

LAGRANGIAN MEASUREMENTS OF AEROSOLS AND OXIDANTS IN THE BOSTON URBAN PLUME DURING THE NAOPEX 2002 CAMPAIGN

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ABSTRACT

Heterogeneous chemical processes involving trace gases and aerosols are poorly understood and are expected to play an important role at night. As part of the New England Air Quality Study (NEAQS), the Nighttime Aerosol/Oxidant Plume Experiment (NAOPEX) was designed to study the chemical evolution and interaction of ambient urban aerosols and trace gases in the absence of photochemistry. Lagrangian measurements of trace gases (O_3 , NO_x , NO_y , VOCs, CO) and aerosols (size distribution and composition) were made with the Department of Energy's (DOE) G-1 aircraft in the nocturnal residual layer downwind of greater Boston area. On clear nights with offshore flow, a superpressure, constant-volume balloon (tetroon) was launched from a coastal site into the Boston plume around sunset to serve as a Lagrangian marker of urban air parcels as they moved out over the Atlantic Ocean. The tetroon carried an instrument payload of about 2.5 kg that included a GPS receiver, radiosonde and ozonesonde. Latitude, longitude, altitude, temperature, pressure, relative humidity and ozone concentration data were transmitted in real-time to a receiver on the ground as well as one onboard the G-1 aircraft. About an hour after the launch, when the tetroon was outside the restricted Class B airspace, the G-1 aircraft made the first flight to make more comprehensive measurements in the vicinity of the tetroon. New GUI-based Lagrangian flight planning software onboard the G-1 was used in intercepting and maneuvering the aircraft near the tetroon. About five hours after the tetroon launch, after it had gone out of range of the ground station (but before sunrise), the G-1 made the second flight to make another set of measurements in its vicinity. Here, we report on the two flights made between 20:00 EST July 30 and 02:00 EST July 31. Analyses of the Lagrangian aerosol and trace gases datasets that suggest evidence of heterogeneous activity and aging of aerosols will be presented.

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