Green leaf volatiles: A regional source of tropospheric secondary organic aerosol

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Green leaf volatiles (GLVs) are a class of wound-induced volatile organic compounds emitted by several plant species. Turf grasses emit a complex profile of GLVs upon mowing, as evidenced by the ‘freshly cut grass’ smell, some of which are readily oxidized in the atmosphere to contribute to secondary organic aerosol (SOA). We use a suite of instrumentation to measure reactive losses and products in both the gas and particle phases. Thermal desorption gas chromatography is used to characterize the reactive gas environment (for example, reactive loss of GLVs and temporal evolution of product signatures), while soft ionization aerosol mass spectrometry is used to analyze the chemical composition of the aerosol on line and in real time (Figure below), yielding a detailed chemical description of SOA formation and aging. Finally, particle bounce measurements are being developed to understand the physical phase and phase transformations of the secondary organic aerosol.

In this presentation, details of the instrumentation and research infrastructure will be discussed, especially as pertains to understanding the contribution of lawn mowing-induced SOA at the urban/suburban interface.

Soft ionization mass spectra recorded for SOA from three different precursors: cis-3-hexenyl acetate, cis-3-hexenol and grass clippings.