

Tyreek J. Frazier

Meteorologist | Machine Learning Scientist | Scientific Software Developer

Ames, IA • tyreekfrazier5@gmail.com

PROFESSIONAL SUMMARY

Meteorologist and machine learning researcher who develops data-driven tools for high-impact weather forecasting and decision support. Ph.D. successfully defended in July 2026, with experience transforming numerical weather prediction, radar-derived precipitation, and hydrologic datasets into reproducible Python pipelines, probabilistic ML models, real-time forecast products, and rigorous verification systems. Skilled at connecting meteorology, hydrology, statistics, software, and operational forecasting needs.

TECHNICAL SKILLS

Programming & Data: Python, Bash, Linux/Unix, Git/GitHub; NumPy, pandas, SciPy, xarray, Matplotlib, Cartopy, scikit-learn, XGBoost, TensorFlow, PyTorch

Scientific Data: GRIB2, NetCDF, HDF5, CSV, geospatial vector data; large gridded datasets, regridding, feature engineering, and automated data pipelines

Methods & Domains: Machine learning, statistical analysis, probabilistic forecasting, model verification, ensemble forecasting, numerical weather prediction, extreme precipitation, flash flooding, mesoscale and convective meteorology, GIS visualization

RESEARCH & TECHNICAL EXPERIENCE

Graduate Research Assistant

Aug 2022 – Aug 2026

Iowa State University

Ames, IA

- Lead NOAA-funded research using machine learning to diagnose and reduce displacement and intensity errors in High-Resolution Ensemble Forecast (HREF) extreme-precipitation forecasts; work has produced one manuscript under review and two additional manuscripts in preparation.
- Designed reproducible Python pipelines that ingest, quality-control, regrid, join, and analyze more than six million gridded samples from multi-year GRIB2, NetCDF, HDF5, radar-derived precipitation, flash flood guidance, and numerical weather prediction datasets.
- Developed and evaluated probabilistic ML models using XGBoost, random forests, and logistic regression, including feature engineering, hyperparameter optimization, holdout testing, and statistical comparison of model performance.
- Built an automated real-time forecast and next-day verification workflow that retrieves operational data, generates flash-flood probabilities at 24-hour lead time, and publishes interactive decision-support graphics for rapid interpretation.
- Assessed forecast quality using reliability, Brier and Ranked Probability Skill Scores, CSI, ETS, POD, FAR, object-based verification, and statistical significance testing; translated results into clear recommendations for scientific and operational audiences.
- Coordinate research across meteorology, hydrology, machine learning, and statistics, translating technical concepts among collaborators and helping guide project scope, methodology, and communication.

Flash Flood and Intense Rainfall (FFaIR) Experiment

Jun 2024 – Aug 2025

NOAA Weather Prediction Center

College Park, MD / Virtual

- Selected for the 2024 in-person and 2025 virtual experiments to collaborate with WPC forecasters and evaluate emerging extreme-rainfall and flash-flood forecasting methods in an operational testbed.
- Generated daily experimental forecasts with self-developed ML post-processing tools and gathered forecaster feedback to identify strengths, failure modes, and priorities for continued development.
- Presented methods and results to operational meteorologists and communicated forecast uncertainty, model behavior, and research limitations in a time-sensitive forecasting environment.

ADDITIONAL EXPERIENCE

Co-Mentor, Undergraduate Research

Mar 2026 – Present

Iowa State University

Ames, IA

- Co-mentor a senior meteorology student studying how near-storm environments affect ML post-processor performance during mesoscale convective systems; guide research design, analysis, and interpretation.

Teaching Assistant

Aug 2022 – Dec 2023

Iowa State University

Ames, IA

- Supported undergraduate synoptic and mesoscale meteorology courses; led lectures and laboratory sessions, explained complex concepts, assessed student work, and proctored examinations.

Summer Intern

Jun 2021 – Aug 2021

Federal Aviation Administration

Washington, DC (Remote)

- Evaluated the capability of Automated Surface Observing System ceilometers to retrieve cloud information above 25,000 ft and summarized potential aviation-weather applications.
- Collaborated with FAA, NCAR, NOAA, and National Weather Service scientists to synthesize technical research and communicate findings to stakeholders.

EDUCATION

Ph.D. in Meteorology — Successfully defended July 16, 2026

Aug 2022 – Aug 2026

Iowa State University

Ames, IA

B.S. in Meteorology; Minors in Mathematics and Psychology

Aug 2018 – May 2022

University of Miami

Coral Gables, FL

PUBLICATIONS

- Gallus, W. A., Jr., et al. (2025). “A Climatology of Errors in HREF MCS Precipitation Objects.” *Water*, 17(15), 2168.
- **Frazier, T. J.**, et al. (under review). “A Machine Learning Postprocessor to Mitigate Ensemble Quantitative Precipitation Forecast Displacement Errors” *Journal of Artificial Intelligence for the Earth Systems*.
- **Frazier, T. J.**, et al. (in preparation). “Using Machine Learning to Improve Intensity Errors in Ensemble Quantitative Precipitation Forecasts”
- **Frazier, T. J.**, et al. (in preparation). “Probabilistic Machine Learning Forecasts of Extreme Rainfall from Mesoscale Convective Systems”

SELECTED PRESENTATIONS

- **Oral:** “Using Machine Learning to Improve Forecasts of Extreme Rainfall,” Earth, Atmosphere, and Climate Graduate Student Symposium (Mar 2026).
- **Oral:** “A Machine Learning Postprocessor to Mitigate Ensemble QPF Displacement and Intensity Errors,” NOAA Weather Prediction Center FFaIR Experiment (Jun 2025).
- **Oral:** “Evaluation of a Machine Learning Post-Processor to Mitigate Quantitative Precipitation Forecast Errors for Improved Hydrometeorological Forecasting,” AMS 105th Annual Meeting (Jan 2025).
- **Poster:** “Correcting Errors in Mesoscale Convective System Quantitative Precipitation Forecasts of Intensity, Timing, and Location Using Machine Learning Algorithms,” AMS 104th Annual Meeting (Jan 2024).
- **Poster:** “Aviation Benefits of Allowing ASOS Ceilometers to Gather Data up to 25,000 ft,” AMS 102nd Annual Meeting (Jan 2022).

LEADERSHIP & HONORS

Eagle Scout, Boy Scouts of America (earned Jun 2017)