Carly Sutter

csutter@albany.edu | https://cgsutter.github.io/ | Ph.D. Candidate

EDUCATION

Ph.D. in Atmospheric Science *(in progress),* University at Albany, SUNY, Albany, NY *Exp. Aug 2026*
Advisors: Dr. Kara Sulia and Dr. Christopher Thorncroft
Thesis: Weather-Related Road Condition Detection using Co-Developed Machine Learning Methods

M.S. in Applied Mathematics, University of Missouri, Columbia, MO May 2015
Advisor: Dr. Carmen Chicone

B.S. in Mathematics Education, North Carolina State University, Raleigh, NC May 2013

SKILLS & ACADEMICS

Coding: proficient in Python, SQL, Git, Bash, LaTeX, Excel; familiar with R, JavaScript, React, Node.js, Express, REST API, Docker, Singularity, Cron, Kubernetes, Slurm

Primary ML Packages & Platforms: TensorFlow, SciKitLearn, Weights & Biases MLOps

Graduate Coursework: atmospheric dynamics and physics, general circulation, fundamentals of Earth's climate, data analysis for atmospheric and environmental sciences, synoptic-dynamic meteorology, mathematical modeling, probability theory, statistics, ordinary and partial differential equations

Actuarial Exams: Probability, Financial Mathematics, Investment and Financial Markets, Short-Term Actuarial Mathematics, Statistics for Risk Modeling

EMPLOYMENT

Graduate Research Assistant Aug 2021 – present
Atmospheric Sciences Research Center (ASRC), Albany, NY
NSF AI Institute for Research on Trustworthy AI in Weather, Climate, and Coastal Oceanography (AI2ES)

- Automated the classification of hazardous weather-related road conditions from NY State Dept. of Transportation (NYSDOT) camera images and weather forecast data using machine learning (ML) models including convolutional neural networks (CNNs) and random forest (RFs)
- Delivered project end-to-end: created a data archive, curated a hand-labeled dataset for model training, developed and tuned ML models, streamlined model inference pipeline for operations, developed a dashboard, conducted social scientific end-user interviews and qualitative data analysis
- Emphasized model generalizability on unseen camera sites for operational application; achieved validation accuracy of ~80% for classifying severe snow, snow, wet, dry, and poor visibility
- Prioritized co-design with end-users and cross-discipline collaboration with computer scientists and social scientists across different institutions

Senior Actuarial Analyst Aug 2020 – Aug 2021
Actuarial Analyst Nov 2018 – Jul 2020
Fidelis Care (Centene Corporation), New York, NY

- Quantified the financial impact of premium rate changes across Medicaid products
- Built and maintained a process for performance reporting including SQL queries and report summaries
- Modeled member-level risk scores using multi-linear regression; results used to inform business decisions such as exiting a market and meeting forecasted revenue

Programmatic Strategy and Optimization (PSO), Senior Specialist Aug 2018 – Nov 2018
PSO, Specialist Jun 2017 – Jul 2018
MediaMath, New York, NY

- Traded ~$7 million of media using MediaMath's real-time trading platform; optimized performance against client KPIs such as ROI and incremental cost per action
- Consulted directly with clients to provide analytical perspectives on test design, execution, and results of their marketing campaigns; primary focus was on lift measurement and A/B testing

International Mathematics Teacher Aug 2015 – Jul 2016
Nanjing Foreign Language School, Nanjing, China

- Taught AP Calculus and Precalculus to English-speaking Chinese students aiming to attend US colleges
- Played an integral role in the program's growth: developed curriculum, mentored new teachers, led teaching demonstrations, and assisted in college advising for students

Graduate Instructor Aug 2013 – May 2015
University of Missouri, Columbia, MO

- Primary instructor for Business Calculus and College Algebra; 9 sections as large as 40 students
- Received the Excellence in Teaching Award in 2015 – based on exceptional teaching evaluations
- Assisted precalculus coordinator in creating assignments, leading and coordinating across recitations during the Spring 2015 semester

DEPARTMENTAL SERVICE

Distinguished Service Award for 2024-2025
Department of Atmospheric & Environmental Sciences, SUNY University at Albany, Albany, NY

Graduate Program Committee Member (GPC) Aug 2022 – Jul 2024
Department of Atmospheric & Environmental Sciences, SUNY University at Albany, Albany, NY
Responsibilities: attend meetings with faculty, voice student issues, and represent the ASRC

Faculty Hiring Committee (Student Representative) Dec 2022 - May 2023
Department of Atmospheric & Environmental Sciences, SUNY University at Albany, Albany, NY
Departmental faculty hire as a part of the UAlbany AI Institute
Responsibilities: reviewing applications, interviewing, directing and planning student roundtables

Graduate Student Recruitment Co-Chair Sep 2021 - Jun 2022
Department of Atmospheric & Environmental Sciences, SUNY University at Albany, Albany, NY
Responsibilities: plan and direct multi-day recruitment events for visiting prospective students

RESEARCH PRODUCTS [J = Journal, G = Git Repository, D = Data, C = Conference]

Publications:

- [J.5] **Sutter, C.**, Wirz, C. D., Sulia, K., Bassill, N. P., & Thorncroft, C. D. (2026). User-centered development of an intelligent road surface condition machine learning tool with the New York State Department of Transportation. [In preparation].
- [J.4] Rothenberger, J. C., Le, T., **Sutter, C.**, & Diochnos, D. I. (2026) Application of Co-Training Methods to Road Condition Classification. [In submission].
- [J.3] **Sutter, C.**, Sulia, K., Bassill, N. P., Wirz, C. D., Thorncroft, C. D., Rothenberger, J., Przybylo, V., Cains, M. G., Radford, J., & Evans, D. A. (2026). Machine learning detection of road surface conditions: A generalizable model using traffic cameras and weather data. *International Journal of Transportation Science and Technology.* [Accepted]. https://arxiv.org/abs/2510.06440
- [J.2] Wirz, C. D., **Sutter, C.**, Demuth, J. L., Mayer, K. J., Chapman, W. E., Cains, M. G., Radford, J., Przybylo, J., Evans, A., Martin, T., Gaudet, L. C., Sulia, K., Bostrom, A., Gagne II, D. J., Bassill, N., Schumacher, A., & Thorncroft, C. D. (2024). Increasing the reproducibility and replicability of supervised AI/ML in the earth systems science by leveraging social science methods. *Earth and Space Science, 11* (e2023EA003364). https://doi.org/10.1029/2023EA003364
- [J.1] Bostrom, A., Demuth, J., Wirz, C., Cains, M., Schumacher, A., Madlambayan, D., Bansal, A. S., Bearth, A., Chase, R., Crosman, K. M., Ebert-Uphoff, I., Gagne II, D. J., Guikema, S., Hoffman, R., Johnson, B. B., Kumler-Bonfanti, C., Lee, J. D., Lowe, A., McGovern, A., Przybylo, V., Radford, J., Roth, E., **Sutter, C.**, Tissot, P., Roebber, P., Stewart, J. Q., White, M., & Williams, J. K. (2023). Trust and trustworthy artificial intelligence: A research agenda for AI in the environmental sciences. *Risk Analysis, 44,* 1498–1513. https://doi.org/10.1111/risa.14245

Software & Technology:

- [G.2] **Sutter, C.**, Sulia, K. (2025). Interactive dashboard for visualizing weather-related road surface condition predictions across New York State [Git repository]. GitHub. https://github.com/cgsutter/Dashboard_DOT (Source code accompanying [J.5])

- [G.1] **Sutter, C.** (2024). Machine learning pipeline for weather-related road surface condition classification [Git repository]. GitHub. https://github.com/cgsutter/DRIVE-clean (Source code accompanying [J.3], [D.1], and [D.3])

Curated Data Products:

- [D.3] **Sutter, C.**, Sulia, K., Bassill, N. P., Wirz, C. D., Przybylo, V., Cains, M. G., Radford, J., Evans, D. A., & Thorncroft, C. D. (2025). *Datasheet: Hand-labeled road surface conditions in New York State Department of Transportation camera images* [Data paper]. Zenodo. https://zenodo.org/records/17080580
- [D.2] Horan, B. T., Sulia, K., Bassill, N. P., Thorncroft, C. D., **Sutter, C.**, Evans, A., Wirz, C., & Radford, J. (2025). *Standardized labeling guidelines and quantitative content analysis of New York State Mesonet daytime camera images* [Data set]. Zenodo. https://doi.org/10.5281/zenodo.15482632
- [D.1] **Sutter, C.**, Sulia, K., Bassill, N. P., Thorncroft, C. D., Wirz, C. D., Przybylo, V., Cains, M. G., Radford, J., & Evans, D. A. (2025). *Quantitative content analysis data for hand labeling road surface conditions in New York State Department of Transportation camera images* [Data set]. Zenodo. https://doi.org/10.5281/zenodo.15257486

Conference Presentations & Proceedings:

- [C.14] *[Upcoming]* **Sutter, C.**, Wirz, C. D., Sulia, K. J., Bassill, N. P., & Thorncroft, C. D. (2026, February 23–26). *Co-development of a machine learning decision-support tool with the New York State Department of Transportation* [Conference presentation]. Weather & Society, Online. https://www.weatherandsociety.com/#program
- [C.13] **Sutter, C.**, Wirz, C. D., Sulia, K. J., Bassill, N. P., & Thorncroft, C. D. (2026, January 25–29). *A user-centered approach to developing a trustworthy AI tool for weather-related road surface prediction with the New York State Department of Transportation* [Conference presentation]. American Meteorological Society 106th Annual Meeting, Houston, TX, United States. https://ams.confex.com/ams/106ANNUAL/meetingapp.cgi/Paper/470921
- [C.12] **Sutter, C.**, Sulia, K. J., Bassill, N. P., Wirz, C. D., & Thorncroft, C. D. (2025, November 5). *Supporting winter maintenance decisions with road condition prediction tools* [Conference presentation]. NYSDOT Snow and Ice University, Albany, NY, United States.
- [C.11] **Sutter, C.**, Sulia, K., Bassill, N. P., Wirz, C. D., & Thorncroft, C. D. (2025, February 18). *A machine learning approach to automated road-surface condition predictions in collaboration with the New York State Department of Transportation* [Seminar presentation]. NOAA Hydrometeorology Testbed, 2024-2025 HMT Seminar Series. https://www.wpc.ncep.noaa.gov/hmt/seminars.shtml
- [C.10] **Sutter, C.**, Sulia, K., Bassill, N. P., Wirz, C. D., & Thorncroft, C. D. (2025, January 12–16). *Lessons learned in developing an automated road surface classification tool using machine learning for the New York State Department of Transportation* [Conference poster]. 105th AMS Annual Meeting, New Orleans, LA, United States. https://ams.confex.com/ams/105ANNUAL/meetingapp.cgi/Paper/451176
- [C.9] Rosenow, A. A., **Sutter, C.**, Reeves, H. D., Sulia, K., & Bassill, N. P (2025, January 12–16). *Using machine learned road weather observations to verify a gridded snow rate product* [Conference presentation]. 105th AMS Annual Meeting, New Orleans, LA, United States. https://ams.confex.com/ams/105ANNUAL/meetingapp.cgi/Paper/454564
- [C.8] Rothenberger, J. C., Le, T., **Sutter, C.**, Sulia, J. K., & Diochnos, D. I. (2025, January 12–16). *Improving road surface classification with co-training algorithms* [Conference presentation]. 105th AMS Annual Meeting, New Orleans, LA, United States. https://ams.confex.com/ams/105ANNUAL/meetingapp.cgi/Paper/451835
- [C.7] Horan, B., Sulia, K., Bassill, N. P., Thorncroft, C. D., **Sutter, C.**, & Evans, D. A. (2025, January 12–16). *Creating convolutional neural networks to monitor New York State Mesonet daytime precipitation from camera images* [Conference presentation]. 105th AMS Annual Meeting, New Orleans, LA, United States. https://ams.confex.com/ams/105ANNUAL/meetingapp.cgi/Paper/450195
- [C.6] **Sutter, C.**, Sulia, K., Bassill, N. P., Wirz, C. D., & Thorncroft, C. D. (2024, October 2–4). *Leveraging machine learning with the New York State Department of Transportation to enhance understanding of road surface conditions* [Conference presentation]. CIWRO Workshop on Science, Predictability, Operations, Preparation and Response for High Impact Weather, Albany, NY, United States.

- [C.5] **Sutter, C.**, Sulia, K. J., Bassill, N. P., Thorncroft, C. D., Przybylo, V., Wirz, C. D., Cains, M. G., Radford, J. T., & Evans, D. A. (2024, January 28 – February 1). *Improving generalizability of road condition classification models for Department of Transportation camera images* [Conference presentation]. 104th AMS Annual Meeting, Baltimore, MD, United States. https://ams.confex.com/ams/104ANNUAL/meetingapp.cgi/Paper/438154
- [C.4] **Sutter, C.**, Sulia, K. J., Bassill, N. P., Thorncroft, C. D., Przybylo, V., Wirz, C. D., Cains, M. G., Radford, J. T., & Evans, D. A. (2023, November 14–15). *Machine learning-driven detection of road surface conditions in Department of Transportation camera images* [Conference presentation]. 24th Northeast Regional Operational Workshop, Albany, NY, United States. https://www.weather.gov/aly/nrow24
- [C.3] **Sutter, C.**, Sulia, K. J., Przybylo, V, Bassill, N. P., Thorncroft, C. D., Wirz, C. D., & Cains, M. G. (2023, January 8–12). *Automated detection of road conditions from Department of Transportation camera images* [Conference presentation]. American Meteorological Society 103rd Annual Meeting, Denver, CO, United States. https://ams.confex.com/ams/103ANNUAL/meetingapp.cgi/Paper/418646
- [C.2] Przybylo, V., **Sutter, C.**, Wirz, C. D., Cains, M. G., & Sulia, K. J. (2023, January 8–12). *Detecting the presence of precipitation in New York State Mesonet imagery at night using convolutional neural networks* [Conference poster]. Artificial Intelligence Conference, American Meteorological Society 103rd Annual Meeting, Denver, CO, United States.
- [C.1] Ferrera, V., Rothenberger, J. C., Wilson Reyes, M., **Sutter, C.**, Fagg, A. H., & Diochnos, D. I. (2023, January 8–12). *Classifying road surface conditions with self-trained artificial intelligence* [Conference presentation]. American Meteorological Society 103rd Annual Meeting, Denver, CO, United States.