

Reply for reviewer's questions

All authors would like to thank the reviewer for the constructive comments. These comments will surely improve our manuscript. Below are the point by point the answers to the reviewer comments.

This is an interesting manuscript that describes photo-oxidation of both representative "real" biomass burning organic aerosol (straw) as well as a simpler surrogate containing.

I find the paper hard to follow. This is in part because the written English, while passable, is imperfect. However, the main issue is that there is no clear story beyond "oxidation of WSOC increases the oxidation state" (which is almost guaranteed) and "even a model system from a single fuel is very complex".

We have realized the deficiency in writing and further improved the structure of this paper. The results and discussion include:

3.1 Mass spectral characteristics of WSOC extracts from WSBA samples.

3.2 Mass spectral characteristics of the products from photooxidation of phenolic compounds in the aqueous phase.

3.3 Comparison of the photochemical products of phenolic compounds and the CHO composition in WSOC extracts from WSBA

samples.

3.4 Photolysis of WSOC extracts from WSBA samples

As far as I can tell a manuscript with a more clearly articulated story would be appropriate for ACP, but I am also on the edge of the subject area, and so a reviewer with greater experience with high-resolution GC methods might be more appropriate.

Some general comments:

The "/" in "O/C" really means ratio, so "O/C ratio" is redundant. I suggest writing "the oxygen to carbon ratio (O/C)" once and then omitting "ratio" when subsequently using the abbreviation.

In this study, we write "the oxygen to carbon ratio (O/C)" once and then use O/C or O/C values to replace it .

There is room in the literature for complex analyses of complex systems and we can not always demand an incredibly simple story, but the paper could still benefit from a major re-write to pull the most important themes to the surface.

We have improved the structure of this paper, especially we added Section 3.3: Comparison of the photochemical products of phenolic compounds and the CHO composition in WSOC extracts from WSBA samples.

I do not believe it is appropriate to end the abstract with "accounting for the highly oxygenated nature". Perhaps "contributing to" is warranted but the implication of the current wording is that the contribution dominates, and that has not been demonstrated here.

Done. We use "contributing to" to replace "accounting for" at the end of the abstract.

Specific comments:

Line 252 "is prone for" is not quite right. "is most sensitive to molecules containing polar ..."?

We have rephrased the sentence (see line 279-283).

Line 287 "the all extract samples" ???? Either the authors actually mean "the all-extract samples" or they may mean "all of the extracted samples".

Clarify.

Here we have deleted the word of "all" (see line 318).

Line 290 "the emerged O/C ratios" could be "the measured O/C values" ("values" is appropriate after O/C in my opinion).

Here we use "the measured O/C" to replace "the emerged O/C ratios" (see line 321).

Line 336 "as well as to increased" clashes with the subject "would result in" before, so "to" should be "in".

Done (see line 365).

Line 347 "pathway for the low-volatility" strike "the".

Deleted (see line 377).

Line 532 "experience the similar" again strike "the".

Deleted (see line 582).

Line 543 "aerosols have the potential" the subject is "fraction" so should be "has".

Done (see line 596).

Line 544 "partly account for" is better than the abstract but "contribute to" would be best in both places.

Here and the abstract we use "contribute to" (see line 52 and 597).