Title: Size distribution of polycyclic aromatic hydrocarbons in a roadway tunnel in Lisbon, Portugal

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Abstract: Atmospheric aerosols of four aerodynamic size ranges were collected using high volume cascade impactors in an extremely busy roadway tunnel in Lisbon (Portugal). Dust deposited on the tunnel walls and guardrails was also collected. Average particle mass concentrations in the tunnel atmosphere were more than 30 times higher than in the outside urban background air, revealing its origins almost exclusively from fresh vehicle emissions. Most of the aerosol mass was concentrated in submicrometer fractions (65%), and polycyclic aromatic hydrocarbons (PAH) were even more concentrated in the finer particles with an average of 84% of total PAH present in sizes smaller than 0.49 mu m. The most abundant PAH were methylated phenanthrenes, fluoranthene and pyrene. About 46% of the total PAH mass was attributed to lower molecular weight compounds (two and three rings), suggesting a strong influence of diesel vehicle emissions on the production of local particulate PAH. The application of diagnostic ratios confirmed the relevance of this source of PAH in the tunnel ambient air. Deposited dust presented PAH profiles similar to the coarser aerosol size range, in agreement with the predominant origin of coarser aerosol particles from soil dust resuspension and vehicle wear products.

Author Keywords: Tunnel; Polycyclic Aromatic Hydrocarbons; Aerosols; Size Distribution

KeyWords Plus: Diesel Passenger Car; On-Road; Particulate Matter; Ambient Air; Source Apportionment; Emission Factors; Motor-Vehicles; Mobile Sources; Exhaust Plume; Urban

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