

Abstract:

Urban aerosol particles are one of the largest human health hazards globally. A significant fraction of urban aerosol is secondary, .i.e., formed via atmospheric chemical reactions of emitted trace gases, with secondary organic aerosol (SOA) driving health impacts in urban air. Decades of air quality regulations have substantially reduced the motor vehicle emissions of organic compounds that act as precursors to SOA and ozone pollution. In this presentation I will show that volatile chemical products from household chemicals are becoming one of the largest sources of organic vapors in US and European cities. I will show the potential of such emission sources to form ozone and SOA using data collected during mobile measurements conducted in 2018 and aircraft measurements conducted this summer on NASA's DC-8 aircraft as part of the AEROMMA mission. Moreover, I will emphasize upcoming measurements in Germany utilizing a Zeppelin as an aerial platform, which will allow us to probe the urban "breath" of European cities and quantify the chemical evolution and SOA production from volatile chemical products downwind of urban centers. These measurements will be complemented by controlled atmospheric simulation chamber experiments next year to oxidize urban emissions and retrieve their SOA yields as a parametrization to be used by chemical transport models.