

Fugitive Road Dust PM 2.5 Emissions and Their Potential Health Impacts

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Fugitive road dust (FRD) particles emitted by traffic-generated turbulence are an important contributor to urban ambient fine particulate matter (PM_{2.5}). Especially in urban areas of developing countries, FRD PM_{2.5} emissions are a serious environmental threat to air quality and public health. FRD PM_{2.5} emissions have been neglected or substantially underestimated in previous study, resulting in large uncertainties in modeling PM concentrations and estimating their health impacts. This study constructed the FRD PM_{2.5} emissions inventory in a major inland city in China (Lanzhou) in 2017 at the high-resolution (500 m×500 m), and further investigated the spatiotemporal characteristics of the FRD emissions in different urban function zones, and quantified their health impacts. The FRD PM_{2.5} emission was approximately 1141±71 kg d⁻¹, accounting for 24.6% of total PM_{2.5} emission in urban Lanzhou. Spatially, high emissions exceeding 3×10⁴ μg m⁻² d⁻¹ occurred over areas with smaller particle sizes, larger traffic intensities, and more frequent construction activities. The estimated premature mortality burden induced by FRD PM_{2.5} exposure was 234.5 deaths in Lanzhou in 2017. Reducing FRD emissions are an important step forward to protect public health in many developing urban regions.

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