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Assessment of Aerosol Emission Sources in a Traffic Site Combining On-line and Off-line Measurements

J.T. Coutinho[1], N. Canha[1], C. Galinha[1], V. Martins[1], T. Faria[1], M. Almeida-Silva[1,2], J. Lage[1], M. Rigler[3], G. Močnik[4], E. Diapouli[5], K. Eleftheriadis[5], S.M. Almeida[1]

[1]C2TN, IST, Universidade de Lisboa, EN 10 ao km 139.7, 2695-066, Bobadela, Portugal
[2]H&TRC- Health & Technology Research Center, ESTeSL- Escola Superior de Tecnologia da Saúde, Instituto Politécnico de Lisboa; [3]Aerosol d.o.o., Kamniška ulica 39a, 1000, Ljubljana, Slovenia
[4]Jozef Stefan Institute, Jamova cesta 39, 1000, Ljubljana, Slovenia
[5]NCSR Demokritos, 15310, Athens, Greece

In urban areas evidences from epidemiological and experimental studies show that traffic-related air pollution has adverse effects on respiratory and cardiovascular systems. Urban air pollution accounts for 3% of mortality from cardiopulmonary disease and 1% of mortality from acute respiratory infections in children under 5 years, worldwide. Therefore, disease and mortality associated with vehicle emissions represent a substantial challenge in public health.

Source apportionment, using receptor models, is an essential tool to support the implementation of the European and Member States legislation on air quality and principally to reduce the impact of exposure to Air Particulate Matter (PM) on human health.

This work was developed in the framework of the Interreg Med REMEDIO project and aims to assess the aerosol emission sources in an urban traffic site, located in the outskirts of Lisbon. With that purpose, PM_{10} and $PM_{2.5}$ were collected in a sampling campaign conducted in the urban centre of Moscavide (North of Lisbon, Portugal). The filters were analysed by XRF for the determination of element concentrations. With the purpose of characterising ambient aerosols and assess the contribution of the main emission sources and processes leading to aerosol formation in the atmosphere, source apportionment was performed by applying the Positive Matrix Factorization (PMF) model. PMF allowed the identification and the quantification of the contributions to the aerosol from different sources.

Figure 1 shows that PM_{10} and $PM_{2.5}$ daily levels exceed the guidelines stablished by the World Health Organization (50 and 25 $\mu g.m^{-3}$ for the 24-hour mean of PM_{10} and $PM_{2.5}$, respectively). This indicates that mitigation measures should be implemented in the studied area in order to protect the population health. Source apportionment using PMF was used to investigate local and regional pollution events, with data from chemical characterisation of particles.

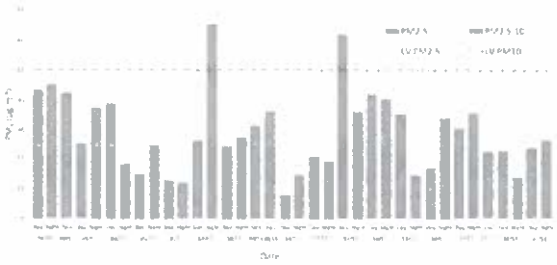

Figure 1. Particulate Matter (PM10 and PM2.5) daily variation in Moscavide.