Jacob Joseph Widanski

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Education

M.S., Atmospheric Science **Aug 2025 – Present**
University of Oklahoma *Norman, OK*

- Expected Graduation: May 2027

B.S., Meteorology *(summa cum laude)* **May 2022 – May 2025**
University of Oklahoma *Norman, OK*

- Minor: Mathematics
- Cumulative GPA: 3.98
- Related coursework: calculus, differential equations, statistics, chemistry, physics, programming, machine learning, and communication.

Research Interests

- Mesoscale meteorology, convective hazards, research-to-operations (R2O), machine learning

Research Experience

Graduate Research Assistant **Norman, OK**
Cooperative Institute for Severe & High-Impact Weather Research & Operations (CIWRO), University of Oklahoma (at National Severe Storms Laboratory, NOAA) *Aug. 2025 – Present*

- Advisors: Dr. Thomas Galarneau (NSSL) and Dr. Benjamin Schenkel (CIWRO)
- Developing a radar-based hail climatology using machine learning

Undergraduate Research Assistant **Norman, OK**
CIWRO, University of Oklahoma (at National Severe Storms Laboratory, NOAA) *Nov. 2022 – Aug. 2025*

- Advisor: Thea Sandmael (CWIRO)
- Developed a probabilistic machine learning (ML), radar-based hail size classification algorithm for real-time operational use, utilizing C++ and Python.
- Contributed to the development of a large dataset of pre-tornadic storm characteristics via radar analysis, aiding CIWRO and NOAA NSSL researchers in developing a probabilistic ML algorithm for tornado prediction.
- Participated in the PERiLS and DELTA research field campaigns with the NOAA X-POL (NOXP) mobile radar and mobile mesonet teams respectively.
- Supported several NOAA Hazardous Weather Testbed (HWT) experiments as both a participant and assistant, evaluating experimental products and forecasting techniques alongside federal research partners and facilitating the assessment of warning guidance tools for severe convective hazards as one of the only undergraduates involved.

William M. Lapenta Student Intern **Norman, OK**
Storm Prediction Center (SPC), NOAA/NWS/NCEP *June 2024 – Aug. 2024*

- Mentors: Dr. Chris Karstens (main), Dr. Israel Jirak, Dr. Nathan Dahl, Andy Dean, and Jacob Vancil
- Completed research project on the evaluation of diagnostic composite indices and environmental parameters for conditional hail size classification from the SPC's real-time, RAP-based gridded surface objective analysis (sfcOA) scheme. Delivered conference-style presentation to SPC and NOAA colleagues.
- Evaluated the utility of hourly mesoscale analysis products used by forecasters as guidance for short-term predictions of severe convective hazards across the nation.
- Developed a probabilistic tree-based ML algorithm for conditional hail size classification using environmental parameters from sfcOA and compared with existing sfcOA indices and parameters.
- Handled and analyzed large gridded datasets, including GEMPAK-based sfcOA, RAP, MRMS MESH, Storm Data reports, and netCDF-based environment data utilizing Linux and Python.
- Shadowed SPC forecasters during active shifts, gaining insights into the operational decision-making process and R2O opportunities.

Other Professional Experience

Portfolio Management Intern **Amelia, OH**

American Modern Insurance Group, Inc. *May 2023 – Aug. 2023*

- Performed case studies for severe convective storm (SCS) perils using SQL and R in understanding atmospheric and policy characteristics influencing loss from claims.
- Analyzed SCS peril trends with Power BI to understand potential loss exposure in portfolio.
- Created Python GUI application used by employees to automate and streamline SQL workflows.

Conference Presentations

1. **Widanski, J.**, C. Karstens, I.L. Jirak, N.A. Dahl, A.R. Dean, and J. Vancil, 2024: Revisiting Environment-Based Hail Size Classification: A Direct Comparison of Composite Indices and Environmental Parameters from SPC Mesoanalysis. *33rd Conference on Weather Analysis and Forecasting/29th Conference on Numerical Weather Prediction, 105th American Meteorological Society Annual Meeting*, New Orleans, LA. Oral Presentation.

2. **Widanski, J.**, K.D. Eskew, A.L. Kenny, T.J. Galarneau, and K.A. Hoogewind, 2024: Changes in the Diurnal Timing and Duration of the Great Plains Low-Level Jet. *24th Annual Student Conference, 105th American Meteorological Society Annual Meeting*, New Orleans, LA. Poster Presentation.

3. Sandmæl, T. N., R. B. Steeves, J. G. Madden, B. R. Smith, P. A. Campbell, J. W. Monroe, C. N. Satrio, J. H. Segall, C. Kuster, R. Martz, E. Loken, Z. Fruits, I. Schick, M. Ake, Z. Cooper, **J. Widanski**, Q. Thomas, R. Galang, R. Mwakyoma, B. Kassel, A. Dringus, and D. Crutchfield, 2024: An Overview of the Single-Radar Machine Learning-Based Tornado Probability Algorithm TORP, *2024 International Workshop on Radar Data Application for High-impact Weather*, Seoul, Republic of Korea, Weather Radar Center, S1.

4. **Widanski, J.** and T. Sandmæl, 2024: A Probabilistic Radar Algorithm for Hail Detection and Classification using Random Forests. *31st Conference on Severe Local Storms*, Virginia Beach, VA. Poster Presentation.

5. Sandmæl, T., J.G. Madden, C.M. Kuster, C.N. Satrio, J. Segall, R.B. Steeves, P.A. Campbell, J.W. Monroe, A.W. Lyza, D. Crutchfield, A.R. Dringus, **J. Widanski**, and R. Mwakyoma, 2024: The 2024 Hazardous Weather Testbed Experimental Warning Program Radar Convective Applications Experiment. *31st Conference on Severe Local Storms*, Virginia Beach, VA. Oral Presentation.

6. Dringus, A.R., S.J. Southward, D. Crutchfield, A. Kenny, J. Shumaker, M. Bowen, and **J. Widanski**, 2024: A New Paradigm of Weather Awareness & Preparedness Within the Norman Community. *23rd Annual Student Conference, 104th American Meteorological Society Annual Meeting*, Baltimore, MD. Poster Presentation.

7. Sandmæl, T., R. B. Steeves, Z. Fruits, I. Schick, M. Ake, Z. A. Cooper, **J. Widanski**, Q. Thomas, and R. Galang, 2023: The Development of a Single-Radar Tornado Prediction Algorithm Using Machine Learning. *40th Conference on Radar Meteorology*, Minneapolis, MN. Oral Presentation.

8. **Widanski, J.**, 2022: Characteristics of seasonal eastern box turtle (*Terrapene carolina carolina*) migration into prairie habitat. *Ohio Student Wildlife Research Symposium, Annual Environmental Education Council of Ohio Conference*, Oxford, OH. Poster Presentation.

Professional Awards and Honors

Best Student Oral Presentation, Third Place **Jan. 2025**

- 33rd Conference on Weather Analysis and Forecasting (WAF) *American Meteorological Society*

Fawbush-Miller Scholarship for Excellence in Forecasting **April 2023**

- Awarded to the OU undergraduate student winner of the Weather Challenge *OU School of Meteorology*

Mensa Foundation National STEM Scholarship **June 2022**

Mensa Foundation

AMS Freshman Undergraduate Scholarship **April 2022**

- Sponsor: Naval Weather Service Association *American Meteorological Society*

Best Research Paper, UC Composition Writing Contest **Feb. 2021**

- Paper: *Should the Current Tornado Rating System Be Reformed?* *University of Cincinnati*
- Selected by a committee of professors for a contest open to all undergraduates enrolled in an English composition course
- Interviewed by local television station WXIX-TV and featured in university news article

Professional Service and Involvement

104th American Meteorological Society Annual Meeting **Jan./Feb. 2024**
Student Volunteer *Baltimore, MD*

OU Student Chapter of the American Meteorological Society and National Weather Association (SCAN) **Fall 2022 – Present**
Senior Class Representative *University of Oklahoma*

- Elected by fellow classmates within SCAN to serve as the representative for the senior class.
- Encouraging active participation within SCAN and fostering a welcoming, inclusive environment for students.

Chair of Fundraising and Apparel

- Collaborated with other student organizations in sponsoring a natural disaster relief fundraiser, raising more than $4,000 in two weeks.
- Organized fundraising events for chapter with local businesses in the Norman area.

Oklahoma Weather Lab (OWL) **Fall 2022 – Present**
Director of Development *University of Oklahoma*

- Director of the Hub of OWL Operational Technology (HOOT), responsible for overseeing the student-run technology branch for OWL web and software development.
- Organizing and leading monthly interactive programming workshops and meetings for practical forecasting applications.

Field Experiments

High-Speed Analysis of Ice Loss and Speed Through Observing Natural Events (HAILSTONE) **Late 2024**
Fieldwork Operator *Central US*

- Contributed to preparation of hail imaging system platform and participated in field deployment.

NOAA HWT Spring Forecasting Experiment (SFE) **May 2023, 2024**
Participant *Norman, OK*

- Evaluated experimental products and forecasting techniques for severe convective hazards alongside federal research partners as one of the only undergraduates involved.

NOAA HWT Radar Convective Applications (RCA) Experiment **April-May 2024**
Student Assistant *Norman, OK*

- Facilitated research process through note-taking and observations of participants in applying novel radar techniques and products for severe convective hazards.
- Monitored social media and broadcast feeds to relay real-time storm reports and observations to participants.

Detecting and Evaluating Low-level Tornado Attributes (DELTA) **Early 2024**
Fieldwork Operator *Central/Southeast US*

- Responsible for preparing windsondes with the mobile mesonet probe team during deployment.

NOAA HWT Probabilistic Hazard Information (PHI) Prototype Experiment **May 2023**
Student Assistant *Norman, OK*

- Collaborated with CIWRO/NSSL researchers and NWS forecasters in testing new probabilistic tools for issuing warnings for severe convective hazards.
- Monitored social media and broadcast feeds to relay real-time storm reports and observations to participants.

Propagation, Evolution, and Rotation in Linear Storms (PERiLS) **Early 2023**
Fieldwork Operator *Southeast US*

- Responsible for navigation and metadata collection with the NOAA X-POL (NOXP) mobile radar team.

Projects

Personal Website | *HTML, Markdown, VS Code, Git* **Jan. 2021 – Present**

- Deployed and maintaining a self-hosted website for personal portfolio using Hugo static site framework and Git.

Trip Mapper GUI | *Java, Eclipse* **May 2023**

- Created an interactive, customizable GUI in Java that maps and animates GPS coordinates.

JRAD | *Python, REST API, Git* **Oct. 2019**

- Created a Python script that produces a placefile for GRLevelX weather radar software mapping real-time air traffic.
- Retrieves real-time flight data using OpenSky Network REST API.

Technical Skills

Programming Languages: Python, Java, C++, R, HTML/CSS, Oracle SQL
Developer Tools: VS Code, Eclipse, IDLE, PyCharm, Jupyter Notebooks, REST APIs, AWS, Git, LaTeX
Data Formats: netCDF, GEMPAK, GRIB, NPZ, HDF5, PKL, JSON, text-based files (.txt, .csv, etc.)
Technologies: Linux (Ubuntu, CentOS, and Red Hat), QGIS, Power BI