohy, S. Kreidenweis, and D. Farmer, *Overview of the Western Wildfire Experiment for Cloud Chemistry, Aerosol Absorption and Nitrogen (WE-CAN)*, Geophysical Union Fall Meeting, Washington, DC, December 10-14, 2018.

G. McFarquhar, C. Bretherton, R. Marchand, A. Protat, P. DeMott, S. Alexander, S. Rintoul, G. Roberts, C. Twohy, D. Toohey, S. Siems, Y. Huang, R. Wood, R. Rauber, S. Lasher-Trapp, J. Jensen, J. Stith, G. Mace, J. Um, E. Järvinen, M. Schnaiter, A. Gettelman, K. Sanchez, C. McCluskey, I. McCoy, K. Moore, T. Hill, and B. Rainwater, *Airborne, ship- and ground-based observations of clouds, aerosols and precipitation from recent field projects over the Southern Ocean*, American Geophysical Union Fall Meeting, Washington, DC, December 10-14, 2018.

G. McFarquhar, C. Bretherton, R. T. Marchand, P. J. DeMott, S. P. Alexander, A. Protat, G. Roberts, C. H. Twohy, D. W. Toohey, S. Siems, Y. Huang, R. Wood, R. M. Rauber, S. Lasher-Trapp, J. B. Jensen, J. Stith, J. Mace, J. Um, E. Jaervinen, M. Schnaiter, A. Gettelman, K. J. Sanchez, C. S. McCluskey, I. L. McCoy, K. A. Moore, T. C. J. Hill, and B. Rainwater, *New Unique Observations of Clouds, Aerosols and Precipitation over the Southern Ocean: An Overview of SOCRATES and MARCUS*, 15th Conference on Cloud Physics 15th Conference on Atmospheric Radiation, Vancouver, CA, 9-13 July, 2018.

J. Um, G. M. McFarquhar, P. J. DeMott, G. Roberts, C. H. Twohy, M. Schnaiter, E. Järvinen, K. J. Sanchez, D. W. Toohey, C. H. Jung, T. C. J. Hill, C. S. McCluskey, and K. A. Moore, *Dependence of Vertical Variability of Microphysical Properties of Southern Ocean Stratus Clouds on Environmental Conditions Observed during the SOCRATES Field Campaign: Preliminary Results*, 15th Conference on Cloud Physics 15th Conference on Atmospheric Radiation, Vancouver, CA, 9-13 July, 2018.

J.L. Stith, J. B. Jensen, G. McFarquhar, S. Ellis, W. C. Lee, C. H. Twohy, D. W. Toohey, B. Rainwater, E. Järvinen, and M. Schnaiter, *Observations of Icing Conditions in Southern Ocean Clouds during SOCRATES*, 15th Conference on Cloud Physics 15th Conference on Atmospheric Radiation, Vancouver, CA, 9-13 July, 2018.

I.L. McCoy, C. Bretherton, R. Wood, C. H. Twohy, K. J. Sanchez, D. W. Toohey, and G. Roberts, *Cloud-Aerosol Interactions and Aerosol Variability Near Southern Ocean Low Clouds*, 15th Conference on Cloud Physics 15th Conference on Atmospheric Radiation, Vancouver, CA, 9-13 July, 2018.

B. Rainwater and D. Toohey, *Overview of CLH-2 Observations of Condensed Water Contents during SOCRATES*, Southern Ocean Science Meeting, National Center for Atmospheric Research (NCAR), Boulder, CO, 27-29 November, 2018.

C. Twohy, B. Rainwater, and D. Toohey, *Overview of CVI Cloud Droplet Residuals Observations during SOCRATES*, Southern Ocean Science Meeting, National Center for Atmospheric Research (NCAR), Boulder, CO, 27-29 November, 2018.

C. Twohy, D. Toohey, P. DeMott, B. Rainwater, L. Russell, S. Lewis, R. Geiss, C. McCluskey, T. Hill, G. McFarquhar, C. Bretherton, R. Wood, G. Roberts, K. Sanchez, C. Wolff, and P. Romashkin, *Measurements of Aerosol Particle and Cloud Properties over the Southern Ocean*, AMS 99th Annual Meeting, Phoenix, AZ, 6-10 January, 2019.

P. DeMott, K. Moore, C. McCluskey, A. Rauker, T. Hill, E. Levin, C. Twohy, D. Toohey, B. Rainwater, J. Stith, G. McFarquhar, R. Marchand, C. Bretherton, R. Wood, S. Alexander, A. Protat, A. Gettelman, Y. Huang, S. Siems, R. Humphries, J. Ward, M. Keywood, J. Mace, S. Kreidenweis, *Ice Nucleating Particles and Their Impacts on Clouds over the Southern Oceans*, AMS 99th Annual Meeting, Phoenix, AZ, 6-10 January, 2019.

B. Rainwater, A. Bailey, L. Christensen, R. Herman, D. Toohey, *Characterization of a New Laser Isotopologue Hygrometer for Measurements of Isotopes in Cloud Water*, AMS 99th Annual Meeting, Phoenix, AZ, 6-10 January, 2019.

E. Fischer, J. Collett, A. Sullivan, P. DeMott, S. Heever, R. Schumacher, S. Murphy, J. Thornton, L. Hu, F. Flocke, D. Toohey, C. Twohy, S. Kreidenweis, D. Farmer, *Introduction to the Western Wildfire Experiment for Cloud Chemistry, Aerosol Absorption and Nitrogen (WE-CAN)*, AMS 99th Annual Meeting, Phoenix, AZ, 6-10 January, 2019.

K. Barry, E. Levin, T. Hill, K. Moore, D. Toohey, S. Kreidenweis, E. Fischer, P. DeMott, *Ice Nucleating Particle Production from Wildfires*, AMS 99th Annual Meeting, Phoenix, AZ, 6-10 January, 2019.

G. McFarquhar, C. Bretherton, R. Marchand, A. Protat, P. DeMott, S. Alexander, S. Rintoul, G. Roberts, C. Twohy, D. Toohey, S. Siems, Y. Huang, R. Wood, R. Rauber, S. Lasher-Trapp, J. Jensen, J. Stith, J. Mace, J. UM, E. Järvinen, M. Schnaiter, A. Gettelman, K. Sanchez, C. McCluskey, I. McCoy, K. Moore, T. Hill, B. Rainwater, *Airborne, Ship-, and Ground-Based Observations of Clouds, Aerosols, and Precipitation from Recent Field Projects over the Southern Ocean*, AMS 99th Annual Meeting, Phoenix, AZ, 6-10 January, 2019.

C.F. Lee, N. Kille, K.J. Zarzana, B.J. Howard, T. Campos, D.W. Toohey, J. Snider, L. Oolman, E. Fischer, and R. Volkamer, *The CU airborne SOF instrument: Spectral retrieval and data validation for the 2018 BB-FLUX campaign*, poster presentation AMS 99th Annual Meeting, Phoenix, AZ, 6-10 January, 2019.

D.W. Toohey, A.R. Bailey, T. L. Campos, E. Fischer, F.M. Flocke, S. Redfern, J.M. Reeves, C.H. Twohy, and R.J. Yokelson, *A Comparison of PM_{10} Emissions in Smoke Plumes from Aircraft UHSAS and CO_2 Measurements During the WE-CAN and MILAGRO Campaigns*, American Geophysical Union Fall Meeting, San Francisco, 9-13 December, 2019.

C.S. McCluskey, A. Gettelman, C. Bardeen, E. Jarvinen, P.J. DeMott, T.C.J. Hill, C.H. Twohy, B.J. Rainwater, D.W. Toohey, S.M. Ellis, M.M. Hayman, J. Vivekanandan, J.B. Jensen, J.L. Stith, W. Wu, and G.M. McFarquhar, *Simulating Southern Ocean Mixed Phased Aerosol-Cloud interactions and Ice Microphysics with the NCAR Community Atmosphere Model*, American Geophysical Union Fall Meeting, San Francisco, 9-13 December, 2019.

K.R. Barry, T.C.J. Hill, E.J.T. Levin, K. Moore, C.H. Twohy, D.W. Toohey, R.S. Hornbrook, A.J. Hills, E.C. Apel, A. Jarnot, N.J. Blake, E.V. Fischer, S.M. Kreidenweis, and P.J. DeMott, *The Influence of Western United States Wildfires on Ice Nucleating Particle Concentrations*, American Geophysical Union Fall Meeting, San Francisco, 9-13 December, 2019.

P.J. DeMott, C.S. McCluskey, S.M. Burrows, K.R. Barry, E. Järvinen, K. Moore, T.C.J. Hill, E.J.T. Levin, J. Creamean, C.H. Twohy, D.W. Toohey, J.L. Stith, G.M. McFarquhar, W. Wu, A. Gettelman, J. Fan, S.

Lasher-Trapp, X. Zhao, X. Liu, P. Lawson, A. Heymsfield, S.M. Kreidenweis, and Y. Lin, *Assessing the Roles of Primary and Secondary Ice Formation in Clouds Through Measurements and Modeling*, American Geophysical Union Fall Meeting, San Francisco, 9-13 December, 2019.

K. O'Dell, E.J.T. Levin, R.S. Hornbrook, E.C. Apel, N.J. Blake, A. Jarnot, J.V. Ortega, J.M. Reeves, D.W. Toohey, J.R. Pierce, and E.V. Fischer, *Hazardous Air Pollutants (HAPs) in fresh and aged western US wildfire smoke*, American Geophysical Union Fall Meeting, San Francisco, 9-13 December, 2019.

S. Hartery, D. Toohey, L. Revell, K. Sellegri, P. Kuma, M. Harvey, A. McDonald, A., *Constraining parameterizations of sea spray aerosol flux in the Southern Ocean*, Deep South Challenge Conference, Auckland, New Zealand, 6-8 May, 2019.

P.J. DeMott, K.A. Moore, C.S. McCluskey, A.M. Rauker, T.C.J. Hill, E.J.T. Levin, J. Uetake, J.M. Creamean, C.H. Twohy, D. Toohey, B. Rainwater, J.L. Stith, G.M. McFarquhar, R. Marchand, C. Bretherton, R. Wood, S.P. Alexander, M. Schnaiter, E. Järvinen, A. Gettleman, Y. Huang, S. Siems, A. Protat, R.H. Humphries, J. Ward, M.D. Keywood, S.M. Kreidenweis, and the SOARS Science Teams, *Ice nucleating particle measurements and their implications during the Southern Ocean Atmospheric Research Studies (SOARS)*, European Aerosol Conference, EAC-2019, 25-30 August 2019, Gothenburg, Netherlands.

B. Rainwater, D. Toohey, C. Twohy, and J. Jensen, *Inlet Icing Inferred from Measurements of Total Condensed Water and Cloud Droplets from the NCAR GV*, Southern Ocean Atmospheric Research Workshop, Hobart, Australia, 19-21 November, 2019.

E. Levin, K. Barry, K. Moore, J. Ortega, L. Garofalo, M.A. Pothier, D. Toohey, M. Reeves, J. Lindaas, E. Emerson, D.K. Farmer, S. Kreidenweis, P. DeMott, E. Fischer, *Characterizing Aerosol Emissions from Wildfires in the Western US*, AAAR 37th Annual Conference, Portland, OR, 14-18 October, 2019.

P. Demott, K. Barry, E. Levin, K. Moore, T. Hill, C. Twohy, D. Toohey, A.P. Sullivan, S. Kreidenweis, E. Fischer, *Western US Wildfire Emissions of Ice Nucleating Particles*, AAAR 37th Annual Conference, Portland, OR, 14-18 October, 2019.

J. D'Allesandro, G. McFarquhar, (...) D. Toohey, (...) et al., *Spatial heterogeneity of liquid, ice and mixed phase low-level clouds over the Southern Ocean derived using SOCRATES in-situ observations*, Southern Ocean Atmospheric Research Workshop, Hobart, Australia, 19-21 November, 2019.

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