Seminar Series 2021 - 2022

Southern Ontario Centre for Atmospheric Aerosol Research

University of Toronto

Photolysis of atmospheric organic aerosol: chemical transformations and photo bleaching

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Brown carbon (BrC) in aerosol particles and cloud droplets can contribute to climate warming by absorbing radiation in the visible region of the solar spectrum. Large uncertainties remain in our parameterization of this warming, in part due to a lack of knowledge about atmospheric lifetimes for the chromophores (the light absorbing structures in BrC molecules). An important removal pathway involves chemical transformations that fragment the chromophore, thus removing its ability to absorb visible light. However, the rates measured for this removal pathway in the laboratory are much shorter than what is observed in ambient measurements. There also can be different amounts of photo-resistant BrC, which is a fraction of the mixture that does not rapidly bleach and therefore affects the practical lifetime of the BrC. An important BrC source in the atmosphere is biomass burning and the overall photochemical decay rates for these emissions are important to quantify to improve our parameterizations for their radiative effects. In this talk, I will be combining results from work in our lab, along with a broader review of prior literature of photochemical bleaching, to evaluate gaps in our ability to predict the observed ambient removal rates using laboratory measurements. By probing complex mixtures from recent biomass burning experiments (e.g. FIREX samples), I will demonstrate that our current measured rates in the laboratory are overestimated and that a slower photolysis rate, as well as a potential gas-phase oxidation rate, should be included to better predict BrC lifetimes in the atmosphere.

Wednesday, November 3, 2021 3:00 - 4:00PM

Microsoft Teams Meeting - Click here to join the meeting

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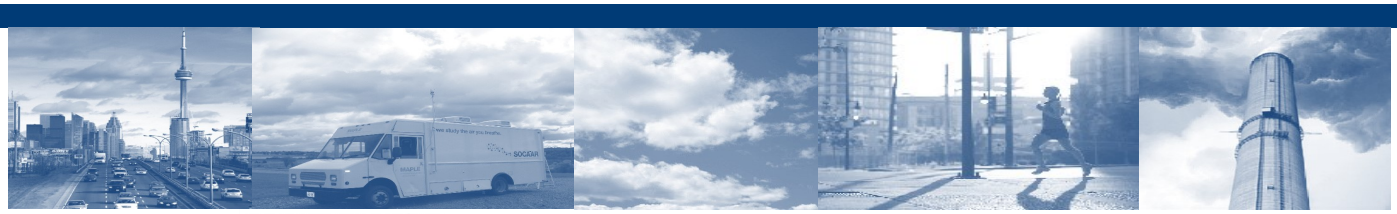
PhoPhone Conference ID: 965 419 528#



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