

**Chelsea R. Thompson**  
**Postdoctoral Research Fellow**

**Institute of Arctic and Alpine Research, University of Colorado - Boulder**

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**Research Interests:**

Atmospheric Science, Cryospheric Science, Analytical Chemistry, Instrumentation  
*Specific Interests:* air-surface interactions, instrument development, atmospheric chemistry in high latitude and high altitude climate systems, methane and NMHC emissions from natural and anthropogenic processes, chemical transformations in snow and ice

**Education:**

**Purdue University**, West Lafayette, Indiana **Ph.D., 2012**  
**Department of Chemistry**

*Advisor:* Prof. Paul B. Shepson

*Degree Granting Program:* Analytical Chemistry

*Dissertation Title:* Studies of Tropospheric Halogen Radical Chemistry During Ozone and Mercury Depletion Events in the Arctic

**University of Central Florida (UCF)**, Orlando, FL **B.S., 2006**  
**Department of Chemistry**  
**Burnett Honors College**

*Major:* Forensic Science, Analytical Track

*Minor:* Chemistry

*Advisors:* Prof. B. G. Fookes, Prof. M. Sigman, and Prof. G. Mattson

**Honors and Awards:**

NSF Atmospheric and Geospace Sciences Postdoctoral Fellowship [2013]  
Selected participant in IARC Modeling of the Arctic Climate System workshop [2011]  
Oslo Science Conference (International Polar Year) Early-Career Scientist Travel Stipend [2010]  
Women in Science Travel Grant [2010]  
Purdue Graduate Student Government Travel Grant [2010]  
Most Outstanding Freshman Chemistry Student, UCF [2003]  
Bright Futures Florida Academic Scholarship [2002-2006]  
High Achievement Scholarship [2002-2006]  
Dean's List, UCF [2005]  
UCF Summer Grant [2005]  
UCF Scholars Award [2005]  
President's Honor Roll, UCF [2003]  
UCF Honors Scholarship [2002-2003]  
UCF Academic Grant [2003-2004]

**Research and Field Experience:**

**University of Colorado – Boulder**

**Institute of Arctic and Alpine Research**

**Jan. 1, 2013 – present**

Postdoctoral Research Associate with Prof. Detlev Helmig

- Conducted measurements of ozone, NO<sub>x</sub>, methane and NMHC vertical gradients from a tethered balloon during the Uintah Basin Winter Ozone Study 2013
- Performed air quality sampling in neighborhoods impacted by oil and gas operations in Erie, Colorado
- Investigated VOC production and destruction within alpine and Arctic snowpacks

**Purdue University, Department of Chemistry**

**Nov. 2007 – Dec. 2012**

Graduate Research Scientist with Prof. Paul B. Shepson

- Developed and tested a flowing chemical method for the detection of halogen radicals (BrO, ClO) in the ambient air using GC-ECD
- Field deployed the instrument in Barrow, AK during Ocean-Atmosphere-Sea Ice-Snowpack (OASIS) 2009 field campaign
- Developed, and field deployed a mobile Arctic instrument sled for atmospheric measurements over sea ice in March 2011
- Conducted computer modeling of Arctic gas-phase chemistry, ozone depletion events, mercury depletion events

**University of Central Florida, Department of Chemistry**

**2005 - 2006**

Undergraduate Research Scientist with Prof. B. G. Fookes & Prof. G. Mattson

- Used FTIR-ATR to differentiate between make and model of broken headlights at hit-and-run crime scenes
- Worked on development of a database of headlight and taillight chemical and physical properties
- Performed crime scene investigation, photography, evidence handling, analysis

**Professional Experience**

**UMIAQ, NSF Barrow Science Support**

**June 13 – August 24, 2011**

Lab Manager and Acting Chief Scientist for Summer Field Season

- Developed laboratory protocols and safe practices
- Developed a Chemical Hygiene Plan and Radiation Safety protocols
- Developed hazardous waste disposal procedures
- Developed recommendations for research support and equipment
- Assisted with invoicing and accounting
- Assisted with logistics, planning, and permitting

**Outreach and Teaching Experience:**

Teaching Assistant, Purdue University, Department of Chemistry

Fall 2007 – Spring 2008; Fall 2011: General Chemistry for Science & Engineering Majors, General Chemistry for Non-Science Majors, Chemistry Lab

Memberships: American Geophysical Union, Association of Polar Early Career Scientists, Earth Science Women's Network, Iota Sigma Pi (Women in Science Honor)

Society), Phi Lambda Upsilon (Chemistry Honor Society), Golden Key National Honor Society, National Scholars Honor Society, Union of Concerned Scientists

Outreach/Education: Science Interview with KGNU, Boulder, CO [2013]; Air Quality Community Talk, Loveland, CO [2013]; INSTAAR Open House [2013]; Science Interview with KBRW radio, Barrow, AK [2011]; Invited Speaker, Logansport Rotary [2011]; National Chemistry Week at elementary schools [Oct. 2010]; Girl Scout Day at Purdue chemistry lab [Apr. 2010]; Judge for Purdue Undergraduate Research Symposium [Apr. 2010]; “Expanding Your Horizons” Girl Scout science event at UCF [2005]

### **Publications:**

Helmig, D., **C. R. Thompson**, J. Evans, P. Boylan, J. Hueber, J.-H. Park, Record-high atmospheric levels of volatile organic compounds in the Uintah Basin, Utah [*accepted by Environ. Sci. Technol.*]

Halfacre, J. W., T. N. Knepp, P. B. Shepson, B. Li, P. K. Peterson, S. J. Walsh, W. R. Simpson, **C. R. Thompson**, K. A. Pratt, P. A. Matrai, J. W. Bottenheim, S. Netcheva, D. K. Perovich, A. Richter, Temporal and spatial characteristics of ozone depletion events from measurements over the Arctic Ocean [*accepted by Atmos. Chem. Phys.*]

Helmig, D., V. Petrenko, P. Martinerie, E. Witrant, T. Roeckmann, A. Zuiderweg, R. Holzinger, J. Hueber, **C. R. Thompson**, J. White, W. Sturges, A. Baker, T. Blunier, D. Etheridge, M. Rubino, and P. Tans, Reconstruction of Northern Hemisphere 1950 – 2010 Atmospheric Non-Methane Hydrocarbons. *Atmos. Chem. Phys.*, 14, 1-21, 2014.

Helmig, D., **C. R. Stephens**, J. Caramore, J. Hueber, Seasonal behavior of non-methane hydrocarbons in the firn air at Summit, Greenland. *Atmos. Environ.*, 85, 234-246, 2014.

Liao, J., L. G. Huey, Z. Liu, D. J. Tanner, C. A. Cantrell, J. J. Orlando, F. M. Flocke, P. B. Shepson, A. J. Weinheimer, S. R. Hall, H. J. Beine, Y. Wang, E. D. Ingall, **C. R. Stephens**, R. S. Hornbrook, E. C. Apel, D. Reimer, A. Fried, R. L. Mauldin III, J. N. Smith, R. F. Staebler, J. A. Neuman, J. B. Nowak, High levels of molecular chlorine in the Arctic atmosphere. *Nature Geoscience*, 7, 91-94, 2014.

**Stephens, C. R.**, P. B. Shepson, A. Steffen, J. W. Bottenheim, J. Liao, L. G. Huey, E. Apel, A. Weinheimer, S. R. Hall, C. Cantrell, B. C. Sive, D. J. Knapp, D. D. Montzka, R. S. Hornbrook, Observations of the Relative Importance of Chlorine and Bromine Radicals in the Oxidation of Mercury at Barrow, AK. *J. Geophys. Res.*, 117, doi:10.1029/2011JD016649, 2012.

Liao, J., L. G. Huey, D. J. Tanner, F. M. Flocke, J. J. Orlando, J. A. Neuman, J. B. Nowak, A. J. Weinheimer, S. R. Hall, J. N. Smith, A. Fried, R. M. Staebler, Y. Wang, J. -H. Koo, C. A. Cantrell, P. Weibring, J. Walega, D. J. Knapp, P. B.

Shepson, and **C. R. Stephens**, Observations of inorganic bromine (HOBr, BrO, and Br<sub>2</sub>) speciation at Barrow, AK in spring 2009. *J. Geophys. Res.*, 117, doi:10.1029/2011JD016641, 2012.

### **Manuscripts Submitted or in Preparation:**

**Thompson, C. R.**, J. Hueber, D. Helmig, Regional impact of fugitive emissions from oil and gas operations on atmospheric non-methane hydrocarbons in Northeastern Colorado [*submitted to Environ. Sci. Technol.*]

**Thompson, C. R.**, P. B. Shepson, J. Liao, L. G. Huey, *et al.* Interactions of bromine, chlorine and iodine photochemistry at Barrow, Alaska [*for submission to Atmos. Chem. Phys.*]

**Thompson, C. R.**, P. B. Shepson, J. Liao, and L. G. Huey, Bromine atom production and chain propagation during springtime Arctic ozone depletion events [*for submission to Atmos. Chem. Phys.*]

### **Oral Presentations:**

**Stephens, C. R.**, D. Helmig, J. Evans, J. Hueber, J.-H. Park, P. Boylan, Vertical distribution of non-methane hydrocarbons during winter ozone production events in the Uintah Basin, *AGU Fall Meeting*, San Francisco, CA, December 2013.

**Stephens, C. R.**, Oil and Gas Emissions and Impacts on Tropospheric Ozone, *community talk sponsored by Protect Our Loveland*, Loveland, CO, October 2013.

**Stephens, C. R.**, D. Helmig, J. Hueber, J.-H. Park, P. Boylan, J. Evans, J. Sauer, NMHC during winter ozone production events in the Uintah Basin, *NOAA Global Monitoring Annual Conference*, Boulder, CO, May 2013.

**Stephens, C. R.**, Halogen Radical Chemistry in the Coastal Arctic Boundary, *INSTAAR Seminar*, Boulder, CO, April 2013

Flocke, F. M., J. J. Orlando, S. Madronich, W. Zheng, E. C. Apel, A. J. Weinheimer, D. D. Montzka, D. J. Knapp, A. Fried, P. Weibring, J. Walega, S. R. Hall, K. Ullmann, L. Mauldin, J. McGrath, C. A. Cantrell, S. J. Sjostedt, P. B. Shepson, **C. R. Stephens**, J. Kellfmann, G. Villena, R. M. Staebler, A. Turnipseed, A. J. Hills, J. N. Smith, U. Friess, H. Sihler, H. J. Beine, M. D. King, J. Lee-Taylor, Gas-Phase Photochemistry During the 2009 OASIS Barrow Field Intensive, *AGU Fall Meeting*, San Francisco, CA, December 2011.

Liao, J., L. G. Huey, D. Tanner, P. B. Shepson, **C. R. Stephens**, F. M. Flocke, J. J. Orlando, E. C. Apel, A. Fried, A. J. Weinheimer, D. J. Knapp, D. D. Montzka, S. R. Hall, K. Ullmann, Unexpected high levels of molecular chlorine observed at

- Barrow in Spring 2009 during OASIS, *AGU Fall Meeting*, San Francisco, CA, December 2011.
- Shepson, P. B., **C. R. Stephens**, A. Steffen, J. Bottenheim, J. Liao, G. Huey, E. Apel, A. Weinheimer, S. V. Nghiem, S. R. Hall, A study of the role of halogen radicals in the oxidation of gaseous elemental mercury, *EGU General Assembly*, Vienna, Austria, April 2011.
- Stephens, C. R.** The science behind science in the Arctic, *Invited Speaker, Logansport Rotary*, Logansport, IN, January 2011.
- Stephens, C. R.**, P. J. Tackett, P. B. Shepson, A. Keil, J. Liao, L. G. Huey, A. Steffen, J. W. Bottenheim, P. Weibring, A. Fried, E. C. Apel, ClO<sub>x</sub> and halogen atom chemistry in the lower Arctic troposphere in Barrow, Alaska 2009. *Oslo Science Conference*, Oslo, Norway, June 2010.
- Thompson, C. R.**, P. J. Tackett, A. Keil, P. B. Shepson, J. Liao, L. G. Huey, ClO<sub>x</sub> during periods of ozone depletion in the lower Arctic troposphere at Barrow, Alaska, *AGU Fall Meeting*, San Francisco, CA, December 2009.
- Apel, E. C., D. D. Riemer, R. S. Hornbrook, J. J. Orlando, L. Mauldin, P. Weibring, A. Fried, F. M. Flocke, W. Zheng, B. C. Sive, R. S. Russo, K. Haase, D. R. Blake, K. A. Gorham, N. J. Blake, J. Liao, L. G. Huey, **C. R. Thompson**, P. B. Shepson, VOCs as indicators of halogen chemistry during ARCTAS A and OASIS, *AGU Fall Meeting*, San Francisco, CA, December 2009.
- Liao, J., L. G. Huey, D. Tanner, H. Sihler, U. Frieß, U. Platt, F. M. Flocke, J. J. Orlando, **C. R. Thompson**, P. B. Shepson, H. J. Beine, Observations of HOBr, BrO, and other halogen species by CIMS in Barrow, AK during OASIS, *AGU Fall Meeting*, San Francisco, CA, December 2009.
- Poster Presentations:**
- Custard, K. D., **C. R. Stephens**, K. Pratt, P. B. Shepson, et al., Influence of elevated NO<sub>x</sub> levels on the oxidation capacity of the atmospheric boundary layer in Barrow, Alaska, *AGU Fall Meeting*, San Francisco, CA, December 2013.
- Evans, J., D. Helmig, **C. R. Stephens**, P. Boylan, J. Park, B. Johnson, S. J. Oltmans, R. Schnell, Ozone vertical profiles and buildup during the 2013 Uintah Basin Winter Ozone Study, *NOAA Global Monitoring Annual Conference*, Boulder, CO, May 2013.
- Park, J.-H., P. Boylan, A. Curtis, J. Evans, J. Hueber, J. Sauer, **C. Stephens**, D. Helmig, Emissions from oil and gas operations and their role in ozone production in the Uintah Basin, Utah, *NOAA Global Monitoring Annual Conference*, Boulder, CO, May 2013.
- Stephens, C. R.**, R. Schnell, S. Oltmans, G. Petron, C. Sweeney, A. Karion, P. Cullis, E. Hall, A. Jordan, T. Mefford, Winter 2013 Ozone Production in the Uintah Basin,

Utah, *NOAA Global Monitoring Division 5-yr Review*, Boulder, CO, April 2009  
[invited]

**Stephens, C.R.**, P. B. Shepson, J. Liao, L. G. Huey, E. C. Apel, C. A. Cantrell, F. M. Flocke, A. Fried, S. R. Hall, R. S. Hornbrook, D. J. Knapp, L. Mauldin, D. Montzka, B. C. Sive, K. Ullman, P. Weibring, A. J. Weinheimer, Simulating halogen radical chemistry and Br propagation during ozone depletion events in Barrow, Alaska, *AGU Fall Meeting*, December 2012.

Halfacre, J. W., T. N. Knepp, **C. R. Stephens**, K. A. Pratt, P. B. Shepson, W. R. Simpson, P. K. Peterson, S. J. Walsh, P. A. Matrai, J. W. Bottenheim, S. Netcheva, D. K. Perovich, A. Richter, Temporal and spatial characteristics of surface ozone depletion events from measurements over the Arctic Ocean, *AGU Fall Meeting*, December 2012.

K. D. Custard, **C. R. Stephens**, K. A. Pratt, J. W. Halfacre, P. B. Shepson, Observations of ClO during springtime in Barrow, AK from the OASIS 2009 and BROMEX 2012 field campaigns, *AGU Fall Meeting*, December 2012.

K. D. Custard, **C. R. Stephens**, P. B. Shepson, Investigation of reactive halogens in the Arctic using a mobile instrument laboratory, *AGU Fall Meeting*, December 2011.

**Stephens, C. R.**, P. B. Shepson, A. Steffen, J. W. Bottenheim, J. Liao, L. G. Huey, E. Apel, A. Weinheimer, S. V. Nghiem, S. R. Hall, Observations of the relative importance of chlorine and bromine radicals in the oxidation of atmospheric mercury at Barrow, AK, *PCCRC Annual Spring Meeting*, March 2011.

**Stephens, C. R.**, P. B. Shepson, A. Steffen, J. W. Bottenheim, J. Liao, L. G. Huey, E. Apel, A. J. Weinheimer, Investigating the Kinetics of Mercury Oxidation and the Contribution of Halogen Radicals from Field Measurements in Barrow, AK, *AGU Fall Meeting*, December 2010.

Shepson, P. B., P. J. Tackett, **C. R. Thompson**, A. Keil, L. G. Huey, J. Liao, A. Fried, P. Weibring, J. Walega, E. Apel, S. Nghiem, Recent studies of halogen activation in the Arctic and the role of sea ice types, *AGU Fall Meeting*, December 2009.