Spatial Distribution of Aerosols over the Urban Sprawl of Metro Manila, Philippines during the CAMP^{2}Ex Airborne Mission in the Maritime Continent

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Abstract

With its unique distribution of islands surrounded by very warm bodies of water, the Maritime Continent (MC) is a region of deep convection important for global atmospheric circulation. It hosts a variety of natural and anthropogenic sources of air pollutants with megacities as one of the major emission sources. Metro Manila, a coastal megacity in Southeast Asia, is one of the urban environments in the MC. In recent years, however, urbanization has sprawled beyond its geopolitical boundaries. An early Monsoon Transition in 2019 fortuitously enabled the NASA Cloud, Aerosol and Monsoon Processes Philippines Experiment (CAMP^{2}Ex), an airborne field campaign in the MC, to investigate the pollution outflow from Metro Manila and nearby industrialized areas of Cavite, Batangas, and Bataan. Aerosol and trace gas species were measured onboard the NASA P3 aircraft on 04 Oct 2019. The downwind transects revealed elevated concentrations of organic aerosols (OA), black carbon (BC), and water-soluble species within the boundary layer (BL) although enhanced concentrations were also detected in some sections above the BL, likely from the residual layer or from long-range transport of polluted air mass. The downwind transects at 100-m and 320-m above ground level (AGL) showed elevated BC and nitrates downwind of Metro Manila and Cavite likely due to contributions from the transportation sector, and also showed enhanced sulfates downwind of Bataan and Batangas in the northern and southern sections of the transects. The latter was likely due to plumes from coal-fired power plants in the two provinces. The low approach over Metro Manila showed results similar to the near surface downwind legs. An inspection of the tracer components of OA revealed roughly equal contributions from both fresh and aged aerosols. The results underscore the spatial heterogeneity of aerosol composition, which is often not fully resolved in chemical reanalysis products over the region.

Early Career Scientist

NO, I am not an early career scientist.

IGAC Activities

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