

Interactive comment on “Assessment of carbonaceous aerosols in Shanghai, China: Long-term evolution, seasonal variations and meteorological effects” by Yunhua Chang et al.

Anonymous Referee #1

Received and published: 11 May 2017

This manuscript presents a statistical analysis of long-term measurements of carbonaceous aerosols in Shanghai, China. Temporal and spatial variations of OC and EC concentration were investigated according to the observation results with reasonable scientific discussions and explanations. I recommend this article to be published after these minor comments as follows are answered properly.

Page 1-2: Please consider rephrasing the abstract. There are too many detailed discussions and general introductions, which make it not convenient to draw the key points from the current study. Please refer your conclusions.

Page 3, line 1-13: Please give proper references.

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Page 3, line 28, Page 4, line 1-2, Page 4, line 3-15: What is the scientific information behind this? Please consider the scientific significance or overview relating to carbonaceous aerosols, no matter the study in China or abroad.

Page 5, line 1-7: Was there short-term analysis of OC/EC measurements obtained from the semi-continuous OC/EC analyzer? What were their findings or the general comparison with your study?

Page 5, line 14: When and where, please specify.

Page 5, line 24-25: Are these emission data for Shanghai or YRD, please specify.

Page 5, line 27: 'urban road network' or 'urban traffic network'?

Page 6, line 8: Please add proper references.

Page 6, line 15: There are actually four OC contents according to four different heating temperatures; have you ever analyzed them separately?

Page 7, line 7: Please add proper references.

Page 7, line 8-10: Please give specific names of all instruments, which measured CO, NO₂ and SO₂ concentration.

Page 8, line 8: Please consider rephrasing the sentence.

Page 8, line 9-10: Please give brief explanations why BPP and PSCF are better than back trajectory analysis in your case.

Page 10, line 5-6: Please rephrase the sentence.

Page 10, line 14-16: Please give references.

Page 10, line 24-25: How is BC measured differently than EC? Please specify. BC is measured based on optical properties, which is light-absorptive EC, hence, it should be lower than your measured EC, please give detail explanation, for instance, did they measure light absorbance using different wavelength laser?. And which earlier studies

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are consistent with your results? Please list them.

Page 11, line 1-2: what kind of different thermal, optical and chemical behavior during springtime as you expect?

Page 11, line 9: Your PM_{2.5} measurement was only started from 2013, so please reword your sentence.

Page 11, line 10-12: This is a scientific article; it is better not only report data. Please give short or brief discussion, even though you give extensive discussions elsewhere.

Page 11, line 15: 56% and 23% of what?

Page 11, line 17-19: Please consider rewording your sentence.

Page 11, line 20: Should primary inorganic aerosol also contribute?

Page 11-12, line 25-end: In a scientific article, it is better not give such massive information and description of the local policies. And I doubt you can conclude that these policies have been ineffective in this study according to your simple observation data.

Page 12, line 8: What does your OC frequency mean in Fig. 4? Please specify in your method part.

Page 12, line 11: Please add references for the discussions on the most severely polluted month.

Page 12, line 11-13: I don't understand your statement here, please reword your sentence and give appropriate explanation.

Page 12, line 19: You concluded previously that the pollution control policies are ineffective; however, here you said the air-cleaning measures are successful. Please be consistent.

Page 12, line 23-25: Please give proper references here.

Page 12, line 29: How was it validated by the evolution of SO₂ concentration, please

specify.

Page 13, line 12: It is really difficult to read Fig. 6, especially each subplot. Please consider replot them. For monthly and seasonal variations, I would suggest a figure plotting the average or medium concentrations of each month or each season during all these years. Then give further discussions regarding to the new figure.

Page 13, line 26-27: I would like to see the comparison of the concentration of OC from different seasons but of the same year.

Page 14, line 19-22: I don't get it. Please reword it.

Page 14, line 25, or Page 35, 37: Please make your figure caption more clearly. Which one is for weekdays and which one is for weekend?

Page 14 line 25 to Page 15, line 9: I suggest you plot the mass fraction of EC and OC in PM_{2.5} or PM₁₀ first and then give the conclusions.

Page 15, line 17 to 24: This paragraph has nothing to do with the explanation of the diurnal patterns of EC and your CO emissions. Or at least it is not written in a clear way to explain your scientific issues here, please consider rewrite it.

Page 15, line 25: The scatter plots of EC vs. CO in Fig. 9 can not confirm that on-road traffic is an important source contributing to EC emissions in Shanghai. You need to cite similar works from others to support your conclusions here.

Page 15, line 27: Where does it show the multi-day build-up of OC for all months in your Fig. 3. Sorry I cannot capture it. Please specify.

Page 15, line 28: I have huge difficulties to read your figures in your manuscript, as the order of your figures are completely messed up. Please consider reorder all your figures in your manuscript.

Page 16, line 5: The increase as you stated could only be observed for the data during fall of 2010 and 2012. As I seen, your diurnal patterns of the OC can vary by seasons

and also by years. The complexity of the diurnal variation of OC, however, suggests the OC you measured were from different sources, both primary and secondary. It is really difficult to estimate only one OC emission source from your current data.

Page 16, line 14: This is actually quite interesting result from Fig. 11a. (Here, again, how could you talked about Fig.11b first, then Fig. 11a? It is difficult to follow.) There is obvious correlation, but not linear relationship. It will be more interesting if you could find out the changes of PM loadings or other trace gaseous concentration at $O_3 > 60$ and $O_3 < 60$, which might support what stated in the following part at current section.

Page 16, line 25: I don't fully agree with you. Higher T does not necessarily mean stronger solar radiation intensity. It also depends on your cloudiness. And at higher T, normally your OC evaporates more, which could not explain what you observed here.

Page 17, line 1-5: Similarly, at low T, the evaporation of OC is slow that it is reasonable to observe a higher OC concentration at low T. However, OC/EC is less than 2, which means the emissions of EC was quite high at those conditions, which you discussed in the next section. Please always combine OC and EC together when you discuss OC/EC ratio.

Page 17, line 6-11: Could that be your primary emissions of EC is high at low T, or winter time, as suggested by your Fig. 9. Please refer the absolute value of EC and CO. And why the WS-dependence of EC concentration is not valid for OC?

Page 17, line 13-20: Please add the correlation coefficient of OC or EC vs. WS.

Page 18, line 5-6: What is your expected reason?

Page 18, line 15: Which urban districts of Shanghai? Should the air mass from SW be your major source for EC?

Page 18, line 19: I am not sure this is fully correct. It is more depending on your back trajectory of the air mass, but not winds from Siberia, as it is quite clean background.

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Page 18, line 24 to Page 19: What does rice-growing areas and biomass burning activity have any relationship with your PSCF or your current section (meteorological effect)? In which area, does the biomass burning occur normally in China, which contributes the EC concentration in Shanghai?

Page 19, line 11: What is the anthropogenic influence you stated here? Please specify. Should biomass burning belong to anthropogenic activity?

Page 19, line 15-line 18: Please consider removing it and giving your scientific understanding of the PSCF you plotted in Fig. 15.

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