Zachary McQueen

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Education

University of Georgia — Athens, Georgia
PhD, Chemistry. — 2018 - 2024
Advisor: Prof. Geoffrey D. Smith

Florida State University — Tallahassee, Florida
BS, Chemistry — 2015 – 2017

Tallahassee Community College — Tallahasee, Florida
AA, Chemistry — 2013 - 2015

Doctoral Research Summary

Atmospheric aerosols, emitted from biogenic and anthropogenic sources, are a critical component radiative forcing in Earth's atmosphere and are largely responsible for the remaining uncertainty in predictive climate models. To work at reducing this uncertainty, I use custom, *in situ* instrumentation to accurately characterize the optical properties of aerosols from experiments and ambient conditions. Understanding how the absorption and scattering properties change due to initial emission conditions and how they evolve over time are vital to parameterize the effects of aerosols on climate change. Furthermore, I train machine learning models on our measurements to classify aerosol particle types and build regression models on lower-cost instrumentation to accurately predict the optical properties of ambient aerosols. These trained models improve the accessibility of measuring the aerosol optical properties accurately and on a local scale.

Publications

Published

- Knoll, P.; Gonzalez, A. V.; **McQueen, Z. C.**; Steinbock, O. Flow-Induced Precipitation in Thin Capillaries Creates Helices, Lamellae, and Tubes. Chem. A Eur. J. 2019, 25 (61), 13885–13889. https://doi.org/10.1002/chem.201903951.

Under Revision

- Glenn, C. K.; Hajj, O. E.; **McQueen, Z.**; Poland, R.; Penland, R.; Roberts, E.; Choi, J.; Bai, B.; Shin, N.; Anosike, A.; Kumar, K.; Abdurrahman, M.; Liu, P.; Amster, I. J.; Smith, G. D.; O'Brien, J.; Saleh, R. Brown Carbon Emissions from Biomass Burning Under Wildfire and Prescribed-Fire Conditions, 2023.

In Preparation

- **McQueen, Z.**; Poland, R.; Glenn, C. K.; Hajj, O. E.; Penland, R.; O'Brien, J.; Saleh, R.; Smith, G. D. Optical Properties of Biomass Burning Aerosols from Representative Fuel Beds from the Southeast United States Under Wildfire and Prescribed Burn Conditions, 2024.
- Poland, R.; **McQueen, Z.**; Glenn, C. K.; Hajj, O. E.; O'Brien, J.; Saleh, R.; Smith, G. D. Comparing the Performance of DualSpot Loading Compensation Methods Using the AE33 Aethalometer, 2024.

Conference Presentations

Platform Presentation

- Optical Properties of Biomass Burning Aerosols from the G-WISE Campaign (AAAR) 2023

Poster Presentation

- Development of a Machine Learning Model for the Prediction of the Scattering Angstrom Exponent From Purple Air Sensor Data (AAAR) 2022

Awards & Honors

- ACS Undergraduate Award in Physical Chemistry 2017
- Tallahassee Community College Chemistry Student of the Year 2015

Teaching Experience

Courses Taught

- CHEM 1211L: General Chemistry 1 Lab
- CHEM 1212L: General Chemistry 2 Lab
- CHEM 3511: Experimental Methods (physical chemistry portion)

Skills & Interests

Technical: MATLAB, Labview, Python, Arduino, Optics, Lasers

Instrumentation: Scanning Mobility Particle Sizer (TSI), APS (TSI), Atomizer, Potential Aerosol Mass Oxidation Flow Reactor (Aerodyne), Single Particle Soot Photometer (Droplet Technologies)

Interests: Aerosol Optical and Physical Properties, Aerosol Physical Chemistry, Aerosol Instrumentation, Aerosol Climate Impacts