Research Title: Refining Carbonaceous Aerosol Apportionment Based on a Novel Carbonaceous Aerosol Speciation Sampler

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Abstract:
In this research poster, we are refining carbonaceous aerosol apportionment based on a novel carbonaceous aerosol speciation sampler (CASS, Magee Scientific, Berkeley CA) alongside my mentors Dr. Lung-Wen Antony Chen and Olusanya Onamuti. Carbonaceous aerosol in our air can consist of hundreds of thousands of organic compounds. At the same time, they are commonly divided into distinct categories such as black carbon (BC) versus organic aerosol (OA), primary organic aerosol (POA) versus secondary organic aerosol (SOA), and brown carbon (BrC) versus non-light-absorbing white carbon (WtC). The newly released CASS instrument, through the combination of thermal and optical detections and patented technologies, shows a potential for real-time apportionment of carbonaceous aerosol into six categories, BC (fossil fuel), BC (biomass burning), POA-BrC, POA-WtC, SOA-BrC, and SOA-WtC, simultaneously. Currently, we are sampling the air from our institution, the University of Nevada, Las Vegas (UNLV), on the rooftop of the Science and Engineering Building, located near the Las Vegas Strip. So far in our results, we have obtained the data from the CASS and automated the output to provide us hourly results on the 7 different absorption wavelengths. Additionally, we have successfully split the BC into its 2 components and captured the absorption coefficient on BrC and BC. During the weekend of the Super Bowl, we found high spikes in BC. Moreover, we will be conducting spectral regression and minimum R-squared analysis to report all 6 carbon categories. Sensitivity tests will be conducted to evaluate uncertainties associated with each carbon-category abundance and explore optimal parameterization in the model. Our primary goal is to quantify carbonaceous aerosol fractions to support climate and health assessments.