

CURRICULUM VITAE

MARY C. BROCK

(publishes as MARY C. BARTH)

EDUCATION:

1991 Ph.D. Atmospheric Sciences University of Washington

1985 B.S. Chemical Engineering University of Colorado

PROFESSIONAL EXPERIENCE:

2004–present Scientist III (section head 2008–present)

2000–2004 Scientist II

1996–2000 Scientist I

1994–1996 Associate Scientist III

1991–1994 Visiting Postdoctoral Scientist

Mesoscale and Microscale Meteorology / Atmospheric Chemistry Divisions
National Center for Atmospheric Research, Boulder, Colorado.

1985–1991 Graduate Research Assistant

Cloud and Aerosol Research Group, Department of Atmospheric Sciences
University of Washington, Seattle, Washington.

1984–1985 Undergraduate Research Assistant

Laboratory for Atmospheric and Space Physics, University of Colorado
Boulder, Colorado.

SCIENTIFIC ACCOMPLISHMENTS:

Dr. Barth's research focuses on how clouds affect atmospheric chemistry and on how chemistry can affect cloud properties. This research is done using numerical models for different spatial scales.

Dr. Barth's early research was aimed at quantifying sulfate production in mesoscale clouds. This work culminated in implementing sulfur chemistry in the Community Climate Model to investigate the influence of sulfate aerosols on climate. This sulfur chemistry has been part of the CCSM model runs for the IPCC assessments.

Much of her recent research has focused on thunderstorms and chemistry. Dr. Barth is conducting numerical simulations with the Weather Research and Forecasting model coupled with gas and aqueous-phase chemistry to elucidate the processes that control the distribution of chemical species in thunderstorms. Further, she is a Principal Investigator of the Deep Convective Clouds and Chemistry (DC3, <https://www2.acd.ucar.edu/dc3>) field experiment that seeks to characterize the effect of midlatitude, continental convection on the transport and transformation of atmospheric constituents. Dr. Barth is a Principal Investigator for the high-

resolution simulation of the chemistry occurring during the North American Monsoon (<http://acd.ucar.edu/~barthm/namcase.html>) to examine the upper troposphere enhancement of ozone and surface air quality during the heat waves of 2006.

Dr. Barth is also examining the influence of boundary layer processes on chemical reaction rates. To do this, Dr. Barth has coupled lumped hydrocarbon chemistry with a large eddy simulation. These studies have been extended to cloud-topped boundary layers so that effects of buoyancy, of aqueous chemistry, and of scattering of solar radiation on chemical species redistribution can be assessed.

SCIENTIFIC SERVICE ACTIVITIES:

Professional Service

- 2010–present Member of the steering committee for the International Global Atmospheric Chemistry Conference
- 2007–2008 Co-chair of the International Programme Committee for the 10th International Global Atmospheric Chemistry Conference
- 2006–2008 Secretary of the AGU Atmospheric Sciences Section (Atmos. Chem.)
- 2006–2008 Member of the ARM Climate Research User Facility Science Board
- 2004–2007 Member of the NSF Observing Facilities Advisory Panel (OFAP)
- 2004–2007 Leader of the cloud chemistry case studies intercomparison at the 6th International Cloud Modeling Workshop (July 12–16, 2004).
- 2000–2008 Member of International Commission on Clouds and Precipitation.
- 1999–2001 Co-leader of the cloud chemistry case studies intercomparison at the 5th International Cloud Modeling Workshop (August 7–11, 2000).
- 2003 Member of organizing committee for NCAR/UCAR Junior Faculty Forum, on Future Scientific Directions (June 18–20, 2003).
- 1999–2000 Member of organizing committee for Modeling Chemistry in Cloud and Mesoscale Models, (March 6–8, 2000).
- 1998–1999 Member of organizing committee for GTP workshop, Mixing and Reactive Turbulence Workshop (July 13–16, 1999).
- 1997–1998 Member of organizing committee for GTP workshop, Observations, Experiments, and LES: A Triad for Geophysical Turbulence Studies (August 13–15, 1998).
- 1988–present Member of the American Meteorological Society.
- 1988–present Member of the American Geophysical Union.

NCAR/UCAR Service

- 2003–2004 Member of MMM Director Search Committee
- 2003 Leadership Academy participant
- 2002–2003 Leader of the MMM CaSSP project
- 2001–2004 Member of UCAR Distinguished Achievement and Outstanding Accomplishments Awards Jury. (Chair, 2002)

- 2000–2005 Member of the University Relations Committee.
- 2000–2002 Leader of the Early Career Scientists Assembly.
- 1997–present Member of the Geophysical Turbulence Program, NCAR.
- 1997–present Member of the NCAR Aerosol Program, NCAR.

Education and Outreach

- 2010 Scientific mentor with the SOARS summer program.
- 2009–present Member of thesis committee for John Wong (Univ. Colorado).
- 2010 Member of thesis committee for Karina Apodaca (Howard University).
- 2008 Scientific mentor with the SOARS summer program.
- 2007 Member of the GLOBE Learning Expedition Student Research Competition Review Committee.
- 1999–2002 Member of thesis committee for Amy Stuart (Stanford University).
- 1998–2000 Member of thesis committee for Rawlings Miller (Univ. of Arizona).
- 2003, 2005 Scientific mentor with the SOARS summer program.
- 2002 Writing mentor with the SOARS summer program.
- 1997-2001 Scientific mentor with the SOARS summer program.
- 1997-1998 PROJECT LEARN teacher and intern leader.

AWARDS and HONORS:

- 2007 AGU Editor’s Citation for Excellence in Refereeing for Journal of Geophysical Research
- 2003 NCAR Special Recognition Award for establishing the Early Career Scientists Assembly

AWARDED PROPOSALS AND GRANTS:

- Current PI of NSF Deep Convective Clouds and Chemistry (DC3) Field Campaign
- Current PI of NSF EaSM award on Chemistry and Climate over Asia
- Current Co-Investigator with PI G. Holland (NCAR) on NSF EaSM award
- Current Co-Investigator with PI C. Wang (MIT) on a NSF award
- Current Collaborator with PI K. Pickering (NASA/Goddard) on a NASA award
- Past PI, Co-I and collaborator on 5 NASA, NOAA, EPA, and NSF awards

PUBLICATIONS – Ph.D. Dissertation

Date	Advisor	Title
1991	Dr. Dean Hegg	Numerical modeling of cloud chemistry and acid deposition associated with the interactions of two rainbands and some comparisons with observations

PUBLICATIONS – Refereed

1. **Barth, M. C.**, D. A. Hegg, P. V. Hobbs, J. G. Walega, G. L. Kok, B. G. Heikes, and A. L. Lazrus, 1989: Measurements of atmospheric gas-phase and aqueous-phase hydrogen peroxide concentrations in winter on the east coast of the United States, *Tellus*, **41B**, 61-69.
2. Hegg, D. A., S. A. Rutledge, P. V. Hobbs, **M. C. Barth** and O. Hertzman, 1989: The chemistry of a mesoscale rainband. *Quart. J. Royal Meteor. Soc.*, **115**, 867–886.
3. **Barth, M. C.**, D. A. Hegg and P. V. Hobbs, 1992: Numerical modeling of cloud and precipitation chemistry associated with two rainbands and some comparisons with observations. *J. Geophys. Res.*, **97**, 5825-5845.
4. **Barth, M. C.**, 1994: Numerical modeling of sulfur and nitrogen chemistry in a narrow cold-frontal rainband: The impact of meteorological and chemical parameters., *J. Appl. Meteor.*, **33**, 855-868.
5. Yuen, P-F., D. A. Hegg, T. V. Larson and **M. C. Barth**, 1996: Parameterization of heterogeneous droplet chemistry for use in bulk cloud models, *J. Appl. Meteor.*, **35**, 679-689.
6. **Barth, M. C.** and D. B. Parsons, 1996: Microphysical processes associated with intense frontal rainbands and the effect of evaporation and melting on frontal dynamics, *J. Atmos. Sci.*, **53**, 1569-1586.
7. **Barth, M. C.** and A. T. Church, 1999: The regional and global distributions and lifetimes of sulfate aerosols from Mexico City and southeast China, *J. Geophys. Res.*, **104**, 30,231-30,239.
8. Rasch, P. J., **M. C. Barth**, J. T. Kiehl, S. E. Schwartz, and C. M. Benkovitz, 2000: A description of the global sulfur cycle and its controlling processes in the National Center for Atmospheric Research Community Climate Model Version 3, *J. Geophys. Res.*, **105**, 1367-1385.
9. **Barth, M. C.**, P. J. Rasch, J. T. Kiehl, C. M. Benkovitz, and S. E. Schwartz, 2000: Sulfur chemistry in the National Center for Atmospheric Research Community Climate Model: Description, evaluation, features and sensitivity to aqueous chemistry, *J. Geophys. Res.*, **105**, 1387-1415.
10. Kiehl, J. T., T. L. Schneider, P. J. Rasch, **M. C. Barth**, and J. Wong, 2000: Radiative forcing due to sulfate aerosols from simulations with the National Center for Atmospheric Research Community Climate Model (CCM3), *J. Geophys. Res.*, **105**, 1441-1457.
11. Dye, J. E., B. A. Ridley, K. Baumann, W. C. Skamarock, **M. C. Barth**, M. Venticinque, E. Defer, P. Blanchet, C. Thery, P. Laroche, G. Hubler, D. D. Parrish, T. Ryerson, M. Trainer,

- G. Frost, J. S. Holloway, F. C. Fehsenfeld, A. Tuck, T. Matejka, D. Bartels, S. A. Rutledge, T. Lang, J. Stith, R. Zerr, 2000: An Overview of the STERAO–Deep Convection Experiment with Results for the 10 July Storm, *J. Geophys. Res.*, **105**, 10,023-10,045.
12. Skamarock, W. C., J. Powers, **M. C. Barth**, J. E. Dye, T. Matejka, D. Bartels, K. Baumann, J. Stith, D. D. Parrish, and G. Hubler, 2000: Numerical simulations of the 10 July STERAO/Deep Convection Experiment Convective System: Kinematics and transport, *J. Geophys. Res.*, **105**, 19,973–19,990.
 13. Hess, P. G., S. Flocke, J-F Lamarque, **M. C. Barth**, and S. Madronich, 2000: Episodic Modeling of the Chemical Structure of the Troposphere as Revealed during the Spring MLOPEX Intensive, *J. Geophys. Res.*, **105**, 26,809-26,839.
 14. Patton, E. G., K. J. Davis, **M. C. Barth**, and P. P. Sullivan, 2001: Decaying scalars emitted by a forest canopy: A numerical study, *Boundary Layer Meteorology*, **100**, 91-129.
 15. **Barth, M. C.**, A. L. Stuart, and W. C. Skamarock, 2001: Numerical simulations of the July 10 Stratospheric-Tropospheric Experiment: Radiation, Aerosols and Ozone/Deep Convection storm: Redistribution of soluble tracers, *J. Geophys. Res.*, **106**, 12,381-12,400.
 16. Brasseur A.-L., R. Ramarason, A. Delannoy, W. Skamarock, **M. Barth**, 2002: Three-dimensional calculation of photolysis frequencies in the presence of clouds, *J. Atmos. Chem.*, **41**, 211-237.
 17. Liu, C-H and **M. C. Barth**, 2002: Large-eddy simulation of flow and scalar transport in a modeled street canyon, *J. Appl. Meteorol.*, **41**, 660-673.
 18. **Barth, M. C.**, P. G. Hess, and S. Madronich, 2002: Effect of marine boundary layer clouds on tropospheric chemistry as analyzed in a regional chemistry transport model, *J. Geophys. Res.*, **107**, (D11), 4126, doi:10.1029/2001JD000468.
 19. Skamarock, W. C., J. E. Dye, E. Defer, **M. C. Barth**, J. L. Stith, B. A. Ridley, and K. Baumann, 2003: Observational- and Modeling-Based budget of lightning-produced NO_x in a continental thunderstorm, *J. Geophys. Res.*, **108**(D10), 4305, doi:10.1029/2002JD002163.
 20. **Barth, M. C.**, S. Sillman, R. Hudman, M. Z. Jacobson, C.-H. Kim, A. Monod, and J. Liang, 2003: Summary of the cloud chemistry modeling intercomparison: Photochemical box model simulation, *J. Geophys. Res.*, **108**(D7), 4214, doi:10.1029/2002JD002673.
 21. Liu, C-H, **M. C. Barth**, and D. Y. C. Leung, 2004: Large-eddy simulation of flow and pollutant transport in street canyons of different building height to street width ratios, *J. Appl. Meteorol.*, **43**, 1410-1424.

22. Liu, C-H, D. Y. C. Leung and **M. C. Barth**, 2005: On the prediction of air and pollutant exchange rates in street canyons of different aspect ratios using large-eddy simulation, *Atmos. Environ.*, **39**, 1567-1574.
23. Kim, S-W, C-H Moeng, J. C. Weil, and **M. C. Barth**, 2005: Lagrangian particle dispersion modeling of fumigation process using large-eddy simulation, *J. Atmos. Sci.*, **62**, 1932-1946.
24. Vila-Guerau de Arellano, J., S-W Kim, **M. C. Barth**, and E. G. Patton, 2005: Transport and chemical transformations influenced by shallow cumulus over land, *Atmos. Chem. Phys.*, **5**, 3219-3231.
25. **Barth, M.**, J. McFadden, J. Sun, C. Wiedinmyer, P. Chuang, D. Collins, R. Griffin, M. Hannigan, T. Karl, S-W Kim, S. Lasher-Trapp, S. Levis, M. Litvak, N. Mahowald, K. Moore, S. Nandi, E. Nemitz, A. Nenes, M. Potosnak, T. Raymond, J. Smith, C. Still, C. Stroud, Coupling between land ecosystems and the atmospheric hydrologic cycle through biogenic aerosol pathways, *Bull. Amer. Meteor. Soc.*, **86**, 1738-1742, 2005.
26. Kazil, J., E. R. Lovejoy, **M. C. Barth**, K.O'Brien, 2006: Aerosol nucleation over oceans and the role of galactic cosmic rays, *Atmos. Chem. Phys.*, **6**, 4905-4924.
27. **Barth, M. C.**, 2006: The importance of cloud drop representation on cloud photochemistry. *Atmos. Res.*, **82**, 294-309.
28. **Barth, M. C.**, S-W Kim, W. C. Skamarock, A. L. Stuart, K. E. Pickering, L. E. Ott, 2007: Simulations of the redistribution of formaldehyde, formic acid, and peroxides in the July 10, 1996 STERAO deep convection storm. *J. Geophys. Res.*, **112**, D13310, doi:10.1029/2006JD008046.
29. **Barth, M. C.**, S.-W. Kim, C. Wang, K. Pickering, L. Ott, G. Stenchikov, M. Leriche, S. Cautenet, J.-P. Pinty, Ch. Barthe, C. Mari, J. Helsdon, R. Farley, A. Fridlind, A. Ackerman, V. Spiridonov, B. Tosko, 2007: Cloud-scale model intercomparison of chemical constituent transport in deep convection. *Atmos. Chem. Phys.*, **7**, 4709-4731.
30. Kim, S-W, C-H Moeng, J. C. Weil, and **M. C. Barth**, 2007: Comment on "Fumigation of pollutants in and above the entrainment zone into a growing convective boundary layer: A large-eddy simulation". *Atmos. Environ.*, **41**, 7679-7682.
31. Barthe, C. and **M. C. Barth**, 2008: Evaluation of a new lightning-produced NO_x parameterization for cloud resolving models and its associated uncertainties. *Atmos. Chem. Phys.*, **8**, 4691-4710.
32. Kim, D., C. Wang, A. Ekman, **M. C. Barth**, and P. Rasch, 2008: Distribution and direct radiative forcing of carbonaceous and sulfate aerosols in an interactive size-resolving aerosol-climate model. *J. Geophys. Res.*, **113**, D16309, doi:10.1029/2007JD009756.

33. Wang C., D. Kim, A. M. L. Ekman, **M. C. Barth**, P. J. Rasch, 2009: Impact of anthropogenic aerosols on Indian summer monsoon, *Geophys. Res. Lett.*, **36**, L21704, doi:10.1029/2009GL040114.
34. Fast, J. D., W. I Gustafson Jr., E. G. Chapman, R. C. Easter, J. P. Rishel, R. A. Zaveri, G. A. Grell, and **M. C. Barth**, 2010: The Aerosol Modeling Testbed: A community tool to objectively evaluate aerosol process modules, *Bull. Atmos. Meteor. Soc.*, submitted.
35. Barthe, C., W. Deierling, and **M. C. Barth**, 2010: The estimation of total lightning from various storm parameters: A cloud-resolving model study. *J. Geophys. Res.*, **115**, D24202, doi:10.1029/2010JD014405.
36. Vila-Guerau de Arellano, J., E. G. Patton, T. Karl, K. van den Dries, **M. C. Barth** and J. J. Orlando, 2011: On the diurnal evolution of isoprene and the hydroxyl radical over tropical forests. *J. Geophys. Res.*, in press.

BOOK CHAPTERS

1. Kreidenweis, S., G. Tyndall, **M. Barth**, F. Dentener, J. Lelieveld, and M. Mozurkewich, Chapter 4: Aerosols and Clouds, in **Atmospheric Chemistry and Global Change**, eds. Brasseur, G. P., J. J. Orlando, and G. S Tyndall, 133-179, 1999.

PUBLICATIONS — Non-refereed Papers

1. **Barth, M. C.**, Hegg, D. A., and P. V. Hobbs, Numerical modeling of cloud chemistry and acid deposition associated with the interactions of two rainbands and some comparisons with observations, Final Report to the Electric Power Research Institute under Research Agreement RP1630-45, June 1991.
2. **Barth, M. C.**, Evolution of chemical transformations in convection that has a trailing stratiform region, Conference on Atmospheric Chemistry, American Meteorological Society, Anaheim, California, 17 - 22 January 1993, 49-52.
3. **Barth, M. C.** and D. B. Parsons, Microphysical processes associated with intense frontal rainbands and the impact of evaporation and melting on frontal dynamics, Cloud Physics Conference, 75th Annual Meeting American Meteorological Society, Dallas, Texas, 15 - 20 January 1995, 226-230.
4. **Barth, M. C.**, P. Hess, and S. Madronich, The accuracy of approximate numerical solver techniques in solving the gas-aqueous chemical system, International Conference on Clouds and Precipitation, Zurich, Switzerland, 19-23 August 1996, 1062-1065.

5. **Barth, M. C.**, P. Rasch, and J. Kiehl, Sulfur chemistry in the NCAR community climate model, International Conference on Clouds and Precipitation, Zurich, Switzerland, 19-23 August 1996, 1181-1183.
6. **Barth, M. C.** and W. W. Grabowski, Preliminary results of cloud effects on the photochemistry in and around stratocumulus, in Report of the Fourth International Cloud Modelling Workshop, WMO Report 29, 83-87, 1998.
7. **Barth, M. C.**, and P. Hess, Effect of aqueous chemistry in a regional chemistry transport model, Conference on Cloud Physics, Everett, Washington, USA, 17-21 August 1998, 197–200.
8. Patton, E. G., K. J. Davis, **M. C. Barth**, and C.-H. Moeng, Large-eddy simulation of convective boundary layer mixing of decaying scalars emitted by a forest canopy, 13th Symposium on Boundary Layers and Turbulence, Dallas, Texas, USA, 10-15 January 1999,
9. **Barth, M. C.**, W. C. Skamarock, and A. L. Stuart, The influence of cloud processes on the distribution of chemical species for the 10 July 1996 STERAO/Deep Convection Storm, in International Conference on Clouds and Precipitation Proceedings, Reno, Nevada, USA, 14-18 August 2000, 960–963.
10. Patton, E. G., **M. C. Barth**, K. J. Davis, and P. P. Sullivan: The Interactions Between Turbulence and Photochemistry in the Planetary Boundary Layer, Air and Waste Management Association International Symposium on the Measurement of Toxic and Other Related Air Pollutants, September 12-14, 2000, Research Triangle Park, NC, 2000. (cdrom)
11. **Barth, M.**, Modeling the effects of clouds on chemical constituents, contribution to the IGAC newsletter, Issue 23, April 2001, 13-15.
12. Liu, C-H, **M. C. Barth**, and S. Madronich, Large-eddy simulation of flow and scalar dispersion inside a street canyon, in Proceedings of the 12th Joint Conference on the Applications of Air Pollution Meteorology with the Air and Waste Management Association, May 20-24, 2002.
13. **Barth, M. C.**, Relative importance of the production and destruction of chemically reactive species in deep convection, in Proceedings of the 14th AMS Conference on Cloud Physics, Ogden, UT, June 3-7, 2002.
14. **Barth, M. C.**, R. Cancel, K. Ross, S.-W. Kim, The importance of cloud drop representation on cloud photochemistry, in Proceedings of the 14th International Conference on Clouds and Precipitation, July 19-23, 2004.
15. **Barth, M. C.**, S.-W. Kim, W. C. Skamarock, Simulating aqueous chemistry in the July 10 STERAO deep convective storm using WRF model, in Proceedings of the 2nd International Workshop on Next Generation NWP Model, May 17-18, 2004.

16. Kim, S.-W., **M. C. Barth**, W. C. Skamarock, WRF model simulations of aqueous chemistry in the July 10 STERAO deep convective storm, in Proceedings of the WRF/MM5 User's Workshop, June 22-25, 2004.
17. Kim, S.-W., C.-H. Moeng, J. C. Weil, **M. C. Barth**, Lagrangian particle dispersion modeling of the fumigation process using large-eddy simulation, in Proceedings of the 16th Symposium on Boundary Layers and Turbulence, August 9-13, 2004.
18. Kim, S.-W., **M. C. Barth**, C.-H. Moeng, The effect of shallow cumulus convection on the segregation of chemical reactants, in Proceedings of the 16th Symposium on Boundary Layers and Turbulence, August 9-13, 2004.
19. **Barth, M.**, McFadden, J., Sun, J., Wiedinmyer, C., Chuang, P., Collins, D., Griffin, R., Hannigan, M., Karl, T., Kim, S.-W., Lasher-Trapp, S., Levis, S., Litvak, M., Mahowald, N., Moore, K., Nandi, S., Nenes, A., Potosnak, M., Raymond, T.M., Smith, J.N., Stroud, C., and C. Still. 'UCAR/NCAR Junior Faculty Forum on Future Scientific Directions'. NCAR technical note, NCAR TN-467+PROC, 2005.
20. **Barth, M. C.**, The role of adsorption of chemical species onto ice and snow in deep convection, in proceedings from the 12th Conference on Cloud Physics, Madison, WI, 10-14 July 2006. <http://ams.confex.com/ams/Madison2006/techprogram/programexpanded346.htm>
21. Acuff, K. and **M. Barth**, Chemical species redistribution by deep convection and its sensitivity to different types of storms, in proceedings of the 7th WRF Users Workshop, Boulder, Colorado, 19-22 June 2006
<http://www.mmm.ucar.edu/wrf/users/workshops/WS2006/WorkshopPapers.htm>
22. Vila-Guerau de Arellano, J., S-W Kim, **M. C. Barth**, E. G. Patton, 2006: Transport and chemical transformations influenced by shallow cumulus over land, in preprints of 17th Symposium on Boundary Layers and Turbulence, San Diego, California, 21-25 May 2006. <http://ams.confex.com/ams/BLTAqFBioA/techprogram/programexpanded351.htm>
23. Leriche, M. S. Cautenet, **M. Barth**, N. Chaumerliac, 2007: Modeling of the July 10 STERAO storm with the RAMS model: Chemical species redistribution including gas phase and aqueous phase chemistry, In Air Pollution Modeling and its Application XVIII, edited by C. Borrego and E. Renner, pp. 437-446, Elsevier, Amsterdam, The Netherlands.
24. **Barth, M.**, T. Birner, N. McFarlane, D. Pendlebury, J. Petch, 2006: Modeling of Deep Convection and of Chemistry and their Roles in the Tropical Tropopause Layer: SPARC-GEWEX/GCSS-IGAC Workshop: Victoria, BC, Canada, June 12-15, 2006, IGACtivities Newsletter, 31-37.
25. **Barth, M.**, T. Birner, N. McFarlane, D. Pendlebury, J. Petch, 2007: Modelling of Deep Convection and Chemistry and their Roles in the Tropical Tropopause Layer: SPARC-

GEWEX/GCSS-IGAC Workshop, June 12-15, 2006, Victoria, BC, Canada, SPARC Newsletter, 7-12.

26. **Barth, M. C.**, S.-W. Kim, C. Wang, K. Pickering, L. Ott, G. Stenchikov, M. Leriche, S. Cautenet, J.-P. Pinty, Ch. Barthe, C. Mari, J. Helsdon, R. Farley, A. Fridlind, A. Ackerman, V. Spiridonov, B. Tosko, 2007: Cloud-scale model intercomparison of chemical constituent transport in deep convection. *Atmos. Chem. Phys. Disc.*, 7, 8035-8085.
27. Petch, J., McFarlane, N., Pendlebury, D., **Barth, M.** and Birner, T., 2007: Modelling of Deep Convection and Chemistry in the Tropical Tropopause Layer: Outcomes from the SPARC-GEWEX-IGAC Workshop, *GEWEX Newsletter*, August 2007, 10-11.

INVITED TALKS

1. Sep. 1998: Clouds and Chemistry, Chemistry and Clouds, ASP/NCAR
2. Feb. 2001: Large Eddy Simulations of Isoprene Chemistry in the Convective Boundary Layer, NOAA Aeronomy Laboratory seminar
3. Jul. 2002: The Relative Importance of Aqueous Chemistry to the Global Sulfur Cycle, ASP Summer Colloquium/NCAR
4. Jul. 2002: How Aqueous Chemistry Affects Sulfate Aerosols, ASP Summer Colloquium/NCAR
5. Aug. 2002: Effect of Cloud Chemistry on Boundary Layer Chemistry, Telluride Atmospheric Chemistry Workshop
6. Nov. 2002: Relative Importance of Cloud Chemistry in Deep Convection, University of Wyoming, Dept. of Atmospheric Sciences seminar
7. Feb. 2003: Cloud Processing: What are the links with climate and how well are we modeling them?, Chemistry Climate Interactions Workshop, Santa Fe, NM
8. Dec. 2004: Simulating the Redistribution of Formaldehyde in Deep Convection Using the Weather Research Forecast Model Coupled with Aqueous Chemistry, AGU Fall Meeting, San Francisco, CA
9. Feb. 2006: Cloud Chemistry Simulations of a Thunderstorm, Harvard University, Atmospheric Sciences Seminar
10. Mar. 2006: Cloud Chemistry Simulations of a Thunderstorm, University of South Florida, Environmental Research Interdisciplinary Colloquium
11. Oct. 2006: Convective-Scale Cloud Chemistry Simulations of a Thunderstorm, Colorado State University, Atmospheric Sciences Colloquium
12. Oct. 2006: Convective-Scale Cloud Chemistry Simulations of a Thunderstorm, NOAA/ESRL, Chemical Sciences Division Seminar

13. Dec. 2006: Processing of Chemical Constituents by Deep Convection, AGU Fall Meeting, San Francisco, CA
14. Oct. 2007: Relevance of and challenges in the representation of surface and boundary layer processes in mesoscale chemistry transport models , Expert Workshop on the Relevance of Surface and Boundary Layer Processes for the Exchanges of Reactive- and Greenhouse Gases, Wageningen, Netherlands
15. Jan. 2008: Advances in Cloud Chemistry, Peter V. Hobbs Symposium, AMS annual meeting, New Orleans, Louisiana
16. Jul. 2008: Effect of Deep Convection on Chemical Species Transport in the Central US, International Conference on Clouds and Precipitation, Cancun, Mexico
17. Oct. 2008: Thunderstorms and Chemistry: Cloud-scale simulations to understand the influence of convective outflows on the upper troposphere composition , University of North Dakota, Atmospheric Sciences Seminar
18. Jan. 2009: Deep Convective Clouds and Chemistry (DC3): Description of the proposed field campaign and modeling of lightning NO_x in the DC3 study areas, American Meteorological Society annual meeting, Phoenix, Arizona
19. Aug. 2009: Introduction: Biogenic Emissions to the Atmosphere, Gordon Research Conference, Waterville, New Hampshire [introductory talk]
20. Aug. 2010: Atmospheric Chemistry Modeling at High Resolution, ASP Colloquium Lecture, Boulder, Colorado
21. Aug. 2010: Atmospheric Chemistry Modeling at High Resolution, Third International Workshop on Next-Generation Numerical Weather Prediction Models, Jeju Island, Korea
22. Oct. 2010: Thunderstorms and Chemistry: Examining the regional-scale effects on the upper troposphere and precipitation, JPL seminar, Pasadena, California