

***Interactive comment on* “Characterization and source apportionment of atmospheric organic and elemental carbon during fall and winter of 2003 in Xi’an, China” by J. J. Cao et al.**

J. J. Cao et al.

Received and published: 31 August 2005

Response to Reviewer Comments on Review: Characterization and source apportionment of atmospheric organic and elemental carbon during fall and winter of 2003 in Xi’an, China

Reviewer 1 Comments and Responses

⌋ The 1st paragraph in page 3563: EC and BC are the analytical definitions, and in some air pollution communities EC and BC are not the same species anymore. Please use them appropriately or at least put a sentence to define them clearly. Revised

Full Screen / Esc

Print Version

Interactive Discussion

Discussion Paper

‡ The 2nd paragraph in page 3563: What is the difference between the mineral dust and the dust storm? Generally, dust storm includes mineral particles. Does authors mean the different intensity of their impacts? We try to emphasize the dust particle resuspended from local sources. “Mineral dust” has been replaced by “fugitive dust” in the sentence to make it clear.

‡ The 1st paragraph of section 3.1, page 3566: Generally, the separation of heating and non-heating season is used. Please shortly explain how the seasons used in this study (fall and winter) were separated. Average temperature? We separate the seasons according to the local meteorological characteristics and residential heating season (from the middle of November to the end of February). So the samples collected from 13 September 2003 to 31 October 2003 are considered as fall samples and others are considered as winter samples. One sentence has been added in the 1st paragraph of section 2.1 to explain it. .

‡ Table 1: Please do not show the sum of the sample numbers in the ‘Average’ row. Revised and updated.

‡ End of the 1st paragraph of section 3.1, page 3566: The OC ratio of the highest to lowest value is higher than those of EC. It does not mean that OC was from several sources. A single point source which frequently shifts its impacts can show highly temporal variability. Revised. High variability of OC concentrations may be due to the contributions of different emission sources or the shift impacts of a single source.

‡ The 2nd paragraph of section 3.1, page 3566: Please clarify ‘these’ in ‘Pearson ...of these two series’. “These” has been replaced by “OC and mass”.

‡ The 2nd paragraph of section 3.1, page 3566: The high correlation coefficient does not mean that OC or EC was a major contributor. It only means they are highly correlated. Revised and updated.

‡ The 2nd paragraph in page 3567: ‘remove OC and EC’ should read ‘remove partic-

[Full Screen / Esc](#)[Print Version](#)[Interactive Discussion](#)[Discussion Paper](#)

ulate OC and EC'. Please remove 'however' in the 3rd line of the paragraph. Please replace 'normal day' with 'non-precipitation day'. The paragraph has been deleted.

‡ The 2nd paragraph in page 3567: The sentence 'During precipitation, ...seasons at Xi'an' is not persuasive. Please add more explanation. The paragraph has been deleted.

‡ The 2nd paragraph in page 3567: 'Average OC and EC levels in winter ... in winter' does not make sense. The authors cannot explain that the lower OC and EC in fall precipitation time than winter precipitation time was caused by shorter precipitation in winter. The OC and EC concentrations in non-precipitation days were also lower in fall. The paragraph has been deleted.

‡ The 1st paragraph of section 3.2: The authors are discussing about the regression coefficients, not correlations. Also, it is not persuasive in relating the number of sources with the regression coefficients or correlations. The correlations have been recalculated and replaced. Normally, the correlation of OC and EC is low when multi primary sources contributed to ambient air. The low correlations may reflect the variations of primary sources without considering secondary formation of OC. The descriptions have been revised.

‡ The 1st paragraph of section 3.3: Please show references for the sentence 'The ratio of OC/EC ...carbonaceous aerosol'. Revised.

‡ The 3rd paragraph of section 3.3: The sentences 'From Table 2, ... days' and 'Since the precipitation ... to be low' are not connected to the others in the paragraph. The reviewer could not figure out what the Authors were trying to discuss here. Authors need more works/explanations. The sentences have been deleted.

‡ The 5th paragraph of section 3.3: Please explain in a sentence or two why the measured OC/EC ratios are much different from others, 12.0 vs 2.7 for coal, 60.3 vs 9 for biomass. Again, it is not persuasive that the OC/EC ratio >2 or 8 indicates

[Full Screen / Esc](#)[Print Version](#)[Interactive Discussion](#)[Discussion Paper](#)

number of or specific sources. The sentence “The order of OC/EC ratios for three emission samples in our investigation is consistent with that in literature even though the absolute values are not same.” has been added. The OC/EC ratios depend on the sampling and measurement methods, so it is not easy to compare them with absolute results. In same study, the OC/EC ratio can reflect the changes of primary emissions without considering secondary OC. For example, if all the OC and EC emitted from motor vehicles, the OC/EC ratios can't reached to the values higher than 4.0. The descriptions have been updated.

¶ The 3rd paragraph of section 3.4: This paragraph needs more works. Please show the correlation coefficient for the TCA and PM2.5, etc. Please show the supporting materials for the co-variation between TCA % and precipitation events. The TCA only highly correlated with the low PM2.5 days from Figure 2, so the correlation of TCA and PM2.5 is not good. The “co-variation” descriptions have been deleted. Revised.

¶ The 3rd paragraph of section 3.5: This paragraph needs more supporting evidence. For OP, November has the highest % (about 25 %). What does it mean? Figure 5, especially percentile can mislead readers. Please modify Figure 5 appropriately. The OP is sometime associated with OC1, which reflects the emission of biomass burning. The high OP in November may be ascribed to the contribution of biomass burning. The Figure 5 has been revised.

¶ The 3rd paragraph of section 3.5: ‘In contrast, the ... in China’. Please exclude this sentence or add more explanation about the Pearl River study, how this study is related to current study, etc. Revised

¶ The 2nd paragraph of section 3.6: October and February are not the low period of EC. In Table 1, PM2.5 EC is 13.1 in October, 12.0 in February, and 12.1 in November. The sentence has been deleted.

¶ 19. The 3rd paragraph of section 3.6: Please specify which ones are ‘these coastal cities’ for the readers who are not familiar with those cities. ‘The lower difference for

[Full Screen / Esc](#)[Print Version](#)[Interactive Discussion](#)[Discussion Paper](#)

EC ... residential heating' needs more supporting evidence, such as traffic counting, annual coal consumption, etc. Revised.

└ Line 23 in page 3573: Please explain 'case 0'. Revised.

└ Line 18 in page 3574: Please show the reference of the gasoline motor vehicle profile. In Figure 5, Coal combustion profile also has similar carbon fractions. Revised.

└ Tables 5 and 6: Please use F1, ... instead of PC1, Revised.

└ Line 24 in page 3574: Please explain why OP is different between fall (0.13) and winter (0.67) in Biomass burning. The OP content depends on the concentrations of OC1, OC2, OC3, OC4 and EC1. At present, it is hard to differential the OP from biomass burning or other sources. We identify the factor as the indicator of biomass burning from OC1 contents.

└ Line 16 in page 3575: 48.8 % and 45.9 % do not support that the carbonaceous aerosols are the dominant component of PM2.5. The reason has been depicted in 2nd paragraph of section 3.4. We think 48.8 % and 45.9 % can support that the carbonaceous aerosols are the dominant component of PM2.5.

Reviewer 2 Comment Response.

└ The abnormally high OC/EC ratios could be more deeply commented or questioned -could there be any bias of the TOR/IMPROVE method in such environment (one of the most polluted cities in China, for particles)? - could it be a temperature effect more than a source fingerprint? If so results may point to the ability of coal-derived SVOC to be highly condensable source apportionment based on OC and EC fraction fingerprint should be more prudent due to the matrix effect. We re-measured twenty samples with high carbon contents, the results from different analysis protocols show similar trends. So the high ratios may reflect the variations of primary emission sources. Source appointment of eight carbon fractions present a preliminary result for understanding the relative contribution of major sources, certainly, the accurate result is needed in the

[Full Screen / Esc](#)[Print Version](#)[Interactive Discussion](#)[Discussion Paper](#)

further study.

Interactive comment on Atmos. Chem. Phys. Discuss., 5, 3561, 2005.

ACPD

5, S2320–S2325, 2005

Interactive
Comment

Full Screen / Esc

Print Version

Interactive Discussion

Discussion Paper

S2325

EGU