CAMERON CUMMINS

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EDUCATION

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

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

HONORS AND AWARDS

Jackson School of Geosciences Recruiter Fellowship 2023

- Merit-based departmental fellowship awarded to incoming graduate students with exceptional skillsets and past experience in academic research

RESEARCH EXPERIENCE

Graduate Research Assistant 2023 - Present
Persad Aero-Climate Lab

- Collaborating 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 using Lonestar6 and Ranch supercomputers at the Texas Advanced Computing Center (TACC)
    - Programmed new, robust Python algorithms for quantifying heatwave threshold, frequency, and duration metrics from gridded temperature data
    - Analyzed heatwave trends using output from the aforementioned algorithms and compiled the results into concise scientific figures
- Building parallel computing and big data infrastructure for use by multiple researchers on a local high-performance computer in the Persad Aero-Climate Lab
- Computed high resolution gridded daily heat index dataset of the state of Texas from 1980 to 2020 using temperature and vapor pressure data from Daymet

Undergraduate Research Assistant 2020 - 2023
Persad Aero-Climate Lab

- Lead research project investigating the impacts of anthropogenic aerosols on global patterns of heatwave hazard and their collocation with population centers
    - First author of research paper now pending publication to Nature Climate

    - Analyzed large ensemble output from the Community Earth System Model 1 all-forcing and all-but-aerosol forcing runs using a heatwave analysis tool written in Python
    - Upscaled population datasets for comparison with gridded climate model temperature data
- Consulted the Persad Aero-Climate Lab on integrating research workflows with high performance computing infrastructure, code debugging, and robust data handling
- Post-processed and archived 60 terabytes of raw simulation output from the Community Earth System Model 2 using the Lonestar6 supercomputer at TACC for use in multiple subsequent research projects
- Collaborated with the Union of Concerned Scientists to prototype a full-stack web application for visualizing regional hydroclimate metrics in the state of California
- Computed hydroclimate data for a research project led by Erica McCormick (UT Austin) and Dr. Daniella M. Rempe (UT Austin) studying the effects of climate change on root zone groundwater storage
- Cleaned and documented development code used in a paper published by Dr. Geeta Persad to enhance public accessibility and reproducibility of the results

COMPUTATIONAL PROJECTS

- Used Python, flask, JavaScript, and Mapbox API to create prototype web game for meteorologists to competitively predict North American land surface temperatures
- Developed a robust finite element program in Python to compute the member stresses and strains of a three-dimensional beam and joint structure under various load conditions
- Prototyped a two-dimensional finite element program in Python to solve a simple heat transfer problem across a flat plate
- Designed and programmed a full-stack web application to demonstrate CRUD functionality (Create, Read, Update, Delete) using Python, Flask, JavaScript, Redis, and Kubernetes

PUBLICATIONS

Journal Papers in Review

Cummins, C., Persad G., Baldwin, J., "Quantifying the Impact of Anthropogenic Aerosols on Global Patterns of Heatwave Hazard and Exposure," Pending submission to Nature Climate.

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", Pending publication to Global Change Biology

PRESENTATIONS

Included in Poster Presentation, "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.

Co-taught Three-Day Workshop, "Python Data Analysis for Geoscientists," **Cummins, C**., Nduka, I., UT Austin Undergraduate Research Traineeship Experience, 2023.

Led 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.

COMPUTER SKILLS

Skill Areas: Big Data, Multidimensional Arrays, High Performance Computing

Programming Languages: Python, bash, JavaScript, C++, NCL, HTML, Fortran

Package/API Experience: Jupyter, xarray, matplotlib, numpy, pandas, Mapbox

REFERENCES

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