

We thank referee #3 (RC3) for the thoughtful review of our manuscript and the constructive comments on how it could be improved. Our responses to the comments and the resulting revisions to the manuscript are listed below.

**General Comment:** Our initial submission already provided some qualitative comparisons with previous similar studies. More quantitative comparisons are difficult considering the large differences between what has been done in the current study versus previous source apportionment studies discussed in the Introduction Section. Nevertheless, we have attempted to include additional discussion on other similar studies, including the EMEP study suggested by the referee. Three new references are cited, and the text in Sects. 1 and 4 has been updated accordingly.

**Specific Comments:**

All comments have been addressed in the revised manuscript:

- 1) Sect. 2.1 has been revised to provide additional details on the boundary conditions and 2 new references are cited.
- 2) The first part of this comment has been addressed in the response to General Comment 1) from RC1. The second part of this comment has been addressed in the response to General Comment 3) from RC1.
- 3) The first part of this comment has been addressed in the response to General Comment 3) from RC1. For the second part of this comment, our analysis of the boundary condition contribution to  $PM_{2.5}$  in Minsk and Kiev indicates that over 60% of the contribution is from primary fine crustal material. The text in Sect. 3.2 has been revised accordingly. The third part of this comment is addressed in our response to the General Comment above. For the fourth part of this comment, we have added a sentence to the first paragraph of Sect. 2.3 to provide more information on how PSAT can track multiple source contributions.

**Minor Comments:**

- 1) The reference is to Collet et al. (2014), not Colette et al. 2014, and the reference was included in the initial submission: "Collet, S., Minoura, H., Kidokoro, T., Sonoda, Y., Kinugasa, Y., Karamchandani, P., Johnson, J., Shah, T., Jung, J., and DenBleyker, A.: Future year ozone source attribution modeling studies for the eastern and western United States, *J. Air Waste Manage. Assoc.*, 64, 1174-1185, 2014". No change was made for this comment.
- 2) Sect. 2.2.1 has been updated to define correlation.
- 3) Figure 1: In response to the reviewer comment, the figure has been modified to show the cities considered for the source attribution analysis.
- 4) Figures 3-5: These figures have been revised as suggested by the referee, but have now been moved to the Supplemental Section to accommodate the additional analysis, tables and figures requested by RC1.