

EDUCATION

- Dec 2016** **PhD, Physics**
Utah State University, Logan, UT
Dissertation title: *Rayleigh Lidar Measurements of the Mesosphere and Thermosphere and Their Connections to Sudden Stratospheric Warmings*
Advisor: Dr. Vincent Wickwar
- May 2010** **BA, Mathematics-Physics**
BA, French
Agnes Scott College, Decatur, GA
Math-Physics senior project: All-Time High Pollen Counts Seen with Lidar
French thesis: Sketches from Memory: the Bande Dessinée as a Memoir
Advisors: Drs. Amy Sullivan, Gary Gimmestad, and Julia Knowlton
Honors: Graduated *cum laude*, *Dean's List*, *Dean's Honor List*
- Spring 2008** **Study Abroad, Contemporary French Studies**
CIEE Paris Center for Critical Studies, Paris, France

EXPERIENCE

- 2018** **Research Scientist II**
Electro-Optical Systems Laboratory, Georgia Tech Research Institute
Atlanta, GA
-Working with a team of scientists and engineers designing and building EO systems for atmospheric, bathymetric, and DoD ISR measurements
-Course instructor for GT Professional Education Atmospheric LIDAR Engineering short course
- 2017** **Postdoctoral Researcher**
Center for Atmospheric and Space Sciences, Logan, UT
-Conducted comparative study of temperatures in the Mesosphere-Lower Thermosphere (MLT) region acquired with collocated Rayleigh-scatter and sodium resonance lidar systems
- 2011-2016** **Graduate Research Assistant**
Center for Atmospheric and Space Sciences, Logan
-Developed, built, operated, and maintained new Rayleigh-scatter lidar system at USU
-Led one-year lidar data campaign
-Processed and analyzed all lidar data
-Published 1 journal and 3 conference articles (refereed)
-Obtained extramural funding for graduate research (approx. \$76k)
-Contributed to group IR&D proposals
-Recruited, trained, and managed students for lidar operations

- Mentored undergrad research projects
- Worked with other instruments' and model datasets
- Presented at national & international conferences

**Summer
2010**

Student Assistant

- Lidar group, Electro-Optical Systems Laboratory
Georgia Tech Research Institute (GTRI), Atlanta, GA
- Liaison between Agnes Scott College (ASC) and GTRI for joint NSF-CCLI grant
 - Contributed lidar design and budget for NASA CIPAIR grant, PI Peter Chen at Spelman College
 - Operated a Rayleigh-Mie depol lidar and a DIAL system
 - Mentored two Agnes Scott College REU students

**Fall 2009-
Spring 2010**

Undergraduate Researcher

- Physics Department, Agnes Scott College, Decatur, GA
- Performed novel research on characterizing pollen particles using the Eye-safe Atmospheric Research Lidar (EARL) at ASC
 - Studied clouds and aerosol in the planetary boundary layer using EARL
 - Led EARL operations from and organized day-to-night data campaigns

TEACHING

Oct 2018

Instructor

- Atmospheric LIDAR Engineering Short Course
Georgia Tech Professional Education, Atlanta, GA
- Developed and taught lectures on lasers, laser eye safety, opto-mechanics and types of atmospheric lidar
 - Contract course for NASA Langley in Hampton, VA

Fall 2017

Instructor of Record

- Physics for Scientists I (PHYS 2310)
Department of Physics, Utah State University, Logan, UT
- Introductory Physics course specifically for Physics majors.
 - Supplementary class-time for student projects and mentoring

Fall 2017

Instructor of Record

- Introductory Astronomy (PHYS 1040)
Department of Physics, Utah State University, Logan, UT
- Large-lecture (>200 students) general education course
 - Coordination with USU Observatory for all students to complete observation projects

Fall 2015

Graduate Teaching Assistant

- Physics for Scientists and Engineers I (PHYS 2210)**
Department of Physics, Utah State University, Logan, UT
- Led recitations for calculus-based physics I
 - Overall instructor rating of 4.8/5.0 in student evaluation

- Fall 2013** **Graduate Teaching Assistant**
Optics I (PHYS 4650/6650)
 Department of Physics, Utah State University, Logan, UT
 -Developed and taught an Intro to Lasers and Laser Safety lab for an optics course that had previously been lectured-based
- Fall 2011-
Spring 2012** **Instructor**
 Physics for Scientists and Engineers Lab I & II (PHYS 2215 & 2225)
 Department of Physics, Utah State University, Logan, UT
 -Instructed calculus-based physics I and II lab experiments
 -Gave lectures on error analysis
 -Graded all assignments
 -Overall instructor rating of 4.3/5.0 in student evaluation

STUDENT MENTORING

- 2017** **Teaching Mentor**
 Department of Physics, Utah State University, Logan, UT
 -Supervising an Undergraduate Teaching Fellow (UTF) and grader for USU PHYS 1040 (Astronomy)
 -Mentoring UTF's preparation of weekly recitation sessions and course concept inventory development
- 2011-2016** **Research Mentor**
 Atmospheric Lidar Observatory, CASS, Logan, UT
 -Trained undergraduate and graduate students to independently and safely operate the Rayleigh Lidar system
 -Mentored the physics undergraduate research projects of Marcus Bingham, Chandler Griffith, David Barton, Rebecca Petrick, Joe Slansky, and Bryant Ward
 -Mentored mechanical and electrical engineering students' research projects

REFEREED PUBLICATIONS

- Sox, L.,** Wickwar, V. B., Yuan, T., & Criddle, N. R. (2018). Simultaneous Rayleigh-scatter and sodium resonance lidar temperature comparisons in the mesosphere-lower thermosphere. *Journal of Geophysical Research: Atmospheres*, 123. <https://doi.org/10.1029/2018JD029438>
- Sox, L.,** Wickwar, V. B., Yuan, T., Criddle, N. R. (2018), Comparison of Rayleigh- Scatter and Sodium Resonance Lidar Temperatures, *2017 International Laser Radar Conference Proceedings*,
- Sox, L.,** Wickwar, V. B., Fish, C., Herron, J. P. (2016), Connection between the midlatitude mesosphere and sudden stratospheric warmings as measured by Rayleigh- scatter lidar, *J. Geophys. Res. Atmos.*, 121, 4627-4636, doi:10.1002/2015JD024374

Sox, L., Wickwar, V. B., Fish, C., Herron, J. P. (2015), Temperature Deviations in the Midlatitude Mesosphere During Stratospheric Warmings as Measured with Rayleigh- scatter Lidar, *EPJ Web of Conferences*, 119, 13008, doi:<http://dx.doi.org/10.1051/epjconf/201611913008>

Wickwar, V. B., **Sox, L.,** Emerick, M. T., Herron, J. P. and Barton D. L. (2015), Early Observations with the Extremely Sensitive Rayleigh Lidar at Utah State University, *EPJ Web of Conferences*, 119, 13007, doi:<http://dx.doi.org/10.1051/epjconf/201611913007>

Barton, D. L., Wickwar, V. B., Herron, J. P., **Sox, L.,** Navarro, L. A. (2015), Mesospheric neutral densities derived from Rayleigh lidar observations at Utah State University, *EPJ Web of Conferences*, 119, 13006, doi:<http://dx.doi.org/10.1051/epjconf/201611913006>

NON-REFEREED PUBLICATIONS

Sox, L., Wickwar, V. B. (2015), Early Rayleigh-Scatter Lidar Temperature Measurements from the Lower Thermosphere, *Utah NASA Space Grant Consortium Fellowship Symposium Proceedings*, Salt Lake City, UT, USA, 12 May.

Sox, L., Wickwar, V. B., Fish, C., Herron, J. P. (2014), Rayleigh Scatter Lidar Observations of the Midlatitude Mesosphere's Response to Sudden Stratospheric Warmings, *Utah NASA Space Grant Consortium Fellowship Symposium Proceedings*, Layton, UT, USA, 06 May.

Sox, L., Wickwar, V. B., Herron, J. P. (2013), Middle Atmosphere Temperature Results from a New, High-powered, Large-Aperture Rayleigh Lidar, *Utah NASA Space Grant Consortium Fellowship Symposium Proceedings*, Salt Lake City, UT, USA, 05 May.

Sox, L., Wickwar, V. B. (2012), Results from an Extremely Sensitive Rayleigh-scatter Lidar, *Rocky Mountain NASA Space Grant Consortium Fellowship Symposium Proceedings*, Logan, UT, USA, 09 May.

INVITED TALKS

Sox, L. (2017), Mesospheric temperature anomalies associated with sudden stratospheric warmings as measured with Rayleigh lidar, Wang Research Group Meeting, Department of Plants, Soils and Climate, Utah State University, Logan, UT, USA, 28 Apr.

Sox., L. (2015), Lidar Research from the Troposphere to the Thermosphere, Physics and Astronomy Department Colloquium, Agnes Scott College, Decatur, GA, USA, 17 Apr.

Sox, L., Wickwar, V. B., Fish, C., Herron, J. P., Emerick, M. T. (2013), Rayleigh Lidar Observations of the Midlatitude Mesosphere during Stratospheric Warming Events and a New Rayleigh-Mie-Raman Lidar at USU, Utah State University Physics Colloquium, Logan, UT, USA, 10 Sept.

Sox, L. and Wickwar, V. B. (2012), New Rayleigh-Scatter Lidar Research at USU, MLTI Waves and Dynamics at Polar Latitudes Workshop, Logan, UT, USA, 11 Oct.

Sox, L. and Wickwar, V. B. (2012), First Light with Upgraded ALO Rayleigh-scatter Lidar, Utah State University Physics Colloquium, Logan, UT, USA, 11 Sept.

SELECTED PRESENTATIONS AND POSTERS

Sox, L., Valenta, C. R., Wickwar, V. B., Herron, J. P., Price, J., Tobiska, W. K. (2019) Rayleigh-Scatter Lidar for Characterizing the Near-Earth Space Environment, Oral Presentation, American Meteorological Society Meeting, Phoenix, AZ, USA, 08 Jan.

Sox, L., Wickwar, V. B., Yuan, T., Criddle, N. R. (2017), Comparison of Rayleigh- Scatter and Sodium Resonance Lidar Temperatures, Poster Presentation, 28th International Laser Radar Conference, Bucharest, Romania, 27 Jun.

Sox, L., Wickwar, V. B., Yuan, T., and Criddle, N. R. (2016), Simultaneous, collocated Rayleigh and sodium lidar temperature comparison, Poster Presentation, CEDAR Workshop, Santa Fe, NM, USA, 22 Jun.

Sox, L., Wickwar, V. B., Fish, C., Herron, J. P. (2015), Temperature Deviations in the Midlatitude Mesosphere During Stratospheric Warmings as Measured with Rayleigh- scatter Lidar, 27th International Laser Radar Conference, New York, NY, USA, 07 Jul.

Wickwar, V. B., **Sox, L.**, Emerick, M. T., Herron, J. P. and Barton D. L. (2015), Early Observations with the Extremely Sensitive Rayleigh Lidar at Utah State University, 27th International Laser Radar Conference, New York, NY, USA, 07 Jul.

Sox, L., and V. B. Wickwar, (2015), Changing Atmospheric Composition and the Retrieval of Rayleigh Lidar Temperatures in the Lower Thermosphere, Poster Presentation, CEDAR Workshop, Seattle, WA, USA, 23 Jun.

Sox, L., Wickwar, V. B., Fish, C., and Herron, J. P. (2014), Effects of Major Sudden Stratospheric Warmings Identified in Midlatitude Mesospheric Rayleigh-Scatter Lidar Temperatures, Poster Presentation, American Geophysical Union Fall Meeting, San Francisco, CA, USA, 19 Dec.

Sox, L., Duly, T., and Emery, B. (2014), The National Science Foundation's Coupling, Energetics and Dynamics of Atmospheric Regions (CEDAR) Student Community, Poster Presentation, American Geophysical Union Fall Meeting, San Francisco, CA, USA, 17 Dec.

Sox, L., Wickwar, V. B., Fish, C., Herron, J. P., Emerick, M. T., Barton, D. L. (2014), Midlatitude Mesospheric Temperature Anomalies during Sudden Stratospheric Warmings and a New Rayleigh-Scatter Lidar at Utah State University, Physical Sciences Department Colloquium, Embry-Riddle Aeronautical University, Daytona Beach, FL, USA, 23 Oct.

Sox, L., Wickwar, V. B., Herron, J. P., Barton, D. L., Emerick, M. T. (2013), Ground-Based Observations with a Rayleigh-Mie-Raman Lidar from 15-120 km, Poster Presentation, Fall National Space Grant Meeting, Charleston, SC, USA, 18 Oct.

Sox, L., Wickwar, V. B., Fish, C., Herron, J. P. (2013), The Mid-Latitude Mesosphere's Response to Sudden Stratospheric Warmings as Determined from Rayleigh Lidar Temperatures, Oral Presentation, IAGA 12TH Scientific Assembly, Merida, Yucatan, Mexico, 26 Aug.

Sox, L., Wickwar, V. B., Herron, J. P., Emerick, M. T. (2013), Rayleigh Lidar Temperature Studies in the Upper Mesosphere and Lower Thermosphere, Poster Presentation, CEDAR Workshop, Boulder, CO, USA, 26 June.

Sox, L., Wickwar, V. B., Herron, J. P., Bingham, M. J., Petersen, L. W., Emerick, M. T. (2012), First Temperature Observations with the USU Very Large Rayleigh Lidar: An Examination of Mesopause Temperatures, Poster Presentation, AGU Fall Meeting, San Francisco, CA, USA, 04 Dec.

Sox, L., Wickwar, V. B., Herron, J. P., Bingham, M. J. (2012), Upgraded ALO Rayleigh Lidar and Its Improved Gravity Wave Measurements, Poster Presentation, CEDAR Workshop, Santa Fe, NM, USA, 27 June.

Sox, L., Wickwar, V. B., Herron, J. P., Bingham, M. J., Petersen, L. W. (2011), The World's Most Sensitive Rayleigh-Scatter Lidar, Poster Presentation, Joint CEDAR-GEM Workshop, Santa Fe, NM, USA, 28 June.

Sox, L. and Sullivan, A. C. (2010), Characterization of Pollen Particles Using LIDAR, Poster Presentation, Symposium on Undergraduate Research, Frontiers in Optics, Rochester, NY, USA, 25 Oct.

Sox, L., (2010), Sketches from Memory: The Bande Dessinée as a Memoir, Oral presentation, Spring Annual Research Conference, Agnes Scott College, Decatur, GA, USA, 21 Apr.

STUDENT-MENTEE PRESENTATIONS

Barton, D. L., Wickwar, V. B., Herron, J. P., **Sox, L.**, Navarro, L. A. (2015), Mesospheric neutral densities derived from Rayleigh lidar observations at Utah State University, 27th International Laser Radar Conference, New York, NY, USA, 07 Jul.

Barton, D. L., Wickwar, V. B., **Sox, L.**, Herron, J. P. (2014), Seasonal Variations of Relative Densities Between 45 And 90 km Determined from USU Rayleigh Lidar Observations, Poster Presentation, CEDAR Workshop, Seattle, WA, USA, 25 June

Barton, D. L., Wickwar, V. B., **Sox, L.**, Herron, J. P. (2013), The behavior of Neutral Densities between 45 and 90 km Determined from Rayleigh Lidar Observations above Logan, Poster Presentation, APS Four Corners Section Meeting, Denver, CO, USA, 18 Oct.

Barton, D. L., Wickwar, V. B., **Sox, L.**, Herron, J. P. (2013), Mesospheric Density Climatologies Determined at Midlatitudes Using Rayleigh Lidar, Poster Presentation, IAGA 12TH Scientific Assembly, Merida, Yucatan, Mexico, 27 Aug.

Griffith, C. (2013), LIDAR Temperature Observations related to Sudden Stratospheric Warmings, Student Showcase, Utah State University, Logan, UT, USA, 11 Apr.

PROFESSIONAL DEVELOPMENT

- 2018 Infrared Technology & Applications**
Professional Education, Georgia Institute of Technology, Atlanta, GA
- 2018 Introduction to LIDAR**
Continuing Education, University of Dayton, Dayton, OH
- 2017 Mobile Summer Institute (MoSI) on Undergraduate STEM Education**
Utah State University, Logan, UT
-Developed evidence-based teaching strategies to implement in future courses
-Created a teachable tidbit on graphical analysis with group using backward design and active learning strategies
- 2014 NSF Incoherent Scatter Radar Summer School**
Arecibo Observatory, Arecibo, Puerto Rico
-Completed week-long course on Incoherent Scatter Radar theory
-Designed and conducted group experiment with the Arecibo ISR, resulting in a successful observation of the He⁺ layer in the topside ionosphere
- 2014 Science Communication Workshop**
Utah State University, Logan, UT
- 2010 Atmospheric LIDAR Engineering**
Professional Education, Georgia Institute of Technology, Atlanta, GA

PROFESSIONAL SERVICE

- 2017-2018 Scientific Teaching Fellow**
Mobile Summer Institute on Scientific Teaching
Utah State University, Logan, UT
-Help implement campus-wide strategic plan on scientific teaching (ST) -
Conduct peer evaluations of other ST fellows' courses
- 2017 Scientific Expert**
Agence Nationale de la Recherche, France
-Reviewed a proposal for the ANR's Generic Call 2017
- 2013-2015 Student Representative**
Coupling, Energetics and Dynamics of Atmospheric Regions (CEDAR)
Science Steering Committee (CSSC)
-Chosen by peers and confirmed by NSF officials to a 2-year term as Student Representative on the CSSC
-Served on a team of scientists and engineers to develop scientific goals for the NSF CEDAR and Aeronomy research community
-Organized, and moderated a day-long tutorial workshop for students titled, "Aeronomy Instrumentation: Where does the data come from?"

PUBLIC OUTREACH

- 2018- STEM @ GTRI**
Georgia Tech Research Institute, Atlanta, GA
-Presented Science Road Kits and the Laser Project traveling laser museum to K-12 students
- 2012-2016 USU Rayleigh lidar facility tours**
Atmospheric Lidar Observatory, CASS
Utah State University, Logan, UT
-Gave impromptu and arranged tours of the facility and overview of the science for hundreds of visitors since 2012
- 2011, 2012, 2014 Lidar talk and demo booth**
Science Unwrapped after events presentations,
Utah State University, Logan, UT
- 2012 Lidar and Physics talks to high school students**
At high schools in Florida and Utah

FEATURES IN POPULAR PRESS

“New Comparisons of Temperatures Near the Mesopause” by William Randel, *Eos – Editors Highlights* (2018). <https://eos.org/editor-highlights/new-lidar-comparisons-of-temperatures-near-the-mesopause>

“The Green Beam: Get up close and personal with USU’s Rayleigh Lidar” by Kevin Opsahl, *The Herald Journal*, Logan, UT (2014). https://www.hjnews.com/news/the-green-beam-get-up-close-and-personal-with-usu/article_d608fe30-650b-11e4-9850-db6f13ea0004.html

AWARDS AND FELLOWSHIPS

- 2017 Travel Grant**, 2017 International Laser Radar Conference
- 2011-2015 Fellow**, Utah NASA Mountain Space Grant Consortium
- 2015 Scholarship**, Keith Taylor Summer Research Scholarship, USU Physics Department
- 2013, 2015 Graduate Student Travel Award**, USU School of Graduate Studies
- 2012, 2015 Travel Grant**, USU Center for Women and Gender
- 2013 Scholarship**, Gene Adams Scholarship, USU Physics Department
- 2012, 2013 Scholarship**, Howard L. Blood Summer Research Scholarship,

USU Physics Department

2013 NSF Graduate Research Fellowship Honorable Mention

PROFESSIONAL MEMBERSHIPS

2019- Directed Energy Professional Society
2014- Earth Science Women's Network (ESWN)
2012- Sigma Pi Sigma, National Physics Honor Society
2011- American Geophysical Union (AGU)
2010- Mortar Board, National Honor Society

ADDITIONAL EXPERIENCE

Fall 2009 Educational Program Intern
Alliance Française d'Atlanta, Atlanta, GA
-Assisted Educational director with public outreach and partnering organization events
-Prepared pedagogical documents and exercises for French language classes and workshops

Summer 2009 AmeriCorps Crew Member
Utah Conservation Corps, Logan, UT
-Maintained trails and repaired fences on rotating trail crews in federal lands throughout Utah and Idaho

2006, 2008 Math Learning Assistant and Course Tutor
Department of Mathematics, Agnes Scott College, Decatur, GA
-Course-tutored for Calculus I and Pre-Calculus
-Tutored Finite Math through Calculus II students in the Agnes Scott Math Learning Center