Carly Sutter

New York, NY | Ph.D. Candidate | she/her | https://cgsutter.github.io/

EDUCATION

Ph.D. in Atmospheric Science *(in progress),* SUNY University at Albany, Albany, NY *Exp. May 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
North Carolina State University, Raleigh, NC

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, atmospheric physics, general circulation, fundamentals of Earth's climate, data analysis for atmospheric and environmental sciences, mathematical modeling, probability theory, mathematical statistics, ordinary differential equations, 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

PUBLICATIONS/OPEN ACCESS WORK [J = Journal, C = Conference, D = Data, G = Git Repository]

[J.4] *[In preparation for ACM Transactions on Interactive Intelligent Systems]* **Sutter, C.**, Wirz, C. D., Sulia, K., Bassill, N. P., & Thorncroft, C. D. (2025) *User-Centered Development of an Intelligent Road Surface Condition Machine Learning Tool with the New York State Department of Transportation.*

[J.3] *[In revision for the International Journal of Transportation Science and Technology (IJTST)]* **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. (2025) *Road Surface Condition Detection with Machine Learning using New York State Department of Transportation Camera Images and Weather Forecast Data.* Preprint available at: https://arxiv.org/abs/2510.06440

[D.2] **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.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

[G.2] **Sutter, C.** (2025). *Interactive Dashboard for Visualizing Weather-Related Road Surface Condition Predictions across New York State* [Git Repository]. *GitHub*. Code accompanying [J.4]. https://github.com/cgsutter/Dashboard_DOT

[G.1] **Sutter, C.** (2025). *Machine Learning Pipeline for Weather-Related Road Surface Condition Classification* [Git Repository]. *GitHub*. Code accompanying [J.3], [D.1], and [D.2]. https://github.com/cgsutter/DRIVE-clean

[C.8] **Sutter, C.**, Sulia, K., Bassill, N. P., Wirz, C. D., & Thorncroft, C. D. (18 Feb 2025). *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.7] **Sutter, C.**, Sulia, K., Bassill, N. P., Wirz, C. D., & Thorncroft, C. D. (13 Jan 2025). *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, Jan 2025. https://ams.confex.com/ams/105ANNUAL/meetingapp.cgi/Paper/451176

[C.6] **Sutter, C.**, Sulia, K., Bassill, N. P., Wirz, C. D., & Thorncroft, C. D. (2 Oct 2024). *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, 2-4 Oct, 2024, Albany, NY 12222

[J.2] Wirz, C. D., **Sutter, C.**, Demuth, J. L., Mayer, K. J., Chapman, W. E., Cains, M. G., et al. (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

[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. (31 Jan 2024). *Improving Generalizability of Road Condition Classification Models for Department of Transportation Camera Images* [Conference presentation by Dr. Kara Sulia]. 104th AMS Annual Meeting, Baltimore, MD, 28 Jan - 1 Feb 2024. 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. (14 Nov 2023). *Machine Learning-Driven Detection of Road Surface Conditions in Department of Transportation Camera Images* [Conference presentation]. 24th Northeast Regional Operational Workshop, Albany, NY, 14-15 Nov 2023. https://www.weather.gov/aly/nrow24

[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, online first. https://doi.org/10.1111/risa.14245

[C.3] **Sutter, C.**, Sulia, K. J., Przybylo, V, Bassill, N. P., Thorncroft, C. D., Wirz, C. D., & Cains, M. G. (9 Jan 2023). *Automated Detection of Road Conditions from Department of Transportation Camera Images* [Conference presentation]. American Meteorological Society 103rd Annual Meeting, Denver, CO, 8-12 Jan 2023. 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. (9 Jan 2023). *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, 8-12 Jan 2023

[C.1] Ferrera, V., Rothenberger, J. C., Wilson Reyes, M., **Sutter, C.**, Fagg, A. H., & Diochnos, D. I. (12 Jan 2023). *Classifying Road Surface Conditions with Self-Trained Artificial Intelligence* [Conference presentation]. American Meteorological Society 103rd Annual Meeting, Denver, CO, 8-12 Jan 2023