



Environmental Analytical Chemistry: Organics/Aerosols/Surfaces

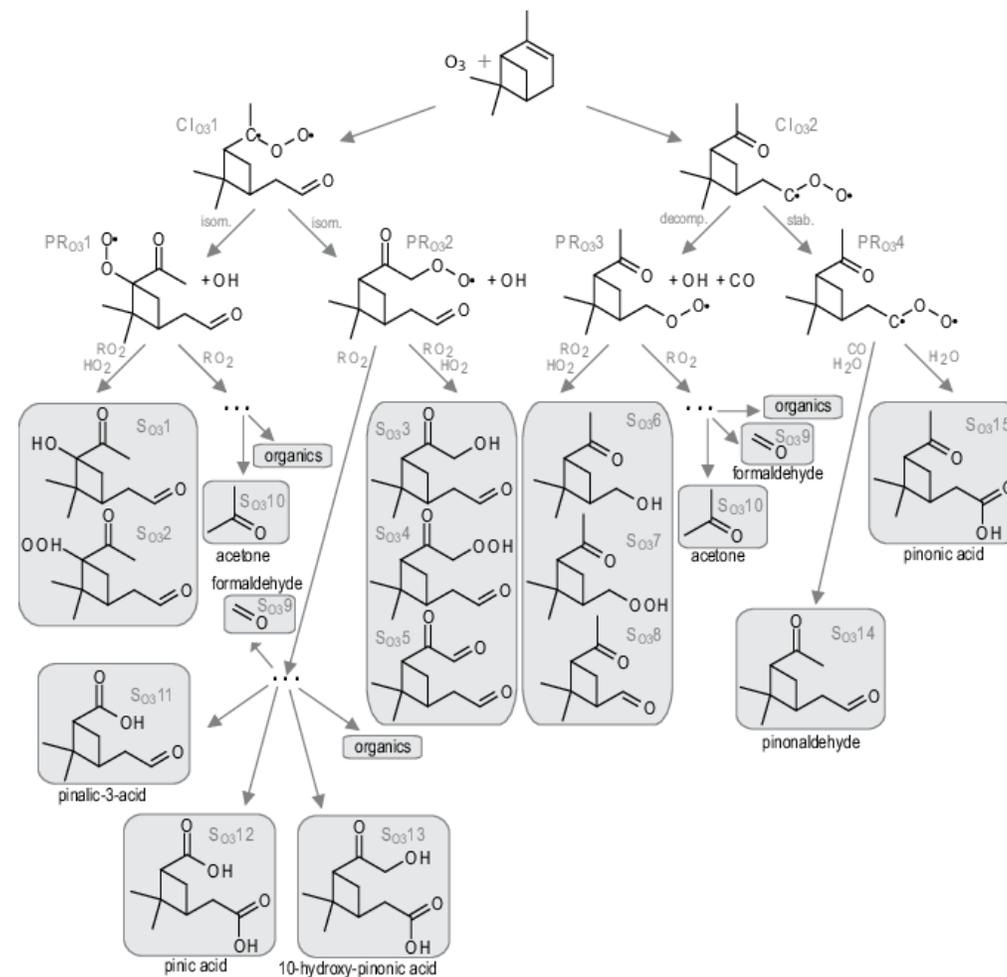
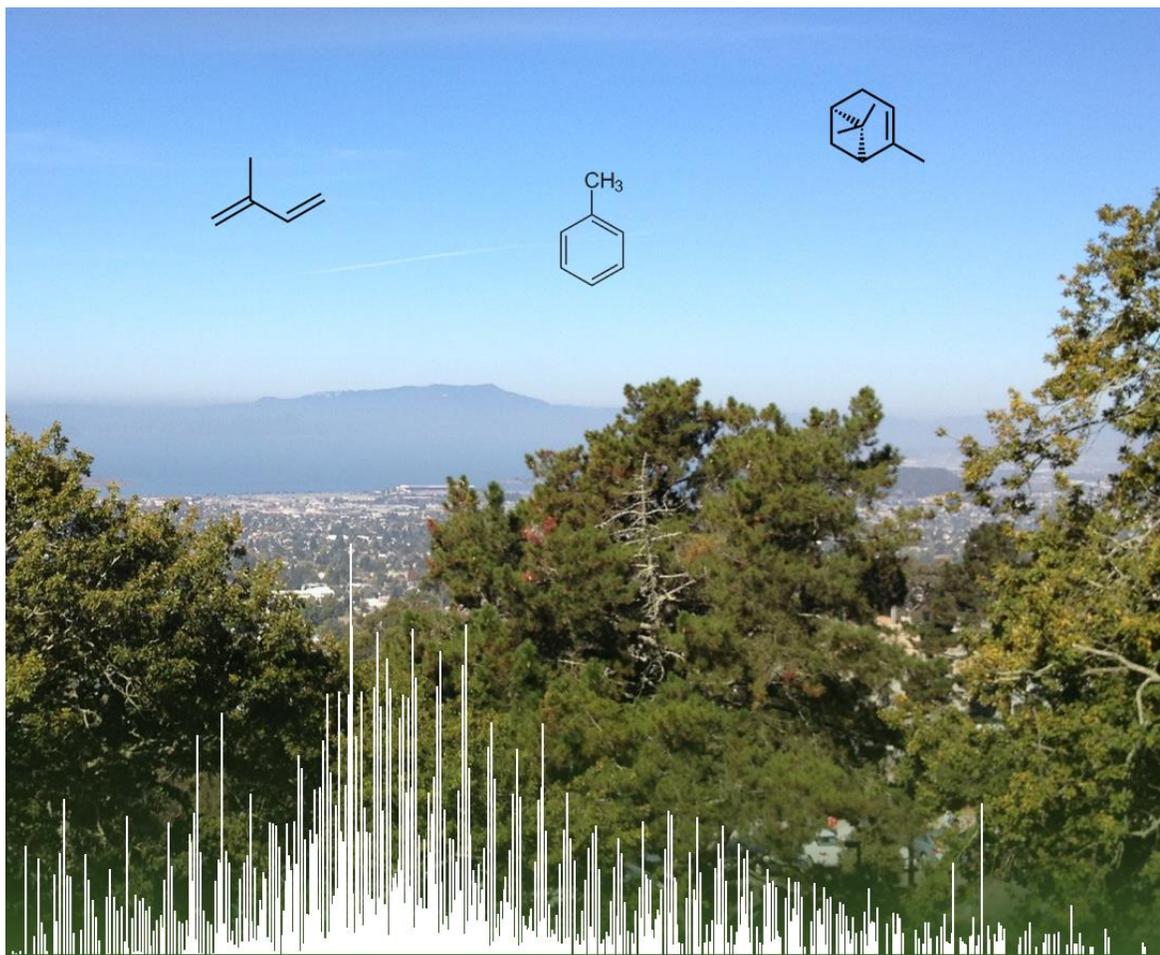
Research in the O'Brien Group

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Organics in the atmosphere/biosphere:

The atmosphere contains a wide range of organic compounds in the gas phase and in aerosol particles. The amount and the type of organic can play important roles in atmospheric chemistry and in air pollution/climate change.



Major research areas



Organic aerosols in polluted regions and forest fires



Chemical compositions on indoor surfaces



Chemical composition of ambient samples: Dew water

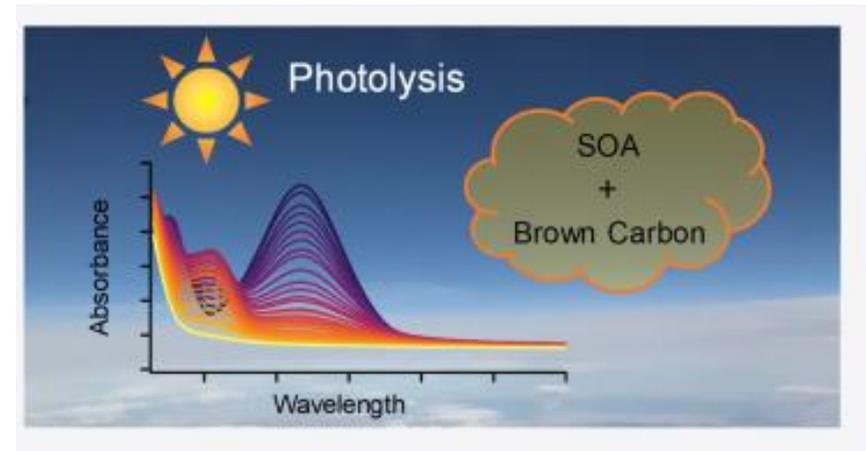


...we have a few other projects that students are working on, information on those is available on my website!

Organic aerosols aging – photo bleaching of fresh aerosols and brown carbon



A major driver for atmospheric chemistry is solar radiation and many organic compounds that are found in the atmosphere can absorb this light. When they do that, they can react or fragment thus changing the composition of the organic mixture. This chemistry can then change the role they play in the atmosphere. We are probing this by aging samples with a lamp in the lab and then looking at the samples with UV/Vis, FTIR, and mass spectrometry.



Papers from our group:

<https://pubs.acs.org/doi/abs/10.1021/acsearthspacechem.9b00109>

<https://pubs.acs.org/doi/pdf/10.1021/acs.estlett.0c00177>

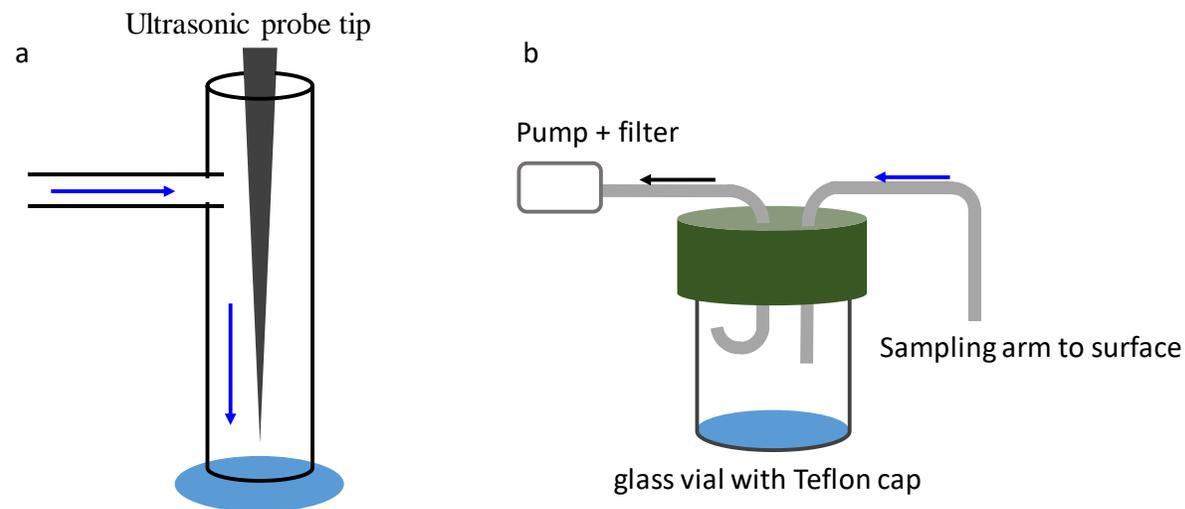


Chemical composition on indoor surfaces

Humans spend 90% of their time indoors, but we still don't have a great understanding of the chemistry that can occur. It is important to understand this in terms of human health and exposure. My group is collecting and analyzing the organic material that deposits on indoor surfaces in order to improve our understanding of how organic compounds partition indoors.



Sample collector development





Chemical composition and reactions in dew

Dew water forms during clear cool nights and can have atmospheric organic material dissolved in it. We currently lack understanding in the amount of this material that deposits and also returns to the atmosphere in the morning when the dew dries. We also don't know what types of organic compounds are being dissolved in the dew from the plants and how those react. In this project we are collecting and analyzing ambient dew water samples for dissolved organic material.





Students will learn:

- Analytical techniques including – GC/MS, LC/MS, ESI-MS on unknown environmental samples
- Sample collection and sample preparation
- Instrument/sampler design and building
- Advanced mass spectrometry data analysis

Interested in taking...

- 2-3 students next fall