

*Curriculum Vitae*  
**LOUISA K. EMMONS**

**EDUCATION**

- 1986 B.S., Physics, Haverford College, Haverford, PA  
1989 M.A., Physics, State University of New York, Stony Brook, NY  
1994 Ph.D., Physics, State University of New York, Stony Brook, NY

**PROFESSIONAL EXPERIENCE**

- 2006-present **Scientist II**, Atmospheric Chemistry Division, National Center for Atmospheric Research, Boulder, CO.  
2003-2006 **Scientist I**, Atmospheric Chemistry Division, National Center for Atmospheric Research, Boulder, CO.  
2001-2003 **Associate Scientist III**, MOPITT group, Atmospheric Chemistry Division, National Center for Atmospheric Research, Boulder, CO.  
2000-2001 **Associate Scientist III**, Global Modeling group, Atmospheric Chemistry Division, National Center for Atmospheric Research, Boulder, CO.  
1999 **Scientific Visitor**, Global Modeling group, Atmospheric Chemistry Division, National Center for Atmospheric Research, Boulder, CO.  
1997-1998 **Visitor**, Atmospheric Chemistry Division, National Center for Atmospheric Research, Boulder, CO.  
1994-1998 **Post-doctoral Research Fellow**, Department of Atmospheric, Oceanic and Space Sciences, University of Michigan, Ann Arbor, MI.  
1986-1994 **Research Assistant**, Department of Physics, State University of New York at Stony Brook.  
1987-1988 **Teaching Assistant**, Department of Physics, State University of New York.

**FIELD EXPERIENCE**

Ground-based remote sensing observations: Mauna Kea, Hawaii, 1988; McMurdo, Antarctica, Aug-Oct, 1987, Aug-Oct, 1991, Aug-Oct, 1992; Thule Greenland, Feb-Mar, 1991; Feb, 1992.

Aircraft-based in situ measurements, NASA/GTE PEM-Tropics-A, Aug-Oct, 1996.

Ground-based in situ measurements, PROPHET site, Pellston, MI, 1997.

Flight planning support, NASA INTEX-A, Jul-Aug, 2004.

**COMMUNITY SERVICE**

*NCAR*

ACD Seminar coordinator (with Thomas Karl)

*Outside*

NASA EOS Validation Contact for MOPITT

MOPITT Science Team, Member

INTEX Science Team, Member

*Professional Reviews*

*Journals*

Atmospheric Chemistry and Physics Discussions

Atmospheric Environment

Environmental Chemistry  
Geophysical Research Letters  
Journal of Geophysical Research-Atmospheres

*Funding Agencies*

NASA  
NOAA  
NSF

**EDUCATION AND OUTREACH**

*Significant Opportunities in Atmospheric Research and Science (SOARS)*

Writing Mentor, 1999, 2000, 2003

*Undergraduate Student Supervision*

Tyler Collier, 2003-2004  
Sara Harrold, 2004-2006

*Elementary School Outreach*

Nashoba Brooks School, (4<sup>th</sup> grade girls science), Concord, Massachusetts, 2004-2005

**AWARDS**

2004 Editors' Citation for Excellence in Refereeing for JGR-Atmospheres  
NCAR Incentive Award, 2001  
Antarctic Service Medal, 1987

**RESEARCH GRANTS**

Edwards, D., Terra/MOPITT Measurements of Tropospheric Carbon Monoxide and Data Analysis in Support of INTEX-NA, NASA, 2005-2008.

Emmons, L., Closing the Carbon Monoxide Budget: Variability in CO Emissions, NASA \$498k, 2004-2007.

Edwards, D., Using satellite tropospheric trace gas remote sensing to link chemistry and transport between the local and global scales, NASA, 2003-2005.

Brasseur, G., M.A. Carroll, L. Emmons, Data-Based Climatologies and Study of the Ozone Budget near the Tropopause, NASA ACMAP, 1999-2002 (L-9301).

Brasseur, G., M.A. Carroll, L. Emmons, Continued Data Archive: Budget of Nitrogen Compounds in the Global Atmosphere - Observations-based climatologies and 3-D chemical transport model simulations NASA AEAP/SASS, 1996-1999 (NAG 5-3168).

**PUBLICATIONS**

*Journal Articles*

Shindell, D. T., G. Faluvegi, and L. K. Emmons, Inferring carbon monoxide pollution changes from space-based observations, *J. Geophys. Res.*, 110, D23303, doi:10.1029/2005JD006132, 2005.

Pfister, G., P.G. Hess, L.K. Emmons, J.-F. Lamarque, C. Wiedinmyer, D.P. Edwards, G. Pétron, J.C. Gille, G.W. Sachse, Quantifying CO emissions from the 2004 Alaskan wildfires using MOPITT CO data, *Geophys. Res. Lett.*, 32, L11809, doi:10.1029/2005GL022995, 2005.

- Lamarque, J.-F., P. Hess, L. Emmons, L. Buja, W. Washington and C. Granier, Tropospheric ozone evolution between 1890 and 1990, *J. Geophys. Res.*, *110*, D08304, doi:10.1029/2004JD005537, 2005.
- Emmons, L.K., et al., Validation of Measurements of Pollution in the Troposphere (MOPITT) CO retrievals with aircraft in situ profiles, *J. Geophys. Res.*, *109(D3)*, D03309, 10.1029/2003JD004101, 14 February 2004.
- Crawford, J.H., et al., Relationship between Measurements of Pollution in the Troposphere (MOPITT) and in situ observations of CO based on a large-scale feature sampled during TRACE-P, *J. Geophys. Res.*, *109*, D15S04, doi:10.1029/2003JD004308, 2004.
- Deeter, M.N., et al., Evaluation of operational radiances for the Measurements of Pollution in the Troposphere (MOPITT) instrument CO thermal-band channels, *J. Geophys. Res.*, *109(D3)*, D03308, 10.1029/2003JD003970, 14 February 2004.
- Deeter, M. N., L. K. Emmons, D. P. Edwards, J. C. Gille, and J. R. Drummond, 2004, Vertical resolution and information content of CO profiles retrieved by MOPITT, *Geophys. Res. Lett.*, *31*, L15112, doi:10.1029/2004GL020235, 2004.
- Edwards, D.P., et al., Observations of carbon monoxide and aerosols from the Terra satellite: Northern Hemisphere variability, *J. Geophys. Res.*, *109*, D24202, doi:10.1029/2004JD004727, 2004.
- Lamarque, J.-F., et al., Application of a bias estimator for the improved assimilation of Measurements of Pollution in the Troposphere (MOPITT) carbon monoxide retrievals, *J. Geophys. Res.*, *109(D16)*, D16304, doi:10.1029/2003JD004466, 2004.
- Pétron, G., C. Granier, B. Khattatov, V. Yudin, J. Lamarque, L. Emmons, J. Gille, and D. P. Edwards, Monthly CO surface sources inventory based on the 2000–2001 MOPITT satellite data, *Geophys. Res. Lett.*, *31*, L21107, doi:10.1029/2004GL020560, 2004.
- Pfister, G., G. Pétron, L. K. Emmons, J. C. Gille, D. P. Edwards, J.-F. Lamarque, J.-L. Attie, C. Granier, and P. C. Novelli, Evaluation of CO simulations and the analysis of the CO budget for Europe, *J. Geophys. Res.*, *109*, D19304, doi:10.1029/2004JD004691, 2004.
- Ridley, B. et al., Florida thunderstorms: A faucet of reactive nitrogen to the upper troposphere, *J. Geophys. Res.*, *109*, D17305, doi:10.1029/2004JD004769, 2004.
- Yudin, V. A., G. Pétron, J.-F. Lamarque, B. V. Khattatov, P. G. Hess, L. V. Lyjak, J. C. Gille, D. P. Edwards, M. N. Deeter, and L. K. Emmons, Assimilation of the 2000–2001 CO MOPITT retrievals with optimized surface emissions, *Geophys. Res. Lett.*, *31*, L20105, doi:10.1029/2004GL021037, 2004.
- Emmons, L., P. Hess, A. Klonecki, X. Tie, L. Horowitz, J.-F. Lamarque, D. Kinnison, G. Brasseur, E. Atlas, E. Browell, C. Cantrell, F. Eisele, R.L. Mauldin, J. Merrill, B. Ridley, R. Shetter, Budget of tropospheric ozone during TOPSE from two chemical transport models, *J. Geophys. Res.*, *108(D8)*, 8372, doi:10.1029/2002JD002665, 2003.
- Browell, E.V., et al., Ozone, aerosol, potential vorticity, and trace gas trends observed at high latitudes from February to May 2000 over North America, *J. Geophys. Res.*, *108*, 8369, doi:10.1029/2001JD001390, 2003.
- Deeter, M.N., et al., Operational carbon monoxide retrieval algorithm and selected results for the MOPITT instrument, *J. Geophys. Res.*, *108(D14)*, 4399, doi:10.1029/2002JD003186, 2003.

- Edwards, D.P., J.-F. Lamarque, J.-L. Attié, L.K. Emmons, A. Richter, J.-P. Cammas, J.C. Gille, G.L. Francis, M.N. Deeter, J. Warner, D.C. Ziskin, L.V. Lyjak, J.R. Drummond, J.P. Burrows, Tropospheric ozone over the tropical Atlantic: A satellite perspective, *J. Geophys. Res.*, *108*, 10.1029/2002JD002927, 2003.
- Heald, C., et al., Asian outflow and transpacific transport of carbon monoxide and ozone pollution: An integrated satellite, aircraft and model perspective, *J. Geophys. Res.*, *108(D24)*, 4804, doi:10.1029/2003JD003507, 2003.
- Horowitz, L., S. Walters, D.L. Mauzerall, L.K. Emmons, P.J. Rasch, C. Granier, X. Tie, J.-F. Lamarque, M.G. Schultz, G.S. Tyndall, J.J. Orlando, and G.P. Brasseur, A global simulation of tropospheric ozone and related tracers: Description and evaluation of MOZART, version 2, *J. Geophys. Res.*, *108(D24)*, 4784, doi:10.1029/2002JD002853, 24 December 2003.
- Jacob, D., J. Crawford, M. Kleb, V. Connors, R. Bendura, J. Raper, G. Sachse, J. Gille, L. Emmons, and C. Heald, The transport and chemical Evolution over the Pacific (TRACE-P) mission: Design, execution, and first results, *J. Geophys. Res.*, *108(D20)*, 9000, doi:10.1029/2002JD003276, 2003.  
[selected by the Institute for Scientific Information (<http://esi-topics.com/>) as the "fast-breaking paper in geosciences" for December 2004]
- Klonecki, A., P. Hess, L. Emmons, L. Smith, J. Orlando, D. Blake, Seasonal changes in the transport of pollutants into the Arctic troposphere-model study, *J. Geophys. Res.*, *108*, 8367, doi:10.1029/2002JD002199, 2003.
- Lamarque, J.-F., D.P. Edwards, L.K. Emmons, J.C. Gille, O. Wilhelm, C. Gerbig, D. Prevedel, M.N. Deeter, J. Warner, D.C. Ziskin, B. Khattatov, G.L. Francis, V. Yudin, S. Ho, D. Mao, J. Chen, and J.R. Drummond, Identification of CO plumes from MOPITT data: Application to the August 2000 Idaho-Montana forest fires, *Geophys. Res. Lett.*, *30(13)*, 1688, doi:10.1029/2003GL017503, 2003.
- Ridley, B.A., et al., Ozone depletion events observed in the high latitude surface layer during the TOPSE aircraft program, *J. Geophys. Res.*, *108*, 8356, doi:10.1029/2001JD001507, 2003.
- Tie, X., L. Emmons, L. Horowitz, G. Brasseur, B. Ridley, E. Atlas, C. Stroud, P. Hess, A. Klonecki, S. Madronich, R. Talbot, J. Dibb, Effect of sulfate aerosol on tropospheric NO<sub>x</sub> and ozone budgets: Model simulations and TOPSE evidence, *J. Geophys. Res.*, *108*, 8364, doi:10.1029/2001JD001508, 2003.
- Cunnold, D.M., et al., In situ measurements of atmospheric methane at GAGE/AGAGE sites during 1985-2000 and resulting source inferences, *J. Geophys. Res.*, *107*, 10.1029/2001JD001226, 2002.
- Tie, X., G. Brasseur, L. Emmons, L. Horowitz, and D. Kinnison, Effects of aerosols on tropospheric oxidants: A global model study, *J. Geophys. Res.*, *106*, 22,931, 2001.
- Tie, X., R. Zhang, G. Brasseur, L. Emmons, W. Lei, Effects of lightning on reactive nitrogen and nitrogen reservoir species in the troposphere, *J. Geophys. Res.*, *106*, 3167, 2001.
- Hauglustaine, D., L. Emmons, M. Newchurch, G. Brasseur, T. Takao, K. Matsubara, J. Johnson, B. Ridley, J. Stith, and J. Dye, On the role of lightning NO<sub>x</sub> in the formation of tropospheric ozone plumes in the tropics: A global model perspective, *J. Atmos. Chem.*, *38*, 277, 2001.

- Emmons, L.K., D.A. Hauglustaine, J-F. Müller, M.A. Carroll, G.P. Brasseur, D. Brunner, J. Stahelin, V. Thouret, A. Marenco, Data composites of airborne observations of tropospheric ozone and its precursors, *J. Geophys. Res.*, *105*, 20,497-20,538, 2000.
- Hauglustaine, D.A., G.P. Brasseur, S. Walters, P.J. Rasch, J.-F. Müller, L.K. Emmons and M.A. Carroll, MOZART: A global chemical transport model for ozone and related chemical tracers, part 2: Model results and evaluation, *J. Geophys. Res.*, *103*, 28,291-28,335, 1998.
- Emmons, L.K., M.A. Carroll, D.A. Hauglustaine, G.P. Brasseur, C. Atherton, J. Penner, S. Sillman, H. Levy II, F. Rohrer, W.M.F. Wauben, P.F.J. van Velthoven, Y. Wang, D. Jacob, P. Bakwin, R. Dickerson, B. Doddridge, C. Gerbig, R. Honrath, G. Hubler, D. Jaffe, Y. Kondo, J.W. Munger, A. Torres, A. Volz-Thomas, Climatologies of NO<sub>x</sub> and NO<sub>y</sub>: A comparison of data and models, *Atmos. Env.*, *31*, 1851, 1997.
- Emmons, L.K., D.T. Shindell, J.M. Reeves and R.L. de Zafra, Stratospheric ClO profiles from McMurdo Station, Antarctica, spring 1992, *J. Geophys. Res.*, *100*, 3049, 1995.
- Shindell, D.T., J.M. Reeves, L.K. Emmons and R.L. de Zafra, Arctic chlorine monoxide observations during spring 1993 over Thule, Greenland, and implications for ozone depletion, *J. Geophys. Res.*, *99*, 25,697, 1994.
- Emmons, L.K., J.M. Reeves, D.T. Shindell and R.L. de Zafra, N<sub>2</sub>O as an indicator of Arctic vortex dynamics: Correlations with O<sub>3</sub> over Thule, Greenland in February and March, 1992, *Geophys. Res. Lett.*, *21*, 1275, 1994.
- de Zafra, R.L., L.K. Emmons, J.M. Reeves, and D.T. Shindell, An overview of millimeter-wave spectroscopic measurements of chlorine monoxide at Thule, Greenland, February-March, 1992: Vertical profiles, diurnal variation, and long-term trends, *Geophys. Res. Lett.*, *21*, 1271, 1993.
- Emmons, Louisa K. and Robert L. de Zafra, Observation of a strong inverse temperature dependence for the opacity of atmospheric water vapor in the mm continuum near 280 GHz, *Int. J. IR and mm Waves*, *11*, 469, 1990.
- de Zafra, R.L., M. Jaramillo, J. Barrett, L.K. Emmons, P.M. Solomon, and A. Parrish, New observations of large concentrations of ClO in the lower springtime stratosphere over Antarctica and its implications for ozone-depleting chemistry, *J. Geophys. Res.*, *94*, 11423, 1989.
- Barrett, J.W., P.M. Solomon, R.L. de Zafra, M. Jaramillo, L. Emmons, and A. Parrish, Formation of the Antarctic ozone hole by the ClO dimer mechanism, *Nature*, *336*, 455, 1988.

#### *Book chapters*

- Emmons, L., C. Granier, G. Brasseur, Importance of chemistry for climate, in *Landolt-Börnstein/New Series, Vol. V/6, Observed Global Climate*, Springer, 2005.
- Penkett, S.A., K.S. Law, T. Cox, and P. Kasibhatla, Atmospheric Photooxidants in *Atmospheric Chemistry in a Changing World*, G.P. Brasseur, R.G. Prinn, A.A.P. Pszenny (eds.), Springer-Verlag, Berlin, 2003. (contributing author)

#### *Thesis*

- Emmons, L., Measurement and Analysis of Polar Stratospheric ClO and N<sub>2</sub>O by Ground-based mm-Wave Spectroscopy, (Robert L. de Zafra, advisor), 1994.

## PRESENTATIONS

### *Invited Talks*

- Identification of source contributions using carbon-13 isotopes of CO and HCs from observations and MOZART, NOAA Aeronomy Lab, Oct. 13, 2004.
- Examining the tropospheric carbon monoxide budget with MOPITT, MOZART and isotopes, State University of New York at Stony Brook, Oct. 1, 2003.
- Using satellite and *in situ* observations with model simulations to examine tropospheric ozone chemistry, ACD seminar for Scientist I application, Nov 26, 2002.
- Data composites of tropospheric ozone and its precursors, *GMI Meeting*, Washington, D.C., Jan 4-6, 2000.
- Climatologies of NO<sub>x</sub>, NO<sub>y</sub> and O<sub>3</sub>, *Combined IGAC Meeting: Global Integration and Modeling (GIM)/Global Emissions Inventory Activity (GEIA)/Global Atmospheric Chemistry Survey (GLOCHEM)*, Fairfax, VA, December 6-8, 1995.

### *Scientific Meetings and Workshops*

- Improving CO emissions using <sup>13</sup>C/<sup>12</sup>C fractions in observations and MOZART, *8<sup>th</sup> International Global Atmospheric Chemistry Conference*, Christchurch, New Zealand, 4-9 September 2004.
- Identification of source contributions using carbon-13 isotopes of CO and HCs, *European Geosciences Union 1<sup>st</sup> General Assembly*, Nice, France, 25-30 April 2004.
- Validation of four years of MOPITT CO retrievals with independent measurements, *2004 Joint Assembly*, Montreal, Canada, 17-21 May, 2004.
- <sup>13</sup>CO in MOZART, at *Workshop on Isotopes in the Earth System*, organized by Natalie Mahowald and Andrew Gettleman, NCAR, Jan. 13-15, 2004.
- Use of carbon isotopes in the analysis of the tropospheric carbon monoxide budget, *Eos Trans. AGU*, 84(46), Fall Meet. Suppl., Abstract A42F-03, 2003.
- The distribution of tropospheric carbon monoxide observed by MOPITT, *7<sup>th</sup> Scientific Conference of the International Global Atmospheric Chemistry Project (IGAC)*, Crete, Sept. 18-25, 2002.
- The budget of tropospheric ozone during TOPSE, *Eos Trans. AGU*, 82(20), Spring Meet. Suppl., S30, 2001.
- Data composites of tropospheric ozone and precursors, *The 1999 Conference on the Atmospheric Effects of Aviation*, Virginia Beach, VA, April 19-23, 1999.
- Evidence of transport across the Indian Ocean of ozone produced from biomass burning and lightning, *Eos Trans. AGU*, 79(45), Fall Meet. Suppl., F111, 1998.
- Data-based climatologies of tropospheric carbon monoxide and ozone, *Eos Trans. AGU*, 79(17), Spring Meet. Suppl., S203, 1998.
- Climatologies from the NO<sub>x</sub>, NO<sub>y</sub> Data Archive, *5th Annual Meeting on NASA Atmospheric Effects of Aviation Project*, Virginia Beach, VA, April 23-28, 1995.
- Observed changes in the vertical profile of stratospheric nitrous oxide at Thule, Greenland in February-March, 1992, Ozone in the Troposphere and Stratosphere, *Proceedings of the 1992 Quadrennial Ozone Symposium*, ed. Robert D. Hudson, NASA Conference Publication 3266, 543, 1994.