Urban and Suburban Intermodal Fraction of Atmospheric Aerosol in Winter 2014

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2014

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Fine (PM_1) and coarse ($PM_{10-2.5}$) aerosols differ not only in size but also in chemical composition, health effects, type of sources, and others. A dividing line between fine and coarse aerosol is not clearly defined. These fractions overlap in the aerodynamic particle size range 1-2.5 μm, also called the intermodal fraction. Sources of both coarse and fine aerosols contribute to the intermodal fraction to a different extent relating to different meteorological conditions and types of locations. According to several studies, the intermodal fraction highly correlated with coarse aerosol in dry areas during high wind speed episodes [1, 2]. In contrast, other studies have shown higher or comparable correlation with fine aerosol [e.g. 3]. The aim of this study is to characterize the intermodal fraction in urban and suburban localities and estimate to what extent fine/coarse aerosol sources contribute to this fraction.

The measuring campaign took place from 5.2.–7.3.2014 at an urban (Radvanice) and a suburban (Plesná) site situated in Ostrava city, Czech Republic. At both sites, aerosol size distributions from 0.5–20 micrometers (5 min resolution) were determined, and daily samples of size resolved aerosol particles were sampled by Personal Cascade Impactor Sampler (PCIS) and Berner Low Pressure Impactor (BLPI).

The results from PCIS showed that the intermodal fraction represented mass range 3–31% of the total PM_{10} in both locations with higher mass range in the suburban locality. The Table 1 summarizes the statistic characterization of 24 hours concentrations from PCIS.

Table 1: The statistic characterization of 24 h concentrations from PCIS

	Radvanice			**Plesná**		
	PM_1	**$PM_{2.5-1}$**	**$PM_{10-2.5}$**	**PM_1**	**$PM_{2.5-1}$**	**$PM_{10-2.5}$**
Average ($\mu g/m^3$)	40.4	3.5	5.1	31.9	3.8	2.4
Median ($\mu g/m^3$)	38.5	3.0	4.1	27.7	2.8	2.1
Min ($\mu g/m^3$)	14.3	1.7	2.2	9.1	0.7	0.6
Max ($\mu g/m^3$)	89.6	10.8	12.2	61.1	22.4	11.3

In-depth aerosol source identification of the intermodal fraction will be conducted with the help of ion chromatography (IC), inductively coupled plasma mass spectrometry (ICP-MS), and transmission electron microscopy (TEM) applied to aerosol samples.

Acknowledgement

The project is supported by the Czech Grant Agency (P503/12/G147) and the Charles University Grant Agency (274213).

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