

Comments to “A Preliminary Assessment of the Impacts of Multiple Temporal-scale Variations in Particulate Matter on its Source Apportionment” by Peng et al.

General comments:

This study conducted a preliminary assessment of the impacts of multiple temporal-scale variations in PM data (using Kolmogorov-Zurbenko filter) on chemical species and source apportionment results, and tried to determine what processes/sources are responsible for the main variation characteristics. The method in this manuscript might be useful in the future PM source apportionment and air pollution studies. However, there are a few questions that are needed to be addressed before considering an acceptance of this work by Atmospheric Chemistry and Physics.

1. The authors should clarify the physical meaning of the four different TS components.
2. The authors should further clarify the different results from Figure 1 and Figure 2. For example, as shown in Figure 1, it seems that only variations of secondary inorganic species (e.g., SO_4^{2-} , NO_3^- , NH_4^+) are more influenced by baseline TS component, and the relative influence by synoptic TS component were higher compared to baseline TS component. However, the results indicated by Figure 2 show that baseline TS component dominates the concentrations of $\text{PM}_{2.5}$ and chemical species.
3. The different source profiles obtained from ME-2 look not quite good in the source apportionment results part. For example, chemical species profiles for coal combustion and vehicle emissions look quite similar both in Figure 3 and Figure S6; and there are high OC fractions exist in the “Nitrate source”. The authors should verify their source apportionment results and give more robust results and explanations.
4. The authors should carefully check their manuscript. There are some mistakes and inconsistencies in the context and figures. Grammar modification is needed.

Specific comments:

- 1) Page 4 Line 55: change to “such as local emission sources and weather conditions”
- 2) Page 4 Line 78: change “key drivers” to “one of the key drivers”?
- 3) Page 9 Line 158-172: please clearly definite the abbreviations, such as Q_{main} , Q_{aux} , a_{kj}
- 4) Page 10 Line 185: The authors should clarify what m values (the length of the moving average window) they used and what should be considered.
- 5) Page 10 Line 186: Grammar mistakes. Please revise the sentence “Then the y_t as the input data and calculate according to Eq.(6).”
- 6) Page 10 Line 190: Grammar mistakes. Please revise the sentence “ $y_t(k)$ is removed the variations that frequency lower than w (cutoff frequency)”

- 7) Page 11 Line 202: change “was” to “were”
- 8) Page 11 Line 202: Please give more descriptions on Figure S1. For example, what do the color bars and black lines represent?
- 9) Page 11: please clarify why different lengths of the moving average window (e.g., 3, 13, 103) were used in the X(intra-day), X(diurnal), and X(synoptic) calculation. And how was the w value determined? What about the criteria?
- 10) Page 14 Line 268: Remove the word “had”.
- 11) Page 14 Line 280 and 282: Please show the data/figure for other elements in the table/figure in the manuscript or in the supplementary materials.
- 12) Page 15 Line 293: delete “s” in the word “contributions”
- 13) Page 15 Line 297: add “e.g.” before “NO₃”
- 14) Figure 2: Please revise the sentence “Presented are box plots of individual chemical species from the original, RI, RD, RS, and RBL datasets.”
- 15) Table S3: Please definite the abbreviation “Q_{the}”
- 16) Figure S3: Please revise “BL” to “RBL”
- 17) Page 17 Line 337: Remove comma after “Fe”
- 18) Page 17 Line 346: It should be “RBL”, but not “BL”
- 19) Page 17 Line 345-347”: Please further explain why “the precision of results from RBL dataset is the best than other four runs” with “slop and r values (larger than 0.89 of all species close to 1)”
- 20) Page 18 Line 358-362: The context about results for RD and RS dataset are not consistent with those shown in Figure 3. Please check Figure 3 and the figure caption.
- 21) Figure S4: The vertical gray lines didn’t correctly present the heavy pollution period selected “from 30 July to 4 August 2014” (see Line 427 on Page 21)
- 22) Table 3: Please clarify the data in the parentheses and outside the parentheses.
- 23) Page 23 Line 461: Please change “BL” to “RBL”, and check other places. It seems the authors used “BL” incorrectly in the last part of the manuscript...
- 24) Page 23 Line 470: Please change “same” to “similar”
- 25) Page 24 in the conclusion part: Please use uniform and consistent abbreviations for “baseline removed datasets”, e.g., “RBL”, “RB”, “BL”.