

Colette L. Heald

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RESEARCH APPOINTMENTS

Assistant Professor Department of Civil and Environmental Engineering, MIT, Cambridge, MA	2012-
Assistant Professor Department of Atmospheric Science, Colorado State University, Fort Collins, CO	2008-2011
NOAA Global and Climate Change Postdoctoral Fellow University of California, Berkeley, CA	2006-2007
Postdoctoral Fellow Harvard University, Cambridge, MA	Fall 2005

EDUCATION

Ph.D., Earth and Planetary Sciences , Harvard University, Cambridge, USA	June 2005
B.Sc., Engineering Physics : Queen's University, Kingston, Canada	June 2000

AWARDS AND HONOURS

- Invited presentation at Gordon Research Conference in Atmospheric Chemistry 2011
- AGU Journal Highlight and cover of *Geophysical Research Letters* 2010
- Invited participant "Biogenic SOA: Observations to Global Modeling" workshop 2007, 2008
- Crutzen award: Best Paper at the Young Scientist's Conference on Global Change 2006
- Visiting Scientist, National Center for Atmospheric Research, Boulder 2006
- NOAA Postdoctoral Fellowship in Climate and Global Change 2005-2007
- NASA Earth System Science Fellowship 2003-2005
- NSERC Postgraduate Scholarship 2000-2004

TEACHING

Lecturer for ATS 681: <i>Interpreting satellite observations of atmospheric composition</i> , CSU	2010
Lecturer for ATS 762: <i>Biosphere-Chemistry-Climate Interactions</i> , CSU	2009
Lecturer for ATS 621: <i>Atmospheric Chemistry</i> , CSU	2008-2011
Faculty Coordinator: <i>ATS Programming Short Course</i> , CSU	2009
Teaching Fellow for EPS 5: <i>Introduction to Environmental Sciences</i> , Harvard University	2003
Teaching Fellow for EPS 133: <i>Introduction to Atmospheric Chemistry</i> , Harvard University	2002

PUBLICATIONS

1. Q. Li, D. J. Jacob, R. M. Yantosca, **C. L. Heald**, H. B. Singh, M. Koike, Y. Zhao, G. W. Sachse, D. G. Streets (2003), A Global 3-D Model Evaluation of the Atmospheric Budgets of HCN and CH₃CN: Constraints From Aircraft Measurements Over the Western Pacific, *J. Geophys. Res.*, 108(D21) 8827, doi:10.1029/2002JD003075.
2. Jacob, D. J., J. H. Crawford, M. M. Kleb, V. S. Connors, R. J. Bendura, J. L. Raper, G. W. Sachse, J. C. Gille, L. Emmons, and **C. L. Heald** (2003), The Transport and Chemical Evolution over the Pacific

- (TRACE-P) aircraft mission: design, execution, and first results, *J. Geophys. Res.*, 180(D20) 8781, doi:10.1029/2002JD003276.
3. Palmer, P. I., D. J. Jacob, D. B. A. Jones, **C. L. Heald**, R. M. Yantosca, J. A. Logan, Glen W. Sachse, D. G. Streets (2003), Inverting for emissions of carbon monoxide from Asia using aircraft observations over the western Pacific, *J. Geophys. Res.*, 108(D21), 8828, doi:10.1029/2003JD003397.
 4. **Heald, C. L.**, D. J. Jacob, P. I. Palmer, M. J. Evans, G. W. Sachse, H. B. Singh and D. R. Blake (2003), Biomass burning emission inventory with daily resolution: application to aircraft observations of Asian outflow, *J. Geophys. Res.*, 108(D21), 8811, doi:10.1029/2002JD003082.
 5. **Heald, C. L.**, D. J. Jacob, A. M. Fiore, L. Emmons, J. C. Gille, G. W. Sachse, E. V. Browell, M. A. Avery, S. A. Vay, J. H. Crawford, D. J. Westberg, D. R. Blake, H. B. Singh, S. T. Sandholm, R. W. Talbot, H. E. Fuelberg (2003), Transpacific satellite and aircraft observations of Asian pollution, *J. Geophys. Res.*, 108 (D24), 4804, doi:10.1029/2003JD003507.
 6. Crawford, J. H., **C. L. Heald**, H. E. Fuelberg, D. Morse, L. K. Emmons, G. W. Sachse, G. Chen, J. Olsen., C. Kittaka, and A. J. Hamlin (2003), Exploring the relationship between 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.
 7. Hudman, R. C., D. J. Jacob, O. C. Cooper, M. J. Evans, **C. L. Heald**, R. J. Park, F. Fehsenfeld, F. Flocke, J. Holloway, G. Hubler, K. Kita, M. Koike, Y. Kondo, A. Neuman, J. Nowak, S. Oltmans, D. Parrish, J. M. Roberts, and T. Ryerson (2004), Ozone production in transpacific Asian pollution plumes and implications for ozone air quality in California, *J. Geophys. Res.*, 109 (D23), D23S18, doi:10.1029/2004JD004978.
 8. **Heald, C. L.**, D. J. Jacob, D. B. A. Jones, P. I. Palmer, J. A. Logan, D. G. Streets, G. W. Sachse, J. C. Gille, R. N. Hoffman, and T. Nehrkorn (2004), Comparative inverse analysis of satellite (MOPITT) and aircraft (TRACE-P) observations to estimate Asian sources of carbon monoxide, *J. Geophys. Res.*, 109, (D23), D23306, doi:10.1029/2004JD005185.
 9. Li, Q.B., D. J. Jacob, R. J. Park, Y. X. Wang, **C. L. Heald**, R. Hudman, R. M. Yantosca, R.V. Martin, and M. J. Evans (2005), Outflow pathways for North American pollution in summer: A global 3-D model analysis of MODIS and MOPITT observations, *J. Geophys. Res.*, 110, D10301, doi:10.1029/2004JD005039.
 10. **Heald, C.L.**, D.J. Jacob, R.J. Park, L.M. Russell, B.J. Huebert, J.H. Seinfeld, H. Liao and R.J. Weber (2005), A large organic aerosol source in the free troposphere missing from current models, *Geophys. Res. Lett.*, 32, L18809, doi:10.1029/2005GL023831.
 11. **Heald, C.L.**, D.J. Jacob, R.J. Park, B. Alexander, T.D. Fairlie, D.A. Chu, R.M. Yantosca (2006), Transpacific transport of Asian anthropogenic aerosols and its impact on surface air quality in the United States, *J. Geophys. Res.*, 111, D14310, doi:10.1029/2005JD006847.
 12. **Heald, C.L.**, D.J. Jacob, S. Turquety, R.C. Hudman, R.J. Weber, A.P. Sullivan, R.E. Peltier, E.L. Atlas, J.A. de Gouw, C. Warneke, J.S. Holloway, J.A. Neuman, F.M. Flocke, and J.H. Seinfeld (2006), Concentrations and sources of organic carbon aerosol in the free troposphere over North America, *J. Geophys. Res.*, 111, D23S47, doi:10.1029/2006JD007705.
 13. van Donkelaar, A., R.V. Martin, R.J. Park, **C.L. Heald**, T.-M. Fu, H. Liao, and A. Guenther (2007), Model evidence for a significant source of secondary organic aerosol from isoprene, *Atmos. Env.*, 41, 1267-1274.
 14. Turquety, S., D.J. Jacob, J.A. Logan, R.C. Hudman, R.M. Yevich, F. Leung, **C.L. Heald**, R.M. Yantosca, S. Wu, L.K. Emmons, D.P. Edwards, G.W. Sachse (2007), Inventory of boreal fire emissions for North America: importance of peat burning and pyro-convective injection, *J. Geophys. Res.*, 112, doi:10.1029/2006JD007281, 2007.
 15. Kopacz, M.A., D.J. Jacob, D.K. Henze, **C.L. Heald**, and D.G. Streets (2007), Comparison of adjoint and analytical inversion methods for constraining Asian sources of carbon monoxide using satellite (MOPITT) measurements of CO columns, *J. Geophys. Res.*, 114, D04305, doi:10.1029/2007JD009264.
 16. Millet, D.B., D.J. Jacob, T.M. Fu, T.P. Kurosu, K. Chance, **C.L. Heald**, A. Guenther (2007), Spatial distribution of isoprene emissions from North America derived from formaldehyde column measurements by the OMI satellite sensor, *J. Geophys. Res.*, 113, D02307, doi:10.1029/2007JD008950.

17. **Heald, C.L.**, D.K. Henze, L.W. Horowitz, J. Feddema, J.-F. Lamarque, A. Guenther, P.G. Hess, F. Vitt, A.H. Goldstein, I. Fung and J.H. Seinfeld (2008), 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.
18. Henze, D.K., J.H. Seinfeld, N.L. Ng, J.H. Kroll, T.-M. Fu, D.J. Jacob, and **C.L. Heald** (2008), Global modeling of secondary organic aerosol formation from aromatic hydrocarbons: high- vs low-yield pathways, *Atmos. Chem. and Phys.*, 8, 2405-2421.
19. **Heald, C.L.**, et al. (2008), Total Observed Organic Carbon (TOOC): A Synthesis of North American Observations, *Atmos. Chem. and Phys.*, 8, 2007-2025.
20. Goldstein, A.H., C.D. Koven, **C.L. Heald**, I. Fung (2009), Biogenic Carbon and Anthropogenic Pollutants Combine to Form a Cooling Haze over the Southeastern US, *Proceedings of the National Academy of Sciences*, in press.
21. Fu, T.-M., D.J. Jacob, **C. L. Heald** (2009), Aqueous-phase reactive uptake of dicarbonyls as a source of organic aerosol over eastern North America, *Atmospheric Environment*, 43, 1814–1822.
22. Dunlea, E.J., P.F. DeCarlo, A.C. Aiken, J.R. Kimmel, R.E. Peltier, R.J. Weber, J. Tomlison, D.R. Collins, Y. Shinozuka, C.S. McNaughton, S.G. Howell, A.D. Clarke, L.K. Emmons, E.C. Apel, G.G. Pfister, A. van Donkelaar, R.V. Martin, D.B. Millet, **C.L. Heald**, J.L. Jimenez (2009), Evolution of Asian Aerosols during Transpacific Transport in INTEX-B, *Atmospheric Chemistry and Physics*, 9, 7257-7287.
23. **Heald, C.L.**, M. J. Wilkinson, R.K. Monson, C.A. Alo, G.Wang, A. Guenther (2009), Response of isoprene emission to ambient CO₂ changes and implications for global budgets, *Global Change Biology*, 15, 4, 1127-1140.
24. Prenni, A.J., M.D. Petters, S.M. Kreidenweis, **C.L. Heald**, S.T. Martin, P. Artaxo, R.M. Garland, A.G. Wollny, U. Poschl (2009), Wet season ice nuclei budget in the Amazon Basin: Biogenic emissions and Saharan dust, *Nature Geosciences*, 2, doi:10.1038/ngeo517.
25. Martin, S.T., M.O. Andreae, P. Artaxo, D. Baumgardner, Q. Chen, A.H. Goldstein, A. Guenther, **C.L. Heald**, O.L. Mayol-Bracero, P.H. McMurray, T. Pauliquevis, U. Poschl, K.A. Prather, G.C. Roberts, S.R. Saleska, M.A. Silva Dias, D.V. Spracklen, E. Swietlicki, I. Trebs (2009), Sources and Properties of Amazonian Aerosol Particles, *Reviews of Geophysics*, submitted.
26. **Heald, C.L.**, D.V. Spracklen (2009), Atmospheric budget of primary biological aerosol particles from fungal sources, *Geophysical Research Letters*, 36, L09806, doi:10.1029/2009GL037493.
27. D. B. A. Jones, K. W. Bowman, J. A. Logan, **C. L. Heald**, J. Liu, M. Luo, J. Worden, and J. Drummond (2009), The zonal structure of tropical O₃ and CO as observed by the Tropospheric Emission Spectrometer in November 2004 – Part 1: Inverse modeling of CO emissions, *Atmospheric Chemistry and Physics*, 9, 3547-3562.
28. Q. Chen, D.K. Farmer, J. Schneider, S.R. Zorn, **C.L. Heald**, T.G. Karl, A. Gunether, J.D. Allan, N. Robinson, H. Coe, J.R. Kimmel, T. Pauliquevis, S. Borrmann, U. Poschl, M.O. Andreae, P. Artaxo, J.L. Jimenez and S.T. Martin (2009) Mass Spectral Characterization of Submicron Biogenic Organic Particles in the Amazon Basin, *Geophys. Res. Lett.*, 36, L20806, doi:10.1029/2009GL039880.
29. **Heald, C.L.**, J.H. Kroll, J.L. Jimenez, K.S. Docherty, P.F. DeCarlo, A.C. Aiken, Q. Chen, S.T. Martin, D.K. Farmer, P. Artaxo (2010), A simplified description of the evolution of organic aerosol composition in the atmosphere, *Geophys. Res. Lett.*, 37, L08803, doi:10.1029/2010GL042737.
30. **Heald, C.L.**, D. A. Ridley, S. M. Kreidenweis, E. E. Drury (2010), Satellite observations cap the atmospheric organic aerosol budget, *Geophys. Res. Lett.*, 37, L24808, doi:10.1029/2010GL045095.
31. Jiang, Z. D.B.A. Jones, M.A. Kopacz, J. Liu, D.K. Henze, **C.L. Heald** (2011), Quantifying the impact of model errors on top-down estimates of carbon monoxide emissions using satellite observations, *J. Geophys. Res.*, 116, D15306, doi:10.1029/2010JD015282.
32. Smirnov, A., et al. (2011), Maritime Aerosol Network as a component of AERONET – first results and comparison with global aerosol models and satellite retrievals, *Atmospheric Measurement Techniques*, , 583-597.
33. Lapina, K., **C.L. Heald**, D. V. Spracklen, S.R. Arnold, J.D. Allan, H. Coe, G. McFiggans, S.R. Zorn, F. Drewnick, T.S. Bates, L. N. Hawkins, L.M. Russell, A. Smirnov, C.D. O'Dowd, A. Hind (2011), Investigating organic aerosol loading in the remote marine environment, *Atmos. Chem. and Phys.*, 11, 8847-8860.

34. Mahowald, N., D.S. Ward, S. Kloster, M.G. Flanner, **C.L. Heald**, N.G. Heavens, P.G. Hess, J.-F. Lamarque, P.Y. Chuang (2011), Aerosol impacts on climate and biogeochemistry, Annual Reviews of Environment and Resources, submitted.
35. Lamarque, J.-F., L.K. Emmons, P.G. Hess, D.E. Kinnison, S. Tilmes, F. Vitt, **C.L. Heald**, E.A. Holland, P. H. Lauritzen, J. Neu, J. Orlando, P. Rasch, G. Tyndall (2011) CAM-chem: description and evaluation of interactive atmospheric chemistry in CESM, GMD, submitted.
36. Ridley, D.A., **C.L. Heald**, and B. Ford (2011), North African Dust Export and Impacts: An Integrated Satellite and Model Perspective, JGR, submitted.
37. **Heald, C.L.**, et al. (2011), Exploring atmospheric organic aerosol: Comparing 17 aircraft field campaigns with a global model, ACPD, submitted.
38. Ford, B. and **C. L. Heald** (2011), An A-Train and Model Perspective on the Vertical Distribution of Pollution Transport in the Northern Hemisphere, J. Geophys. Res., submitted.

CONFERENCE PRESENTATIONS

Goldschmidt Conference (Prague, Czech Republic, August 2011, invited), Atmospheric Chemistry Gordon Research Conference (Mt Snow, VT, July 2011, invited), International Global Atmospheric Chemistry Conference (Halifax, Canada, July 2010), Fall AGU (San Francisco, CA, December 2009), Atmospheric Chemistry Gordon Research Conference (Waterville Valley, NH, August 2009), Goldschmidt Conference (Davos, Switzerland, June 2009), Fall AGU (San Francisco, CA, December 2008, invited), International Global Atmospheric Chemistry Conference (Annecy, France, September 2008), Atmospheric Chemistry Gordon Research Conference (Big Sky, MT, August 2007), International Union of Geodesy and Geophysics (Perugia, Italy, July 2007), Biogenic Hydrocarbon Gordon Research Conference (Ventura, CA, February 2007), Young Scientists' Conference on Global Change (Beijing, China, November 2006), iLEAPS Meeting (Boulder, CO, January 2006), Fall AGU (San Francisco, CA, 2005), AAAR Meeting (Austin, TX, October 2005, invited), Atmospheric Chemistry Gordon Research Conference (Big Sky, MT, September 2005), EGU (Vienna, Austria, April 2005), Spring AGU (Montreal, Canada, May 2004), Fall AGU (San Francisco, CA, December 2003), EGS/AGU (Nice, France, April 2003), IGAC (Heraklion, Greece, September 2002)

INVITED SEMINARS

MIT (March 2011), Reed College (October 2010), University of Cambridge (June 2010), University of Leeds (June 2010), Michigan Technological University (Oct 2009), Aerodyne Research, Inc. (April 2009), NOAA (June 2008), NCAR (May 2008), Stanford University (October 2006), Colorado State University (May 2006), Stony Brook University (April 2006), York University (November 2005), University of Toronto (November 2005), Harvard University (April 2005), NOAA-GFDL (November 2004)

MEETINGS/WORKSHOPS

16th annual CESM Workshop (Breckenridge, CO, June 2011), SOAS Workshop (New Brunswick, NJ, May 2011), 5th International GEOS-Chem Meeting (Cambridge, MA, May 2011), Chemistry-Climate Working Group Meeting (NCAR, March 2011), Organic Particles in the Atmosphere Workshop (Telluride, CO, July 2010), "Atmospheric Chemistry in the Tropics: Marine, Biosphere and Climate Connections" (Royal Society, UK, June 2009), GEOS-Chem User's Meeting (Harvard University, April 2009), Chemistry-Climate Working Group Meeting (NCAR, March 2009), TES Science Team Meeting (Boulder, CO, February 2009), "Biogenic Secondary Organic Aerosols: Observations to Global Modeling" (Tovetorp, Sweden, August 2008), Organic Particles in the Atmosphere Workshop (Telluride, CO, July 2008), AMAZE-08 Science Team Meeting (Boulder, CO, July 2008), 13th Annual CCSM Workshop (Breckenridge, CO, June 2008), Aerosols in the Amazon (Manaus, Brazil, February 2008), Chemistry-Climate Working Group Meeting (NCAR, February 2008), BEACHON workshop (NCAR, November 2007), "Biogenic Secondary Organic Aerosols: Observations to Global Modeling" (Hyytiälä, Finland, July 2007), 12th Annual CCSM Workshop (Breckenridge, CO, June 2007), GEOS-Chem user's Meeting (Harvard University, April 2007), TES Science Team Meeting (JPL, Nov 2006), Biogenic Hydrocarbon Workshop (NCAR, Oct 2006), 11th Annual CCSM Workshop (Breckenridge, CO, June 2006), CCSM Chemistry-Climate Working Group Meeting (NCAR,

March 2006), ICARTT Science Team Meeting (Durham, NH, Aug 2005), 10th Annual CCSM Workshop (Breckenridge, CO, June 2005), GEOS-Chem User's Meeting (Harvard University, April 2005), NASA Aura Science Team Meeting (Lanham, Maryland, March 2003), TRACE-P Data Workshop (Norfolk, VA, June 2002), NASA IDS Meeting (Duke University, April 2002), MOPITT Science Team Meeting (NCAR, Feb 2002)

PROFESSIONAL ACTIVITIES

- Member of the American Geophysical Union (AGU), the American Chemical Society (ACS) and the American Association for Aerosol Research (AAAR)
 - GEOS-Chem model Steering Committee member and Chair of Working Group for Aerosols
 - Member of the Chemistry-Climate Working Group of the Community Climate System Model
 - Associate Editor, *Journal of Geophysical Research*
 - Regular Reviewer:
Journals: *Atmospheric Chemistry and Physics*, *Atmospheric Environment*, *Geophysical Research Letters*, *Global Biogeochemical Cycles*, *Journal of Geophysical Research*, *Nature Geoscience*, *Proceedings of the National Academy of Sciences*, and *Science*
Grant Agencies: NOAA (Review Panel), NSF, NASA (Review Panel), DoE, NERC (UK), NSERC (Canada), NWO (Netherlands)
 - Convener:
 - Fall AGU 2006 session "*Chemistry Climate Interactions*"
 - Fall AGU 2008 session "*Sources, Evolution and Sinks of Organics in the Troposphere*"
 - IGAC 2010 session "*Observing atmospheric composition*"
 - Fall AGU 2010 session "*Sources, Evolution and Sinks of Organics in the Troposphere*"
 - Fall AGU 2011 session "*Interactions Between Tropospheric Chemistry and Climate*"
 - Member of the Colorado State University Faculty Council (2009-2012)
 - Department of Atmospheric Science Committees:
 - Student Awards Committee (2008)
 - Colloquia co-organizer (2008-10)
 - Curriculum committee (2008-11)
 - Website committee (2008-09)
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