Supplemental Information

List of acronyms

AMS – Aerosol Mass Spectrometer

HOA – Hydrocarbon-like Organic Aerosol

OOA – Oxidized Organic Aerosol

PMF – Positive matrix factorization

POA – Primary Organic Aerosol

SOA – Secondary Organic Aerosol

UC – Unified Cycle

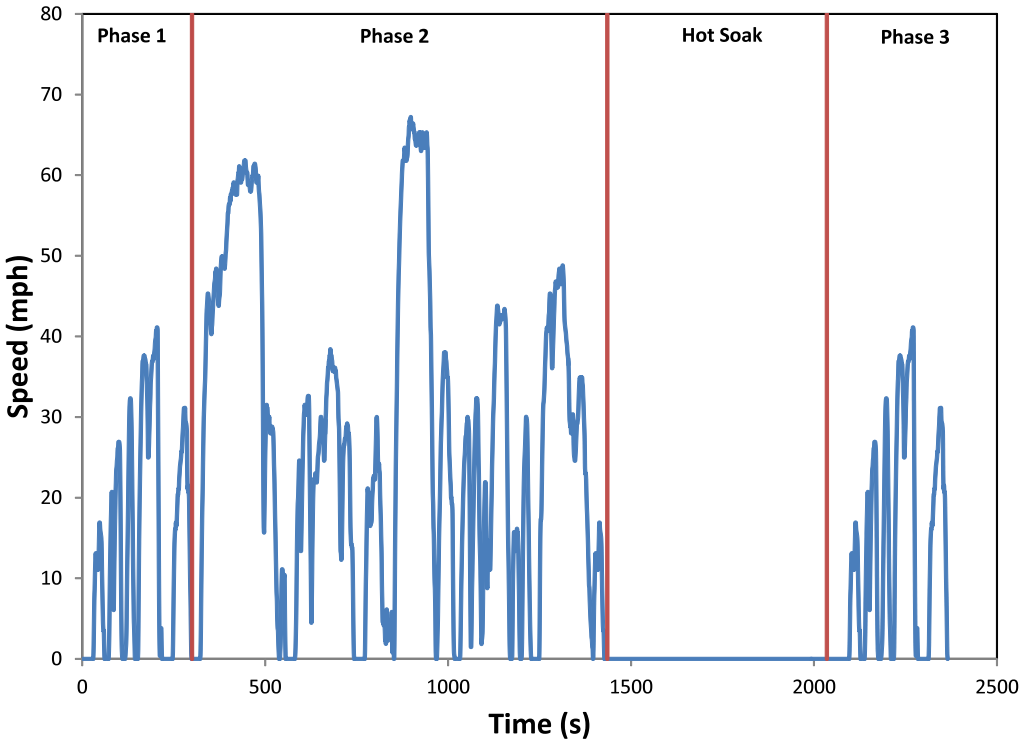

Figure S.1 Driving speed and duration for Unified Cycle. The complete test cycle is divided into three phases with a hot soak (engine off during hot soak). Composite samples were collected over all three phases, but not during the hot soak.

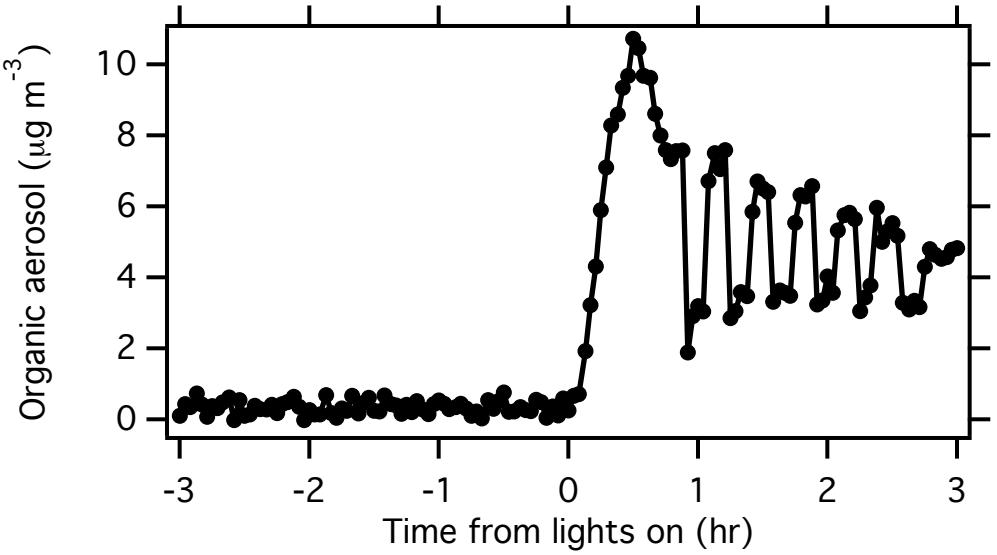

Figure S.2 Time series for a "pure SOA" experiment (LEV2-1.2). There is no evidence of POA entering the chamber when filling with diluted exhaust (filling started at $t \sim -1$ hr), and rapid formation of SOA with the start of photo-oxidation.

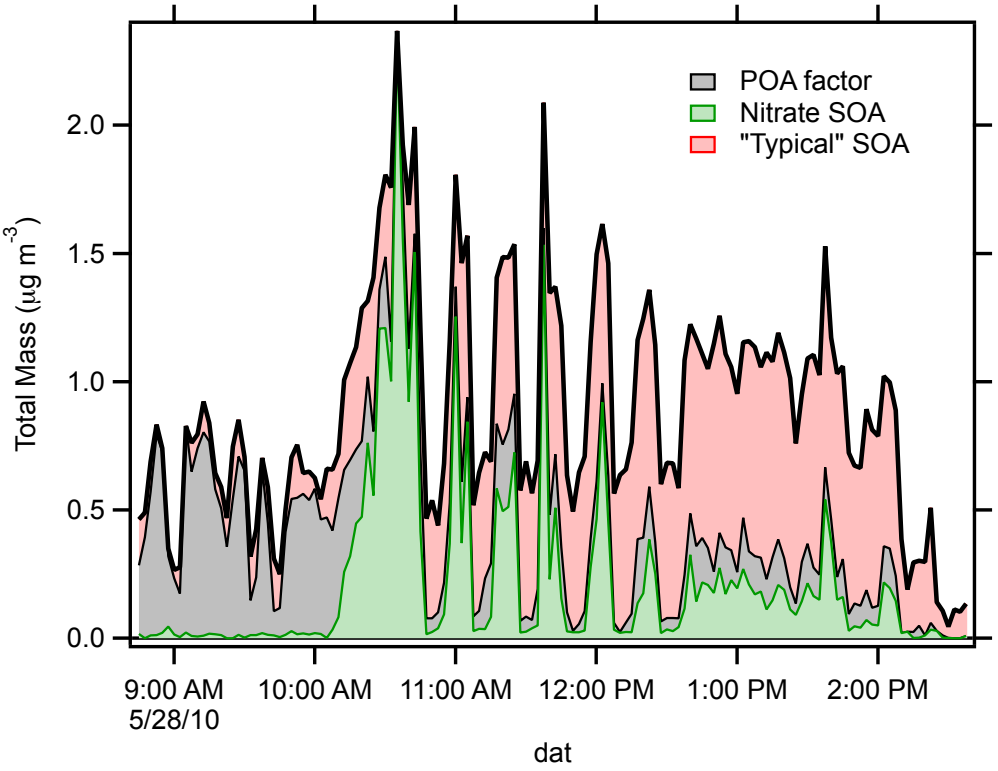

Figure S.3 Time series of the 3-factor PMF solution for experiment LEV1-6.1. This was the only of the gasoline and diesel experiments to require more than two factors. In this case, the green color indicates a high nitrate SOA factor that is formed early in the photo-oxidation phase of the experiment. Later in the experiment the high nitrate SOA is overwhelmed by a more typical SOA factor.

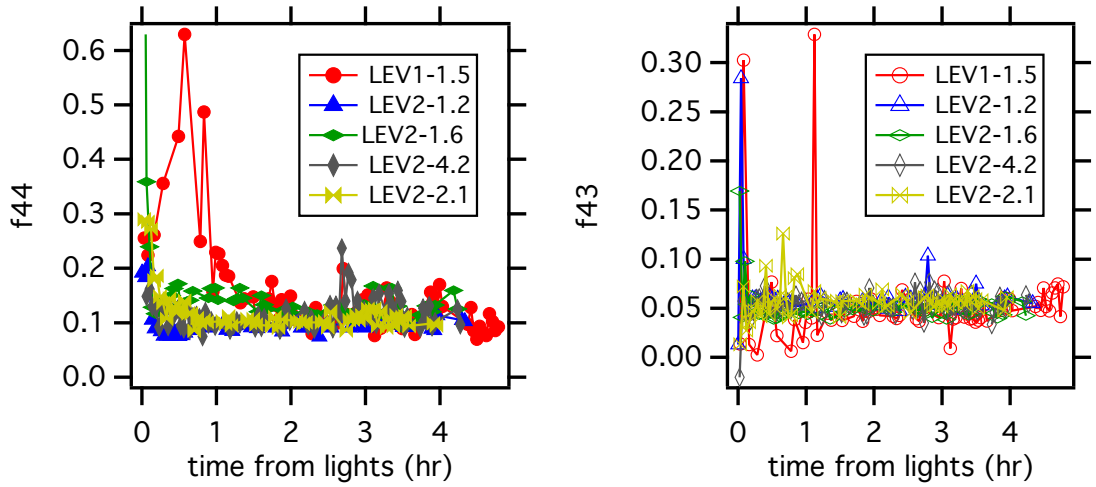

Figure S.4 Time series of f_{44} and f_{43} for "pure SOA" gasoline experiments.

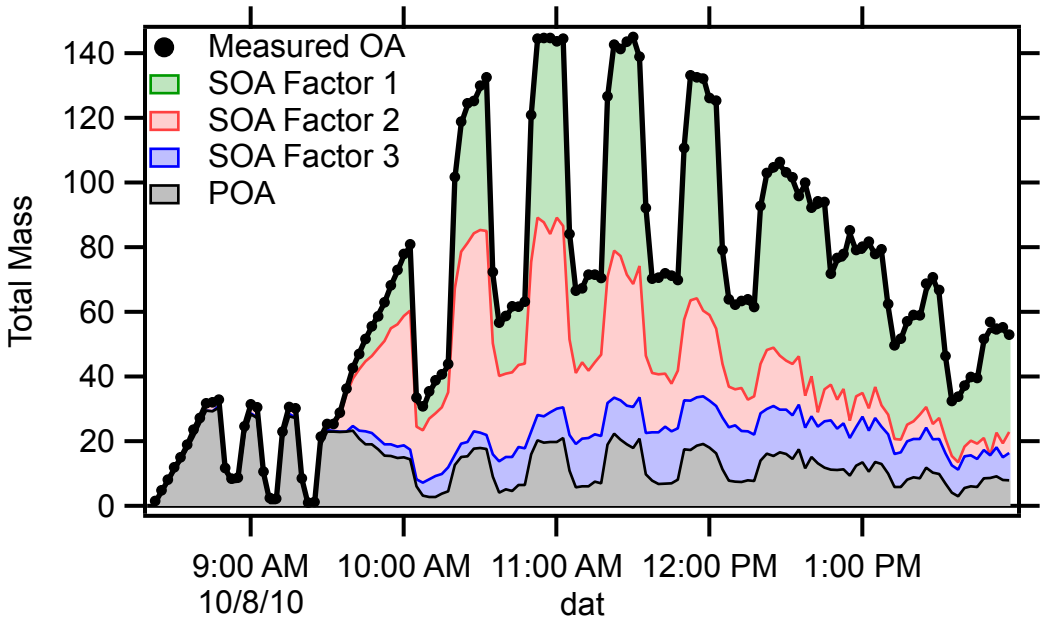

Figure S.5 Four-factor PMF reconstruction for an experiment using dilute exhaust from a jet aircraft. The concentration of the POA factor clearly increases after the onset of photo-oxidation, consistent with absorptive partitioning of the POA into the mixed POA/SOA organic phase.