

## ***Interactive comment on “The characteristics of atmospheric brown carbon in Xi’an, inland China: sources, size distributions and optical properties” by Can Wu et al.***

### **Anonymous Referee #3**

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This study characterized brown carbon including extracted mass using methanol and water, and PAHs, Oxy-PAHs etc., composition analysis for size-segregated particles collected during winter and summer period in Xi’an. Brown carbon has significant impacts on radiative forcing and regional climate, and receives growing interests during the past decades. Studies on abundance, temporal variations, possible sources, ect., of BrC is essential for a better understanding on impacts of carbonaceous aerosols in environment on air quality and climate, and vital for air pollution controls. My main questions on this study are:

Line 46, for correlation analysis, use  $r$  instead of  $R^2$ . Please correct and revise through-

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out the manuscript

Line 56, pay more attention to the significant figures

Line 63, “a small fraction”- do you mean the mass fraction? Giving high OC fractions in carbonaceous aerosols, and probably high abundance of BrC to total OC, its mass fraction might be not “small”, although so far it is still unclear about its mass as there is only an operationally defined term, and mass differs when using different extraction methods.

Lines 102-105, better to move this part ahead to the beginning of paragraph

Line 112, “12-hr” – only daytime, or both day and night samples were collected?

Line 160, provide methods in quantification mass of WSOC and MSOC

Line 172, why not “300-880nm”?

Line 195, start a new sentence “similar phenomena. . .”

Line 198 “mainly”- the relative contribution of primary and secondary sources for OPAHs and nitrophenols is still unclear so far. But my opinion here is that the word “mainly” here might be inappropriate. Also, the authors may provide some past emission studies on OPAHs, nitrophenols, and PAHs here. The cited study here was insufficient to support the statement.

Lines 201-203, but the question is that these chemicals comprised only a small mass fraction of BrC or OC, so the light absorption of BrC could be attributed to other components, although currently there is a big gap in this area.

Line 205, a few past studies indicated that in some area especially in north China, coal burning could be an unignorable source of LG as well.

Line 216, “open biomass burning”

Line 233, is it possible that BrC compositions differed among these sites, resulting

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different absorption efficient? “BrC pollution is more significnat”- is a little hard to understand.

Line 237, “OC” or “MSOC”?

Line 254- any evidence or past studies to support this?

Lines 293-317, while interpreting these results, I'd like to suggest to paying more attentions to the uncertainties in both Mie theory calculation as well as experimental methods, and difference in difference extraction approaches. The 30% difference may be not a “significant underestimation”.

Line 347, delete “which is also called black carbon”

Line 411, did the authors calculate AAE for this fraction(source) separately? Please clarify.

Figure 6- suggest to improving quality

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