**Particle size distribution of persistent organic pollutants and polar organic marker compounds at traffic and urban background sites**

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A broad range of polar and non polar organic compounds are often found in urban aerosols due to the emissions from local sources as well as to short and/or long range atmospheric transport [1-6]. The focus of research in aerosol studies has shifted on the investigation of their distribution in different aerosol size classes and particular their occurrence in respirable and alveolar fractions due to possible environmental and health risks.

In this study size segregated samples (<0.49, 0.49-0.97, 0.97-1.5, 1.5-3.0, 3.0-7.2 and 7.2-30 μm) of airborne particles were collected using a cascade impactor at two sites (traffic and urban background) in the urban agglomeration of Thessaloniki, northern Greece. Sampling campaign was conducted during cold and warm period. Samples were analysed for Polybrominated Diphenyl Ethers (PBDEs, 12 congeners, BDE-15, 17, 28, 49, 71, 47, 66, 100, 99,154,153 and 183), Polychlorinated Bisphenyls (PCBs, 15 congeners, PCB-28, 31, 52, 77, 101, 105, 118, 126, 128, 138, 153, 156, 169, 170, 180 ) and Organochlorine Pesticides (OCPs, 17 compounds) representing various classes of persistent organic pollutants (POPs) regulated by the Stockholm Convention. Moreover, samples were analysed for low molecular weight carboxylic acids (CAs, monocarboxylic and dicarboxylic acids) and saccharides/anydrosaccharides (SAs) representing polar organic compounds. A pretreatment scheme including extraction and clean up and fractionation steps, was employed to recover target compounds. POPs were analysed by employing GC-MS. Polar organic compounds were first subjected to a derivatization process with BSTFA/TMCS and further analysed by GC-MS.

The particle size distribution of PBDEs, PCBs, OCPs, CAs and SAs, spatial and temporal variations are presented. The use of certain compounds as markers for possible sources and atmospheric processes (primary emissions, secondary organic aerosol, biomass combustion) is discussed. Finally, the exposure via inhalation to toxic persistent substances is assessed.

Significant fraction of POPs was found to be associated with alveolar fraction of <0.49μm. The higher aggregated concentrations of POPs were measured at the traffic impacted site during cold period. The higher concentrations of levoglucosan, a marker of biomass combustion, showed the contribution of biomass burning for residential heating in local atmosphere in winter.

References

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