

Cover Letter

I am applying for the [summer internship](#). I am currently a Cooperative Institute for Great Lakes research (CIGLR) postdoctoral fellow at the University of Michigan at the department of Climate and Space sciences, working with Prof. Allison Steiner. The research project I am working on is titled “Generation and Transport of Aerosolized Toxins from Harmful Algal Blooms in the western Lake Erie basin”. For this project I develop a parameterization for lake aerosol emissions for the WRF-Chem model driven by laboratory data.

My research interests include aerosol-cloud interactions both in numerical models and observations as well as the role of clouds and aerosols in climate system. My Ph.D. thesis focused on the importance of the semi-direct effect (SDE). To this end, I have been extensively involved in both analyzing satellite data and modifying the Community Atmosphere Model (CAM). Accessing different data formats, extracting metadata, managing, converting and statistically analyzing data has become routine work for me. The first part of my work focused on studying the impact of Saharan dust on North Atlantic marine stratocumulus clouds (MSc). We show that there is a strong seasonal variation, with the aerosol–cloud radiative effect switching from significantly negative during the boreal summer to weakly positive during boreal winter. We conclude that Saharan-MSc interactions off the coast of northern Africa are likely dominated by the SDE. The second part of my work focused on observationally-constrained aerosol-cloud semi-direct effects in multiple global climate models (GCMs). We investigated the SDE using multiple models driven by observationally constrained fine-mode aerosol forcing without dust and sea salt. We found a significant global annual mean decrease in low and mid-level clouds, and weaker decreases in high-level clouds, which leads to a positive SDE dominated by shortwave radiation. Thus, in contrast to most studies, we find a robust positive SDE, implying cloud adjustments act to warm the climate system. This work was published in Nature Partner Journal (npj). In my current research project I develop a parameterization for wind-driven emissions of aerosols from the surface of the Great Lakes based on laboratory measurements of lake spray aerosol size distributions for WRF-Chem.

Sincerely,
Anahita Amiri-Farahani