Real-World Emission Factors for Antimony and Other Brake Wear Related Trace Elements: Size-Segregated Values for Light and Heavy Duty Vehicles

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Hourly trace element measurements were performed in an urban street canyon and next to an interurban freeway in Switzerland during more than one month each, deploying a rotating drum impactor (RDI) and subsequent sample analysis by synchrotron radiation X-ray fluorescence spectrometry (SR-XRF). Antimony and other brake wear associated elements were detected in three particle size ranges (2.5-10,1-2.5, and 0.1-1 mu m). The hourly measurements revealed that the effect of resuspended road dust has to be taken into account for the calculation of vehicle emission factors. Individual values for light and heavy duty vehicles were obtained for stop-and-go traffic in the urban street canyon. Mass based brake wear emissions were predominantly found in the coarse particle fraction. For antimony, determined emission factors were 11 +/- 7 and 86 +/- 42 mu g km(-1) vehicle(-1) for light and heavy duty vehicles, respectively. Antimony emissions along the interurban freeway with free-flowing traffic were significantly lower. Relative patterns for brake wear related elements were very similar for both considered locations. Beside vehicle type specific brake wear emissions, road dust resuspension was found to be a dominant contributor of antimony in the street canyon.
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