Curriculum Vitae

Jason Stock

Updated April 18, 2025

jasonstock.me jason12stock@gmail.com github.com/stockeh

EDUCATION

2024	Ph.D.	**Colorado State University**, Computer Science *From Neuro–Inspired Attention Methods to Generative Diffusion: Applications to Weather and Climate.* Advisor: Charles Anderson
2021	M.S.	**Colorado State University**, Computer Science *Using Machine Learning to Improve Vertical Profiles of Temperature and Moisture for Severe Weather Nowcasting.* Advisor: Charles Anderson & Co-Advisor: Imme Ebert-Uphoff
2019	B.S.	**Colorado State University**, Computer Science & Mathematics (minor)

EMPLOYMENT

01.2025 – present	**Postdoctoral Appointee**, Argonne National Laboratory — GenAI for Weather and Climate
06.2020 – 12.2024	**Graduate Research Assistant**, Colorado State University — Computer Science *NSF AI Institute for Research on Trustworthy AI in Weather, Climate, and Coastal Oceanography (AI2ES)*
11.2023 – 02.2024	**Research Intern**, NVIDIA Research — Climate Simulation Group
05.2023 – 08.2023	**Research Intern**, Maxar Technologies — Research and Development
06.2018 – 11.2019	**Software Engineer Intern**, The Boeing Company — NOTAMs Group
01.2020 – 05.2020	**Graduate Teaching Assistant**, Colorado State University — Distributed Systems
01.2017 – 05.2018	**Undergraduate Teaching Assistant**, Colorado State University — Computer Architecture

RESEARCH INTERESTS

Neuro–inspired attention in neural networks, generative diffusion and flow matching, deep reinforcement learning for control, creating interpretable-by-design machine learning methods, and modeling weather and climate change.

Languages: Python, Java, C++, Bash, ReactJS, Rust, C, Scala
Tools: PyTorch, TensorFlow, MLX, NumPy, Linux, Git, Apache Hadoop & Spark, Azure, AWS, Slurm, Docker

CONFERENCE AND JOURNAL PUBLICATIONS

1. Campanella, S., Piani, S., Querin, S., Salon, S., Bortolussi, L., & **Stock, J.** (2025). *Learning Subseasonal-to-Seasonal Global Ocean Forecasting on a Hierarchical Triangle Mesh.* In ICLR 2025 Workshop on Tackling Climate Change with Machine Learning, Apr, 2025.
2. **Stock, J.**, Hilburn, K., Ebert-Uphoff, I., & Anderson, C. (2024). *SRViT: Vision Transformers for Estimating Radar Reflectivity from Satellite Observations at Scale.* In ICML 2024 Workshop on Machine Learning for Earth System Modeling, July, 2024.
3. **Stock, J.**, Pathak, J., Cohen, Y., Pritchard, M., Garg, P., Durran, D., Mardani, M., & Brenowitz, N. (2024). *DiffObs: Generative Diffusion for Global Forecasting of Satellite Observations.* In ICLR 2024 Workshop on Tackling Climate Change with Machine Learning, May, 2024.
4. **Stock, J.**, & Anderson, C. (2023). *Memory-Based Sequential Attention.* In NeurIPS 2023 Workshop on Gaze Meets Machine Learning (PMLR), Dec, 2023. **(Oral Spotlight)**
5. Haynes, K., **Stock, J.**, Dostalek, J., Anderson, C., & Ebert-Uphoff, I. (2023). *Exploring the Use of Machine Learning to Improve Vertical Profiles of Temperature and Moisture.* Artificial Intelligence for the Earth Systems (AIES), Aug, 2023.
6. **Stock, J.**, & Anderson, C. (2022). *Attention-Based Scattering Network for Satellite Imagery.* In NeurIPS 2022 Workshop on Tackling Climate Change with Machine Learning, Dec, 2022.
7. Anderson, C., & **Stock, J.**(2022). *An Interpretable Model of Climate Change Using Correlative Learning.* In NeurIPS 2022 Workshop on Tackling Climate Change with Machine Learning, Dec, 2022.

8. **Stock, J.**, & Anderson, C. (2022). *Trainable Wavelet Neural Network for Non-Stationary Signals.* In ICLR 2022 Workshop on AI for Earth and Space Science, Apr, 2022.
9. Anderson, C., **Stock, J.**, & Anderson, D. (2022). Interpretable Climate Change Modeling with Progressive Cascade Networks. In ICLR 2022 Workshop on AI for Earth and Space Science, Apr, 2022.
10. **Stock, Jason** (2021). *Using Machine Learning to Improve Vertical Profiles of Temperature and Moisture for Severe Weather Nowcasting.* M.S. Thesis, Dept. of Computer Science, Colorado State University, Jun, 2021. **(CSU CS Department Best Poster Award)**

TECHNICAL REPORTS AND PREPRINTS

1. Ebert-Uphoff, I., Ver Hoef, L., Schreck, J.S., **Stock, J.**, Molina, M.J., McGovern, A., Yu, M., Petzke, B., Hillburn, K., Hall, D.M., Gagne, D.J., & Scheuerman, S. (Draft). *An Investigation of Metrics to Evaluate the Sharpness in AI-Generated Meteorological Imagery.* AI Institute for Research on Trustworthy AI in Weather, Climate, and Coastal Oceanography (AI2ES), Jan, 2024.
2. Ebert-Uphoff, I., Lagerquist, R., Hilburn, K. A., Lee, Y., Haynes, K., **Stock, J.**, Kumler, C., & Stewart, J. Q. (2021). *CIRA Guide to Custom Loss Functions for Neural Networks in Environmental Sciences – Version 1.* arXiv preprint arXiv:2106.09757, Jun, 2021.
3. **Stock, J.**, & Cavey, T. (2021). *Who's a Good Boy? Reinforcing Canine Behavior in Real-Time using Machine Learning.* arXiv preprint arXiv:2101.02380, Jan, 2021. **(NVIDIA Interview)**

NON-REFEREED CONFERENCE PRESENTATIONS

1. Ebert-Uphoff, I., Ver Hoef, L., Schreck, J.S., **Stock, J.**, Molina, M.J., McGovern, A., Yu, M., Petzke, B., Hillburn, K., Hall, D.M., Gagne, D.J., Campbell, W.F., Radford, J.T., Stewart, J.Q, & Scheuerman, S. (Draft). *Measuring Sharpness of AI-Generated Meteorological Imagery.* AMS 105th Annual Meeting, Testing, Metrics, and Validation Artificial Intelligence for Numerical Weather Prediction (AI4NWP), Jan 2025.
2. Bostrom, A., Davis, P., Ebert-Uphoff, I., Kumler, C., **Stock, J.**, & White, M. (2023). *On the Ethical and Responsible Design of AI Systems for Environmental Science.* Conference on Ethical and Responsible Design in the National AI Institutes, May, 2023. Summary report: https://arxiv.org/abs/2407.13926
3. **Stock, J.**, & Anderson, C. (2023). *Attention-Based Scattering Network for Satellite Imagery.* AMS 103rd Annual Meeting, 22nd Conference on Artificial Intelligence for Environmental Science, Jan, 2023.
4. Haynes, K., **Stock, J.**, Dostalek, J., Grasso, L., Anderson, C., & Ebert-Uphoff, I. (2023). *Exploring the Use of Machine Learning to Improve Vertical Profiles of Temperature and Moisture.* AMS 103rd Annual Meeting, 22nd Conference on Artificial Intelligence for Environmental Science, Jan, 2023.
5. Ebert-Uphoff, I., Lagerquist, R., Hilburn, K. A., Lee, Y., Haynes, K., **Stock, J.**, Kumler, C., & Stewart, J. Q. (2022). *How to Develop Custom Loss Functions for Neural Networks in Meteorology.* AMS 102nd Annual Meeting, 21st Conference on Artificial Intelligence for Environmental Science, Jan, 2022.
6. Ebert-Uphoff, I., Lagerquist, R., Hilburn, K., Lee, Y., Haynes, K., **Stock, J.**, Kumler, C., & Stewart, J. Q. (2021). *Guide to Custom Loss Functions for Neural Networks in Environmental Sciences.* 3rd NOAA Workshop on Leveraging AI in Environmental Sciences, Sept, 2021.
7. **Stock, J.**, Dandy, J., Ebert-Uphoff, I., Dostalek, J., & Grasso, L. (2021). *Using Machine Learning to Improve Vertical Profiles of Temperature and Moisture for Severe Weather Forecasting.* 3rd NOAA Workshop on Leveraging AI in Environmental Sciences, Sept, 2021.
8. **Stock, J.**, Dandy, J., Ebert-Uphoff, I., Anderson, C., Dostalek, J., Grasso, L., Zeitler, J., & Weinman, H. (2021). *Using Machine Learning to Improve Vertical Profiles of Temperature and Moisture for Severe Weather Nowcasting.* AMS 101st Annual Meeting, 20th Conference on Artificial Intelligence for Environmental Science, Jan, 2021.

OPEN-SOURCE SOFTWARE AND PROJECTS

Chat with MLX `[code|demo]` (2024). A high-performance macOS app connecting local documents to personalized LLMs using RAG on Apple silicon with MLX. Features include document-specific prompts, real-time conversation, personalization, and secure local data processing.

Emulating Atmospheric Compensation with Machine Learning (2023). Corrected lightwave scattering as seen in high-resolution satellite imagery with large-scale deep learning. Collaborated with research scientists in designing a performant model that significantly reduced compute time.

Clustering Cloud Types from the Geostationary Operational Environmental Satellite [code] (2020). Studied emerging cloud types from untreated GOES-16 imagery using a convolutional autoencoder with k-means. Found inferred and visible channels best for separating clear/cloudy conditions and detecting icing.

Area Mapping in Voluminous Virtual Environments [code|paper] (2019). A distributed system for managing several thousand clients to interact in a multi-terabyte virtual environment. Backend services scale horizontally and use HDFS to provide partition tolerance and high data availability.

***Note**: Additional works in machine learning, distributed systems, and big data analytics on my GitHub.*

PROFESSIONAL ACTIVITIES

Invited Talks and Tutorials

Machine Learning: Fundamentals and Architectures. Disasters, Demography, Disparities and Decisions (D4) Hack Week at the University of Washington, 2024.

Generative Diffusion for Global Forecasting of Satellite Observations. NSF AI Institute for Research on Trustworthy AI in Weather, Climate, and Coastal Oceanography (AI2ES), 2024.

Demystifying Diffusion Models: Insights for Meteorological Applications. Generative AI Working Group, Cooperative Institute for Research in the Atmosphere (CIRA), 2024.

Neural Attention Beyond Saliency. Information and Language Processing (ILP) Lab, Computer Science Department at the University of Virginia, 2023.

Estimating Radar from Satellite Observations at Scale with Vision Transformers. Machine Learning Core, Cooperative Institute for Research in the Atmosphere (CIRA), 2023.

Toward Biological Models of Sequential Attention. Guest Lecture for CS510: Image Computation, Computer Science Department at Colorado State University, 2023.

Memory-Based Sequential Attention for Climate Science. Barnes Research Group, Atmospheric Science Department at Colorado State University, 2023.

Neural Models of Attention for Tropical Cyclones. Machine Learning for Tropical Cyclones, Cooperative Institute for Research in the Atmosphere (CIRA), 2023.

Wavelet Neural Networks for Non-Stationary Signals and Satellite Imagery. NSF AI Institute for Research on Trustworthy AI in Weather, Climate, and Coastal Oceanography (AI2ES), 2022.

Trainable Wavelet Neural Network for Non-Stationary Signals. Data Science Seminar, Mathematics Department at Colorado State University, 2022.

An Introduction to Recurrent Neural Networks and Sequence Learning. Machine Learning Core, Cooperative Institute for Research in the Atmosphere (CIRA), 2022.

Reinforcement Learning: an Introduction and Application to Climate Science. Barnes Climate & Data Science Group, Atmospheric Science Department at Colorado State University, 2022.

Mentorship

Stefano Campanella, National Institute of Oceanography and Applied Geophysics (OGS), 2025
Zach Hird & Stanley Howard, NeurIPS 2024 High School Paper Track, 2024
Parker Smith, B.S., Colorado State University (Undergraduate Research Assistant), 2022
Alanood Alqobaisi, M.S., Colorado State University (CS Outreach Program), 2022

Service

Program Committee: NeurIPS 2024 Workshop on Tackling Climate Change with Machine Learning, 2024
Reviewing: Artificial Intelligence for the Earth Systems (AIES; 2022 & 2023)
Certificates: SAFe4 DevOps Practitioner (Scaled Agile Inc.); Leadership Preparation (CSU)

Workshops and Hackathons

Contributor, Disasters, Demography, Disparities and Decisions (D4) Hack Week, University of Washington, 2024
Resident, Jessy's Hacker House, EthDenver, 2023
Contributor, Trustworthy Artificial Intelligence for Environmental Science Summer School, NCAR, 2022
Participant, Artificial Intelligence for Earth System Science Summer School, NCAR, 2020

Leadership and Affiliations

Team Captain, Competitive eSports COD Team (CSU), 2021–2024
Member, CSU Association for Computer Machinery (ACM), 2016–2021
Member, CSU CS Hashdump Security Club, 2016–2021
Founder and President, Photography at Colorado State, 2015–2018
Volunteer, Ronald McDonald House, Tri Elks Lodge, and others, 2013–2022