

Interactive comment on “Analysis of exceedances in the daily PM₁₀ mass concentration (50 µg m⁻³) at a roadside station in Leipzig, Germany” by C. Engler et al.

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Your comment: Are the PM₁₀ mass at UB corrected (normally by 1.3 times), which may lead to the low UB concentrations?

Our response: PM₁₀ mass concentrations at UB were recorded by a TEOM (50°C) until 2008-12-16, and by a TEOM-FDMS instrument afterwards. Both data sets were corrected to the level expected from the reference method (DIN EN 12341:1999, high volume samplers, with filter samples weighed at controlled RH and temperature). The correction is based on a regression model taking into account ambient relative humidity and temperature.

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Your comment: What are the weighing conditions or how is the weighing room controlled?

Our response: For Leipzig Mitte, glass-fibre-filters and for Melpitz quartz-fibre filters were used. The quartz-fibre filters were preheated for 24 h at 105°C. The conditioning time before weighing was 48 h (relative humidity 50(±2)%, temperature 20(±2)°C). The first paragraph on page 15837 was changed into: "The 24 h mass concentrations of PM₁₀ and PM_{2.5} at Leipzig-Mitte and Melpitz were determined by using DIGITEL High Volume Samplers (HVS, Walter Riemer Messtechnik, Germany) (Gnauk et al., 2005). PM₁₀ mass in Leipzig-Mitte and Melpitz as well as PM_{2.5} in Melpitz were available daily, but PM_{2.5} in Leipzig-Mitte only every second day. For Leipzig-Mitte, glass-fibre filters were used. Because the 24 h filter samples of Melpitz were additionally analyzed for daily chemical particle composition considering the main ions (sulfate, nitrate, ammonium, chloride, sodium, calcium, magnesium, potassium) and especially organic and elemental carbon, the use of quartz-fibre filters was necessary. These quartz-fibre filters were preheated for 24 h at 105°C to minimize blank values of OC (Spindler et al., 2010). The conditioning time before weighing was 48 h (relative humidity 50(±2)%, temperature 20(±2)°C). The uncertainty for the gravimetric mass determination is about 1 to 2 µg m⁻³ and for the ion analysis less than 10% (Neusüß et al., 2000; Brüggemann et al., 2005)."

Your comment: In Table 3, the calculation of the probability of exceedances (%) should be mentioned in the text.

Our response: Actually, it was mentioned in the text but the labeling was misleading. On page 15847, the following sentence was added/changed: "The occurrence rate of each cluster is calculated as the number of days accounted to one cluster divided by the total number of days (1788). The probability of exceedance days is calculated as the ratio of exceedance days to all days belonging to one cluster (see Fig. 8c; stars to columns). With other words, it is the probability of an exceedance if the weather condition of this cluster is occurring."

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Your comment: In Figure 7, the results showed are at the RB, not at the UB stated. Figure 7 indicate that the data is for urban road (UR), but in the text on page 15843, line 14 it mentioned the regional background (RB).

Our response: The results shown are from the RB site. But the definition of exceedance and non-exceedance days was according to the concentrations at the UR site. Figure 7 and the figure caption were changed to make this clearer: "Chemical composition of rural background PM₁₀ for each season and (a) exceedance days at roadside and (b) non-exceedance days at roadside."

Your comment: In Figure 7, high concentrations of Cl in winter may relate to road salt during severe weather conditions (?).

Our response: For the Melpitz site, we found ourselves unable to detect any influence of re-emission of road deicing agents as relevant elevated magnesium concentrations for the rural background site at exceedance days in winter (compare Figure 7). The amount of magnesium is comparable for the winter and summer seasons (0.48 and 0.4 $\mu\text{g m}^{-3}$, respectively). Magnesium can be used as tracer for street deicing, because it is not affected by an exchange with other species during transport and background sources are relatively equal distributed. In long-time measurements (Spindler, et al. 2010) was found that Melpitz is only dispensable influenced by reemissions from street deicing since roads are relatively far away from this site.

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