

## ***Interactive comment on “Source Apportionment of Carbonaceous Aerosols in Beijing with Radiocarbon and Organic Tracers: Insight into the Differences between Urban and Rural Sites” by Siqi Hou et al.***

**Anonymous Referee #1**

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The title of this paper accurately describes its content. Measurements of the C14 content of 25 daily samples of PM2.5 collected at an urban site within Beijing and a rural site to the north of Beijing in both summer and winter were combined with OC, EC and organic tracer data to estimate contributions of different sources to the carbonaceous material within the PM2.5 samples. The method follows that applied to similar datasets of C14, OC-EC and tracer content of PM samples elsewhere. The work here extends the sources in the apportionment to include estimated contributions from cooking and a partitioning of biomass burning between wood and straw.

C1

The general methodology requires certain assumptions about the number (and/or pre-dominance) of certain contributing source types and on the generality of ratios of, for example, OC-to-EC or levoglucosan-to-OC, to yield the quantitative apportionment. The sensitivity of the conclusions of the quantification to these assumptions can be investigated using sensitivity calculations. In this work, the quantitative source apportionment was also compared against a chemical mass balance model. The two approaches agreed well aside from the cooking aerosol.

This work has been very carefully undertaken. The descriptions of the methods and of the interpretation of the data analyses are comprehensive and clear. The overall presentation quality of the manuscript is excellent. Likewise the depth and appropriateness of citation to previous work.

As well as providing novel insight into the source apportionment of the carbonaceous fraction at the sampling locations, the paper provides useful methodological approach for this sort of source apportionment.

I have a couple of general comments and only a few technical comments.

The first general observation is the really remarkably low spread (as represented by what is presumably a standard deviation) in the source proportion percentages, for example in the standard deviation of OCbb percentage for a given site and season, given the range in absolute PM2.5 concentrations. I might have expected that different sources would contribute proportionally greater or lesser to the carbonaceous PM2.5 as prevailing meteorology caused absolute PM2.5 concentrations vary. The discussion in the paper doesn't discuss within-season/site variability (or lack of) but only on between season/site variability.

The second general comment concerns statements in lines 152 and 156 that a value of 1.10 is applied to derive a fraction contemporary for EC under the assumption that the biomass burning is the only non-fossil source of EC. Whilst it is okay to assume that biomass burning is the only (or overwhelmingly dominant) non-fossil source of EC,

C2

surely the appropriate correction factor depends on the age assumed for the biomass contributing to the EC?

Technical comments

L152: Should fM read fNF,ref here?

L158: Are the proportions stated here of 0.9 for biogenic and 0.1 for biomass burning the wrong way around?

L205: Use singular 'representative' here.

Figure 1 caption: The caption has 'left' and 'right' the wrong way around. Also add the respective years for the summer and winter dates.

Figure 2 caption: State the year for the summer and winter dates.

Figure 3 caption: Define LG, MN and GA in the caption. Also, correct 'LG/MA' to 'LG/GA'.

Figure 4 caption: change 'versus' to 'add'; the figure is not plotting one variable versus the second.

Figure 5: sort out the text that describes what is plotted in p

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