ACROSS: A Future Campaign to Study Oxidation in Mixed Anthropogenic-Biogenic Air Masses

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It is well known that the high population density of urban regions leads to significant degradation of the quality of the air because of the emissions of pollutants that are by-products of energy production, transportation, and industry. The composition and chemistry of urban air has been studied for many decades and these studies have led to detailed understanding of the factors controlling, for example, the formation of ozone, peroxyacetyl nitrate and other secondary species. In the last 20 to 30 years, significant progress has been made in reducing emissions of volatile organic compounds (VOCs) and oxides of nitrogen (NO_x) in urban atmospheres. Substantial reductions in the abundance of secondary compounds, though, have been more elusive.

Research has continued to reveal more and more details of the complex processes involved in the atmospheric degradation of wide varieties of volatile organic compounds (VOCs) of anthropogenic and biogenic (BVOCs) origins. BVOCs include isoprene, monoterpenes and sesquiterpenes, and oxygenated VOCs (OVOCs, such as small alcohols). Emissions of BVOCs depend on several factors such as plant or tree species, temperature, and photosynthetically active radiation. They consist almost exclusively of unsaturated compounds with chemistry somewhat different from those of typical urban organic compound emissions.

ACROSS (Atmospheric ChemistRy Of the Suburban foreSt) is an integrative, innovative, multi-scale project awarded under the “Make Our Planet Great Again” (MOPGA) framework that seeks to definitively improve understanding of the impacts of mixing urban and biogenic air masses on the oxidation of atmospheric VOCs. A key highlight of ACROSS is an intensive, multi-platform measurement campaign in the summer of 2022. It will use instruments staged on an airborne platform, a tower in the Rambouillet Forest near Paris, and other ground sites. The data collected from this campaign will be analyzed and studied to extract information about tropospheric oxidation chemistry generally, but particularly those changes observed in the situation of mixed urban and biogenic air masses.