Joshua Gebauer

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CURRENT APPOINTMENT

The Cooperative Institute for Severe and High-Impact Weather Research and Operations
2022–Present
   I conduct research on boundary-layer-observation network design and the potential analysis products that can be created from such observations to help the development of next-generation boundary-layer-observation networks.

EDUCATION

University of Oklahoma
Dec. 2020 *Doctor of Philosophy — Meteorology*
   Dissertation: Assessing Dual-Doppler Vertical Velocity Retrievals from Rapid-Scan Radar Data
   Advisor: Dr. Alan Shapiro

University of Oklahoma
May 2017 *Master of Science — Meteorology*
   Thesis: Convection Initiation Caused by Heterogeneous Great Plains Low-Level Jets
   Advisor: Dr. Alan Shapiro

California University of Pennsylvania
May 2015 *Bachelor of Science — Earth Science, Meteorology Concentration*
   Summa Cum Laude
   Minor: Mathematics

PROFESSIONAL APPOINTMENTS

National Center for Atmospheric Research
2020–2022 *Postdoctoral Fellow I, Earth Observing Laboratory*
   I led the development of combined data products for the Lower Tropospheric Observing System (LOTOS) and created a lidar simulator as part of NCAR's Boundary Layer Reinvestment project.
   Supervisor: Steve Oncley

University of Oklahoma
2020 *Graduate Research Assistant, School of Meteorology*
   I assisted with analytical and numerical modeling of nocturnal low-level jets within horizontal buoyancy gradients.
   Advisors: Dr. Alan Shapiro, Dr. Dave Parsons

2018–2020 *Graduate Research Assistant, School of Meteorology*
   I evaluated the impact of rapid-scan radar data on vertical velocity retrievals from various dual-Doppler and ensemble Kalman filter (EnKF) techniques. I also developed radar advection correction techniques, and methods to correct for azimuthal displacement errors in mobile radar datasets.
   Advisors: Dr. Alan Shapiro, Dr. Corey Potvin

2015–2017 *Graduate Research Assistant, School of Meteorology*
   I conducted research with the Boundary Layer Integrated Sensing and Simulation (BLISS) group on heterogeneities within the Great Plains nocturnal low-level jet and the role these heterogeneities have in nocturnal convection initiation.
   Advisors: Dr. Alan Shapiro, Dr. Evgeni Fedorovich, Dr. Petra Klein

PROFESSIONAL APPOINTMENTS CONT.

Radar Operations Center – Applications Branch
2014 National Weather Center Research Experience for Undergraduates
 I developed a method for verifying Bragg scatter returns detected by the Bragg scatter detection algorithm created by the Radar Operations Center.
 Advisor: Dr. Jeffery Cunningham

REFEREED PUBLICATIONS

11. **Gebauer, J. G.**, A. Shapiro, C. K. Potvin, and N. A. Dahl, 2021: Three-dimensional advection correction of scalars. In Prep.

10. **Gebauer, J. G.**, A. Shapiro, C. K. Potvin, N. A. Dahl, M. I. Biggerstaff, and A. A. Alford, 2021: Evaluating vertical velocity retrievals from vertical vorticity equation constrained dual-Doppler analysis of real, rapid-scan radar data. In Review.

9. Shapiro, A., **J. G. Gebauer**, and D. Parsons, 2021: Emergence of a nocturnal low-level jet from a broad baroclinic zone. In Review.

8. Shapiro, A., **J. G. Gebauer**, N. A. Dahl, D. J. Bodine, A. Mahre, and C. K. Potvin, 2020: Spatially variable advection correction of Doppler radial velocity data. J. Atmos. Sci., 78, 167–188.

7. **Gebauer, J. G.** and A. Shapiro, 2019: Clarifying the baroclinic contribution to the Great Plains low-level jet frequency maximum. Mon. Wea. Rev., 147, 3481–3493.

6. Dahl, N. A., A. Shapiro, C. K. Potvin, A. Theisen, **J. G. Gebauer**, A. D. Schenkman, and M. Xue, 2019: High-resolution, rapid-scan dual-Doppler retrievals of vertical velocity in a simulated supercell. J. Atmos. Oceanic Technol., 36, 1477–1500.

5. Smith, E. N., **J. G. Gebauer**, P. M. Klein, E. Fedorovich, and J. A. Gibbs, 2019: The Great Plains low-level jet during PECAN: Observed and simulated characteristics. Mon. Wea. Rev., 147, 1845–1869.

4. **Gebauer, J. G.**, A. Shapiro, E. Fedorovich, and P. Klein, 2018: Convection initiation caused by heterogeneous low-level jets over the Great Plains. Mon. Wea. Rev., 146, 465–478.

3. Shapiro, A. E. Fedorovich, and **J. G. Gebauer**, 2018: Mesoscale ascent in nocturnal low-level jets. J. Atmos. Sci., 75, 1403–1427.

2. **Gebauer, J. G.**, E. Fedorovich, and A. Shapiro, 2017: A 1-D theoretical analysis of northerly low-level jets over the Great Plains. J. Atmos. Sci., 74, 3419–3431.

1. Richardson, L. M., J. G Cunningham, W. D. Zittel, R. R. Lee, R. L. Ice, V. M. Melnikov, N. P. Hoban, and **J. G. Gebauer**, 2017: Bragg scatter detection by the WSR-88D. Part 1: Algorithm development. J. Atmos. Oceanic. Technol., 34, 465–478.

SELECTED CONFERENCE PRESENTATIONS

Gebauer, J. G., S. Oncley, W. O. J. Brown, T. M. Weckwerth, T. Hock, C. P. Riedel, T. M. Bell, and E. N. Smith, 2021: Multi-sensor, High-temporal Resolution Thermodynamic and Kinematic Profiling with the Lower Troposphere Observing System (LOTOS). 22nd Symposium on Meteorological Observation and Instrumentation, Houston, TX, Amer. Meteor. Soc., 11.3.

Gebauer, J. G., A. Shapiro, C. Potvin, N. Dahl, D. Bodine, A. Mahre, M. Biggerstaff, and A. A. Alford, 2019: Impact of Rapid-Scan Radar Data on Vertical Velocity Retrievals from Dual-Doppler Analysis. 39th International Conference on Radar Meteorology, Nara, Japan, Amer. Meteor. Soc., 3-51.

SELECTED CONFERENCE PRESENTATIONS CONT.

Gebauer, J. G., A. Shapiro, C. Potvin, and N. Dahl, 2019: Three-Dimensional Spatially Variable Advection Correction: Concept and Potential Uses. 39th International Conference on Radar Meteorology, Nara, Japan, Amer. Meteor. Soc., 3-52.

Gebauer, J. G., A. Shapiro, E. Fedorovich, P. Klein, and E. N. Smith, 2018: Examining Common Features of the Low-Level Jet During PECAN. A Special Symposium on Plains Elevated Convection At Night, Austin, TX, Amer. Meteor. Soc., 2.5.

Gebauer, J. G., A. Shapiro, E. Fedorovich, and P. Klein, 2017: The Role of the Noctural Low-Level Jet in Convection Initiation over Eastern Kansas on 2 June 2015. 28th Conf. on Weather Analysis and Forecasting/24th Conf. on Numerical Weather Prediction, Seattle, WA, Amer. Meteor. Soc., 97.

G**ebauer, J. G.**, A. Shapiro, E. Fedorovich, and P. Klein, 2016: The Role of the Nocturnal Low-Level Jet in Convection Initiation over Eastern Kansas on 2 June 2015. 22nd Symposium on Boundary Layers and Turbulence, Salt Lake City, UT, Amer. Meteor. Soc., 14B.3.

Gebauer, J. G., J. G Cunningham, W. D Zittel, and R. R. Lee, 2015: Verification of the Bragg Scatter Method on the WSR-88D. 31st Conf. on Environmental Information Processing Technology, Phoenix, AZ, Amer. Meteor. Soc., 504.

TEACHING EXPERIENCE

University of Oklahoma
2015–2019 *Graduate Teaching Assistant – School of Meteorology*
    METR 3113 – Atmospheric Dynamics I
    METR 3123 – Atmospheric Dynamics II
    METR 3613 – Meteorology Measurements

FIELD WORK

2021 *LOTOS 2021*
    I helped to organize and plan a joint deployment of NCAR-EOL instrumentation and the OU CLAMPS facility at NCAR's Marshall Field site to protype a single LOTOS node.

2019 *Target Observations by Radars and UAS of Supercells (TORUS)*
    I assisted in finding deployment locations for the NOXP radar during IOPs. Additionally, when needed, I filled in as lead of the mobile lidar platform, where I was responsible for the operation of the lidar in the vicinity of supercells.

2017 *Perdigão*
    I assisted in operating the mini-CLAMPS system and helped NCAR launch radiosondes during the double hill experiment near Perdigão, Portugal.

2016 *Mini-Mesoscale Predictability Experiment (mini-MPEX)*
    I operated the NOAA-NSSL CLAMPS-2 in the far-field environment of supercells.

2015 *Plains Elevated Convection at Night (PECAN)*
    I operated the OU-NSSL CLAMPS-1, which served as a mobile PECAN Integrated Sounding Array (PISA), during the entire 45-day field experiment. This project was focused on observations of mesoscale convective systems, bores, convection initiation and low-level jets.

OBSERVATIONS FACILITY EXPERIENCE

CLAMPS-1, 2 – Mobile boundary layer profiling facilities that include Atmospheric Emitted Radiance Interferometers (AERIs), Doppler lidars, microwave radiometers, and radiosonde launching capabilities.

RaXPol – A rapid scanning, mobile polarmetric X-band radar maintained by the Advanced Radar Research Center

NOXP – A mobile polarmetric X-band radar maintained by the National Severe Storms Laboratory.

SOFTWARE DEVELOPMENT

(github.com/jgebauer44)

Lidar Simulator
I created a Python-based lidar simulator that operates on output from FastEddy, WRF, and NCAR LES. The program can simulate any potential scan that a lidar could perform and operates using realistic scan schedules. Some examples of what this software can be used for include model comparisons to observations, lidar retrieval studies, and designing optimal lidar scans for field deployments.

Winds via optimal estimation (WINDoe)
I developed software that uses optimal estimation to combine wind observations from instruments such as lidars, wind profilers, and instrumented towers to retrieve surface to mid-atmosphere wind profiles.

Tropospheric Radiative Observation Profiling via optimal estimation (TROPoe)
I ported the original AERIoe IDL code to Python so AERI processing software could be more accessible. This new Python version was renamed to TROPoe and will eventually replace the IDL AERIoe code for processing AERI data once code testing is complete. I continue to assist in the development of TROPoe when needed.

TECHNICAL SKILLS

Python (proficient), MATLAB (proficient), FORTRAN (proficient), Weather Research and Forecast (WRF) model (proficient), Data Assimilation Research Testbed (proficient), IDL (working knowledge), HPC-computing (working knowledge).

HONORS AND AWARDS

2019 *Yoshi Sasaki Award – Outstanding Publication as a Master Student*
2018 *Second Place Student Oral Presentation, Special Symposium on PECAN*
2017 *National Science Foundation Graduate Research Fellowship Honorable Mention*
2015 *Second Place Student Poster Presentation, 31st Conf. on Environmental Information Processing Technology*
2014 *Lawrence L. Moses Scholarship in Meteorology, California University of Pennsylvania*
2011–2015 *California University of Pennsylvania Presidential Scholar*

SERVICE AND LEADERSHIP

2018–Present *Peer Reviewer — Boundary Layer Meteorology, Journal of Atmospheric Science, Monthly Weather Review, Bulletin of the American Meteorological Society, Quarterly Journal of the Royal Meteorological Society, Journal of Geophysical Research-Atmospheres*
2016–2018 *Treasurer, School of Meteorology Student Affairs Committee*
2014–2015 *President, Southwest Pennsylvania Chapter of the AMS/Three River Chapter of the NWA*
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