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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Trace metal characterization of aerosol particles and cloud water during HCCT 2010" *by* K. W. Fomba et al.

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Specific Comments Discussion Paper

1. Page 10903, line 21, and further within the manuscript: Here it said that polycarbonate foils were used in the impactors. Later, it becomes polycarbonate filters (thus with pores). Were it foils or filters and if it were filters what was the pore size? Also,were the aluminum foils and polycarbonate foils/filters coated with a grease? If not, was there no danger of particle bounce off?

- The word polycarbonate filters has been replaced with polycarbonate foils throughout the manuscript. In the case of this experiment, there was hardly a risk for particle bounce off since the relative humidity was rather high . Corresponding sentence has

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been added on page 5 lines 5-8 which reads:

“For the regulation of the humidity, seven parallel tubes were used after the isokinetic inlet to regulate the relative humidity to approx. 80 % via heating/cooling of the tubes. This was done in order to avoid water condensation on the impaction substrates under very humid conditions during cloud appearance at Mt. Schmücke and also to avoid particle bounce off during very dry conditions.”

Nevertheless, the application of grease would interfere with our chemical analyses and, thus, this was not done for our impactor sampling.

2. Page 10905, line 8: Acronyms and abbreviations (here DI) should be defined (written full-out) when first used. Presumably, DI stands for deionized.

- Deionized water has been defined

3. Pages 10906-10908, section 3.1: The data from the current study are compared with data from a few other rural sites, but several more data sets from rural sites in Europe are available. Under References below, I list a number of publications from the past ten years, which contain aerosol trace metal data for rural sites in Europe. Why is no comparison made with those data? On which basis were the data sets and rural sites selected that were used for the comparison?

- The suggested references have been incorporated into the discussions and the comparisons to the obtained concentrations of this study have been done. In addition, Table1 has been updated to list most of the references during the past 10 years. The text has been changed accordingly on Page 8 lines 8-31 and now reads:

“For trace metals such as Cr and Zn, their mean concentrations were higher than those reported at Boccadifalco, Italy (Dongarra et al., 2010), Puy de Dôme, France (Vlastelic et al., 2014) K-Puska, Hungary (Maenhaut et al., 2008), Monte Cimone, Italy (Marenco et al., 2006) Monte Martono, Italy (Moroni et al., 2015) and at Auchencorth (UK) (Allen et al., 2001) although in the case of Zn the average concentration was comparable with

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that observed at Castlemorton (UK) (Allen et al., 2001) but lower than that reported at the, Schmücke (Rüd, 2003) and at Bertiz, Spain (Aldabe et al., 2011). However, the concentration ranges were similar to those reported by Rüd (2003). Trace metals such as Sr and As showed comparable average values and ranges to those reported at other rural sites in Italy (Dongarra et al., 2010; Allen et al., 2001; Hueglin et al., 2005), UK and Switzerland as well as at Bertiz (Aldabe et al., 2011) and Diabla Gora, Poland (Rogula-Kozlowska et al., 2014). Se, Rb, mean concentrations were lower than those reported at Bertiz, Spain (Aldabe et al., 2011) and Puy de Dôme, France (Vlastelic et al., 2014). For trace metals such as Ti, Co, Fe, Ni, Cu, Pb, the mean concentrations were lower than those reported in the above stated sites except for Fe and Cu which were higher than the values reported at Bertiz, Spain (Aldabe et al., 2011) and at Hyytiälä, Finland (Maenhaut et al., 2011), respectively. However, the concentration ranges of these metals were within the same order of magnitude as those reported at the other rural sites. The lower average values obtained during HCCT-2010 than those reported at other rural sites are likely due to the different geographical settings of the sampling sites and the different particulate matter size ranges sampled at some of these sites. The measurements at the UK sites were based on total suspended particulate matter (TSP) while the measurements at Payerne in Switzerland (Hueglin et al., 2005) and the measurements from Rüd (2003), Puy de Dôme (Vlastelic et al., 2014), (Vlastelic et al., 2014) K-Puska (Maenhaut et al., 2008) were done on PM10 particles and those during HCCT-2010 on PM3.5 particles."

4. Pages 10913-10914, section 3.3: Although it is also stated in some other publications that "an enrichment factor above 10 is considered as a significant enrichment", deducing from it that "enrichment factors between 0.70 and 10 are considered to be similar and within the error range of the reference source, implying that the elements with such factors might have originated from a similar source" is in my opinion not justified or at least grossly exaggerated. To my feeling, it should be "between 0.70 and 2" or at most "between 0.70 and 3" in the above statement. Also, there are no literature references given for backing up the above statement in the manuscript.

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- This was an overestimation. The sentence has been changed on page 14 lines 22-25 to now read:

“Enrichment factors between 0.70 and 2 are considered to be similar and within the error range of the reference source, implying that the elements with such factors might have originated from a similar source while enrichment factors between 2 and 10 are considered to be moderately enriched”

5. Page 10929, Table 2: Acronyms and abbreviations (here LEV) should be defined (written full-out) when first used. Presumably, LEV stands for levoglucosan. There is actually no need for this acronym as it not used elsewhere in the text.

- We agree, LEV has been changed to Levoglucosan

6. Pages 10933-10935, Figures 2-4: The symbols and text in these figures are too Small

- Figures have been changed and the text and symbols sizes have been increased.

7. Problems with references:

Page 10918, lines 4 and 13: “Schwanz (1998)” is not in the Reference list. There is “Schwanz et al. (1998)” in that list, to which no reference is made within the text.

- This reference has been edited and now appears correctly.

Page 10922, lines 26-27: There is no reference made within the text to “Desboeufs et al. (2001)”.

- Desboeufs et al has been removed from the reference list.

Page 10928, heading of Table 1: “Hueglin et al. (2011)” is not in the Reference list.

- This reference has been changed to Hueglin et al. (2005)

Page 10930, footnote for Ref. E: “Wrzesinsky et al. (2000)” is not in the Reference list; there is “Wrzesinsky and Klemm (2000)” in that list.

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- The footnote reference has been changed to Wrzesinsky and Klemm (2000)

8. Technical and other minor corrections:

p. 10900, l. 3: Replace “were performed” by “was performed”. Replaced

p. 10900, l. 25: Replace “mark increase” by “marked increase”. Replaced

p. 10902, l. 4: Replace “have been observed” by “has been observed”. Replaced

p. 10902, l. 5: Replace “have also been” by “has also been”. Replaced

p. 10902, l. 22: Replace “(Tilgner et al., 2014)” by “Tilgner et al. (2014)”. Replaced

p. 10903, l. 11: Replace “(Tilgner et al., 2014)” by “Tilgner et al. (2014)”. Replaced

p. 10905, l. 25: Replace “influence by” by “influenced by”. Replaced

p. 10906, l. 8-9: Replace “(Oktavia et al., 2008)” by “Oktavia et al. (2008)”. Replaced

p. 10906, l. 23: Replace “(Rüd, 2003)” by “Rüd (2003)”. Replaced

p. 10907, l. 22: Replace “and those” by “than those”. Replaced

p. 10908, l. 1: Replace “(Rüd, 2003)” by “Rüd (2003)”. Replaced

p. 10909, l. 2: Replace “easily loss” by “easily lost”. Replaced

p. 10910, l. 12: Replace “have been” by “has been”. Replaced

p. 10910, l. 14: Replace “(Schmidl et al., 2008)” by “Schmidl et al. (2008)”. Replaced

p. 10910, l. 24: Replace “metals may” by “metals that may”. Replaced

p. 10910, l. 25: Replace “or are simply” by “or is simply”. Replaced

p. 10913, l. 25: Replace “mostly present in the coarse mode as in” by “more present in the coarse mode than in”. Replaced

p. 10915, l. 25: Replace “China, (Guo” by “China (Guo”. Replaced

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p. 10915, l. 26: Replace “(Wang et al., 2014)” by “Wang et al. (2014)”. Replaced

p. 10915, l. 29: Replace “influence hence” by “influence, hence”. Replaced

p. 10916, l. 24: Replace “Fig. 7 below” by “Fig. 7”. Replaced

p. 10918, l. 21: Replace “and 2 above” by “and 2”. Replaced

p. 10919, l. 4: Replace “and Cr,” by “and Cr”. Replaced

p. 10919, l. 16: Replace “Mn, in” by “Mn in”. Replaced

p. 10919, l. 22: Replace “Cr, concentrations” by “Cr concentrations”. Replaced

p. 10920, l. 26: Replace “year ago” by “years ago”. Replaced

p. 10928, heading of Table 1: Replace “UK) Ref 5” by “UK), Ref 5”. Replaced

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Interactive comment on Atmos. Chem. Phys. Discuss., 15, 10899, 2015.