

Mobile platform measurements of PM mass and number concentrations and black carbon in the Greater Athens Area

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Introduction

The city of Athens has been known to face air pollution problems over the last decades, with frequent exceedances of the daily PM₁₀ air quality standard in certain stations (Aleksandropoulou et al., 2012). This work presents a survey of the particulate matter (PM) mass concentrations and other aerosol properties across the Greater Athens Area (GAA), by means of mobile measurements. The objectives of this measurement campaign were the examination of the spatial distribution of PM, the evaluation of the representativeness of the National Monitoring Network (NMN) in characterizing the Athens city population exposure and the identification of the potential local sources, which contribute to the very high levels of pollutant concentrations observed in a number of areas.

Methodology

The measurements were conducted during warm period of 2011 and cold-period of 2012 (two weeks for each season), by the use of a monitoring vehicle (MOBILAB). MOBILAB is a lightweight truck 4.3 m long Mercedes-Benz Sprinter, model 2006 (with Diesel Engine 2,2l). The vehicle's mission control system included oxidizing catalyst (DOC) and particulate filter for Diesel engines (DPF). In addition, a GPS system was constantly monitoring the vehicle's exact position over time. The mobile laboratory was constructed and operated by the Laboratory of Aerosol and Particle Technology. For mobile measurements an iso-axial horizontal sampling tube extended well outside the profile volume of the vehicle and enabled representative sampling from the undisturbed flow with high sampling efficiency for 10 µm particles. The examined parameters during the sampling campaign were: particle size distribution (SMPS, OPC, TSI Inc.), PM₁₀ mass concentration (DR-4, Thermo Instr.) and black carbon (AE-52 Maggee Sci. Aethalometer). Mobile measurements (on-road) were performed during the day, in areas of