

Dr. Lin Zhang – curriculum vitae

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EDUCATION

- **Harvard University**, Cambridge, USA
Ph.D. in Earth and Planetary Sciences, September 2009
Atmospheric Chemistry modeling
Dissertation: Application of satellite observations and adjoint inverse modeling to intercontinental transport of ozone pollution
Advisor: Prof. Daniel J. Jacob
- **Harvard University**, School of Engineering and Applied Sciences
S.M. in Applied Physics, June 2008
- **Peking University**, Beijing, P.R. China
B.S. in Atmospheric Sciences, July 2004

RESEARCH INTERESTS

My research scope is to understand changes of atmospheric composition (air pollutants and greenhouse gases) due to human and natural activities, and their implications on environment and climate change.

My research utilizes the newly-developed satellite observations of atmospheric composition combined with field measurements and atmospheric models to advance our knowledge of: 1) Sources, transformation, and consequences of air pollution; 2) Long-distance transport of air pollution; 3) Effects on air quality and climate

PROFESSIONAL EXPERIENCE

- **Tenure-track Assistant Professor**, since September 2012
Department of Atmospheric & Oceanic Sciences, School of Physics, Peking University
- **Research Associate**, December 2010 – present
Atmospheric Chemistry Modeling Group, Harvard University
Research focus:
 1. Origins of ozone pollution in the Intermountain West US
 2. Source of nitrogen deposition over the US
- **Postdoctoral Research Fellow**, October 2009 – November 2010
Atmospheric Chemistry Modeling Group, Harvard University
- **Graduate Research assistant** with Prof. Daniel J. Jacob, September 2004 – 2009
Department of Earth and Planetary Sciences, Harvard University
Focus area: Atmospheric chemistry and environment

TEACHING EXPERIENCE

- Teaching Fellow, EPS5 (*Introduction to Environmental Sciences: atmosphere, ocean, and biosphere*), Harvard University, Fall 2006
- Teaching Fellow, EPS5 (*Introduction to Environmental Sciences: atmosphere, ocean, and biosphere*), Harvard University, Fall 2005

HONORS & AWARDS

The Program of Young One Thousand Experts, China, 2011
NASA Earth and Space Science Fellowship, 2007-2009
Bertram J. Cohn Fund award for Environmental Studies, Harvard University, 2006-2007
May 4th Scholarship, Peking University, 2002-2003
Yibing Xie Scholarship, Peking University, 2001-2002
May 4th Scholarship, Peking University, 2000-2001

PROFESSIONAL ACTIVITIES

Member of the American Geophysical Union (AGU)
Member of the European Geosciences Union (EGU)
Contributor of the U.S. Environmental Protection Agency's Integrated Science Assessment for Ozone and Related Photochemical Oxidants (2011)
Reviewer for Journals: *Atmospheric Chemistry and Physics*, *Journal of Geophysical Research*, *Geophysical Research Letters*, *Atmospheric Environment*, *Remote Sensing of Environment*.

PUBLICATIONS

- 18) **Zhang, L.**, D. J. Jacob, E. M. Knipping, N. Kumar, J. W. Munger, C. C. Carouge, A. van Donkelaar, Y.X. Wang, D. Chen, Nitrogen deposition to the United States: distribution, sources, and processes, *Atmos. Chem. Phys. Discuss.*, 12, 241-282, 2012.
- 17) Tai, A. P. K., Mickley, L. J., Jacob, D. J., Leibensperger, E. M., **Zhang, L.**, Fisher, J. A., and Pye, H. O. T., Meteorological modes of variability for fine particulate matter (PM_{2.5}) air quality in the United States: implications for PM_{2.5} sensitivity to climate change, *Atmos. Chem. Phys. Discuss.*, 11, 31031-31066, 2011.
- 16). Zhao, Y., C. P. Nielsen, M. B. McElroy, **L. Zhang**, and J. Zhang, CO emissions in China: Uncertainties and implications of improved energy efficiency and emission control, *Atmos. Environ.*, 49, 103-113, 2012.
- 15). Ridder, T., Gerbig, C., Notholt, J., Rex, M., Schrems, O., Warneke, T., and **Zhang, L.**, Ship-borne FTIR measurements of CO and O₃ in the Western Pacific from 43° N to 35° S: an evaluation of the sources, *Atmos. Chem. Phys. Discuss.*, 11, 22951-22985, 2011.
- 14) McDonald-Buller, E.C., D.T. Allen, and co-authors including **L. Zhang**, Establishing policy relevant background (PRB) ozone concentrations in the United States, *Environ. Sci. Technol.*, 45, 9,484-9,497, 2011.
- 13) Zoogman, P., D.J. Jacob, K. Chance, **L. Zhang**, P. Le Sager, A.M. Fiore, A. Eldering, X. Liu, V. Natraj, S.S. Kulawik, Ozone Air Quality Measurement Requirements for a Geostationary Satellite Mission, *Atmos. Environ.*, 45, 7,143-7,150, 2011.
- 12). **Zhang, L.**, D.J. Jacob, N.V. Smith-Downey, D.A. Wood, D. Blewitt, C.C. Carouge, A. van Donkelaar, D.B.A. Jones, L.T. Murray, and Y. Wang, Improved estimate of the policy-relevant background ozone in the United States using the GEOS-Chem global model with 1/2°x2/3° horizontal resolution over North America, *Atmos. Environ.*, 45, 6769-6776, 2011.

- 11) **Zhang, L.**, D. J. Jacob, X. Liu, J. A. Logan, K. Chance, A. Eldering, and B.R. Bojkov, Intercomparison methods for satellite measurements of atmospheric composition: application to tropospheric ozone from TES and OMI, *Atmos. Chem. Phys.*, 10, 4725-4739, 2010.
- 10) **Zhang, L.**, Intercontinental transport of air pollution, *Front. Environ. Sci. Engin. China*, 4(1), 20-29, 2010.
- 9) Fairlie, T. D., D. J. Jacob, J. E. Dibb, B. Alexander, M. A. Avery, , A. van Donkelaar, and **L. Zhang**, Impact of mineral dust on nitrate, sulfate, and ozone in transpacific Asian pollution plumes, *Atmos. Chem. Phys.*, 10, 3999-4012, 2010.
- 8) Kopacz, M., D.J. Jacob, J.A. Fisher, J.A. Logan, **L. Zhang**, I.A. Megretskaia, et al., Global estimates of CO sources with high resolution by adjoint inversion of multiple satellite datasets (MOPITT, AIRS, SCIAMACHY, TES), *Atmos. Chem. Phys.*, 10, 855-876, 2010.
- 7) **Zhang, L.**, D. J. Jacob, M. Kopacz, D. K. Henze, K. Singh, and D. A. Jaffe, Intercontinental source attribution of ozone pollution at western U.S. sites using an adjoint method, *Geophys. Res. Lett.*, 36, L11810, 2009.
- 6) Nassar, R., J. A. Logan, I. A. Megretskaia, L. T. Murray, **L. Zhang**, and D. B. A. Jones, Analysis of tropical tropospheric ozone, carbon monoxide and water vapor during the 2006 El Niño using TES observations and the GEOS-Chem model, *J. Geophys. Res.*, 114, D17304, doi:10.1029/2009JD011760, 2009.
- 5) **Zhang, L.**, D. J. Jacob, K. F. Boersma, D. A. Jaffe, J. R. Olson, K. W. Bowman, J. R. Worden, A. M. Thompson, M. A. Avery, R. C. Cohen, J. E. Dibb, F. M. Flocke, H. E. Fuelberg, L. G. Huey, W. W. McMillan, H. B. Singh, and A. J. Weinheimer, Transpacific transport of ozone pollution and the effect of recent Asian emission increases on air quality in North America: an integrated analysis using satellite, aircraft, ozonesonde, and surface observations, *Atmos. Chem. Phys.*, 8, 6117-6136, 2008.
- 4) Tanimoto, H., Y. Sawa, S. Yonemura, K. Yumimoto, H. Matsueda, I. Uno, T. Hayasaka, H. Mukai, Y. Tohjima, K. Tsuboi, and **L. Zhang**, Diagnosing recent CO emissions and ozone evolution in East Asia using coordinated surface observations, adjoint inverse modeling, and MOPITT satellite data, *Atmos. Chem. Phys.*, 8, 3867-3880, 2008.
- 3) Logan, J. A., I. A. Megretskaia, R. Nassar, L. T. Murray, **L. Zhang**, K. W. Bowman, H. M. Worden, and M. Luo, Effects of the 2006 El Nino on tropospheric composition as revealed by data from the Tropospheric Emission Spectrometer (TES), *Geophys. Res. Lett.*, 35, L03816, doi:10.1029/2007GL031698, 2008.
- 2) **Zhang, L.**, D. J. Jacob, K. W. Bowman, J. Logan, S. Turquety, R. C. Hudman, Q. Li, R. Beer, H. M. Worden, J. R. Worden, C. P. Rinsland, S. S. Kulawik, M. C. Lampel, M. W. Shephard, B. M. Fisher, A. Eldering, and M. A. Avery, Ozone-CO correlations determined by the TES satellite instrument in continental outflow regions, *Geophys. Res. Lett.*, 33, L18804, doi:10.1029/2006GL026399, 2006.
- 1) Kulawik, S. S., Worden, J., Eldering, A., Bowman, K., Gunson, M., Osterman, G. B., **Zhang, L.**, Clough, S. A., Shephard, M. W., Beer, R., Implementation of cloud retrievals for Tropospheric Emission Spectrometer (TES) atmospheric retrievals: part 1. Description and characterization of errors on trace gas retrievals, *J. Geophys. Res.*, 111, D24204, doi:10.1029/2005JD006733, 2006.

PRESENTATIONS

- Understanding the background ozone concentrations over North America: intercontinental transport and natural variability*, **Invited seminar at Department of Physics**, University of Toronto, Toronto, Canada, January 16, 2012.
- Domestic and external source attribution of nitrogen deposition over the United States*, **The 5th International GEOS-Chem Users Meeting**, Harvard University, Cambridge, MA, May 3, 2011.
- Domestic and foreign source attribution of nitrogen deposition and surface ozone pollution over the United States*, poster presentation at **Conference on Air Quality and Climate**, Kona, HI, March 14, 2011.
- Nitrogen deposition over the United States: results from the GEOS-Chem nested model*, **EPRI Model Development Meeting**, Palo Alto, CA, July 7, 2010
- Intercontinental Source Attribution of Ozone Pollution at Western U.S. Sites Using an Adjoint method*, **2009 CMAS Conference**, University of North Carolina, Chapel Hill, North Carolina, Oct. 19, 2009
- Intercontinental Transport of Tropospheric Ozone Pollution: Integrating aircraft and Satellite Observations with Model*, **EPS Graduate Student/Post-doc Seminar**, Harvard, Apr. 16, 2009.
- Intercontinental Source Attribution of Ozone Pollution at Western U.S. Sites Using an Adjoint method*, **4th GEOS-Chem Users Meeting**, Harvard University, Cambridge, MA, Apr. 7, 2009
- Intercomparison of tropospheric ozone measurements from TES and OMI*, **TES Science Team Meeting**, Boulder, CO, Feb. 24, 2009.
- Intercomparison of tropospheric ozone measurements from TES and OMI - a new method using a chemical transport model as comparison platform*, **Aura Science Team Meeting**, Columbia, Maryland, Oct. 28, 2008.
- Recent increases in Asian emissions and consequences for transpacific ozone pollution in the United States: Aura and INTEX-B observations*, **AGU Fall meeting**, San Francisco, CA, Dec. 7, 2007
- Recent increases in Asian emissions and consequences for transpacific ozone pollution in the United States: Aura and INTEX-B observations*, **Aura Science Team Meeting**, Pasadena, CA, Oct. 4, 2007
- Transpacific transport of ozone pollution as seen from satellite and aircraft*, **TES Science Team Meeting**, Harvard University, Cambridge, MA, Sep. 6, 2007
- Transpacific Transport of Ozone Pollution During INTEX-B*, **3rd GEOS-Chem Users Meeting**, Harvard University, Cambridge, MA, Apr. 13, 2007
- Transpacific Transport of Ozone Pollution During INTEX-B*, **INTEX-B Data Review Meeting**, Virginia Beach, VA, Mar. 6, 2007
- Continental outflow and intercontinental transport of ozone pollution as determined from TES*, **Aura Science Team Meeting**, Boulder, CO, Sep. 11, 2006
- Continental outflow of ozone pollution as determined by ozone-CO correlations from the TES satellite instrument*, **TES science team meeting**, Boulder, CO, Feb. 23, 2006
- Continental outflow of ozone pollution as determined by ozone-CO correlations from the TES satellite instrument*, poster presentation at **the Community Workshop on Air Quality Remote Sensing from Space**, Boulder, CO, Feb. 22, 2006
- Global Distribution of the Ozone-CO Correlation from TES and Comparison to the GEOS-Chem Model*, **AGU Fall meeting**, San Francisco, Dec. 9, 2005
- Ozone Comparison among TES, GOME and GEOS-Chem*, **TES science team meeting**, Harvard University, Aug. 17, 2005