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PROFESSIONAL EXPERIENCE

2008-present **PRINCETON UNIVERSITY**, Princeton, New Jersey
Lecturer, Department of Geosciences, Program in Atmospheric and Oceanic Sciences

2001-present **GEOPHYSICAL FLUID DYNAMICS LABORATORY**, Princeton, New Jersey
Physical Scientist
Leader, Atmospheric Chemistry and Climate Group (since 2012)

My current research focuses on tropospheric trace gases and aerosols. I use global chemical transport models to simulate the chemical and dynamical processes affecting these species.

1999-2001 **GEOPHYSICAL FLUID DYNAMICS LABORATORY**, Princeton, New Jersey
Visiting Scientist, Atmospheric and Oceanic Sciences Program, Princeton University

My work aimed to improve our understanding of the processes controlling tropospheric trace gas distributions. I used global chemical transport models to study the impact of chemistry and transport on ozone and related chemical species.

1997-1999 **NATIONAL CENTER FOR ATMOSPHERIC RESEARCH**, Boulder, Colorado
Postdoctoral Fellow, Advanced Study Program / Atmospheric Chemistry Division

My research focused on simulating the chemistry of ozone and related species in the troposphere. Using a three-dimensional global model, I studied the dependence of ozone concentrations on emissions of ozone precursors from anthropogenic and natural sources.

EDUCATION

1993-1997 **HARVARD UNIVERSITY**, Cambridge, Massachusetts
Ph.D. in Atmospheric Chemistry/Applied Mathematics, Division of Engineering and Applied Sciences, degree received November 1997
Committee: Professors Daniel Jacob (advisor), Michael McElroy, Steven Wofsy

My research focused on the tropospheric photochemistry of ozone, nitrogen oxides, and non-methane hydrocarbons. I developed a photochemical mechanism describing the reactions occurring within the continental boundary layer and the global troposphere, for use in chemical models. Using a three-dimensional chemical transport model, I examined the impact of non-methane hydrocarbon chemistry on the global distributions of ozone and nitrogen oxides. Thesis title: The influence of boundary layer chemistry on global tropospheric ozone and nitrogen oxides.

LARRY WAYNE HOROWITZ

1991-1993 **HARVARD UNIVERSITY**, Cambridge, Massachusetts
S.M. in Applied Physics, Division of Applied Sciences

Emphasis on the chemistry and physics of the atmosphere. Additional courses in applied mathematics, including numerical techniques.

Summer 1990 **WEIZMANN INSTITUTE OF SCIENCE**, Rehovot, Israel

Research on spectroscopy in molecular jets, Department of Chemical Physics, Karyn Kupcinet International Science School, funded to attend.

1987-1991 **HARVARD COLLEGE**, Cambridge, Massachusetts
A.B. summa cum laude in Chemistry
Advisors: Professors Elias Corey, William Klemperer

HONORS AND AWARDS

2012 **Gold Medal**, Department of Commerce
2009 **Outstanding Scientific Paper Award**, National Oceanic and Atmospheric Administration, Office of Oceanic and Atmospheric Research
2009 **Silver Medal**, Department of Commerce
2008 **Administrator's Award**, National Oceanic and Atmospheric Administration
2008 **Editors' Citation** for Excellence in Reviewing, Geophysical Research Letters
2005 **Silver Medal**, Department of Commerce
1993-1996 **NASA Graduate Student Fellowship in Global Change Research**
Provided funding for tuition, stipend, and travel
1991-1993 **Ernst Habicht Fellowship**, Harvard University
Provided funding for tuition and stipend
1991 Elected to **Phi Beta Kappa**
1987-1991 **John Harvard Scholarship**, Harvard College, for academic achievement

TEACHING EXPERIENCE

2003-present **Princeton University Visiting Lecturer**, Atmospheric and Oceanic Sciences Program

Atmospheric Chemistry, graduate-level class

1992-1997 **Harvard University Teaching Fellow**, Department of Earth and Planetary Sciences

Environmental Sciences, Professors Brian Farrell and Michael McElroy
Chemical Oceanography, Professor Heinrich Holland, graduate-level class
Atmospheric Chemistry, Professor Daniel Jacob
Environmental Pollution, Professors Raymond Siever and Daniel Jacob

LARRY WAYNE HOROWITZ

Fall 1993 **Harvard University Teaching Fellow**, Undergraduate Core Curriculum Program

The Atmosphere, Professors Michael McElroy and Daniel Jacob

1990-1991 **Harvard University Course Assistant**, Department of Mathematics

Linear Algebra and Differential Equations, Professor Shlomo Sternberg
Multivariable Calculus, Professor David Kazhdan

PROFESSIONAL SERVICE AND AFFILIATIONS

2002-present **Science**, Reviewer
2001-present **Atmospheric Chemistry and Physics**, Reviewer
2001-present **Geophysical Research Letters**, Reviewer
1999-present **Atmospheric Environment**, Reviewer
1999-present **Journal of Atmospheric Chemistry**, Reviewer
1999-present **National Science Foundation, Division of Atmospheric Sciences**, Reviewer
1998-present **Journal of Geophysical Research - Atmospheres**, Reviewer
1998-present **NASA Office of Earth Science, Atmospheric Chemistry Modeling and Analysis Program**, Reviewer
1996-present **American Geophysical Union**, Member

PUBLICATIONS

Lin, M., A.M. Fiore, L.W. Horowitz, A.O. Langford, S. J. Oltmans, D. Tarasick, H.E. Reider, Climate variability modulates western U.S. ozone air quality in spring via deep stratospheric intrusions, *Nature Communications*, in press, 2015.

Rieder, H.E., A.M. Fiore, L.W. Horowitz, and V. Naik, Projecting policy-relevant metrics for high summertime ozone pollution events over the eastern United States due to climate and emission changes during the 21st century, *J. Geophys. Res. Atmos.*, *120*, 784-800, doi:10.1002/2014JD022303, 2015.

Schnell, J.L., M.J. Prather, B. Josse, V. Naik, L.W. Horowitz, P. Cameron-Smith, D. Bergmann, G. Zeng, D.A. Plummer, K. Sudo, T. Nagashima, D.T. Shindell, G. Faluvegi, and S.A. Strode, Use of North American and European air quality networks to evaluate global chemistry-climate modeling of surface ozone, *Atmos. Chem. Phys. Discuss.*, *15*, 11369-11407, doi:10.5194/acpd-15-11369-2015, 2015.

Westervelt, D.M., L.W. Horowitz, V. Naik, and D.L. Mauzerall, Radiative forcing and climate response to projected 21st century aerosol decreases, *Atmos. Chem. Phys. Discuss.*, *15*, 9293-9353, doi:10.5194/acpd-15-9293-2015, 2015.

Clifton, O. E., A.M. Fiore, G. Correa, L.W. Horowitz, and V. Naik, Twenty-first century reversal of the surface ozone seasonal cycle over the northeastern United States, *Geophys. Res. Lett.*, 41, doi:10.1002/2014GL061378, 2014.

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Cooper, O.R., D.D. Parrish, J. Ziemke, N.V. Balashov, M. Cupeiro, I.E. Galbally, S. Gilge, **L. Horowitz**, N.R. Jensen, J.-F. Lamarque, V. Naik, S.J. Oltmans, J. Schwab, D.T. Shindell, A.M. Thompson, V. Thouret, Y. Wang, and R.M. Zbinden, Global distribution and trends of tropospheric ozone: An observation-based review, *Elem. Sci. Anth*, *2*: 000029, doi:10.12952/journal.elementa.000029, 2014.

Fiore, A.M., J.T. Oberman, M.Y. Lin, L. Zhang, O.E. Clifton, D.J. Jacob, V. Naik, L.W. Horowitz, J.P. Pinto, G.P. Milly, Estimating North American background ozone in U.S. surface air with two independent global models: Variability, uncertainties, and recommendations, *Atmos. Environ.*, *96*, 284-300, doi:10.1016/j.atmosenv.2014.07.045, 2014.

Li, X., J. Liu, D.L. Mauzerall, L.K. Emmons, S. Walters, L.W. Horowitz, and S. Tao, Effects of trans-Eurasian transport of air pollutants on surface ozone concentrations over Western China, *J. Geophys. Res. Atmos.*, *119*, doi:10.1002/2014JD021936, 2014.

Lin, M., L.W. Horowitz, S.J. Oltmans, A.M. Fiore, and S. Fan, Tropospheric ozone trends at Mauna Loa Observatory tied to decadal climate variability, *Nature Geoscience*, *7*(2), DOI:10.1038/ngeo2066, 2014.

Merlis, T.M., I.M. Held, G.L. Stenchikov, F. Zeng, and L.W. Horowitz, Constraining transient climate sensitivity using coupled climate model simulations of volcanic eruptions, *J. Clim.*, 27, 7781-7795, doi:10.1175/JCLI-D-14-00214.1, 2014.

Parrish, D. D., J.-F. Lamarque, V. Naik, L. Horowitz, D.T. Shindell, J. Staehelin, R. Derwent, O.R. Cooper, H. Tanimoto, A. Volz-Thomas, S. Gilge, H.-E. Scheel, M. Steinbacher, and M. Fröhlich, Long-term changes in lower tropospheric baseline ozone concentrations: Comparing chemistry-climate models and observations at northern midlatitudes, *J. Geophys. Res.*, *119*, doi:10.1002/2013JD021435, 2014.

Rotstayn, L.D., E.L. Plymin, M.A. Collier, O. Boucher, J.-L. Dufresne, J.-J. Luo, K. von Salzen, S.J. Jeffrey, M.-A. Foujols, Y. Ming, and L.W. Horowitz, Declining aerosols in CMIP5 projections: Effects on atmospheric temperature structure and midlatitude jets, *J. Clim.*, *27*, 6960–6977, 2014.

Shen, Z., J. Liu, L.W. Horowitz, D.K. Henze, S. Fan, H. Levy II, D.L. Mauzerall, J.-T. Lin, and S. Tao, Analysis of transpacific transport of black carbon during HIPPO-3: Implications for black carbon aging, *Atmos. Chem. Phys.*, *14*(12), DOI:10.5194/acp-14-6315-2014, 2014.

Austin, J., L.W. Horowitz, M.D. Schwarzkopf, R.J. Wilson, and H. Levy II, Stratospheric ozone and temperature simulated from the preindustrial era to the present day, *J. Climate*, *26*, 3528-3543, DOI:10.1175/JCLI-D-12-00162.1, 2013.

Bowman, K.W., D.T. Shindell, H.M. Worden, J.F. Lamarque, P.J. Young, D.S. Stevenson, Z. Qu, M. de la Torre, D. Bergmann, P.J. Cameron-Smith, W.J. Collins, R. Doherty, S.B. Dalsøren, G. Faluvegi, G. Folberth, L.W. Horowitz, B.M. Josse, Y.H. Lee, I.A. MacKenzie, G. Myhre, T. Nagashima, V. Naik, D.A. Plummer, S.T. Rumbold, R.B. Skeie, S.A. Strode, K. Sudo, S. Szopa, A. Voulgarakis, G. Zeng, S.S. Kulawik, A.M. Aghedo, and J.R. Worden, Evaluation of ACCMIP outgoing longwave radiation from tropospheric ozone using TES satellite observations, *Atmos. Chem. Phys.*, *13*, 4057-4072, doi:10.5194/acp-13-4057-2013, 2013.

LARRY WAYNE HOROWITZ

Eyring, V., J.M. Arblaster, I. Cionni, J. Sedláček, J. Perlwitz, P.J. Young, S. Bekki, D. Bergmann, P. Cameron-Smith, W.J. Collins, G. Faluvegi, K.-D. Gottschaldt, L.W. Horowitz, D.E. Kinnison, J.-F. Lamarque, D.R. Marsh, D. Saint-Martin, D.T. Shindell, K. Sudo, S. Szopa, and S. Watanabe, Long-term ozone changes and associated climate impacts in CMIP5 simulations, *J. Geophys. Res.*, *118*, 5029-5060, doi:10.1002/jgrd.50316, 2013.

Fang, Y., V. Naik, L.W. Horowitz, and D.L. Mauzerall, Air pollution and associated human mortality: the role of air pollutant emissions, climate change and methane concentration increases from the preindustrial period to present, *Atmos. Chem. Phys.*, *13*, 1377-1394, doi:10.5194/acp-13-1377-2013, 2013.

Fang, Y., A.M. Fiore, J.-F. Lamarque, L.W. Horowitz, and M. Lin, Using synthetic tracers as a proxy for summertime PM2.5 air quality over the Northeastern United States in physical climate models, *Geophys. Res. Lett.*, *40*, 755-760, doi:10.1002/grl.50162, 2013.

Fang, Y., D.L. Mauzerall, J. Liu, A.M. Fiore, and L.W. Horowitz, Impacts of 21st century climate change on global air pollution-related premature mortality, *Climatic Change*, *121*(2), DOI:10.1007/s10584-013-0847-8, 2013.

Golaz, J.-C., L.W. Horowitz, and H. Levy II, Cloud tuning in a coupled climate model: Impact on 20th century warming, *Geophys. Res. Lett.*, *40*, 2246-2251, doi:10.1002/grl.50232, 2013.

He, C., J. Liu, A.G. Carlton, S. Fan, L.W. Horowitz, H. Levy II, and S. Tao, Evaluation of factors controlling global secondary organic aerosol production from cloud processes, *Atmos. Chem. Phys.*, *13*, 1913-1926, doi:10.5194/acp-13-1913-2013, 2013.

Lamarque, J.-F., D.T. Shindell, B. Josse, P.J. Young, I. Cionni, V. Eyring, D. Bergmann, P. Cameron-Smith, W.J. Collins, R. Doherty, S. Dalsoren, G. Faluvegi, G. Folberth, S.J. Ghan, L.W. Horowitz, Y.H. Lee, I.A. MacKenzie, T. Nagashima, V. Naik, D. Plummer, M. Righi, S.T. Rumbold, M. Schulz, R.B. Skeie, D.S. Stevenson, S. Strode, K. Sudo, S. Szopa, A. Voulgarakis, and G. Zeng, The Atmospheric Chemistry and Climate Model Intercomparison Project (ACCMIP): overview and description of models, simulations and climate diagnostics, *Geosci. Model Dev.*, *6*, 179-206, doi:10.5194/gmd-6-179-2013, 2013.

Lee, Y. H., J.-F. Lamarque, M.G. Flanner, C. Jiao, D.T. Shindell, T. Berntsen, M.M. Bisiaux, J. Cao, W.J. Collins, M. Curran, R. Edwards, G. Faluvegi, S. Ghan, L.W. Horowitz, J.R. McConnell, J. Ming, G. Myhre, T. Nagashima, V. Naik, S.T. Rumbold, R.B. Skeie, K. Sudo, T. Takemura, F. Thevenon, B. Xu, and J.-H. Yoon, Evaluation of preindustrial to present-day black carbon and its albedo forcing from Atmospheric Chemistry and Climate Model Intercomparison Project (ACCMIP), *Atmos. Chem. Phys.*, *13*, 2607-2634, doi:10.5194/acp-13-2607-2013, 2013.

Levy, H. II, L.W. Horowitz, M.D. Schwarzkopf, Y. Ming, J.-C. Golaz, V. Naik, and V. Ramaswamy, The roles of aerosol direct and indirect effects in past and future climate change, *J. Geophys. Res.*, *118*, 4521-4532, doi:10.1002/jgrd.50192, 2013.

Mao, J., L.W. Horowitz, V. Naik, S. Fan, J. Liu, and A.M. Fiore, Sensitivity of tropospheric oxidants to biomass burning emissions: implications for radiative forcing, *Geophys. Res. Lett.*, *40*, 1241-1246, doi:10.1002/grl.50210, 2013.

Mao, J., F. Paulot, D.J. Jacob, R.C. Cohen, J.D. Crounse, P.O. Wennberg, C.A. Keller, R.C. Hudman, M.P. Barkley, and L.W. Horowitz, Ozone and organic nitrates over the eastern United States: Sensitivity to isoprene chemistry, *J. Geophys. Res. Atmos.*, *118*, 11,256-11,268, doi:10.1002/jgrd.50817, 2013.

Nabat, P., S. Somot, M. Mallet, I. Chiapello, J.J. Morcrette, F. Solmon, S. Szopa, F. Dulac, W. Collins, S. Ghan, L.W. Horowitz, J.F. Lamarque, Y.H. Lee, V. Naik, T. Nagashima, D. Shindell, and R. Skeie, A 4-D climatology (1979-2009) of the monthly tropospheric aerosol optical depth distribution over the Mediterranean region from a comparative evaluation and blending of remote sensing and model products, *Atmos. Meas. Tech.*, *6*, 1287-1314, doi:10.5194/amt-6-1287-2013, 2013.

Naik, V., A. Voulgarakis, A.M. Fiore, L.W. Horowitz, J.-F. Lamarque, M. Lin, M.J. Prather, P.J. Young, D. Bergmann, P.J. Cameron-Smith, I. Cionni, W.J. Collins, S.B. Dalsøren, R. Doherty, V. Eyring, G. Faluvegi, G.A. Folberth, B. Josse, Y.H. Lee, I.A. MacKenzie, T. Nagashima, T.P.C. van Noije, D.A. Plummer, M. Righi, S.T. Rumbold, R. Skeie, D.T. Shindell, D. Stevenson, S. Strode, K. Sudo, S. Szopa, and G. Zeng, Preindustrial to present-day changes in tropospheric hydroxyl radical and methane lifetime from the Atmospheric Chemistry and Climate Model Intercomparison Project (ACCMIP), *Atmos. Chem. Phys.*, *13*, 5277-5298, doi:10.5194/acp-13-5277-2013, 2013.

Naik, V., L.W. Horowitz, A.M. Fiore, P. Ginoux, J. Mao, A.M. Aghedo, and H. Levy II, Impact of preindustrial to present-day changes in short-lived pollutant emissions on atmospheric composition and climate forcing, *J. Geophys. Res.*, *118*, doi:10.1002/jgrd.50608, 2013.

Shindell, D.T., J.-F. Lamarque, M. Schulz, M. Flanner, C. Jiao, M. Chin, P.J. Young, Y.H. Lee, L. Rotstayn, N. Mahowald, G. Milly, G. Faluvegi, Y. Balkanski, W.J. Collins, A.J. Conley, S. Dalsoren, R. Easter, S. Ghan, L. Horowitz, X. Liu, G. Myhre, T. Nagashima, V. Naik, S.T. Rumbold, R. Skeie, K. Sudo, S. Szopa, T. Takemura, A. Voulgarakis, J.-H. Yoon, and F. Lo, Radiative forcing in the ACCMIP historical and future climate simulations, *Atmos. Chem. Phys.*, *13*, 2939-2974, doi:10.5194/acp-13-2939-2013, 2013.

Silva, R.A., J.J. West, Y. Zhang1, S.C. Anenberg, J.-F. Lamarque, D.T. Shindell, W.J. Collins, S. Dalsoren, G. Faluvegi, G. Folberth, L.W. Horowitz, T. Nagashima, V. Naik, S. Rumbold, R. Skeie, K. Sudo, T. Takemura, D. Bergmann, P. Cameron-Smith, I. Cionni, R.M. Doherty, V. Eyring, B. Josse, I.A. MacKenzie, D. Plummer, M. Righi, D.S. Stevenson, S. Strode, S. Szopa, and G. Zeng, Global premature mortality due to anthropogenic outdoor air pollution and the contribution of past climate change, *Environ. Res. Lett.*, *8*, 034005, doi:10.1088/1748-9326/8/3/034005, 2013.

Stevenson, D.S., P.J. Young, V. Naik, J.-F. Lamarque, D.T. Shindell, A. Voulgarakis, R.B. Skeie, S.B. Dalsoren, G. Myhre, T.K. Berntsen, G.A. Folberth, S.T. Rumbold, W.J. Collins, I.A. MacKenzie, R.M. Doherty, G. Zeng, T.P.C. van Noije, A. Strunk, D. Bergmann, P. Cameron-Smith, D.A. Plummer, S.A. Strode, L. Horowitz, Y.H. Lee, S. Szopa, K. Sudo, T. Nagashima, B. Josse, I. Cionni, M. Righi, V. Eyring, A. Conley, K.W. Bowman, O. Wild, and A. Archibald, Tropospheric ozone changes, radiative forcing and attribution to emissions in the Atmospheric Chemistry and Climate Model Inter-comparison Project (ACCMIP), *Atmos. Chem. Phys.*, *13*, 3063-3085, doi:10.5194/acp-13-3063-2013, 2013.

Su, H., J.H. Jiang, C. Zhai, V.S. Perun, J.T. Shen, A. del Genio, L.S. Nazarenko, L.J. Donner, L. Horowitz, C. Seman, C. Morcrette, J. Petch, M. Ringer, J. Cole, K. von Salzen, M. dos Santos Mesquita, T. Iversen, J.E. Kristjansson, A. Gettelman, L. Rotstayn, S. Jeffrey, J.-L. Dufresne, M. Watanabe, H. Kawai, T. Koshiro, T. Wu, E.M. Volodin, T. L'Ecuyer, J. Teixeira, and G.L. Stephens, Diagnosis of regime-dependent cloud simulation errors in CMIP5 models using "A-Train" satellite observations and reanalysis data, *J. Geophys. Res.*, *118*, doi:10.1029/2012JD018575, 2013.

Turner, A.J., A.M. Fiore, L.W. Horowitz, V. Naik, and M. Bauer, Summertime cyclones over the Great Lakes Storm Track from 1860-2100: variability, trends, and association with ozone pollution, *Atmos. Chem. Phys.*, *12*, 13,565-13,578, doi:10.5194/acp-13-565-2013, 2013.

Voulgarakis, A., V. Naik, J.-F. Lamarque, D.T. Shindell, P.J. Young, M.J. Prather, O. Wild, R.D. Field, D. Bergmann, P. Cameron-Smith, I. Cionni, W.J. Collins, S.B. Dalsøren, R.M. Doherty, V. Eyring, G. Faluvegi, G.A. Folberth, L.W. Horowitz, B. Josse, I.A. McKenzie, T. Nagashima, D.A. Plummer, M. Righi, S.T. Rumbold, D.S. Stevenson, S.A. Strode, K. Sudo, S. Szopa, and G. Zeng, Analysis of present day and future OH and methane lifetime in the ACCMIP simulations, *Atmos. Chem. Phys.*, *13*, 2563-2587, doi:10.5194/acp-13-2563-2013, 2013.

West, J.J., S.J. Smith, R.A. Silva, V. Naik, Y. Zhang, Z. Adelman, M.M. Fry, S. Anenberg, L.W. Horowitz, and J.-F. Lamarque, Co-benefits of mitigating global greenhouse gas emissions for future air quality and human health, *Nature Climate Change*, *3*, 885-889, doi:10.1038/nclimate2009, 2013.

Winton, M., A. Adcroft, S.M. Griffies, R.W. Hallberg, L.W. Horowitz, and R.J. Stouffer, Influence of ocean and atmosphere components on simulated climate sensitivities, *J. Climate*, *26*, 231-245, doi:10.1175/JCLI-D-12-00121.1, 2013.

Young, P.J., A.T. Archibald, K.W. Bowman, J.-F. Lamarque, V. Naik, D.S. Stevenson, S. Tilmes, A. Voulgarakis, O. Wild, D. Bergmann, P. Cameron-Smith, I. Cionni, W.J. Collins, S.B. Dalsøren, R.M. Doherty, V. Eyring, G. Faluvegi, L.W. Horowitz, B. Josse, Y.H. Lee, I.A. MacKenzie, T. Nagashima, D.A. Plummer, M. Righi, S.T. Rumbold, R.B. Skeie, D.T. Shindell, S.A. Strode, K. Sudo, S. Szopa, and G. Zeng, Pre-industrial to end 21st century projections of tropospheric ozone from the Atmospheric Chemistry and Climate Model Intercomparison Project (ACCMIP), *Atmos. Chem. Phys.*, *13*, 2063-2090, doi:10.5194/acpd-13-2063-2013, 2013.

Fan, S.-M., J.P. Schwarz, J. Liu, D.W. Fahey, P. Ginoux, L.W. Horowitz, H. Levy II, Y. Ming, J.R. Spackman, Inferring ice formation processes from global-scale black carbon profiles observed in the remote atmosphere and model simulations, *J. Geophys. Res.*, *117*, D23205, doi:10.1029/2012JD018126, 2012.

Fiore, A.M., V. Naik, D.V. Spracklen, A. Steiner, N. Unger, M. Prather, D. Bergmann, P.J. Cameron-Smith, I. Cionni, W.J. Collins, S. Dalsøren, V. Eyring, G.A. Folberth, P. Ginoux, L.W. Horowitz, B. Josse, J.-F. Lamarque, I.A. MacKenzie, T. Nagashima, F.M. O'Connor, M. Righi, S.T. Rumbold, D.T. Shindell, R.B. Skeie, K. Sudo, S. Szopa, T. Takemura, and G. Zeng, Global air quality and climate, *Chem. Soc. Rev.*, *41*(19), DOI:10.1039/C2CS35095E, 2012.

Jiang, J.H., H. Su, C. Zhai, V.S. Perun, A. Del Genio, L.S. Nazarenko, L.J. Donner, L. Horowitz, C. Seman, J. Cole, A. Gettelman, M.A. Ringer, L. Rostayn, S. Jerrfey, T. Wu, F. Brient, J.-L. Dufersne, H. Kawai, T. Koshiro, M. Watanabe, T.S. Lécuyer, E.M. Volodin, T. Iversen, H. Drange, M.D.S. Mesquita, W.G. Read, J.W. Waters, B. Tian, J. Teixeira, and G.L. Stephens, Evaluation of cloud and water vapor simulations in CMIP5 climate models using NASA "A-Train" satellite observations, *J. Geophys. Res.*, *117*, D14105, doi:10.1029/2011JD017237, 2012.

John, J.G., A.M.Fiore, V. Naik, L.W. Horowitz, and J.P. Dunne, Climate versus emission drivers of methane lifetime against loss by tropospheric OH from 1860-2100, *Atmos. Chem. Phys.*, *13*, 12,021-12,036, doi:10.5194/acpd-12-12021-2012, 2012.

Koffi, B., M. Schulz, F.-M. Bréon, J. Griesfeller, D. Winker, Y. Balkanski, S. Bauer, T. Berntsen, M. Chin, W.D. Collins, F. Dentener, T. Diehl, R. Easter, S. Ghan, P. Ginoux, S. Gong, L.W. Horowitz, T. Iversen, A. Kirkevåg, D. Koch, M. Krol, G. Myhre, P. Stier, and T. Takemura, Application of the CALIOP layer product to evaluate the vertical distribution of aerosols estimated by global models: AeroCom phase I results, *J. Geophys. Res.*, *117*, D10201, doi:10.1029/2011JD016858, 2012.

Li, J.-L. F., D.E. Waliser, W.-T. Chen, B. Guan, T. Kubar, G. Stephens, H.-Y. Ma, M. Deng, L. Donner, C. Seman, and L. Horowitz, An observationally based evaluation of cloud ice water in CMIP3 and CMIP5 GCMs and contemporary reanalyses using contemporary satellite data, *J. Geophys. Res.*, *117*, D16105, doi:10.1029/2012JD017640, 2012.

Lin, M., A.M. Fiore, L.W. Horowitz, O.R. Cooper, V. Naik, J. Holloway, B.J. Johnson, A.M. Middlebrook, S.J. Oltmans, I.B. Pollack, T.B. Ryerson, J.X. Warner, C. Wiedinmyer, J. Wilson, and B. Wyman, Transport of Asian ozone pollution into surface air over the western United States in spring, *J. Geophys. Res.*, *117*, D00V07, doi:10.1029/2011JD016961, 2012.

Lin, M., A.M. Fiore, O.R. Cooper, L.W. Horowitz, A.O. Langford, H. Levy II, B.J. Johnson, V. Naik, S.J. Oltmans, and C.J. Senff, Springtime high surface ozone events over the western United States: Quantifying the role of stratospheric intrusions, *J. Geophys. Res.*, *117*, D00V22, doi:10.1029/2012JD018151, 2012.

Liu, J., L.W. Horowitz, S. Fan, A.G. Carlton, and H. Levy II, Global in-cloud production of secondary organic aerosols: Implementation of a detailed chemical mechanism in the GFDL atmospheric model AM3, *J. Geophys. Res.*, *117*, D15303, doi:10.1029/2012JD017838, 2012.

Ocko, I.B., V. Ramaswamy, P. Ginoux, Y. Ming, and L.W. Horowitz, Sensitivity of scattering and absorbing aerosol direct radiative forcing to physical climate factors, *J. Geophys. Res.*, *117*, D20203, doi:10.1029/2012JD018019, 2012.

Rasmussen, D.J., A.M. Fiore, V. Naik, L.W. Horowitz, S.J. McGinnis, and M.G. Schultz, Surface ozone-temperature relationships in the eastern US: A monthly climatology for evaluating chemistry-climate models, *Atmos. Environ.*, *47*, 142-153, doi:10.1016/j.atmosenv.2011.11.021, 2012.

West, J.J., A.M. Fiore, and L.W.Horowitz, Scenarios of methane emission reductions to 2030: Abatement costs and co-benefits to ozone air quality and human mortality, *Climatic Change*, doi:10.1007/s10584-012-0426-4, 2012.

LARRY WAYNE HOROWITZ

Anenberg, S.C., J.J West, L.W. Horowitz, and D.Q. Tong, The global burden of air pollution on mortality: Anenberg et al. Respond, *Environ. Health Perspect.*, *119*, 158-159, doi:10.1289/ehp.1003276R, 2011.

Avnery, S., D.L. Mauzerall, J. Liu, and L.W. Horowitz, Global crop yield reductions due to surface ozone exposure: 1. Year 2000 crop production losses and economic damage, *Atmos. Environ.*, *45*, 2284-2296, doi:10.1016/j.atmosenv.2010.11.045, 2011.

Avnery, S., D.L. Mauzerall, J. Liu, L.W. Horowitz, Global crop yield reductions due to surface ozone exposure: 2. Year 2030 potential crop production losses and economic damage under two scenarios of O_3 pollution, *Atmos. Environ.*, *45*, 2297-2309, doi:10.1016/j.atmosenv.2011.01.002, 2011.

Donner, L.J., B.L. Wyman, R.S. Hemler, L.W. Horowitz, Y. Ming, M. Zhao, J.-C. Golaz, P. Ginoux, S-J. Lin, M.D. Schwarzkopf, J. Austin, G. Alaka, W.F. Cooke, T.L. Delworth, S.M. Freidenreich, C. T. Gordon, S.M. Griffies, I.M. Held, W.J. Hurlin, S.A. Klein, T.R. Knutson, A.R. Langenhorst, H.-C. Lee, Y. Lin, B.I. Magi, S.L. Malyshev, P.C.D. Milly, V. Naik, M.J. Nath, R. Pincus, J.J. Ploshay, V. Ramaswamy, C.J. Seman, E. Shevliakova, J.J. Sirutis, W.F. Stern, R.J. Stouffer, R.J. Wilson, M. Winton, A.T. Wittenberg, and F. Zeng, The dynamical core, physical parameterizations, and basic simulation characteristics of the atmospheric component AM3 of the GFDL global coupled model CM3, *J. Clim.*, *24*, 3484-3519, doi:10.1175/2011JCLI3955.1, 2011.

Fang, Y., A.M. Fiore, L.W. Horowitz, A. Gnanadesikan, I. Held, G. Chen, G. Vecchi, and H. Levy, The impacts of changing transport and precipitation on pollutant distributions in a future climate, *J. Geophys. Res.*, *116*, D18303, doi:10.1029/2011JD015642, 2011.

Golaz, J.-C., M. Salzmann, L.J. Donner, L.W. Horowitz, Y. Ming, and M. Zhao, Sensitivity of the aerosol indirect effect to subgrid variability in the cloud parameterization of the GFDL atmosphere general circulation model AM3, *J. Clim.*, *24*, 3145-3160, doi:10.1175/2010JCLI3945.1, 2011.

Griffies, S.M., M. Winton, L.J. Donner, L.W. Horowitz, S.M. Downes, R. Farneti, A. Gnanadesikan, W.J. Hurlin, H.-C. Lee, Z. Liang, J.B. Palter, B.L. Samuels, A.T. Wittenberg, B.L. Wyman, J. Yin, and N. Zadeh, GFDL's CM3 coupled climate model: Characteristics of the ocean and sea ice simulations, *J. Clim.*, *24*, 3520-3544, doi: 10.1175/2011JCLI3964.1, 2011.

Huneeus, N., M. Schulz, Y. Balkanski, J. Griesfeller, J. Prospero, S. Kinne, S. Bauer, O. Boucher, M. Chin, F. Dentener, T. Diehl, R. Easter, D. Fillmore, S. Ghan, P. Ginoux, A. Grini, L. Horowitz, D. Koch, M.C. Krol, W. Landing, X. Liu, N. Mahowald, R. Miller, J.-J. Morcrette, G. Myhre, J.E. Penner, J. Perlwitz, P. Stier, T. Takemura, and C. Zender, Global dust model intercomparison in AeroCom phase I, *Atmos. Chem. Phys.*, *11*, 7781-7816, doi:10.5194/acp-11-7781-2011, 2011.

Liu, J., S. Fan, L.W. Horowitz, and H. Levy II, Evaluation of factors controlling long-range transport of black carbon to the Arctic, *J. Geophys. Res.*, *116*, D04307, doi:10.1029/2010JD015145, 2011.

Rasmussen, D.J., A.M. Fiore, V. Naik, L.W. Horowitz, S.J. McGinnis, M.G. Schultz, Surface ozone-temperature relationships in the eastern US: A monthly climatology for evaluating chemistry-climate models, *Atmos. Environ.*, *47*, 142-153, doi:10.1016/j.atmosenv.2011.11.021, 2011.

Saikawa, E., J. Kurokawa, M. Takigawa, J. Borken-Kleefeld, D.L. Mauzerall, L.W. Horowitz, and T. Ohara, The impact of China's vehicle emissions on regional air quality in 2000 and 2020: a scenario analysis, *Atmos. Chem. Phys.*, *11*, 9465-9484, doi:10.5194/acp-11-9465-2011, 2011.

Anenberg, S.C., L.W. Horowitz , D.Q. Tong, and J.J. West, An estimate of the global burden of anthropogenic ozone and fine particulate matter on premature human mortality using atmospheric modeling, *Environ Health Perspect.*, doi:10.1289/ehp.0901220, 2010.

Anenberg, S.C., J.J. West, L.W. Horowitz, and D.Q. Tong, The global burden of air pollution on mortality: Anenberg et al. respond, *Environ Health Perspect.*, doi:10.1289/ehp.1002397R , 2010.

Anenberg, S.C., J.J. West, L.W. Horowitz, and D.Q. Tong, The global burden of air pollution on mortality: Anenberg et al. respond, *Environ Health Perspect.*, doi:10.1289/ehp.1003276R, 2010.

Fang, Y., A.M. Fiore, L.W. Horowitz, H. Levy II, Y. Hu, and A.G. Russell, Sensitivity of the NO_y budget over the United States to anthropogenic and lightning NO_x in summer, *J. Geophys. Res.*, *115*, D18312, doi:10.1029/2010JD014079, 2010.

Koch, D., M. Schulz, S. Kinne, T.C. Bond, Y. Balkanski, S. Bauer, T. Berntsen, O. Boucher, M. Chin, A. Clarke, N. De Luca, F. Dentener, T. Diehl, O. Dubovik, R. Easter, D.W. Fahey, J. Feichter, D. Fillmore, S. Freitag, S. Ghan, P. Ginoux, S. Gong, L. Horowitz, T. Iversen, A. Kirkevåg, Z. Klimont, Y. Kondo, M. Krol, X. Liu, C. McNaughton, R. Miller, V. Montanaro, N. Moteki, G. Myhre, J.E. Penner, Ja. Perlwitz, G. Pitari, S. Reddy, L. Sahu, H. Sakamoto, G. Schuster, J.P. Schwarz, Ø. Seland, J.R. Spackman, P. Stier, N. Takegawa, T. Takemura, C. Textor, J.A. van Aardenne, and Y. Zhao, Corrigendum to "Evaluation of black carbon estimations in global aerosol models" published in *Atmos. Chem. Phys.*, *9*, 9001-9026, 2009, *Atmos. Chem. Phys.*, *10*, 79-81, 2010.

Naik, V., A.M. Fiore, L.W. Horowitz, H.B. Singh, C. Wiedinmyer, A. Guenther, J.A. de Gouw, D.B. Millet, P.D. Goldan, W.C. Kuster, and A. Goldstein, Observational constraints on the global atmospheric budget of ethanol, *Atmos. Chem. Phys.*, *10*, 5361-5370, doi:10.5194/acp-10-5361-2010, 2010.

Saikawa, E., V. Naik, L.W. Horowitz, J. Liu, D.L. Mauzerall, Corrigendum to: "Present and potential future contributions of sulfate, black and organic carbon aerosols from China to global air quality, premature mortality and radiative forcing" [Atmos. Environ. 43 (2009) 2814-2822], *Atmos. Environ.*, *44*, 4528, doi:10.1016/j.atmosenv.2010.07.009, 2010.

Fang, Y., A.M. Fiore, L.W. Horowitz, A. Gnanadesikan, H. Levy, Y. Hu, and A.G. Russell, Estimating the contribution of strong daily export events to total pollutant export from the United States in summer, *J. Geophys. Res.*, *114*, D23302, doi:10.1029/2008JD010946, 2009.

LARRY WAYNE HOROWITZ

Fiore, A.M., F.J. Dentener, O. Wild, C. Cuvelier, M.G. Schultz, P. Hess, C. Textor, M. Schulz, R. Doherty, L.W. Horowitz, I.A. MacKenzie, M.G. Sanderson, D.T. Shindell, D.S. Stevenson, S. Szopa, R. Van Dingenen, G. Zeng, C. Atherton, D. Bergmann, I. Bey, G. Carmichael, B.N. Duncan, G. Faluvegi, G. Folberth, M. Gauss, S. Gong, D. Hauglustaine, T. Holloway, I.S.A. Isaksen, D.J. Jacob, J.E. Jonson, J. W. Kaminski, T.J. Keating, A. Lupu, E. Marmer, V. Montanaro, R. Park, G. Pitari, K.J. Pringle, J.A. Pyle, S. Schroeder, M.G.Vivanco, P. Wind, G. Wojcik, S. Wu, and A. Zuber, Multimodel estimates of intercontinental source-receptor relationships for ozone pollution, *J. Geophys. Res.*, *114*, D04301, doi:10.1029/2008JD010816, 2009.

Koch, D., M. Schulz, S. Kinne, T.C. Bond, Y. Balkanski, S. Bauer, T. Berntsen, O. Boucher, M. Chin, A. Clarke, N. De Luca, F. Dentener, T. Diehl, O. Dubovik, R. Easter, D.W. Fahey, J. Feichter, D. Fillmore, S. Freitag, S. Ghan, P. Ginoux, S. Gong, L. Horowitz, T. Iversen, A. Kirkevåg, Z. Klimont, Y. Kondo, M. Krol, X. Liu, C. McNaughton, R. Miller, V. Montanaro, N. Moteki, G. Myhre, J.E. Penner, Ja. Perlwitz, G. Pitari, S. Reddy, L. Sahu, H. Sakamoto, G. Schuster, J.P. Schwarz, Ø. Seland, J.R. Spackman, P. Stier, N. Takegawa, T. Takemura, C. Textor, J.A. van Aardenne, and Y. Zhao, Evaluation of black carbon estimations in global aerosol models, *Atmos. Chem. Phys.*, *9*, 9001-9026, 2009.

Liu, J., D.L. Mauzerall, L.W. Horowitz, P. Ginoux, and A.M. Fiore, Evaluating inter-continental transport of fine aerosols: (1) Methodology, global aerosol distribution and optical depth, *Atmos. Environ.*, *43*, 4327-4338, 2009.

Liu, J., D.L. Mauzerall, and L.W. Horowitz, Evaluating inter-continental transport of fine aerosols: (2) Global health impact, *Atmos. Environ.*, *43*, 4339-4347, 2009.

Livingstone, P.L., K. Magliano, K. Gurer, P.D. Allen, K.M. Zhang, Q. Ying, B.S. Jackson, A. Kaduwela, M. Kleeman, L.F. Woodhouse, K. Turkiewicz, L.W. Horowitz, K. Scott, D. Johnson, C. Taylor, G. O'Brien, J. DaMassa, B.E. Croes, F. Binkowski, D. Byun, Simulating PM concentration during a winter episode in a subtropical valley: Sensitivity simulations and evaluation methods, *Atmos. Environ.*, *43*, 5971-5977, doi:10.1016/j.atmosenv.2009.07.033, 2009.

Saikawa, E., V. Naik, L.W. Horowitz, J. Liu, and D.L. Mauzerall, Present and potential future contributions of sulfate, black and organic carbon aerosols from China to global air quality, premature mortality and radiative forcing, *Atmos. Environ.*, *43*, 2814-2822, 2009.

West, J.J., V. Naik, L.W. Horowitz, and A.M. Fiore, Effect of regional precursor emission controls on long-range ozone transport -- Part 1: short-term changes in ozone air quality, *Atmos. Chem. Phys.*, *9*, 6077-6093, 2009.

West, J.J., V. Naik, L.W. Horowitz, and A.M. Fiore, Effect of regional precursor emission controls on long-range ozone transport -- Part 2: steady-state changes in ozone air quality and impacts on human mortality, *Atmos. Chem. Phys.*, *9*, 6095-6107, 2009.

Ellingsen, K., M. Gauss, R. Van Dingenen, F.J. Dentener, L. Emberson, A.M. Fiore, M.G. Schultz, D.S. Stevenson, M.R. Ashmore, C.S. Atherton, D.J. Bergmann, I. Bey, T. Butler, J. Drevet, H. Eskes, D.A. Hauglustaine, I.S.A. Isaksen, L.W. Horowitz, M. Krol, J.F. Lamarque, M.G. Lawrence, T. van Noije, J. Pyle, S. Rast, J. Rodriguez, N. Savage, S. Strahan, K. Sudo, S. Szopa, and O. Wild, Global ozone and air quality: A multi-model assessment of risks to human health and crops, *Atmos. Chem. Phys. Discuss.*, *8*, 2163-2223, 2008.

Fiore, A., J. West, L. Horowitz, V. Naik, and M.D. Schwarzkopf, Characterizing the tropospheric ozone response to methane emission controls and the benefits to climate and air quality, *J. Geophys. Res.*, *113*, D08307, doi:10.1029/2007JD009162, 2008.

Heald, C.L., D.K. Henze, L.W. Horowitz, J. Feddema, J.-F. Lamarque, A. Guenther, P.G. Hess, F. Vitt, J.H. Seinfeld, A.H. Goldstein, and I. Fung, Predicted change in global secondary organic aerosol concentrations in response to future climate, emissions, and land-use change, *J. Geophys. Res.*, *113*, D05211, doi:10.1029/2007JD009092, 2008.

Holloway, H., T. Sakurai, Z. Han, S. Ehlers, S.N. Spak, L.W. Horowitz, G.R. Carmichael, D.G. Streets, Y. Hozumi, H. Ueda, S.U. Park, C. Fung, M. Kajino, N. Thongboonchoo, M. Engardt, C. Bennet, H. Hayami, K. Sartelet, Z. Wang, K. Matsuda, M. Amann, MICS-Asia II: Impact of global emissions on regional air quality in Asia, *Atmos. Environ.*, *42*, 3543-3561, doi:10.1016/j.atmosenv.2007.10.022, 2008.

Levy, H., II, M.D. Schwarzkopf, L. Horowitz, V. Ramaswamy, and K. Findell, Strong sensitivity of late 21st century climate to projected changes in short-lived air pollutants, *J. Geophys. Res.*, *113*, D06102, doi:10.1029/2007JD009176, 2008.

Liu, J., D.L. Mauzerall, and L.W. Horowitz, Source-receptor relationships between East Asian sulfur dioxide emissions and Northern Hemisphere sulfate concentrations, *Atmos. Chem. Phys.*, *8*, 3721-3733, 2008.

Parrington, M., D.B.A Jones, K.W. Bowman, L.W. Horowitz, A.M. Thompson, D.W. Tarasick, and J.C. Witte, Estimating the summertime tropospheric ozone distribution over North America through assimilation of observations from the Tropospheric Emission Spectrometer, *J. Geophys. Res.*, *113*, D18307, doi:10.1029/2007JD009341, 2008.

Sanderson, M.G., F.J. Dentener, A.M. Fiore, C. Cuvelier, T.J. Keating, A. Zuber, C.S. Atherton, D.J. Bergmann, T. Diehl, R.M. Doherty, B.N. Duncan, P. Hess, L.W. Horowitz, D.J. Jacob, J.-E. Jonson, J.W. Kaminski, A. Lupu, I.A. MacKenzie, E. Mancini, E. Marmer, R. Park, G. Pitari, M. J. Prather, K.J. Pringle, S. Schroeder, M.G. Schultz, D.T. Shindell, S. Szopa, O. Wild, and P. Wind, A multi-model study of the hemispheric transport and deposition of oxidised nitrogen, *Geophys. Res. Lett.*, *35*, L17815, doi:10.1029/2008GL035389, 2008.

Shindell, D., H. Levy II, M.D. Schwarzkopf, L. Horowitz, J.-F. Lamarque, and G. Faluvegi, Multi- model projections of climate change from short-lived emissions due to human activities, *J. Geophys. Res.*, *113*, D11109, doi:10.1029/2007JD009152, 2008.

Shindell, D.T., M. Chin, F. Dentener, R.M. Doherty, G. Faluvegi, A.M. Fiore, P. Hess, D.M. Koch, I.A. MacKenzie, M.G. Sanderson, M.G. Schultz, M. Schulz, D.S. Stevenson, H. Teich, C. Textor, D.J. Bergmann, I. Bey, H. Bian, C. Cuvelier, B.N. Duncan, G. Folberth, L.W. Horowitz, J. Jonson, J.W. Kaminski, E. Marmer, R. Park, K.J. Pringle, S. Schroeder, S. Szopa, T. Takemura, G. Zeng, T.J. Keating, and A. Zuber, A multi-model assessment of pollution transport to the Arctic, *Atmos. Chem. Phys.*, *8*, 5353-5372, 2008.

LARRY WAYNE HOROWITZ

United States Climate Change Science Program (CCSP), *Climate Projections Based on Emissions Scenarios for Long-Lived and Short-Lived Radiatively Active Gases and Aerosols*. A Report by the U.S. Climate Change Science Program and the Subcommittee on Global Change Research. H. Levy II, D.T. Shindell, A. Gilliland, M.D. Schwarzkopf, L.W. Horowitz, (eds.). Department of Commerce, NOAA's National Climatic Data Center, Washington, D.C., USA, 100 pp., 2008.

Donner, L.J., L.W. Horowitz, A.M. Fiore, C.J. Seman, D.R. Blake, and N.J. Blake, Transport of radon-222 and methyl iodide by deep convection in the GFDL atmospheric model AM2, *J. Geophys. Res.*, *112*, D17303, doi:10.1029/2006JD007548, 2007.

Gloor, M., E.J. Dlugokencky, C.A.M. Brenninkmeijer, L. Horowitz, D. Hurst, G. Dutton, C. Crevoisier, T. Mashida, and P. Tans, Three-dimensional SF_6 data and tropospheric transport simulation: Signals, modeling accuracy, and implications for inverse modeling, *J. Geophys. Res.*, *112*, D15112, doi:10.1029/2006JD007973, 2007.

Horowitz, L.W., A.M. Fiore, G.P. Milly, R.C. Cohen, A. Perring, P.J. Wooldridge, P.G. Hess, L.K. Emmons, and J.-F. Lamarque, Observational constraints on the chemistry of isporene nitrates over the eastern United States, *J. Geophys. Res.*, *112*, D12S08, doi:10.1029/2006JD007747, 2007.

Mena-Carrasco, M., Y. Tang, G. Carmichael, T. Chai, N. Thongboonchoo, E. Campbell, S. Kulkarni, L. Horowitz, J. Vukovich, M. Avery, W. Brune, J. Dibb, L. Emmons, F. Flocke, G. Sachse, D. Tan, R.E. Shetter, R. Talbot, D. Streets, G. Frost, and D. Blake, Improving regional ozone modeling through systematic evaluation of errors using the aircraft observations during the International Consortium for Atmospheric Research on Transport and Transformation, *J. Geophys. Res.*, *112*, D12S19, doi:10.1029/2006JD007762, 2007.

Ming, Y., V. Ramaswamy, L.J. Donner, V.T.J. Phillips, S.A. Klein, P.A. Ginoux, and L.W. Horowitz, Modeling the interactions between aerosols and liquid water clouds with a self-consistent cloud scheme in a general circulation model, *J. Atmos. Sci.*, *64*, 1189-1209, 2007.

Naik, V., D.L. Mauzerall, L.W. Horowitz, M.D. Schwarzkopf, V. Ramaswamy, and M. Oppenheimer, On the sensitivity of radiative forcing from biomass burning aerosols and ozone to emission location, *Geophys. Res. Lett.*, *34*, L03818, doi:10.1029/2006GL028149, 2007.

Singh, H.B., L. Salas, D. Herlth, R. Kolyer, E. Czech, M. Avery, J.H. Crawford, R.B. Pierce, G.W. Sachse, D.R. Blake, R.C. Cohen, T.H. Bertram, A. Perring, P.J. Wooldridge, J. Dibb, G. Huey, R.C. Hudman, S. Turquety, L.K. Emmons, F. Flocke, Y. Tang, G.R. Carmichael, and L.W. Horowitz, Reactive nitrogen distribution and partitioning in the North American troposphere and lowermost stratosphere, *J. Geophys. Res.*, *112*, D12S04, doi:10.1029/2006JD007664, 2007.

Tang, Y., G.R. Carmichael, N. Thongboonchoo, T. Chai, L.W. Horowitz, R.B. Pierce, J.A. Al-Saadi, G. Pfister, J.M. Vukovich, M.A. Avery, G.W. Sachse, T.B. Ryerson, J.S. Holloway, E.L. Atlas, F.M. Flocke, R.J. Weber, L.G. Huey, J.E. Dibb, D.G. Streets, and W.H. Brune, The influence of lateral and top boundary conditions on regional air quality prediction: A multi-scale study coupling regional and global chemical transport models, *J. Geophys. Res.*, *112*, D10S18, doi:10.1029/2006JD007515, 2007.

Textor, C., M. Schulz, S. Guibert, S. Kinne, Y. Balkanski, S. Bauer, T. Berntsen, T. Berglen, O. Boucher, M. Chin, F. Dentener, T. Diehl, J. Feichter, D. Fillmore, P. Ginoux, S. Gong, A. Grini, J. Hendricks, L. Horowitz, P. Huang, I.S.A. Isaksen, T. Iversen, S. Kloster, D. Koch, A. Kirkevåg, J.E. Kristjansson, M. Krol, A. Lauer, J.F. Lamarque, X. Liu, V. Montanaro, G. Myhre, J.E. Penner, G. Pitari, M.S. Reddy, Ø. Seland, P. Stier, T. Takemura, and X. Tie, The effect of harmonized emissions on aerosol properties in global models -- an AeroCom experiment, *Atmos. Chem. Phys.*, *7*, 4489-4501, 2007

West, J.J., A.M. Fiore, V. Naik, L.W. Horowitz, M.D. Schwarzkopf, and D.L. Mauzerall, Ozone air quality and radiative forcing consequences of changes in ozone precursor emissions, *Geophys. Res. Lett.*, *34*, L06806, doi:10.1029/2006GL029173, 2007.

Bates, T.S., T.L. Anderson, T. Baynard, T. Bond, O. Boucher, G. Carmichael, A. Clarke, C. Erlick, H. Guo, L. Horowitz, S. Howell, S. Kulkarni, H. Maring, A. McComiskey, A. Middlebrook, K. Noone, C.D. O'Dowd, J. Ogren, J. Penner, P.K. Quinn, A.R. Ravishankara, D.L. Savoie, S.E. Schwartz, Y. Shinozuka, Y. Tang, R.J. Weber, Y. Wu, Aerosol direct radiative effects over the northwest Atlantic, northwest Pacific, and North Indian Oceans: estimates based on in-situ chemical and optical measurements and chemical transport modeling, *Atmos. Chem. Phys.*, *6*, 1657-1732, 2006.

Crevoisier, C., M. Gloor, E. Gloaguen, L.W. Horowitz, J.L. Sarmiento, C. Sweeney and P.P. Tans, A direct carbon budgeting approach to infer carbon sources and sinks. Design and synthetic application to complement the NACP observation network, *Tellus B, 58*(5), 366-375, doi: 10.1111/j.1600-0889.2006.00214.x, 2006.

Delworth, T.L., A. Rosati, R.J. Stouffer, K.W. Dixon, J. Dunne, K.L. Findell, P. Ginoux, A. Gnanadesikan, C.T. Gordon, S.M. Griffies, R. Gudgel, M.J. Harrison, I.M. Held, R.S. Hemler, L.W. Horowitz, S.A. Klein, T.R. Knutson, S.-J. Lin, V. Ramaswamy, M.D. Schwarzkopf, J.J. Sirutis, M.J. Spelman, W.F. Stern, M. Winton, A.T. Wittenberg, B. Wyman, A.J. Broccoli, V. Balaji, J. Russell, R. Zhang, J.A. Beesley, J. Liu, W.F. Cooke, J.W. Durachta, A.R. Langenhorst, H.-C. Lee, F. Zeng, K.A. Dunne, P.C.D. Milly, P.J. Kushner, S.L. Malyshev, and E. Shevliakova, GFDL s CM2 global coupled climate models Part 1: Formulation and simulation characteristics, *J. Climate*, *19*(5), 643-674, 2006.

Dentener, F., J. Drevet, J.F. Lamarque, I. Bey, B. Eickhout, A.M. Fiore, D. Hauglustaine, L.W. Horowitz, M.Krol, U.C. Kulshrestha, M. Lawrence, C. Galy-Lacaux, S. Rast, D. Shindell, D. Stevenson, T. van Noije, C. Atherton, N. Bell, D. Bergman, T. Butler, J. Cofala, B. Collins, R. Doherty, K. Ellingsen, J. Galloway, M. Gauss, V. Montanaro, J.F. Müller, G. Pitari, J. Rodriguez, M. Sanderson, F. Solmon, S. Strahan, M. Schultz, K. Sudo, S. Szopa, and O. Wild, Nitrogen and sulfur deposition on regional and global scales: A multimodel evaluation, *Global Biogeochem. Cycles*, *20*, GB4003, doi:10.1029/2005GB002672, 2006.

Dentener, F., D. Stevenson, K. Ellingsen, T. van Noije, M. Schultz, M. Amann, C. Atherton, N. Bell, D. Bergmann, I. Bey, L. Bouwman, T. Butler, J. Cofala, W. Collins, R. Doherty, J. Drevet, R. Doherty, B. Eickhout, H. Eskes, A. Fiore, M. Gauss, D. Hauglustaine, L. Horowitz, I.S.A. Isaksen, B. Josse, M. Lawrence, M.Krol, J.F. Lamarque, V. Montanaro, J.F. Müller, V.H. Peuch, G. Pitari, J. Pyle, S. Rast, J. Rodriguez, M. Sanderson, N.H. Savage, D. Shindell, S. Strahan, S. Szopa, K. Sudo, R. Van Dingenen, O. Wild, and G. Zeng, The global atmospheric environment for the next generation, *Environ. Sci. & Technol.*, *40*, 3586-3594, 2006.

LARRY WAYNE HOROWITZ

Fiore, A.M., L.W. Horowitz, E.J. Dlugokencky, and J.J. West, Impact of meteorology and emissions on methane trends, 1990-2004, *Geophys. Res. Lett.*, *33*, L12809, doi:10.1029/2006GL026199, 2006.

Ginoux, P., L.W. Horowitz, V. Ramaswamy, I.V. Geogdzhayev, B.N. Holben, G. Stenchikov, and X. Tie, Evaluation of aerosol distribution and optical depth in the GFDL coupled model CM2.1 for present climate, *J. Geophys. Res.*, *111*, D22210, doi:10.1029/2005JD006707, 2006.

Horowitz, L.W., Past, present, and future concentrations of tropospheric ozone and aerosols: Methodology, ozone evaluation, and sensitivity to aerosol wet removal, *J. Geophys. Res.*, *111*, D22211, doi:10.1029/2005JD006937, 2006.

Kinne, S., M. Schulz, C. Textor, S. Guibert, Y. Balkanski, S. E. Bauer, T. Berntsen, T. F. Berglen, O. Boucher, M. Chin, W. Collins, F. Dentener, T. Diehl, R. Easter, J. Feichter, D. Fillmore, S. Ghan, P. Ginoux, S. Gong, A. Grini, J. Hendricks, M. Herzog, L. Horowitz, I. Isaksen, T. Iversen, A. Kirkevåg, S. Kloster, D. Koch, J. E. Kristjansson, M. Krol, A. Lauer, J. F. Lamarque, G. Lesins, X. Liu, U. Lohmann, V. Montanaro, G. Myhre, J.E. Penner, G. Pitari, S. Reddy, O. Seland, P. Stier, T. Takemura, X. Tie, An AeroCom initial assessment optical properties in aerosol component modules of global models, *Atmos. Chem. Phys.*, *6*, 1815-1834, 2006.

Shindell, D.T., G. Faluvegi, D.S. Stevenson, M.C. Krol, L.K. Emmons, J.-F. Lamarque, G. Pétron, F.J. Dentener, K. Ellingsen, M.G. Schultz, O. Wild, M. Amann, C.S. Atherton, D.J. Bergmann, I. Bey, T. Butler, J. Cofala, W.J. Collins, R.G. Derwent, R.M. Doherty, J. Drevet, H.J. Eskes, A.M. Fiore, M. Gauss, D.A. Hauglustaine, L.W. Horowitz, I.S.A. Isaksen, M.G. Lawrence, V. Montanaro, J.-F. Müller, G. Pitari, M.J. Prather, J.A. Pyle, S. Rast, J.M. Rodriguez, M.G. Sanderson, N.H. Savage, S.E. Strahan, K. Sudo, S. Szopa, N. Unger, T.P.C. van Noije, and G. Zeng, Multi-model simulations of carbon monoxide: Comparison with observations and projected near-future changes, *J. Geophys. Res.*, *111*, D19306, doi:10.1029/2006JD007100, 2006.

Stevenson, D.S., F.J. Dentener, M.G. Schultz, K. Ellingsen, T.P.C. van Noije, O. Wild, G. Zeng, M. Amann, C.S. Atherton, N. Bell, D.J. Bergmann, I. Bey, T. Butler, J. Cofala, W.J. Collins, R.G. Derwent, R.M. Doherty, J. Drevet, H.J. Eskes, A.M. Fiore, M. Gauss, D.A. Hauglustaine, L.W. Horowitz, I.S.A. Isaksen, M.C. Krol, J.-F. Lamarque, M.G. Lawrence, V. Montanaro, J.-F. Mueller, G. Pitari, M.J. Prather, J.A. Pyle, S. Rast, J.M. Rodriguez, M.G. Sanderson, N.H. Savage, D.T. Shindell, S.E. Strahan, K. Sudo, S. Szopa, Multi-model ensemble simulations of present-day and near-future tropospheric ozone, *J. Geophys. Res.*, *111*, D08301, doi:10.1029/2005JD006338, 2006.

Textor, C., M. Schulz, S. Guibert, S. Kinne, Y. Balkanski, S. Bauer, T. Berntsen, T. Berglen, O. Boucher, M. Chin, F. Dentener, T. Diehl, R. Easter, H. Feichter, D. Fillmore, S. Ghan, P. Ginoux, S. Gong, A. Grini, J. Hendricks, L. Horowitz, P. Huang, I. Isaksen, T. Iversen, S. Kloster, D. Koch, A. Kirkevåg, J.E. Kristjansson, M. Krol, A. Lauer, J.F. Lamarque, X. Liu, V. Montanaro, G. Myhre, J. Penner, G. Pitari, S. Reddy, Ø. Seland, P. Stier, T. Takemura, and X. Tie, Analysis and quantification of the diversities of aerosol life cycles within AeroCom, *Atmos. Chem. Phys.*, *6*, 1777-1813, 2006.

van Noije, T.P.C., H.J. Eskes, F.J. Dentener, D.S. Stevenson, K. Ellingsen, M.G. Schultz, O. Wild, M. Amann, C.S. Atherton, D.J. Bergmann, I. Bey, K. F. Boersma, T. Butler, J. Cofala, J. Drevet, A.M. Fiore, M. Gauss, D.A. Hauglustaine, L.W. Horowitz, I.S.A. Isaksen, M.C. Krol, J.-F. Lamarque, M.G. Lawrence, R.V. Martin, V. Montanaro, J.-F. Müller, G. Pitari, M.J. Prather, J.A. Pyle, A. Richter, J.M. Rodriguez, N.H. Savage, S. E. Strahan, K. Sudo, S. Szopa, and M. van Roozendael., Multi-model ensemble simulations of tropospheric NO_2 compared with GOME retrievals for the year 2000, *Atmos. Chem. Phys.*, *6*, 2943-2979, 2006.

West, J.J., A.M. Fiore, L.W. Horowitz, and D.L. Mauzerall Global health benefits of mitigating ozone pollution with methane emission controls , *Proc. Natl. Acad. Sci.*, *103*(11), 3988-3993, doi:10.1073/pnas.0600201103, 2006.

Brasseur, G., A. Guenther, and L. Horowitz, Atmospheric chemistry in the tropics, in *Climate Change and Africa*, edited by P.S. Low, Cambridge Univ. Press, New York, pp. 60-68, 2005.

Fiore, A.M., L.W. Horowitz, D.W. Purves, H. Levy II, M.J. Evans, Y. Wang, Q. Li, and R.M. Yantosca, Evaluating the contribution of changes in isoprene emissions to surface ozone trends over the eastern United States, *J. Geophys. Res.*, *110*, D12303, doi:10.1029/2004JD005485, 2005.

Lamarque, J.F., J.T. Kiehl, G.P. Brasseur, T. Butler, P. Cameron-Smith, W.D. Collins, W.J. Collins, C. Granier, D. Hauglustaine, P.G. Hess, E.A. Holland, L. Horowitz, M.G. Lawrence, D. McKenna, P. Merilees, M.J. Prather, P.J. Rasch, D. Rotman, D. Shindell, and P. Thornton, Assessing future nitrogen deposition and carbon cycle feedback using a multi-model approach: Analysis of nitrogen deposition, *J. Geophys. Res.*, *110*, D19303, doi:10.1029/2005JD005825, 2005.

Liu, J., D.L. Mauzerall, L.W. Horowitz, Analysis of seasonal and interannual variability in transpacific transport, *J. Geophys. Res.*, *110*, D04302, doi:10.1029/2004jd005207, 2005.

Ming, Y., V. Ramaswamy, P.A. Ginoux, L.W. Horowitz, and L.M. Russell, Geophysical Fluid Dynamics Laboratory general circulation model investigation of the indirect radiative effects of anthropogenic sulfate aerosol, *J. Geophys. Res.*, *110*, D22206, doi:10.1029/2005JD006161, 2005.

Ming Y., V. Ramaswamy, P.A. Ginoux, and L.W. Horowitz, Direct radiative forcing of anthropogenic organic aerosols, *J. Geophys. Res.*, *110*, D20208, doi:10.1029/2004JD005573, 2005.

Naik, V., D. Mauzerall, L. Horowitz, M.D. Schwarzkopf, V. Ramaswamy, and M. Oppenheimer, Net radiative forcing due to changes in regional emissions of tropospheric ozone precursors, *J. Geophys. Res.*, *110*, D24306, doi:10.1029/2005JD005908, 2005.

Cooper, O.R., C. Forster, D.D. Parrish, E. Dunlea, G. Hübler, F.C. Fehsenfeld, J.S. Holloway, S.J. Oltmans, B.J. Johnson, A. Wimmers and L. Horowitz, On the life-cycle of a stratospheric intrusion and its dispersion into polluted warm conveyor belts, *J. Geophys. Res.*, *109*, D23S09, doi:10.1029/2003JD004006, 2004.

Fan, S.-M., L.W. Horowitz, H. Levy II, and W.J. Moxim, Impact of air pollution on wet deposition of mineral dust aerosols, *Geophys. Res. Lett.*, *31*, L02104, doi:10.1029/2003GL018501, 2004.

Geophysical Fluid Dynamics Laboratory (GFDL) Global Atmospheric Model Development Team (GAMDT), The new Geophysical Fluid Dynamics Laboratory (GFDL) global atmosphere and land model AM2/LM2: Evaluation with prescribed SST simulations, *J. Climate*, *17*(24), 4641-4673, 2004.

LARRY WAYNE HOROWITZ

Goldstein, A.H., D.B. Millet, M. McKay, L. Jaegle, L. Horowitz, O. Cooper, R. Hudman, D.J. Jacob, S. Oltmans, and A. Clarke, Impact of Asian emissions on observations at Trinidad Head, California, during ITCT 2K2, *J. Geophys. Res.*, *109*, D32S17, doi:10.1029/2003JD004406R, 2004.

Tang, Y., G.R. Carmichael, L.W. Horowitz, I. Uno, J.-H. Woo, D.G. Streets, D. Dabdub, G. Kurata, A. Sandu, J. Allan, E. Atlas, F. Flocke, L.G. Huey, R.O. Jakoubek, D.B. Millet, P.K. Quinn, J.M. Roberts, D.R. Worsnop, A. Goldstein, S. Donnelly, S. Schauffler, V. Stroud, K. Johnson, M.A. Avery, H.B. Singh, E.C. Apel, Multiscale simulations of tropospheric chemistry in the eastern Pacific and on the U.S. West Coast during spring 2002, *J. Geophys. Res.*, *109*, D23S11, doi:10.1029/ 2004JD004513, 2004.

Emmons, L.K., 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, and R. Shetter, Budget of tropospheric ozone during TOPSE from two chemical transport models, *J. Geophys. Res.*, *108*(D8), 8372, doi:10.1029/2002JD002665, 2003.

Gauss, M., G. Myhre, G. Pitari, M.J. Prather, I.S.A. Isaksen, T.K. Berntsen, G.P. Brasseur, F.J. Dentener, R.G. Derwent, D.A. Hauglustaine, L.W. Horowitz, D.J. Jacob, M. Johnson, K.S. Law, L.J. Mickley, J.-F. Müller, P.-H. Plantevin, J.A. Pyle, H.L. Rogers, D.S. Stevenson, J.K. Sundet, M. van Weele, and O. Wild, Radiative forcing in the 21st century due to ozone changes in the troposphere and the lower stratosphere, *J. Geophys. Res.*, *108*(D9), 4292, doi:10.1029/2002JD002624, 2003.

Horowitz, L.W., S. Walters, D.L. Mauzerall, L.K. Emmons, P.J. Rasch, C. Granier, X.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, 2003.

Prather, M., M. Gauss, T. Berntsen, I. Isaksen, J. Sundet, I. Bey, G. Brasseur, F. Dentener, R. Derwent, D. Stevenson, L. Grenfell, D. Hauglustaine, L. Horowitz, D. Jacob, L. Mickley, M. Lawrence, R. von Kuhlmann, J.-F. Muller, G. Pitari, H. Rogers, M. Johnson, J. Pyle, K. Law, M. van Weele, and O. Wild, Fresh air in the 21st Century?, *Geophys. Res. Lett.*, *30*(2), 1100, doi:10.1029/ 2002GL016285, 2003.

Tie, X., L. Emmons, L. Horowitz, G. Brasseur, B. Ridley, E. Atlas, C. Stround, P. Hess, A. Klonecki, S. Madronich, R. Talbot, and J. Dibb, Effect of sulfate aerosol on tropospheric NO_x and ozone budgets: Model simulations and TOPSE evidence, *J. Geophys. Res.*, *108*(D4), 8364, doi:10.1029/ 2001JD001508, 2003.

Wei, C.-F., V.R. Kotamarthi, O.J. Ogunsola, L.W. Horowitz, S. Walters, D.J. Wuebbles, M.A. Avery, D.R. Blake, E.V. Browell, and G.W. Sachse, Seasonal variability of ozone mixing ratios and budgets in the tropical Southern Pacific: A GCTM perspective, *J. Geophys. Res.*, *107*, 8235, doi:10.1029/2001JD000772, 2002. [printed *108*(D2), 2003]

Contributing author to: Prather, M. and D. Ehhalt, Atmospheric chemistry and greenhouse gases, in *Climate Change 2001: The Scientific Basis*, J.T. Houghton et al., eds., Cambridge University Press, pp. 239-287, 2001.

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*, 22,931-22,964, 2001.

Mauzerall,D.L., D. Narita, H. Akimoto, L. Horowitz, S. Walters, D. Hauglustaine, G. Brasseur, Seasonal characteristics of tropospheric ozone production and mixing ratios over East Asia: A global three-dimensional chemical transport model analysis, *J. Geophys. Res.*, *105*, 17,895-17,910, 2000.

Spivakovsky, C.M., J.A. Logan, S.A. Montzka, Y.J. Balkanski, M. Foreman-Fowler, D.B.A. Jones, L.W. Horowitz, A.C. Fusco, C.A.M. Brenrefninkmeijer, M.J. Prather, S.C. Wofsy, and M.B. McElroy, Three-dimensional climatological distribution of tropospheric OH: Update and evaluation, *J. Geophys. Res.*, *105*, 8931-8980, 2000.

Horowitz, L.W., and D.J. Jacob, Global impact of fossil fuel combustion on atmospheric NO_x, *J. Geophys. Res.*, *104*, 23,823-23,840, 1999.

Horowitz, L.W., J. Liang, G.M. Gardner, and D.J. Jacob, Export of reactive nitrogen from North America during summertime: Sensitivity to hydrocarbon chemistry, *J. Geophys. Res.*, *103*, 13,451- 13,476, 1998.

Liang, J., L.W. Horowitz, D.J. Jacob, Y. Wang, A.M. Fiore, J.A. Logan, G.M. Gardner, and J.W. Munger, Seasonal budgets of reactive nitrogen species and ozone over the United States, and export fluxes to the global atmosphere, *J. Geophys. Res.*, *103*, 13,435-13,450, 1998.

Olson, J., M. Prather, T. Berntsen, G. Carmichael, R. Chatfield, P. Connell, R. Derwent, L.Horowitz, S. Jin, M. Kanakidou, P. Kasibhatla, R. Kotamarthi, M. Kuhn, K. Law, J. Penner, L. Perliski, S. Sillman, F. Stordal, A. Thompson, and O. Wild, Results from the Intergovernmental Panel on Climatic Change photochemical model intercomparison (PhotoComp), *J. Geophys. Res.*, *102*, 5979-5991, 1997.

Staffelbach, T., A. Neftel, and L.W. Horowitz, Photochemical oxidant formation over southern Switzerland, 2, Model results, *J. Geophys. Res.*, *102*, 23,363-23,373, 1997.

Hirsch, A.I., J.W. Munger, D.J. Jacob, L.W. Horowitz, and A.H. Goldstein, Seasonal variation of the ozone production efficiency per unit NO_x at Harvard Forest, Massachusetts, *J. Geophys. Res.*, *101*, 12,659-12,666, 1996.

Jacob, D.J., L.W. Horowitz, J.W. Munger, B.G. Heikes, R.R. Dickerson, R.S. Artz, and W.C. Keene, Seasonal transition from NO_x- to hydrocarbon-limited conditions for ozone production over the eastern United States in September, *J. Geophys. Res.*, *100*, 9315-9324, 1995.

Munger, J.W., D.J. Jacob, B.C. Daube, L.W. Horowitz, W.C. Keene, and B.G. Heikes, Formaldehyde, glyoxal, and methylglyoxal in air and cloudwater at a rural mountain site in central Virginia, *J. Geophys. Res.*, *100*, 9325-9333, 1995.

PRESENTATIONS

The influence of short-lived air pollutants on climate, Princeton University, Science, Technology and Environmental Policy program seminar, December 2012.

Historical and Future Climate Change Simulated by GFDL's CM3 Coupled Model, NOAA Geophysical Fluid Dynamics Laboratory, seminar, May 2012.

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Tropospheric chemistry and climate, Geosciences Department, Princeton University, seminar, April 2008.
Observational constraints on the chemistry of isoprene nitrates over the eastern United States, Department of Environmental Sciences, Rutgers University, seminar, April 2007.
Impact of meteorology and emissions on methane trends, 1990-2004, AGU Joint Assembly, Baltimore, MD, May 2006.
MOZART Photochemistry and Transport Modeling for ICARTT, ICARTT Data Analysis Workshop, Durham, NH, August 2005.
Tropospheric ozone and aerosols, GFDL/Hadley Centre Meeting, Princeton, NJ, November 2003.
Tropospheric chemistry and aerosol modeling in AM2, NCAR-GFDL Model Development Meeting, Princeton, NJ, October 2003.
MOZART-2 modeling in ITCT 2K2 and 2K4, Planning Meeting for Summer 2004 Atmospheric Research Campaigns, Durham, NH, April 2003.
Trans-Pacific transport of pollution during ITCT 2K2, ITCT 2K2 Data Workshop, Boulder, CO, March 2003.
Chemical weather forecasts using the MOZART-2 global model in ITCT 2K2, AGU Fall Meeting, San Francisco, CA, December 2002.
Ozone and aerosol modeling: Radiative forcing and air quality, GFDL-NOAA Meeting, Princeton, NJ, November 2002.
Ozone and aerosol modeling: Radiative forcing and air quality, NOAA/OAR Senior Research Council Meeting, Princeton, NJ, November 2002.
Ozone and aerosol modeling: Radiative forcing and air quality, NCAR/GFDL Joint Atmospheric Model Development Workshop, November 2002.
Chemical transport models and applications, NOAA/OAR Aerosol-Tropospheric Ozone Research Workshop, Boulder, CO, October 2002.
Budget of tropospheric ozone in MOZART-2, Max Planck Institute for Meteorology, Hamburg, Germany, June 2002.
Overview of MOZART-2, ITCT 2K2 Planning Meeting, Boulder, CO, November 2001.
Status of MOZART-2, MOZART Workshop, Boulder, CO, November 2001.
Global simulation of tropospheric ozone and related tracers: Description and evaluation of MOZART, version 2, AGU Spring Meeting, Boston, MA, May 2001.
A global simulation of tropospheric ozone and related tracers: Description and evaluation of MOZART, version 2, MOZART Workshop, NCAR, Boulder, CO, April 2001.
MOZART-2: Recent updates and comparison with observations, MOZART Workshop, UIUC, Urbana-Champaign, IL, September 2000.
MOZART-2: Model evaluation and recent updates, MOZART Workshop, Nederland, CO, May 2000.
MOZART-2: Model description and evaluation, MOZART Workshop, Max Planck Institute for Meteorology, Hamburg, Germany, January 2000.
Update on model development at NCAR and status of IPCC effort, NCAR/LLNL Model Symposium, NCAR, Boulder, CO, October 1999.
Global simulation of tropospheric ozone using MOZART-2, NCAR/ASP Research Report, Boulder, CO, October 1999.
Current status of MOZART-2, MOZART Workshop, NCAR, Boulder, CO, September 1999.
Tropical tropospheric ozone: The role of biomass burning and lightning, NCAR/ACD Research Report, Boulder, CO, July 1999
Model Simulation of Tropical Tropospheric Ozone, and Its Dependence on Biomass Burning, Lightning, and Convection, AGU Spring Meeting, Boston, MA, June 1999.

LARRY WAYNE HOROWITZ

Tropospheric ozone in the tropics: The role of biomass burning and lightning, NCAR/ASP Presentation, Boulder, CO, May 1999.

2-D and 3-D chemical transport modelling: Preliminary results and future plans for the MOZART-2 model, NCAR/ASP Research Report, Boulder, CO, October 1998.

Tropospheric ozone in the tropics: The role of convection, NCAR/ASP Research Report, Boulder, CO, May 1998.

Update on recent work on the MOZART model, NCAR/ACD Presentation, Boulder, CO, March 1998.

The impact of fossil fuel combustion on the global distributions of tropospheric nitrogen oxides and ozone, AGU Fall Meeting, San Francisco, CA, December 1997.

The effect of non-methane hydrocarbons on the export of reactive nitrogen from North America during summertime, AGU Fall Meeting, San Francisco, CA, December 1996.