

November 14, 2025

## Mark Andrew Zondlo

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### Education

Ph. D., Chemistry (physical and atmospheric), University of Colorado, Boulder, 1999  
Thesis title: *Laboratory studies of heterogeneous reactions on surfaces representative of polar stratospheric cloud and cirrus cloud ice particles* (Adviser: Prof. Margaret A. Tolbert)  
B.A., Chemistry, Rice University, 1994

### Professional Experience

**2021-current** **Professor**, Dept. of Civil and Environmental Engineering, Princeton University  
Atmospheric Chemistry and Composition Group  
Associated Faculty:  
Program in Atmospheric and Oceanic Sciences  
Ctr. for Mid-Infrared Technologies for Health and the Environment  
Princeton Materials Institute  
Princeton Environmental Institute  
Andlinger Center for Energy and the Environment

**2014-2021** **Associate Professor**, Dept. of Civil and Environmental Engineering, Princeton University

**2008-2014** **Assistant Professor**, Dept. of Civil and Environmental Engineering, Princeton University

**2002-2007** **Senior Research Scientist**, Southwest Sciences, Inc., Santa Fe, New Mexico.

**1999-2002** **Advanced Study Program Postdoctoral Fellow**, Natl. Ctr. for Atmos. Research, Boulder, Colorado  
Postdoc adviser: Fred L. Eisele, nitric acid airborne field measurements

**1994-1999** **Graduate research assistant**, Univ. of Colorado, Boulder (advisor: Prof. Margaret A. Tolbert)  
Thesis: Heterogeneous chemistry on polar stratospheric cloud and cirrus cloud ice particles

**1992-1993** **Undergraduate research assistant**, Univ. of Calif.-Irvine (advisor: Prof. F. Sherwood Rowland)  
Research: biomass burning source strength of methyl halides

### PI Awards/Honors

2024 NASA Group Achievement Award for ASIA-AQ

2020 NASA Group Achievement Award for FIREX

2015-2016 Visiting Scientist, EUMETSAT Satellite Application Facility on Atmospheric Composition Monitoring, Brussels, Belgium

2015 NASA Group Achievement Award for DISCOVER-AQ

2014 Outstanding Engineering Teaching Faculty, Princeton Univ., Spring 2014

2013 Nomination for Popular Mechanics 100 Breakthrough Innovations, NSF Engineering Directorate

2001-2002 NCAR ACD Visiting Scientist

1999-2001 NCAR Advanced Study Program Postdoctoral Fellowship

1996-1998 NASA Earth Systems Science Graduate Fellowship

1995-1996 NASA Global Change Graduate Fellowship

1994-1995 University of Colorado Chancellor's Fellowship

### Teaching

*Princeton University:*

CEE/CHM/GEO 311, "Global Air Pollution" (S2009, F2010, S2012-2015, S2017-2021, S2023-2025)

CEE/AOS 593, "Aerosol Chemistry and Physics" (F2018, F2020, F2024)

CEE 599B, "Special Topics: Environmental Field Sampling and Design" (F2019, F2022)

CEE 509/510, "Directed Graduate Research" (2019-2020, 2020-2021, 2022-2023, 2023-2024, 2024-2025)

ELE/CEE/MAE/MSE 455, "Mid-Infrared Technol. for Health and the Environment" (S2011, F2012, F2013)

CEE/AOS 593, "Aerosol Observations and Modeling" (F2009 (CEE 599B), F2011, F2014, F2020, F2024)

CEE 501, "Environmental Engineering Fundamentals I: Atmospheric and Surface Processes" (F2008-2011)

CEE 445/578, "Air Quality and Aerosol Processes" (S2009)

*Santa Fe Community College:*

HB 365, "Understanding Global Climate Change", Continuing Education (S2006, S2007, F2007)

*University of Colorado, Boulder:*

Teaching Assistant, Physical Chemistry laboratory and lecture, 1994-1995.

### **University Service**

2019-present Director of Graduate Studies, Dept. of Civil and Environmental Engineering,  
2019-present Faculty Committee on the Graduate School  
Curriculum Subcommittee (AY 2024-2025, 2025-2026)  
Fellowship Subcommittee (AY 2020-2021, 2022-2023, 2023-2024)  
Student Life and Discipline Committee (AY 2019-2020)  
2016-present Executive Committee, Andlinger Center for Energy and the Environment  
2018-present CEE/SEAS Building Subcommittee  
2017-2021 SEAS Robotics and Cyber Physical Systems Search Committee  
2017-2021 Environmental Studies and SEAS Building Planning Committee  
2016-2019 Associate Director for External Partnerships, Andlinger Center for Energy and the Environment  
2016-2019 Princeton E-affiliates Partnership (director), Andlinger Center for Energy and the Environment  
2014-2015 Chair, SEAS Self-study: Relationships with External Entities Subcommittee  
2013-2015 CEE Undergraduate Adviser (Engineering track)  
2013-2014 Member, Committee on Library and Computing  
2008-2010 Coordinator, seminar series, Dept. of Civil and Environmental Engineering  
multiple years SEAS BSE First year Adviser (AY 2013/14, 2017/18, 2019/20, 2020/21)

### **Professional Activities**

*Atmospheric Chemistry Field Experiments and Science Teams:*

NASA ASIA-AQ, PI for open-path NH<sub>3</sub> sensor on NASA DC-8 aircraft (2024 field campaign)  
NOAA AEROMMA, PI for open-path NH<sub>3</sub> sensor on NASA DC-8 aircraft (2023 field campaign)  
NASA FIREX-AQ, PI for open-path NH<sub>3</sub> sensor on NASA DC-8 aircraft (2019 field campaign)  
EPA Duke Forest Ammonia Eddy Covariance study, PI for open-path NH<sub>3</sub> sensor (2017)  
NSF LTER Kellogg Biological Station, PI for open-path, eddy covariance nitrous oxide sensor (2015-2017)  
EPA/NPS Rocky Mountain Nitrogen Study, PI for open-path, eddy covariance ammonia sensor (2015-2016)  
NASA DISCOVER-AQ Colorado, PI for Mobile mapping of NH<sub>3</sub>/CO/CO<sub>2</sub>/CH<sub>4</sub> (2014)  
EDF Barnett Shale Methane Emissions Coordinated Campaign, PI for drone-based methane measurements (2013)  
NASA DISCOVER-AQ Houston, PI for Mobile mapping of NH<sub>3</sub>/CO and greenhouse gas measurements (2013)  
CAREBEIJING-North Coastal Plain, PI for Mobile greenhouse gas and air pollutant measurements (2013)  
NASA DISCOVER-AQ California, PI for Mobile mapping of NH<sub>3</sub>/CO and greenhouse gas measurements (2013)  
NASA Southeast Asia Cloud, Climate, Coupling and Composition Regional Study (SEAC4RS), PI for VCSEL hygrometer (NSF-cancelled their participation in 2012)  
NSF Deep Convection and Cloud Chemistry (DC3), PI for VCSEL hygrometer (2012)  
NSF Tropical Ocean Troposphere Exchange of Reactive Halogen Species and Oxygenated VOCs, PI for VCSEL hygrometer (2012)  
NSF Pre-Depression Investigation of Cloud Systems in the Tropics, PI for VCSEL hygrometer (2010)  
NOAA Nexus of Climate Change and Air Quality (CalNex 2010), PI for open-path ammonia measurements (2010)  
NSF HIAPER Pole-to-Pole Observations, PI for VCSEL hygrometer (2009-2011)  
NSF Pre-Depression Investigation of Cloud-systems in the Tropics, PI for VCSEL hygrometer (2010)  
NSF Stratosphere-Troposphere Analyses of Regional Transport, PI for VCSEL hygrometer (2008)  
AquaVIT International Water Vapour Intercomparison, Karlsruhe, Germany, PI for VCSEL hygrometer (2008)

*Program Committee*, 16th Intl. Conf. on Mid-Infrared Optoelectronics: Materials and Devices, 2022-2023

*NASA Mission Selection Evaluation Team*, DISCOVERY Mission, 2020-2021

*Member*, NASA Health and Air Quality Applied Sciences Team Member (HAQAST), 2016-2020

*Chair*, CLEO A&T 4: Photonic Instrumentation for Energy and Environment Committee, 2014-2019

*Member*, EUMETRISPEC, European Spectral Data for Metrology Analyses, 2012-2017

*Member*, Program Committee, Energy and Environment, CLEO: Applications and Technology, 2011-2013

*Chair and Discussion Leader*, NSF Facilities Users Workshop, UT/LS Science, Sept. 24-26, 2007

*Member*, Environmental Technology Advisory Committee, Santa Fe Community College, 2007  
*Member*, Expert Working Group on Turbulence and Thermodynamics, European Fleet for Airborne Research, 2006  
*Co-chair*, “Dynamics and Chemistry of the UT/LS, A31G”, AGU Fall Meeting, December 10, 2005  
*Convener*, Special Session, “Cloud Chemistry and Processing”, Fall AGU Meeting, December 13-17, 2004  
*Chair*, NCAR Advanced Study Program 2000-2001 Seminar Series

Reviewer for *Environmental Science and Technology*, *PNAS*, *Nature*, *Journal of Geophysical Research-Atmospheres*, *Journal of Geophysical Research-Biogeosciences*, *Geophysical Research Letters*, *Physical Chemistry Chemical Physics*, *Aerosol Science and Technology*, *Journal of Atmospheric and Oceanic Technology*, *Journal of Physical Chemistry*, *Atmospheric Chemistry and Physics*, *Atmospheric Measurement Techniques*, *Sensors*, *Optics Express*; also reviewer for NASA Science Mission Directorate, NASA DISCOVERY Planetary Mission, DOE Biological and Environmental Research, NOAA AC4, European Space Agency, and NSF Geosciences Directorate proposals

### **Graduate Student Advising**

#### **current:**

Nathan Li (8<sup>th</sup> year Ph.D. candidate, CEE)  
Vlad Sevostianov (5<sup>th</sup> year Ph.D. candidate, CEE)  
Yunseo Choi (4<sup>th</sup> year Ph.D. candidate, CEE)  
Ryan Boyd (3<sup>rd</sup> year Ph.D. candidate, CEE)  
Eric Savini (1<sup>st</sup> year MSE candidate, CEE)

#### **past:**

Daniel Moore, Ph.D., CEE, 2024 (now Data Scientist at WattTime non-profit)  
Rui Wang, Ph.D., CEE, 2022 (now postdoctoral researcher, NOAA GFDL)  
Xuehui Guo, Ph.D., CEE, 2022 (now postdoctoral researcher, Univ. of Virginia, Prof. Sally Pusede)  
Da Pan, Ph.D., CEE 2021 (now Assistant Professor at Georgia Tech./CEE)  
Levi M. Golston, Ph.D., CEE, 2019 (now Software Engineer, U.S. Air Force)  
Kang Sun, Ph.D., CEE, 2015 (now Associate Professor, University at Buffalo)  
David Miller, Ph.D., CEE, 2014 (now Senior Scientist, Environmental Defense Fund)  
Minghui Diao, Ph.D., CEE, 2013 (now Professor, Dept. of Meteorology, San Jose St. Univ.)  
Qiushi Zhang, MSE Civil and Environmental Engineering, 2013 (unknown)  
Loayeh Jumbam, MSE Civil and Environmental Engineering, 2010 (Res. Sci. at Sonoma Tech.)

#### **Other Ph.D./Masters thesis committee members (all Princeton University unless otherwise noted:**

Jin Wang, Ph.D., Civil and Environmental Engineering, 2025  
Michael Soskind, Ph.D., Electrical and Computer Engineering, 2024  
Daniella Tijerina, Ph.D., Civil and Environmental Engineering, 2024  
Charles Link Patrick, Ph.D., Electrical and Computer Engineering, 2023  
Joel Strothers, MSE, Civil and Environmental Engineering, 2023  
Xiaohan Li, Ph.D., Civil and Environmental Engineering, 2023  
Julie Kim, Ph.D., Civil and Environmental Engineering, 2023  
Mohammad Allouche, Ph.D., Civil and Environmental Engineering, 2022  
Yiheng Tao, Ph.D., Civil and Environmental Engineering, 2022  
Sassan Hajirezaie, Ph.D., Civil and Environmental Engineering, 2021  
Zahra Bajalan, MSE, Civil and Environmental Engineering, 2021  
Joseph Fogarty, Ph.D., Civil and Environmental Engineering, 2021  
Sassan Hajirezaie, Ph.D., Civil and Environmental Engineering, 2021  
Yifeng Chen, Ph.D., Electrical Engineering, 2021  
Michael Soskind, Ph.D., Electrical Engineering, 2021  
Peeyush Khare, Ph.D., Chemical and Environmental Engineering, Yale University, 2020  
Xiili Sarkela-Bassett, MSE, Civil and Environmental Engineering, 2020  
Cheyenne Teng, Ph.D., Electrical Engineering, 2020  
Peeyush Kare, Ph.D., Yale University, 2020  
Cheyenne Teng, Ph.D., Electrical Engineering, 2020

Melany Ruiz Uriguen, Ph.D., Civil and Environmental Engineering, 2019  
 Xiaogang He, Ph.D., Civil and Environmental Engineering, 2019  
 Enrico Dammers, Ph.D., Vrije Universiteit Amsterdam, 2017  
 Genevieve B. Plant, Ph.D., Electrical Engineering, 2016  
 Qi Li, Ph.D., Civil and Environmental Engineering, 2016  
 Hagar ElBishlwai, Ph.D., Civil and Environmental Engineering, 2014  
 Matthew Reid, Ph.D., Civil and Environmental Engineering, 2014  
 Yin Wang, Ph.D., Electrical Engineering, November 2013  
 Jeff Paull, Ph.D., Electrical Engineering, November 2012  
 Tracy Tsai, Ph.D., Electrical Engineering, September 2012  
 Lauren Crandell, Ph.D., Civil and Environmental Engineering, May 2012  
 Zhihua Wang, Ph.D., Civil and Environmental Engineering, August 2011  
 Ekuu Bentil, Ph.D., Electrical Engineering, April 2011  
 Richard Cendejas, Ph.D., Electrical Engineering, April 2011  
 Scott Sheridan Howard, Ph.D., Electrical Engineering, May 2008  
 Afusat Dirisu, Ph.D., Electrical Engineering, December 2008  
 Fatima Toor, Ph.D., Electrical Engineering, May 2009

**Undergraduate Student Advising**

**Senior Thesis Students:**

Ashley Holmes, Civil and Environmental Engineering, 2025-2026  
 Courtney Harrison, Civil and Environmental Engineering, 2025-2026  
 Jazmine Leiva, Civil and Environmental Engineering, 2024-2025  
 Alec Pirone, Civil and Environmental Engineering, 2023-2024  
 Christopher Gilwa, Civil and Environmental Engineering, 2020-2021  
 Peyton Brown, Civil and Environmental Engineering, 2020-2021  
 Rei Zhang, Civil and Environmental Engineering, 2020-2021  
 Sierra Castaneda, Civil and Environmental Engineering, 2019-2020  
 Sofio Bisogno, Civil and Environmental Engineering, 2019-2020  
 Margaret McAllister, Civil and Environmental Engineering, 2018-2019  
 Mikaela Sawyer, Civil and Environmental Engineering, 2018-2019  
 Chinezimuzo Mmega, Civil and Environmental Engineering, 2017-2018  
 Jessica Lu, Civil and Environmental Engineering, 2016-2017  
 Haley Lane, Civil and Environmental Engineering, 2015-2016  
 Levi Stanton, Civil and Environmental Engineering, 2014-2015  
 Kevin Ross, Civil and Environmental Engineering, 2013-2014  
 Michelle L. Yakubisin, Chemical and Biological Engineering, 2013-2014  
 Brian Pourciau, Civil and Environmental Engineering, 2012-2013  
 Garnet Abrams, Geosciences, 2011-2012  
 Otavio Fleury, Civil and Environmental Engineering, 2011-2012  
 Nicole McAndrew, Chemical and Biological Engineering, 2010-2011  
 Emma Bedard, Chemical and Biological Engineering, 2010-2011

**Undergraduate research students:**

2025: Angelina Dipaola, Princeton University  
 Sasha Gor, Univ. of Minnesota  
 2024: Amélie Lemay, Princeton University  
 2020: Natasha Montiel, Princeton University  
 2019: Sierra Castaneda, Princeton University  
 Allen Dai, Princeton University  
 2018: Sofia Bisogno, Princeton University  
 Kira Olander, MIRTHERU, Wheaton College  
 Sal Lombardo, Worcester Polytechnic University  
 2016: Jessica Lu, CEE / Princeton University  
 Tanvir Mangat, University of Massachusetts, MIRTHERU

- 2015: Kira Olander, MIRTHERU, Wheaton College  
 Haley Lane, CEE / Princeton University  
 Jessica Lu, CEE / Princeton University  
 Tanvir Mangat, University of Massachusetts, MIRTHERU  
 Stephanie Paredes Mesa, City College of New York, MIRTHERU
- 2014: Victor Fu, Univ. Southern California, MIRTHERU  
 Naomi Pohl, Univ. Of Pennsylvania, MIRTHERU  
 Levi Stanton, PEI Summer Intern
- 2013: John Buglione, Villanova, MIRTHERU  
 Victor Fu, Univ. Southern California, MIRTHERU  
 Levi Stanton, CEE / Princeton University, MIRTHERU
- 2012: John Buglione, Villanova, MIRTHERU  
 Andrew Ortiz, SUNY-Buffalo, MIRTHERU  
 Kathryn Nicolich, Bucknell University, PCCM REU  
 Levi Stanton, CEE / Princeton University, PEI intern  
 Christopher Hamm, CEE / Princeton University, PEI intern
- 2011: Garnet Abrams, GEO / Princeton University, PEI intern  
 Oshare Mcrae, Vanderbilt University, MIRTHERU  
 Caitlyn Puzio, Northeastern University, MIRTHERU
- 2010: Kristine Rafferty, Univ. of Notre Dame, MIRTHERU  
 George Apfelbach, Boston College, PCCM REU  
 Jeff Schreiber, University of Dayton, MIRTHERU
- 2009: Alex Trevisan, CHM / Princeton University  
 Kristine Rafferty, Univ. of Notre Dame, MIRTHERU  
 Elise Pusateri, Rensselaer Polytechnic Institute, PCCM REU  
 David Tersegno, St. Lawrence University, MIRTHERU
- 2008: David Tersegno, St. Lawrence University, MIRTHERU

### **High School Advising**

#### *Summer research students:*

- 2022: Caroline Zhao, Montgomery High School (NJ)  
 Joseph Lansang, Notre Dame High School (Lawrence, NJ)
- 2018: Sal Lomadardo, Hunterdon Central Regional High School (NJ)
- 2017: Sal Lomadardo, Hunterdon Central Regional High School (NJ)  
 Wendy Wu, High Tech High School (NJ)
- 2015: Brancis Leal, Raritan-Bridgewater High School (NJ)
- 2013: Namoi Pohl, high school student, Morristown (NJ) High School
- 2012: Joel Martin, Bridgewater-Raritan High School (NJ)  
 Victor Fu, The Peddy School (NJ)
- 2010: Caitlyn Puzio, Pennington High School (NJ)  
 Marissa Portenti, Bayonne High School (NJ)
- 2009: Humaira Admani, William L. Dickinson High School

#### **High school teachers research advising:**

- 2013-2019: Lars Wendt, Hunterdon Central Regional High School, Flemington, NJ  
 (summers + fall 2017 sabbatical)

### **External Funding (lead PI unless explicitly noted, since 2008)**

#### *Current*

- Water Research Foundation, “Head-to-head greenhouse gas measurement comparison”, WRF 5310, subcontractor to Brown and Caldwell, November 1, 2025-August 31, 2027.
- Water Research Foundation (co-PI), “Advancing the understanding of nitrous oxide emissions through enhanced whole-plant monitoring and quantification”, WRF 5251, subcontract to Jacobs Engineering Group, July 16, 2025-June 1, 2027.

Water Research Foundation (co-PI), "Developing a greenhouse gas emissions library for unit processes by water utilities and decentralized systems", WRF 5255, September 15, 2024-May 15, 2027.

ClimateWorks Foundation, Fluxx Grant #G-2409-802319914, Grant No. 24-3186, "Nitrogen emissions from the ammonia supply chain", March 1, 2025-February 28, 2028.

Department of Energy ARPA-E DE-AR0001983, "HydroNet: integrated photonic system for hydrogen leak localization, quantification and monitoring", Nov. 21, 2024-Nov. 20, 2027. Suspended on March 31, 2025.

Grantham Foundation, "NitroNet: Quantifying spatiotemporal cropland nitrous oxide emissions", May 15, 2024-May 14, 2026.

NASA 80NSSC24K03980 (co-PI), "Integrating satellite data, in-situ measurements, and process-based models to quantify and attribute agricultural emissions of NH<sub>3</sub> and NO<sub>x</sub> for the US Midwest", Princeton co-PI share, Dec. 7, 2023-Dec. 6, 2026.

Corteva Inc., "Greenhouse gas sensors for agricultural settings", July 1, 2023-June 30, 2024.

NASA 80NSSC23K0815, "Tropospheric ammonia measurements by the Open-Path Airborne Laser Spectrometer during ASIA-AQ", May 1, 2023-April 30, 2026; suspended on March 31, 2025.

DOE PNNL, "Vertical cavity surface emitting laser (VCSEL) hygrometer for Challenger 850 aircraft test flights", DOE #DE-AC05-76RL01830, April 12, 2021-December 31, 2024.

### Past

Metropolitan Water Reclamation District of Greater Chicago, "Greenhouse Gas Monitoring and Quantification at the Metropolitan Water Reclamation District of Greater Chicago Facilities", Agreement No. 1598272, Dec. 1, 2023-Dec. 31, 2024.

California Air Resources Board, "Ammonia and nitrous oxide emissions during digester effluent storage and field application", Agreement No. 2021319, August 1, 2022-June 30, 2025.

DOE ARPA-E DE-AR0001385, "NitroNet: Quantifying spatial and temporal nitrous oxide emissions", May 21, 2021-August 31, 2024.

NASA 80NSSC21K1632, "Characterization of reactive nitrogen emissions from agricultural hotspots", September 1, 2021-August 31, 2024.

Alfred P. Sloan Foundation, "Quantifying emissions from wastewater and agricultural waste", April 2020-April 2024.

U.S. EPA via Wood Environmental and Infrastructure Solutions, Inc., TTR2022-001 (PRIME U.S. EPA #68HERH21D0006), "Open-path ammonia analyzer", February 1, 2022-January 30, 2024.

NASA NNH17ZDA001N, "Tropospheric ammonia measurements onboard the DC8 in FIRE-CHEM", Mar. 1, 2018-March 19, 2023.

NEC Laboratories of America, Inc., "Development of drone-based optical sensors for use in decarbonization", January 1, 2022-December 31, 2022.

NASA 80NSSC17K0377, "Understanding tropospheric ammonia through remote sensing measurements: student Xuehui Guo", Sept. 1, 2017-Dec. 31, 2020.

ACEE/EMRE, "Understanding Atmospheric Ammonia and its Impacts on Air Quality and Climate Using Satellites and Models", June 1, 2018-October 31, 2020.

DOE DE-FE0029059, "Remote Methane Sensor for Emissions from Pipelines and Compressor Stations using chirped-laser dispersion spectroscopy", March 1, 2017-February 28, 2021.

NASA NNX16AQ90G, "Spatiotemporal variability of ammonia through syntheses of in-situ, ground-based, and remote sensing instruments", Aug. 17, 2016-Aug. 16, 2020.

DOE ARPA-E SC67232-1867 (subcontractor), "RMLD™ Sentry for Upstream Natural Gas Leak Monitoring" for ARPA-E Methane Observation Networks with Innovative Technology to Obtain Reductions (MONITOR), Subcontract via Physical Sciences, Inc., April 24, 2015-April 17, 2018.

NOAA Climate Program Office, Atmospheric Chemistry, Carbon Cycle, and Climate, #NA14OAR4310134, "Distribution of fugitive methane emissions in the Marcellus Shale", August 1, 2014-July 31, 2017.

EPA via Amec Foster Wheeler MSSP #TMH2017-084 via prime #EP-W-16-015, "Support for Ammonia Eddy Covariance Flux Measurements", March 8, 2017-July 8, 2017.

DOD Navy N68335-17-C-0359 (co-PI), "US Navy SBIR Phase I: UAV-Compatible Secondary Payload for Meteorological Profiling", Oct. 11, 2017 -Nov. 27, 2017.

DOE DE-SC00021004 (co-PI), "Compact laser hygrometer for in-situ measurements of water vapor from small unmanned aerial vehicles", February 19, 2016-December 1, 2016.

NOAA NA14OAR4320106 (co-I), “Reactive nitrogen biogeochemical cycling in the GFDL Earth System Models: Advancing understanding of atmosphere-land interactions under changing climate and land use”, July 1, 2013-June 30, 2018.

NASA NNX14AT36G, “Quantifying ammonia emissions from agriculture and cities during DISCOVER-AQ”, Oct. 1, 2014-Sept. 30, 2015.

NASA NNX14AT32G, “Understanding spatial variability of methane by comparing bottom-up and top-down methods during DISCOVER-AQ Colorado”, Oct. 1, 2014-Sept. 30, 2015.

NSF IIP-1445031, “Partnerships for Innovation: Accelerating Innovation Research-Technology Transfer: Prototype mid-infrared, methane sensor for natural gas leak detection on small unmanned aerial systems”, Sept. 15, 2014-February 29, 2016.

NSF DEB-1359538, “EAGER: Collaborative research: development of a new technique to measure ecosystem-level soil nitrous oxide fluxes using micrometeorological towers”, August 4, 2014-August 3, 2016.

DOE DE-SC0011288 (subcontractor, co-PI), “Portable nitrous oxide sensor for understanding agricultural and soil emissions”, February 17, 2014-November 16, 2016.

Environmental Defense Fund, Barnett Shale Methane Emissions Coordinated Campaign, “Methane emissions from near field sources using an electric aircraft”, August 1, 2013-July 31, 2014.

NSF IIP-1263579, “I-Corps: Open-path, Compact Nitrous Oxide Sensor Using Quantum Cascade Laser Spectroscopy”, Oct. 1, 2012-March 31, 2013.

NASA NNX12AN64H, “Validation of TES Ammonia Using an Open-path Quantum Cascade Laser Based Spectrometer (student: Kang Sun)”, NASA Earth and Space Science Graduate Fellowship, Sept. 1, 2012-Aug. 31, 2015.

NSF AGS-1063466, “Supplement: Environmental Conditions and Characteristics of Ice Supersaturated Regions in Deep Convective Clouds and Chemistry (DC3)”, April 7, 2012-April 30, 2014, awarded but returned to NSF due to cancellation of NSF involvement in the NASA SEAC4RS field study.

NSF AGS-1063466, “Environmental conditions and characteristics of ice supersaturated regions in Deep Convective Clouds and chemistry (DC3)”, Apr. 7, 2011-Apr. 30, 2014.

NSF AGS-1036275, “RAPID: Ice supersaturated regions and distribution of water vapor during the third HIPPO deployment”, Aug. 15, 2010-July 31, 2012.

NSF IIP-1038825, “High precision, range-resolved remote gas sensing”, July 1, 2010-June 30, 2012.

NASA NNX09AO51H, “Aircraft-based measurements of ice supersaturated regions in the upper troposphere and lower stratosphere and comparison to AIRS climatologies (student: Minghui Diao)”, NASA Earth and Space Science Graduate Fellowship, Sept. 1, 2009-Aug. 31, 2012.

NSF IIP-0646479, “Phase IIR: Balloon-based instrument for measurements of atmospheric water vapor and methane”, July 2, 2009-Jan. 31, 2011.

USDA 2009-35112-05274, Air Quality, “Nitrous oxide measurements using a quantum cascade laser near 4.54 microns”, Feb. 1, 2009-July 31, 2010.

NSF ATM-0840732, “SGER: Water vapor measurements from the G-V VCSEL hygrometer during START08/PreHIPPO”, Sep. 1, 2008-Aug. 31, 2009.

NSF MIRTHE, “Nitrous oxide measurements using a quantum cascade laser near 4.54 microns”, May 1, 2008-Apr. 30, 2009.

### **Community Service**

Director of Mentoring and Program Strategy, Young Science Achievers Program (2008-present), 501c3 non-profit  
 Member, Board of Directors, Young Science Achievers Program (2008-present), 501c3 non-profit  
 Transportation Advisory Council, Member, Montgomery Township, New Jersey (2014-present)  
 Board Member, Montgomery Friends of Open Space (2015-present)

### **Professional Organizations**

American Geophysical Union, 1994-present  
 Optical Society of America, 2011-present  
 American Chemical Society, 2015-present  
 American Meteorological Society, 2023-present

- 86.\* Lemay, A.C., D.L. Plata, and M.A. Zondlo (2025), "Observational evidence of the impact of electric vehicles on local air quality in the United States", *Envi. Sci. Proc. Impacts*, doi:10.1039/d5em00559k.
- 85.\* Moore, D.P., N.P. Li, C. Song, J.-J. Zhu, H. Yi, L. Tao, J. McSpiritt, V.I. Sevostianov, L.P. Wendt, N.E. Rojas Robles, F.M. Hopkins, Z.J. Ren, **M.A. Zondlo** (2025), "Greater contribution of wastewater treatment to urban greenhouse gas emissions", *Nature Water*, 3, 1114-1124, doi: 10.1038/s44221-025-00490-z.
84. Song, C., J.-J. Zhu, J.L. Willis, D.P. Moore, **M.A. Zondlo** and Z.J. Ren (2024), "Oversimplification and misrepresentation of nitrous oxide emissions from wastewater treatment plants", *Nature Sustainability*, 7, 1348-1358, <https://doi.org/10.1038/s41893-024-01420-9>.
- 83.\* Pan, D., D.L. Mauzerall, R. Wang, X. Guo, M. Puchalski, Yixin Guo, S. Song, D. Tong, A.P. Sullivan, B.A. Schitchel, J.L. Collett Jr., and **M.A. Zondlo** (2024), "Regime shift in secondary inorganic aerosol formation and nitrogen deposition in the rural United States", *Nature Geoscience*, doi:10.1038/s41561-024-01455-9.
82. Gerges, F., M. Llaguno-Munitxa, **M.A. Zondlo**, M.C. Boufadel, and E. Bou-Zeid (2024) "Weather and the City: Machine Learning for Predicting and Attributing Fine Scale Air Quality to Meteorological and Urban Determinants" (2024), *Environ Sci. Technol.*, 58 (14), 6313-6325, doi: 10.1021/acs.est.4c00783.
81. Cady-Pereira, K.E., X. Guo, R. Wang, A.B. Leytem, C. Calkins, E. Berry, K. Sun, M. Müller, A. Wisthaler, V.H. Payne, M. Shephard, **M.A. Zondlo**, V. Kantchev (2024), "Validation of MUSES NH<sub>3</sub> observations from AIRS and CrIS against aircraft measurements from DISCOVER-AQ and a surface network in the Magic Valley", *Atmos. Meas. Tech.*, 17, 15–36, <https://doi.org/10.5194/amt-17-15-2024>.
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**Manuscripts in review** \*=Primary author, corresponding author, or first author is from my group

\*Li, N.P. and M.A. Zondlo, "Roadmap: Spectroscopic Chemical Sensing", submitted to *Advances in Optics and Photonics*.

Li, Z., K. Sun, K. Guan, S. Wang, B. Peng, L. Clarisse, M. Van Damme, P.-F. Coheur, K. Cady-Pereria, M.W. Shephard, M.A. Zondlo, and D. Moore, "Ammonia emissions and depositions over the contiguous United States derived from IASI and CrIS using the directional derivative approach", in review, *Atmos. Chem. Phys.*

### **Unrefereed articles**

Puchalski, M.A., J.T. Walker, G.M. Beachley, **M.A. Zondlo**, K.B. Benedict, R.H. Grant, B.A. Schichtel, C.M. Rogers, A.B. Leytem, J. Rice, K. Morris, J.J. Schauer, and R. Wang (2019), "Need for improved monitoring of spatial and temporal trends of reduced nitrogen", *Environmental Monitor*, July 2019 (trade journal for the Air and Waste and Management Association).

### **Intellectual Property**

#### **Patents**

**Zondlo, M.A.**, L. Tao, D. Pan, J. Collins, P. Guiguizian, H.Y. Bell, A.M.S. Elliott, P.M. Killough, B.M. Geerthuis, and H.J. Soto, "Spectroscopic devices, systems, and methods for optical sensing of molecular species", US Patent 11,953,434 B2, issued April 4, 2024.

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US Patent App. 63/631,896, **Zondlo, M.A.**, J. Collins, P. Zorner, P. Guiguizian, A. Michaels, and V. Sevostianov, "Systems and methods for determining analyte concentration in air over an agricultural field", April 9, 2024.

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### **Public Relations / Media**

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Interview, Princeton Office of Communication, Air Quality from Canadian Fires, <https://www.youtube.com/watch?v=EZKjq6jIiql>, June 7, 2023 (also interviewed on CNN, NJ.com, ABC news, e.g.: <https://edition.cnn.com/2023/06/08/weather/air-quality-smoke-nyc-northeast-thursday/index.html>, <https://edition.cnn.com/us/live-news/canada-wildfire-smoke-air-quality-06-28-23/index.html>).

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Feature, Yale Environment 360, “On fracking front, a push to reduce leaks of methane”, April 7, 2014, [http://e360.yale.edu/feature/on\\_fracking\\_front\\_a\\_push\\_to\\_reduce\\_leaks\\_of\\_methane/2754/](http://e360.yale.edu/feature/on_fracking_front_a_push_to_reduce_leaks_of_methane/2754/)

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Feature, Discovery Research at Princeton, “Inventions bridge the gap between lab and marketplace”, 2013 issue, November 3, 2013, <https://discovery.princeton.edu/2013/11/03/inventions-bridge-the-gap-between-lab-and-marketplace/>

Press release, NASA, September 25, 2013: “Mobile laboratories measure air quality in Houston”, [http://www.nasa.gov/mission\\_pages/discover-aq/news/mobile-laboratories-measure-air-quality-in-houston/#.UwubMP0vuUM](http://www.nasa.gov/mission_pages/discover-aq/news/mobile-laboratories-measure-air-quality-in-houston/#.UwubMP0vuUM)

Feature, NSF GEO Innovation Call Newsletter, <http://www.nsf.gov/geo/innovation/2013-geo-innovation.pdf>

Feature, Princeton homepage, “Researchers' entrepreneurial skills shine at Innovation Forum”, posted March 19, 2013, <http://www.princeton.edu/main/news/archive/S36/36/42153/index.xml?section=topstories>

Feature, Fondriest Environmental Monitor, “Mobile air sensor lab takes a California road trip”, February 27, 2013, <http://www.fondriest.com/news/mobile-air-sensor-lab-takes-a-california-road-trip.htm>

Feature, Princeton SEAS homepage, “Launchpad helps blast new teams into business”, <https://www-dept-edit.princeton.edu/engineering/news/archive/?id=9556>

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Interview, German Public Radio, on methane emissions from fracking, January 4, 2013 <http://www.dradio.de/dlf/sendungen/forschak/1968450/>

Press release highlighting two papers from the Zondlo group: Miller et al. (field ammonia measurements) and Khan et al. (UAV greenhouse gas sensors) at CLEO 2012 in San Jose, California, May 10, 2012

Morristown Green Sustainability series, “Cloudy World of Climate Change”, April 29, 2010, invited community lecture (story in online version of Newark Star-Ledger, nj.com on April 30, 2010)

Research highlighted on Princeton University homepage, July 14, 2010

Research featured in Princeton Alumni Weekly, April 2010, “Nothing Succeeds like Failure”, April 7, 2010

Research in highlighted in story in EQuad News, “Round-the-world mission puts greenhouse gases in laser focus”, Winter 2010

NSF 09-01 press release on HIPPO Global field campaign (Jan. 7, 2009) and media advisory (Jan. 27, 2009) that mentioned the PI as part of the field experiment.

MIRTHE REU Summer Outreach story on Princeton University home page, July 14-17, 2008

### **Selected Presentations**

Alternative Fuels and Chemicals Coalition annual meeting, "Nitrous oxide emissions: new technologies for sustainable agriculture", National Harbor, Maryland, November 20, 2024 (INVITED).

High Meadows Environmental Institute, CEREAL talk, Princeton University, "Agriculture's perturbations to the atmosphere", November 19, 2024 (INVITED).

Purdue University, Department of Earth, Atmospheric, and Planetary Sciences, "Sensors for climate change and air quality: the path from the lab to the stratosphere", lecture for class "EAPS 227: Introduction to Atmospheric Measurement Techniques", November 5, 2024 (INVITED).

Columbia University, Dept. of Earth and Environmental Engineering, "From agriculture and the hydrogen economy: the story of atmospheric ammonia", New York, New York, October 24, 2024 (INVITED).

N2ONet Design Workshop, "New advances in N<sub>2</sub>O sensing technologies for spatiotemporal measurements", Chicago, Illinois, January 18, 2024 (INVITED).

Alternative Fuels and Chemicals Coalition annual meeting, "NitroNet: new tool for N<sub>2</sub>O emissions", National Harbor, Maryland, November 13, 2023 (INVITED).

DOE ARPA-E Agricultural Portfolio Meeting, "NitroNet: a new tool for spatiotemporal patterns of N<sub>2</sub>O emissions", St. Louis, Missouri, November 3, 2023 (INVITED).

High Meadows Environmental Institute, Faculty Seminar, Princeton University, "Mysteries and challenges of agricultural emissions to the atmosphere", October 3, 2023 (INVITED).

Photonics and Electromagnetics Research Symposium (PIERS), "Agricultural Greenhouse Gas Emissions through Open-path Laser Spectroscopy", Advanced Photonic Technologies for Spectroscopic Applications, Prague, Czech Republic, July 5, 2023 (INVITED).

Canadian Society of Soil Science, Greenhouse Gas Workshop, "New advances in N<sub>2</sub>O sensing for agricultural emissions", Truro, Nova Scotia, Canada, June 25, 2023 (INVITED).

Carbon Mitigation Initiative Annual Meeting, "Atmospheric ammonia from field studies to better understand air quality, climate, and the nitrogen cycle", Princeton, New Jersey, May 4, 2023 (INVITED).

California Air Resources Board, Greenhouse Gas, Short-Lived Climate Pollutants Policy Section, "Nitrous oxide and ammonia emissions from dairies", Sacramento, California, November 17, 2022 (INVITED).

Optica Optical Sensors and Sensing 2022, "Atmospheric ammonia from field studies to better understand air quality, climate, and the nitrogen cycle", AQ4H.4, Vancouver, BC, Canada, July 13, 2022 (INVITED).

East Bay Municipal Utility District, "Carbon and nitrogen emissions from wastewater treatment plants", Oakland, California, May 11, 2022 (INVITED).

DOE Agriculture Portfolio Meeting, "NitroNet: A system to quantify spatiotemporal patterns of nitrous oxide fluxes from croplands", San Francisco, California, April 23, 2022 (INVITED).

Navajo Nation, "Air quality and health exposure to oil and gas emissions", Bluff, Utah, March 23, 2022 (INVITED).

DOE Advanced Research Projects - Energy, SMARTFARM 2021, "NitroNet: Smart System to Quantify Nitrous Oxide Emissions", February 2, 2021 (INVITED).

American Physics Society, Mid-Atlantic Section Fall Meeting 2020, "Mid-infrared sensing of atmospheric ammonia: linking farms, cities, and ecosystems", December 5, 2020 (INVITED).

Agriculture and Air Quality in India: Science and Solutions, M.S. Chadha Center for Global India, Princeton University, "Emissions of aerosol precursors and greenhouse gases in India: toward top-down and bottom up constraints", October 19, 2020 (INVITED).

NASA Health and Air Quality Applied Sciences Team Final Showcase, "What, When, Where?: How HAQAST Has Helped Quantify Uncertain Emissions Sources", July 22, 2020 (INVITED).

NASA Health and Air Quality Applied Sciences Team Final Showcase, "Ammonia Measurements from Satellites: Constraints on Emissions, Implications for Ground-Based Networks, and Future Opportunities", July 21, 2020 (INVITED).

Drexel University, Dept. of Chemistry, "Constraining atmospheric ammonia through bottom-up and top-down observations", April 17, 2020 (INVITED).

Conference on Lasers and Opto-Electronics, "Sensors for climate change and air quality: the path from the lab to the stratosphere", May 12, 2020 (INVITED).

M.S. Chadha Center for Global India, "Air Quality, Climate, and Health", March 27, 2020 (INVITED, panelist).

National Atmospheric Deposition Program Total Deposition Science Committee workshop, Boulder, Colorado, November 2, 2019 (INVITED).

6<sup>th</sup> International Workshop on Infrared Technologies, "Fiber-coupled QCL for open-path sensing of ammonia", Princeton, New Jersey, Oct. 29, 2019 (INVITED).

Dept. of Geosciences, Princeton University, "New insights into ammonia from satellites: implications for emissions and future surface networks", October 10, 2019 (INVITED).

USDA Forest Service (WI/MN/MI region) and Minnesota Pollution Control Agency “New insights into ammonia from satellites: implications for emissions and future surface networks”, webinar, August 8, 2019 (INVITED).

Gordon Research Conference on Atmospheric Chemistry, “New instruments for the nitrogen cycle: new tools for observing nitrogen and ideas emerging from their use”, discussion leader, Newry, Maine, July 31, 2019 (INVITED).

Optical Society of America / Optical Sensors and Sensing Congress, “Open-Path Ammonia Measurements on the NASA DC-8 Aircraft Using a Fiber-coupled, Quantum Cascade Laser”, San Jose, California, June 27, 2019 (INVITED).

Air and Waste Management Association Annual Conference, “New insights into NH<sub>3</sub> from satellites: implications for emissions and future surface networks” for session on “Answering Critical Challenges Facing our Planet in Air Quality by Using NASA’s Current and Future Earth Observing Satellites”, Québec City, Québec, Canada, June 26, 2019 (INVITED).

Mid-Atlantic Regional Air Management Association / Northeastern states emissions inventory work group, “Constraining ammonia emission inventories from space-based observations”, webinar, April 1, 2019 (INVITED).

NASA Health and Air Quality Applied Sciences Team Meeting-5, “Bridging scales with satellite and in-situ data: from agricultural ammonia to volcanic emissions”, Phoenix, Arizona, January 4, 2019 (INVITED).

NOAA Earth Systems Laboratory FIREX-AQ science team meeting, “Ammonia measurements during FIREX-AQ”, Boulder, Colorado, October 24, 2018 (INVITED).

California Air Resources Board, “Ammonia fluxes in dairies and natural systems: insights from eddy covariance measurements”, Sacramento, California, October 19, 2018 (INVITED).

Western Regional Air Partnership Regional Technical Operations Working Group, “Ammonia in Colorado: insights from in-situ, mobile, and satellite data”, webinar, September, 20, 2018 (INVITED).

NASA Health and Air Quality Applied Sciences Team Meeting-4, “From Agricultural Ammonia to Volcanic Sulfur – Satellite Measurements to Improve Emissions Inventories”, Madison, Wisconsin, July 17, 2018 (INVITED).

Northeastern Legislative Climate and Energy Summit, Council of State Governments “Measuring greenhouse gas emissions and air quality in urban communities”, Princeton, New Jersey, May 11, 2018 (INVITED).

NASA Health and Air Quality Applied Sciences Team Meeting-3, “Satellite measurements of spatiotemporal variability and comparison to emission inventories”, Palisades, New York, November 29, 2017 (INVITED).

Federation of Analytical Chemistry and Spectroscopy Societies SCI-X 2017, “Open-path, quantum cascade laser spectroscopy for atmospheric measurements in power-constrained platforms”, Reno, Nevada, October 9, 2017.

SPIE Defense and Commercial Sensing industry panel, “Miniaturized and Mobile Spectroscopy and Optical Sensor Applications”, Anaheim, California, April 12, 2017 (INVITED).

NASA Health and Air Quality Applied Sciences Team Meeting-2, “Air quality at the urban/agriculture interfaces”, Seattle, Washington, February 27, 2017 (INVITED).

Colorado Department of Public Health and the Environment, “Understanding ammonia emissions in northeast Colorado through satellite and in-situ measurements”, Denver, Colorado, September 23, 2016 (INVITED).

Symposium on Regional Air Quality, Monitoring, and Urban Sensing in Safety and Security Applications, “Role of drones in air quality monitoring and natural gas leak detection”, New York, New York, Oct. 4, 2016 (INVITED).

European Geophysical Union General Assembly, “Ammonia emissions, transport, and deposition downwind of agricultural areas at local to regional scales”, Vienna, Austria, April 18, 2016.

Infrared Atmospheric Sounding Interferometer Conference, “Validation of IASI NH<sub>3</sub> columns at the single-pixel scale from airborne- and ground-based measurements”, Antibes Juan-Les-Pins, France, April 14, 2016.

Physiklatisch-Technische Bundesanstalt (PTB), “Mid-infrared sensor development for quantifying fugitive emissions from gas/oil extraction”, Braunschweig, Germany, Dec. 10, 2015 (INVITED).

European Geophysical Union General Assembly, “Laser-based sensors on UAVs for quantifying local emissions of greenhouse gases”, Vienna, Austria, April 16, 2015 (INVITED).

MIRTHE Summer Workshop, “Why does commercialization of mid-infrared, environmental sensors lag behind other markets”, August 8, 2014 (INVITED).

16<sup>th</sup> Global Emissions Initiative Conference, “Ammonia emissions from agricultural and vehicular sources”, Boulder, Colorado, June 10, 2014.

Department of Geosciences, Princeton University, “Ammonia, automobiles, and agriculture: new insights into precursor emissions of fine particulate matter”, Princeton, New Jersey, March 4, 2014 (INVITED).

Optical Society of America Workshop on Precision Monitoring of Human Metabolism, “Ambient pressure detection to overcome breath ammonia sampling challenges”, Princeton, New Jersey, February 17, 2014 (INVITED).

Environmental Defense Fund Barnett Coordinated Campaign Science Team meeting, “Near-field measurements of CH<sub>4</sub> from the Ponder compression station area”, Denver, Colorado, January 23, 2014 (INVITED).

Laser Focus World Webinar, “Fracking, climate change, and lasers: new tools to reduce fugitive methane emissions”, October 30, 2013 (INVITED).

MIRTHE Workshop on Air Monitoring in Energy Extraction, also panelist for discussion, “Shale gas methane emissions from UAV- and vehicle-based systems”, August 9, 2013 (INVITED).

New York City Regional Innovative Node and I-Corps Kickoff Event, panelist, July 24, 2013.

College of Environmental Science and Engineering, Peking University, “From the surface to the stratosphere: microscale processes of cloud formation, air pollutants, and greenhouse gases”, Beijing, China, July 2, 2013 (INVITED).

Environmental Defense Fund Barnett Shale Coordinated Campaign, “Methane emissions from near-field sources using a model electric aircraft”, Richardson, Texas, June 24, 2013 (INVITED).

William E. Heraeus Seminar on "Water Vapor and Ice in the Atmosphere", “Measuring water vapor in the UT/LS: Challenges, advances, and outstanding issues”, Bad Honnef, Germany, June 11, 2013 (INVITED).

Environmental Defense Fund Methane Monitoring Workshop, “Primer on laser-based CH<sub>4</sub> sensors”, Houston, Texas, June 6, 2013 (INVITED).

HIAPER HALO Workshop, “Water vapor variability and cirrus cloud formation from NSF/NCAR G-V field campaigns”, Mainz, Germany, April 16, 2013 (INVITED).

California Air Resources Board, “Ammonia emissions and variability through mobile mapping with a suite of chemical tracers”, Sacramento, California, January 31, 2013 (INVITED).

Department of Geophysical Sciences, University of Chicago, “Water vapor variability and cirrus cloud formation from global field experiments”, January 11, 2013 (INVITED)

American Geophysical Union Fall Meeting, “Fugitive methane emissions from gas/oil activities near Dish, Texas”, San Francisco, California, Dec. 5, 2012.

EUMETRISPEC Stakeholder Workshop, “Atmospheric trace gas sensing: Community needs with respect to spectral line data”, Wolfenbüttel, Germany, November 15, 2012 (INVITED).

International Breath Analysis Meeting, “Overcoming the Sampling Challenges of Ammonia in Exhaled Breath”, Sonoma, California, October 29, 2012 (INVITED).

TORERO Science Team Mtg. “Water vapor, ice supersaturation, and stratospheric mixing in TORERO”, July 24, 2012 (INVITED).

Department of Chemistry, University of British Columbia, “Ice supersaturated regions from global aircraft observations: new insights into cirrus cloud formation”, July 19, 2012 (INVITED).

CMOS Conference on Emerging Technologies, “Laser-Based Sensors From the Surface to the Stratosphere: New Insights Into Air Pollution and Global Climate Change”, Vancouver, Canada, July 18, 2012 (INVITED).

EPA Apps and Sensors for Air Pollution (ASAP) Workshop, “Compact and lightweight sensors for air quality and greenhouse gas measurements”, Research Triangle Park, North Carolina, March 26, 2012 (INVITED).

DOE Advanced Research Projects Energy, Workshop on “Ubiquitous methane leak detection through novel sensors and sensing platforms”, “UAV methane measurements using VCSELs, fast sampling QCLs”, Washington, DC, March 29, 2012 (INVITED).

School of Engineering and Applied Sciences Colloquium in Climate Science (SCiCS), Columbia University, “Ice supersaturated regions from global aircraft observations: new insights into cirrus cloud formation”, Feb. 23, 2012 (INVITED).

2012 Earth and Planetary Sciences Lecture Series, Massachusetts Institute of Technology, “Atmospheric field studies: Atmospheric chemistry field experiments from UAVs to stratospheric aircraft”, Cambridge, Massachusetts, January 9, 2012 (INVITED).

The National Academies Keck Futures Initiative, Ecosystem Services: Charting a Path to Sustainability, “Quantifying ammonia and nitrous oxide emissions from agricultural activities”, Irvine, California, November 11 (INVITED).

TORERO Science Team Meeting, “Cloud formation in the tropics: insights from HIPPO and PREDICT”, Boulder, Colorado, November 1, 2011 (INVITED).

Field Laser Applications in Industry and Research (FLAIR), “Open-path atmospheric detection: new insights into cloud and aerosol formation”, Murnau, Germany, September 16, 2011 (INVITED).

University of Alaska-Fairbanks, “Low power trace gas sensors for clouds, climate, and air quality”, Fairbanks, Alaska, August 23, 2011 (INVITED).

MIRTHE Summer Workshop, “Sensing the Atmosphere”, Princeton, New Jersey, August 1, 2011 (INVITED).

Gordon Research Conference on Atmospheric Chemistry, “Fine-scale ice supersaturated regions observed from airborne campaigns”, Mount Snow, Vermont, July 23, 2011 (poster).

HIPPO Science Team Meeting, “Supersaturations during HIPPO”, Boulder, Colorado, March 18, 2011 (INVITED).

NASA Sounder Science Team Meeting, “Ice supersaturations with AIRS and NSF G-V VCSEL hygrometer”, Greenbelt, Maryland, Nov. 3, 2010 (INVITED).

USDA Air Quality Project Directors Meeting, “Nitrous oxide emissions with a 4.54  $\mu\text{m}$  quantum cascade laser”, Amarillo, Texas, August 23, 2010 (INVITED).

Department of Atmospheric Sciences, Texas A&M University, “Characteristics of ice supersaturation in the upper troposphere”, College Station, Texas, Aug. 3, 2010 (INVITED).

HIPPO Science Team Meeting, “Ice supersaturations during HIPPO Global”, May 25, 2010 (INVITED).

NOAA GFDL, “Climatologies of ice supersaturated regions”, Princeton, New Jersey, December 2, 2009 (INVITED).

NASA Sounder Science Team Meeting, “Comparison of water vapor from AIRS and VCSEL hygrometer during START08/HIPPO Global”, Greenbelt, Maryland, Oct. 14, 2009.

CEE Brown Bag Seminar, “Laser spectroscopy for understanding air quality and global climate change”, Princeton, New Jersey, Sept. 25, 2009.

Dept. of Environmental Sciences, Rutgers University, “When clouds should be present but are not: the puzzle of ice supersaturation”, New Brunswick, New Jersey, Sept. 18, 2009 (INVITED).

Field Applications in Laser Research (FLAIR), “Ice supersaturations during START08 and HIPPO Global from the NSF VCSEL hygrometer”, Grainau, Germany, September 10, 2009.

Gordon Research Conference on Radiation and Climate, “Ice supersaturations and global transport of water vapor from recent field campaigns”, New London, New Hampshire, July 8, 2009 (poster).

START08 Science Team Meeting, “Ice supersaturations during START08”, Boulder, Colorado. March 5, 2009.

School of Engineering and Applied Sciences and NOAA GFDL workshop, “New measurement technologies for understanding cloud microphysics and aerosol chemistry”, Princeton, New Jersey October 29, 2008 (INVITED).

MIRTHE summer workshop (tutorial), “Atmospheric laser-based spectroscopy”, Baltimore, Maryland, August 4, 2008 (INVITED).

Supélec-Princeton workshop on Wireless Sensors and the Environment, “Low power sensors in atmospheric research and the need for low power communication”, June 23, 2008.

Aqua-VIT Data Workshop, Zurich, “NSF G-V VCSEL hygrometer during AquaVIT: description, performance, and calibrations”, Switzerland, May 29, 2008.

IBM-Princeton Energy and the Environment Day, “Global field experiments using laser-based sensors onboard the NSF G-V research aircraft”, Princeton, New Jersey, May 23, 2008.

NOAA Geophysical Fluid Dynamics Laboratory, Aerosol Pause Café, “Ice supersaturations: how high can they be?”, Princeton, New Jersey, April 28, 2008.

PRISM/PCCM/MIRTHE/CNSA University and Industry Annual Research Symposium, “Laser spectroscopy from the laboratory to the stratosphere: new instrumentation for understanding global climate change”, March 17, 2008

The Boeing Company, “Assessment of aircraft-based water vapor instruments”, Everett, Washington, March 5, 2008 (INVITED).

MIRTHE Industrial Advisory Board, “Toward a new understanding of cirrus cloud and aerosol chemistry with laser-based sensors”, January 28, 2008.