

MAKENZIE J. KROCAK

Research Scientist

University of Oklahoma Institute for Public Policy Research and Analysis

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RESEARCH INTERESTS

Decision making under uncertainty, risk communication, severe weather climatology, forecast evaluation, societal impacts of hazardous weather, severe weather risk perception

EDUCATION

- 2017–2020 Ph.D. meteorology, The University of Oklahoma
Dissertation: If we forecast it, they may (or may not) use it: a comprehensive analysis of sub-daily severe weather timing information and its utility for forecasters, stakeholders, and end users
Advisors: Harold E. Brooks and Joseph T. Ripberger
- 2015–2017 M.S. meteorology, The University of Oklahoma
Thesis: A sub-daily severe weather climatology and its implications for forecasting
Advisor: Harold E. Brooks
- 2012–2015 B.S. meteorology, Iowa State University
Graduated with honors, magna cum laude

PROFESSIONAL EXPERIENCE

- 2020–Present Research Scientist, The University of Oklahoma
Center for Risk and Crisis Management
Cooperative Institute for Mesoscale Meteorological Studies
- 2015–2020 Graduate Research Assistant, The University of Oklahoma
Advisors: Harold E. Brooks and Joseph T. Ripberger
- 2015 Field Scientist - Plains Elevated Convection at Night (PECAN) campaign
- 2014–2015 Undergraduate Research Assistant, Iowa State University
Advisor: Bill Gallus
- 2014 Ernest F. Hollings Intern, National Severe Storms Laboratory
Advisor: Harold E. Brooks

REFEREED PUBLICATIONS

15. Krocak, M.J., Ripberger, J.T., Ernst, S., Silva, C.L., Jenkins-Smith, H.C., 2021: Exploring the differences in SPC convective outlook interpretation using categorical and numeric information, *Weather and Forecasting*. <https://doi.org/10.1175/WAF-D-21-0123.1>

14. Rosen, Z., **Krocak, M.J.**, Ripberger, J.T., Cross, R., Lenhardt, E., Silva, C.L., Jenkins-Smith, H.C., 2021: Communicating probability information in hurricane forecasts: Assessing statements that forecasters use on social media and implications for public assessments of reliability. *J. Operational Meteor.*, **9**, 7, 89-101, <https://doi.org/10.15191/nwajom.2021.0907>.
13. Calhoun, K. M., K. L. Berry, D. M. Kingfield, T. Meyer, **M. J. Krocak**, T. M. Smith, G. Stumpf, and A. Gerard, 2021: The Experimental Warning Program of NOAA's Hazardous Weather Testbed, *Bulletin of the American Meteorological Society*. <https://doi.org/10.1175/BAMS-D-21-0017.1>
12. **Krocak, M. J.**, M.D. Flournoy, and H. E. Brooks, 2021: Examining sub-daily tornado warning performance and associated environmental characteristics. *Weather and Forecasting*. <https://doi.org/10.1175/WAF-D-21-0097.1>
11. **Krocak, M. J.** and H. E. Brooks, 2021: The Influence of Weather Watch Type on the Quality of Tornado Warnings and its Implications for Future Forecasting Systems. *Weather and Forecasting*. <https://doi.org/10.1175/WAF-D-21-0052.1>
10. **Krocak, M. J.**, J. N. Allan, J. T. Ripberger, C. L. Silva, and H. C. Jenkins-Smith, 2021: An analysis of tornado warning reception and response across time: leveraging respondent's confidence and a nocturnal tornado climatology. *Weather and Forecasting*. <https://doi.org/10.1175/WAF-D-20-0207.1>
9. Ernst, S., J. T. Ripberger, **M. J. Krocak**, C. Silva, and H. Jenkins-Smith, 2021: Colorful Language – Investigating the Public Interpretation of the Storm Prediction Center Convective Outlook. *Weather and Forecasting*. <https://doi.org/10.1175/WAF-D-21-0001.1>
8. Allan, J. N., J. T. Ripberger, W. W. Wehde, **M. J. Krocak**, C. Silva, and H. Jenkins-Smith, 2020: Geographic Distributions of Extreme Weather Risk Perceptions in the United States. *Risk Analysis*. **40**, 12, 2498–2508, <https://doi.org/10.1111/risa.13569>.
7. **Krocak, M. J.**, J. T. Ripberger, C. L. Silva, and H. C. Jenkins-Smith, 2020: Thinking Outside the Polygon: A Study of Tornado Warning Reception Outside of Warning Polygon Bounds. *Nat. Hazards*, **102**, 3, 1351–1368, <https://doi.org/10.1007/s11069-020-03970-5>.
6. Lenhardt, E. D., R. N. Cross, **M. J. Krocak**, J. T. Ripberger, S. R. Ernst, C. L. Silva, and H. C. Jenkins-Smith, 2020: How Likely is That Chance of Thunderstorms? A Study of How National Weather Service Forecast Offices Use Words of Estimative Probability and What They Mean to the Public. *J. Operational Meteorology*, **8**, 64–78, <https://doi.org/10.15191/nwajom.2020.0805>.
5. Ripberger, J. T., C. Silva, H. Jenkins-Smith, J. Allan, **M. J. Krocak**, W. Wehde, and S. Ernst, 2020: Exploring Community Differences in Tornado Warning Reception, Comprehension, and Response Across the United States. *Bull. Amer. Met. Soc.* **101**, 6, 863–880, <https://doi.org/10.1175/BAMS-D-19-0064.1>
4. **Krocak, M. J.** and H. E. Brooks, 2020: An Analysis of Subdaily Severe Thunderstorm Probabilities for the United States. *Wea. Forecasting*, **35**, 107–122, <https://doi.org/10.1175/WCAS-D-19-0023.1>
3. **Krocak, M. J.**, J. T. Ripberger, C. L. Silva, and H. C. Jenkins-Smith, 2019: The Impact of Hours of Advance Notice on Protective Action in Response to Tornadoes. *Wea. Climate Soc.*, **11**, 881–888, <https://doi.org/10.1175/WCAS-D-19-0023.1>
2. Ripberger, J. T., **M. J. Krocak**, W. W. Wehde, J. N. Allan, C. Silva, and H. Jenkins-Smith, 2019: Measuring Tornado Warning Reception, Comprehension, and Response in the

United States. *Wea. Climate Soc.*, **11**, 863–880, <https://doi.org/10.1175/WCAS-D-19-0015.1>

- 1. Krocak, M. J.** and H. E. Brooks, 2018: Climatological Estimates of Hourly Tornado Probability for the United States. *Wea. Forecasting*, **33**, 59–69, <https://doi.org/10.1175/WAF-D-17-0123.1>

NON-REFEREED PUBLICATIONS AND POLICY REPORTS

- Clark, A. et al. [including **M. J. Krocak**], 2021: “The Second Real-Time, Virtual Spring Forecasting Experiment to Advance Severe Weather Prediction.” *Bull. Amer. Met. Soc.* *In press*.
- M. J. Krocak**, J. T. Ripberger, C. L. Silva, H.C. Jenkins-Smith, A. Gaviria-Pabón, A. Forney, A. Blttermann, 2021: Continuing the Series: Public Reception, Understanding, and Responses to Severe Weather Forecasts and Warnings in the Contiguous United States. University of Oklahoma Center for Risk and Crisis Management, <https://dataverse.harvard.edu/dataset.xhtml?persistentId=doi:10.7910/DVN/QYZLSO>
- Clark, A. et al. [including **M. J. Krocak**], 2020: “A Real-Time, Virtual Spring Forecasting Experiment to Advance Severe Weather Prediction.” *Bull. Amer. Met. Soc.* <https://doi.org/10.1175/BAMS-D-20-0268.1>.
- M. J. Krocak**, 2020: If we forecast it, they may (or may not) use it: sub-daily severe weather timing information and its utility for forecasters, stakeholders, and end users. Dissertation, The University of Oklahoma. https://shareok.org/bitstream/handle/11244/324932/2020_Krocak_Makenzie_Dissertation.pdf?sequence=1&isAllowed=y.
- M. J. Krocak**, J. T. Ripberger, Silva, C. L., H.C. Jenkins-Smith, S. Ernst, A. Bell, and J. Allan, 2020: Measuring Change: Public Reception, Understanding, and Responses to Severe Weather Forecasts and Warnings in the Contiguous United States. University of Oklahoma Center for Risk and Crisis Management, <https://dataverse.harvard.edu/dataset.xhtml?persistentId=doi:10.7910/DVN/EWOCUA>
- Clark, A. et al. [including **M. J. Krocak**], 2020: “A Real-Time, Simulated Forecasting Experiment for Advancing the Prediction of Hazardous Convective Weather.” *Bull. Amer. Met. Soc.* <https://doi.org/10.1175/BAMS-D-19-0298.1>
- Krocak, M. J.**, G. H. Kerr, and M. D. Flornoy, 2019: Diversity, Equity, and Inclusion in the Atmospheric Sciences: An Interview with Dr. Kevin Petty. *Bull. Amer. Met. Soc.*, **100**, 6, 1126–1127.
- Flornoy, M. D., **M. J. Krocak**, and G. H. Kerr, 2018: An Introvert’s Guide to Networking—Looking Ahead to the 18th Annual AMS Student Conference. *Bull. Amer. Met. Soc.*, **99**, 11, 2379–2380.
- Kerr, G. H., **M. J. Krocak**, M. D. Flornoy, and J. A. Knox, 2018: Weathering Together: Building a Climate of Diverse Community Perspectives – Looking Ahead to the 18th Annual AMS Student Conference. *Bull. Amer. Met. Soc.*, **99**, 10, 2150.
- Silva, C. L., J. T. Ripberger, H.C. Jenkins-Smith, **M. J. Krocak**, S. Ernst, and A. Bell, 2019: Continuing the Baseline: Public Reception, Understanding, and Responses to Severe Weather Forecasts and Warnings in the Contiguous United States. University of Oklahoma Center for Risk and Crisis Management, <http://risk.ou.edu/downloads/news/WX19-Reference-Report.pdf>
- Silva, C. L., J. T. Ripberger, H.C. Jenkins-Smith, **M. J. Krocak**, and W. W. Wehde, 2018: Refining the Baseline: Public Reception, Understanding, and Responses to Severe

Weather Forecasts and Warnings in the Contiguous United States. University of Oklahoma Center for Risk and Crisis Management,
<http://risk.ou.edu/downloads/news/WX18-Reference-Report.pdf>

Silva, C. L., J. T. Ripberger, H.C. Jenkins-Smith, and **M. J. Krocak**, 2017: Establishing a Baseline: Public Reception, Understanding, and Responses to Severe Weather Forecasts and Warnings in the Contiguous United States. University of Oklahoma Center for Risk and Crisis Management, <http://risk.ou.edu/downloads/news/WX17-Reference-Report.pdf>

TEACHING EXPERIENCE

- 2019 Lab instructor, Dept. of Political Science, The University of Oklahoma
P SC 5923: Introduction to Analysis of Political Data
P SC 5933: Intermediate Analysis of Political Data
- 2019 Guest Lecturer, School of Meteorology, The University of Oklahoma
METR 5308: Forecast Evaluation
- 2016–2018 Lab instructor, School of Meteorology, The University of Oklahoma
METR 1014: Introduction to Weather and Climate
METR 2011: Introduction to Meteorology I
- 2015–2016 Help Desk Tutor, School of Meteorology, The University of Oklahoma
- 2013–2015 Math Mentor, Dept. of Geological and Atmospheric Sciences, Iowa State University
MATH 165: Calculus I
MATH 166: Calculus II
MATH 265: Calculus III
MATH 267: Elementary Differential Equations

STUDENTS SUPERVISED

- 2022 Gbriel Mignardi
NOAA Ernest F. Hollings Scholarship Program
Title: Public ability to detect low-quality information on social media
- 2022 Hayden Giller and Markelle Mikkelson
OU School of Meteorology Senior Capstone class
Title: Understanding trust in severe weather information sources
- 2021 Josué Chamberlain, co-mentored with Dr. Matthew Flournoy and Dr. Harold Brooks
National Weather Center Research Experience for Undergraduates
Title: Analyzing tornado warning performance across storm lifetime
- 2021 Spencer McCormick, Nathan Feather, and Andrew Kramer, co-mentored with Dr. Joe Ripberger and Addison Alford
OU School of Meteorology Senior Capstone class

- Title: Understanding Hurricane Harvey hazards and associated NOAA communication on Twitter*
- 2021 Veronica Piscitelli, Tara Pettner, and Brandon Edwards, co-mentored with Jinan Allan and Dr. Kim Klockow-McClain
OU School of Meteorology Senior Capstone class
Title: Flooding risk perception changes after major flooding events
- 2021 Natalie Ramer, Cole Hess, and Lauren Tyler, co-mentored with Dr. Joe Ripberger
OU School of Meteorology Senior Capstone class
Title: Severe weather reception, understanding, and response difference across generational groups
- 2020 Trey Bell and Joshua Schank, co-mentored with Dr. Chris Fiebrich
OU School of Meteorology Senior Capstone class
Title: Understanding the Knowledge Driving the Interaction Between Observational Weather Data and Broadcast Meteorologists
- 2019 Garrett Heyd, co-mentored with Dave Flory
Iowa State University Meteorology Senior Thesis
Title: An Analysis of Tweet Reach During the Severe Weather Season: What Factors Impact the Reach of Tweets from Forecasters?
- 2019 Michael Jacquari Smith, co-mentored with Dr. Harold Brooks
National Weather Center Research Experience for Undergraduates
Title: Classifying Rare Tornadoic Outbreaks in the United States
- 2017 Kylie Capps, Grant Tosterud, and Cara Vanarsdel, co-mentored with Dr. Daphne LaDue
OU School of Meteorology Senior Capstone class
Title: The Effectiveness of National Weather Service Tweets for Spanish Speaking People

HONORS AND AWARDS

- 2019 The University of Oklahoma School of Meteorology award for Outstanding Service as a Graduate Student
- 2018 Best Student Poster Award at the 29th Conference on Severe Local Storms, Stowe, Vermont
- 2018 Best Student Presentation Award at the 98th AMS Annual Meeting, Austin, Texas
- 2017 Second Place Student Poster Award at the 97th AMS Annual Meeting, Seattle, Washington

- 2015 National Weather Association Bob Glahn Scholarship in Statistical Meteorology
- 2015–Present Phi Beta Kappa Member
- 2014 American Meteorological Society Named Scholarship
- 2013 NOAA Ernest F. Hollings Undergraduate Scholarship

PROFESSIONAL SERVICE

- 2021–2022 Program Co-Chair, The 17th Symposium on Societal Applications: Policy, Research, and Practice, The 102nd AMS Annual Meeting
- 2020–present Editor, societal impacts and hazard communication, Bulletin of the American Meteorological Society
- 2020–present Team Leader, OU School of Meteorology Undergraduate Mentoring Ecosystem
- 2019–present Reviewer, Weather and Forecasting, Journal of Operational Meteorology, Weather, Climate, and Society, Bulletin of the American Meteorological Society
- 2019–2020 Program Co-Chair, The 19th Annual American Meteorological Society Student Conference, The 100th AMS Annual Meeting, Boston, Massachusetts
- 2019–2020 Museum Docent, National Weather Museum and Science Center, Norman, Oklahoma
- 2019–2020 Committee Member, Overall Planning Committee, The 100th AMS Annual Meeting, Boston, Massachusetts
- 2019 Student Representative, OU School of Meteorology faculty search committee
- 2018–2019 Program Co-Chair, The 18th Annual American Meteorological Society Student Conference, The 99th AMS Annual Meeting, Phoenix, Arizona
- 2018–present Committee Member, American Meteorological Society Board on Societal Impacts
- 2018 Poster Judge, OU School of Meteorology Senior Capstone Class
- 2018 Panelist, OU School of Meteorology Graduate Student Panel for Prospective Students
- 2017–2018 Graduate Student Representative, OU School of Meteorology Undergraduate Student Visiting Day

- 2016–2020 Volunteer and Host, OU School of Meteorology Visiting Student Weekend, Norman, Oklahoma
- 2016–2018 Graduate Vice Chair, The University of Oklahoma Meteorology Student Affairs Committee, Norman, Oklahoma
- 2014–2015 President, American Meteorological Society-Iowa State Student Chapter, Ames, IA
- 2013–2014 Vice President, American Meteorological Society-Iowa State Student Chapter, Ames, IA

PROFESSIONAL DEVELOPMENT WORKSHOPS

- 2020 National Weather Center Diversity Seminar Series
Unlearning Ableism, Unlearning Sexism, Unlearning Classism, Unlearning Racism
- 2019 National Center for Atmospheric Research Advanced Study Program colloquium, Boulder, Colorado
Topic: Quantifying and Communicating Uncertainty in High-impact Weather Prediction
- 2018 LGBTQ Ally Training, Gender and Equality Center, University of Oklahoma, Norman, Oklahoma
- 2017 Python Training Workshop: MetPy and Siphon, Unidata Software, Norman, Oklahoma
- 2015 Professional Ethics Training, University of Oklahoma Graduate College, Norman, Oklahoma
- 2014 Undergraduate Leadership Workshop, National Center for Atmospheric Research, Boulder, Colorado

INVITED TALKS

- 2022 AMS/NWA Memphis Chapter, “Nocturnal tornadoes and the information timeline: what do people want and need?”, March 2022
- 2022 NWS Science Operations Officer Development Course, “Risk Communication 101, Forecast and Warning Communication”, March 2022
- 2021 NWS Southern Region Science Circle, “Information insight: what do people need, when do they need it, and is it high-quality?”, November 2021
- 2021 Virtual Science by the Glass, Texas Tech Climate Center, “Understanding what you do during severe weather”, May 2021

- 2020 Geography 5943: Natural Hazards, Norman, Oklahoma, “The Where and When for Tornadoes and What it Means for You”, March 2020
- 2018 Geophysical Society of Oklahoma City, Oklahoma City, Oklahoma, “The Where and When for Tornadoes and What it Means for You”, May 2018
- 2018 2018 Douglas County, Kansas Severe Weather Symposium, Lawrence, Kansas, “A Sub-Daily Tornado Climatology and its Implications for Forecasting”, March 2018

PROFESSIONAL AFFILIATIONS

Member, American Meteorological Society

SELECTED CONFERENCE PRESENTATIONS

- 2022 M. J. Krocak, S. Ernst, J. T. Ripberger, C. Silva, and H. Jenkins-Smith: Forecast Information Type across Time: What do People Want and Need? 102nd AMS Annual Meeting
- 2021 M. J. Krocak, S. Ernst, and J. T. Ripberger: Exploring the differences in SPC convective outlook interpretation using categorical and numeric information. 101st AMS Annual Meeting
- 2020 M. J. Krocak and H. E. Brooks: Evaluating the addition of forecast timing information with multiple user groups. 100th AMS Annual Meeting, Boston, Massachusetts
- 2020 M. J. Krocak, S. Ernst, and J. T. Ripberger: The impact of increased lead-time on protective action in response to tornadoes. 100th AMS Annual Meeting, Boston, Massachusetts
- 2019 M. J. Krocak and J. T. Ripberger: The Waiting Game: The Impact of Watch-Scale Lead Time on Protective Action in Response to Tornadoes. 99th AMS Annual Meeting, Phoenix, AZ
- 2018 M. J. Krocak and H. E. Brooks: Developing and Testing Watch-Scale Forecast Products in the FACETs Paradigm. 29th Conference on Severe Local Storms, Stowe, Vermont
- 2018 M. J. Krocak and H. E. Brooks: Developing and Testing Watch-Scale Forecast Products in the FACETs Paradigm. Severe Storms and Doppler Radar Conference, Ankeny, Iowa
- 2018 M. J. Krocak and J. T. Ripberger: A Difference in the Details: Assessing the Impact of Demographic Differences on Tornado Warning Comprehension, Reception, and Response. 98th AMS Annual Meeting, Austin, Texas

- 2017 M. J. Krocak, J. T. Ripberger, J. Pudlo: Establishing a Baseline: What We Know About Tornado Warning Reception, Comprehension, and Response. AMS 97th Annual Meeting, Seattle, Washington
- 2017 M. J. Krocak and H. E. Brooks: Sub-daily Severe Weather Climatology and its Implications on Forecasting. AMS 97th Annual Meeting, Seattle, Washington
- 2016 M. J. Krocak and H. E. Brooks: Sub-daily Severe Weather Climatology and its Implications on Forecasting. 28th Conference on Severe Local Storms, Portland, Oregon
- 2015 M. J. Krocak, H. E. Brooks, J. T. Ripberger: Fact, Fiction, or Somewhere In Between: Examining the Quality of Severe Weather Information in the Twittiverse. Severe Storms and Doppler Radar Conference, Ankeny, Iowa
- 2014 M. J. Krocak, H. E. Brooks, J. T. Ripberger: Fact, Fiction, or Somewhere In Between: Examining the Quality of Severe Weather Information in the Twittiverse. 27th Conference on Severe Local Storms, Madison, Wisconsin