CAMERON CUMMINS

Climate Researcher and Computational Engineer

cameron.cummins@utexas.edu Austin, TX
github.com/AgentOxygen

EDUCATION

MS Earth Science, The University of Texas at Austin Expected May 2025
Research Focus: Climate and Atmospheric Science
Advisor: Dr. Geeta Persad
GPA: 4.0

BS Computational Engineering, The University of Texas at Austin May 2023
GPA: 3.7

HONORS AND AWARDS

National Center for Atmospheric Research NSF Subaward 2025

Endowed Presidential Fellowship 2024 - 2025

Jackson School of Geosciences Recruiter Fellowship 2023 - 2024

RESEARCH EXPERIENCE

Graduate Research Assistant 2023 - Present
Persad Aero-Climate Lab

- Designed and currently developing the heatwave diagnostics package (HDP)
- Developing high performance post-processing software for climate models
- Post-processing and analyzing ensemble results from the Regional Aerosol Model Intercomparison Project (RAMIP)
- Building parallel computing and big data infrastructure for use on an HPC
- Collaborated with the Environmental Defense Fund to investigate the impacts of simulated methane-mitigation polices on global heatwave trends
    - Post-processed and archived 150 terabytes of ensemble simulation output from the Community Earth System Model 2 (CESM2)
    - Compiled HDP results and created concise scientific figures
- Computed high resolution gridded daily heat index dataset from Daymet
- Designed the lab group's local HPC

NCAR Graduate Student Visitor 2024
Climate Analysis Section, National Center for Atmospheric Research

- Designed, built, and distributed the GenTS Python package (see projects)
- Collaborated with Teagan King and Mike Levy on developing features for the CESM Unified Post-Processing and Diagnostics (CUPiD) project

- Assisted Adam Philips with updating the Climate Variability and Diagnostics Package (CVDP) from NCL to Python
- Accepted to and completed the 2024 CESM Tutorial

Undergraduate Research Assistant 2020 - 2023
Persad Aero-Climate Lab
- Led research project investigating the impacts of anthropogenic aerosols on global patterns of heatwave hazard and collocation with population centers
    - Analyzed CESM large ensemble output using Python
    - Created figures for submitted to Nature Climate Change
- Built research workflows for analyzing climate model output
- Post-processed and archived 60 terabytes of simulation output from CESM2
- Collaborated with the Union of Concerned Scientists to prototype a full-stack web app for visualizing regional hydroclimate metrics in California
- Contributed hydroclimate data analysis to paper led by Erica McCormick and Dr. Daniella M. Rempe (UT Austin) submitted to Global Change Biology

OPEN-SOURCE PROJECTS

Heatwave Diagnostics Package (HDP) 2024-Present
Sole Developer
- Compute heatwave metrics for climate model output efficiently
- Analyze the parameter space by testing multiple heatwave thresholds and definitions in parallel by leveraging XArray, Numba, and Dask.

GenTS 2024-Present
Sole Developer
- Convert raw model “history file” output into useable “timeseries” datasets
- Leverage Dask parallelism to process terabytes of data efficiently
- Completely written in Python and well-documented to replace older tools
- Pending integration into NCAR CUPiD project

CUPiD 2024
Contributor
- Integrating post-processing tools from GenTS tailored to CESM output
- Developing climatology functions for analyzing timeseries output
- Assisting with overall package structure and design

Cartopy 2024
Contributor
- Added the Winkel-Tripel projection to the Cartopy library of map transforms

SERVICE AND LEADERSHIP

1st Annual JSG Open-Source Hackathon 2024
Organizer
- Assisted with planning the event and structuring the competition
- Coordinated judging panel and led final student presentations
- Presented on the utility and importance of open-source in climate science
- Developed GitHub Page for documenting the event

Python for Geoscientists Workshop 2023
Co-instructor
- Developed interactive coursework for the Jackson School's RTX program
- Taught three-day class to undergraduate students on how to use Python in geoscience research at the Jackson School

Hot Science, Cool Talks Public Outreach 2023
Volunteer
- Ran booth outside the UT Environmental Science Institute's Hot Science, Cool Talks venue to K-12 students and educators displaying the UCAR 'Sounding Climate' demonstration, converting climate simulations into music

PRESENTATIONS

"City of Austin Climate Hazards & Risks", **Cummins, C.**, Lee, S., Ptomey, A, UT Austin Environment, Health, and Climate Change instructed by Marc Coudert. 2024. **Conducted Climate Presentation for City of Austin Epidemiologists.**

"Developing an Index to Understand Large-scale Rainfall Patterns in Southeast Texas," Kalyanaraman, L., Nduka, I., **Cummins, C**., Persad, G., American Geophysical Union Fall Conference, 2023. **Included in Poster Presentation.**

"Quantifying the Effect of Anthropogenic Aerosols on Global Patterns of Heat Wave Risk," **Cummins, C**., Persad, G., Baldwin, J., American Meteorological Society's 35th Conference on Climate Variability and Change, 2021. **Presented Poster.**

PUBLICATIONS

Papers In Preparation

Cummins, C., Persad, G., "Heatwave Diagnostics Package: A Python Package for Evaluating Climate Model Heatwave Metrics Across Multiple Parameters," In preparation for submission to *Journal of Open-Source Science*.

Dhungel, S., **Cummins, C.**, Persad, G., Liu, D., Xu, Y., Ocko, I.. "Reduced Heatwave Risks from Rapid Methane Mitigation." In Preparation for Submission to *Environmental Research Letters*.

Submitted Journal Papers

Persad, G., **Cummins, C.**, Baldwin, J., “Quantifying the Impact of Anthropogenic Aerosols on Global Patterns of Heatwave Hazard and Exposure,” Submitted to *Nature Climate Change*.

Rempe, D., McCormick, E., Hahm, W. J., Persad, G., **Cummins, C**., Lapides, D., Chadwick, K. D., Dralle, D., “Mechanisms underlying the vulnerability of seasonally dry ecosystems to drought”, Submitted to *Global Change Biology*.

COMPUTER SKILLS

Skill Areas: Software Engineering, Climate Modeling, Big Data, HPC
Programming Languages: Python, NCL, Java, JavaScript, C++, HTML, Fortran
Experienced Packages: xarray, Dask, numpy, numba, matplotlib, netCDF4, Zarr