

LARRY WAYNE HOROWITZ

Geophysical Fluid Dynamics Laboratory/NOAA • Princeton University

P.O. Box 308 • Princeton, NJ 08542

(609) 452-6520 • Fax (609) 987-5063 • larry.horowitz@noaa.gov • <http://www.gfdl.noaa.gov/~lwh/>

PROFESSIONAL EXPERIENCE

2001-present **GEOPHYSICAL FLUID DYNAMICS LABORATORY**, Princeton, New Jersey
Physical Scientist

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.

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.

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

Extensive coursework in physical and organic chemistry, mathematics, and physics.

ACADEMIC HONORS

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

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

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PUBLICATIONS

- 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.*, in press, 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 SF₆ 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 isoprene 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

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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, submitted to *J. Geophys. Res.*, 2007.

Heald, C.L., D.K. Henze, L.W. Horowitz, J.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, resubmitted to *J. Geophys. Res.*, 2007.

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Levy, H., 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, submitted to *J. Geophys. Res.*, 2007.

Liu, J., D.L. Mauzerall, and L.W. Horowitz, Inter-continental transport of fine aerosols and its impact on global health, to be submitted to *J. Geophys. Res.*, 2007.

Liu, J., D.L. Mauzerall, and L.W. Horowitz, Source-receptor relationships for East Asian sulfur dioxide emissions and northern hemisphere sulfate concentrations, submitted to *Geophys. Res. Lett.*, 2007.

Naik, V., A. Fiore, L. Horowitz, H. Singh, C. Wiedinmyer, and A. Guenther, The global atmospheric budget of ethanol, submitted to *Science*, 2007.

Parrington, M., D. Jones, K. Bowman, L. Horowitz, A. Thompson, D. Tarasick, and J. Witte, Estimating the summertime tropospheric ozone distribution over North America through assimilation of observations from the Tropospheric Emission Spectrometer, submitted to *J. Geophys. Res.*, 2007.

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, submitted to *J. Geophys. Res.*, 2007.

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Yang, H., Y. Gao, and L. Horowitz, The size distribution of entrained dust and the impact on dust load and deposition to the ocean, manuscript in preparation, 2007.

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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.

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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.

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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.

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- 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.
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