

Atmos. Chem. Phys. Discuss., referee comment RC1
<https://doi.org/10.5194/acp-2021-159-RC1>, 2021
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Comment on acp-2021-159

Anonymous Referee #1

Referee comment on "Chemical composition, optical properties, and oxidative potential of water- and methanol-soluble organic compounds emitted from the combustion of biomass materials and coal" by Tao Cao et al., Atmos. Chem. Phys. Discuss.,
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Review of 'Chemical composition, optical properties, and oxidative potential of water and methanol-soluble organic compounds emitted from the combustion of biomass materials and coal' by Cao et al.

The manuscript describes the experimental data of aerosol particles generated by laboratory combustion of coal and biomass. The study mainly focuses on chemical characteristics of organic aerosols. The authors separated organic aerosol to three categories (water soluble, HULIS, and methanol soluble). The segregated samples were measured for UV-VIS, EEM, NMR, and DTT assay. It seems to the reviewer that the measurements were carefully conducted. Compared with the previous studies from the group, the major novelty of the manuscript seems to be the addition of DTT assay. However, the novelty was not clear without checking the references from the group. The importance/significance/novelty of the DTT assay data of the study was not clearly discussed. The reason why UV-VIS, EEM, and NMR measurements need to be concurrently conducted with the DTT assay was not shown. As a result, the manuscript looks like a collection of data, rather than a document which provides a coherent story. A significant improvement will be needed for the manuscript to be accepted by the journal.

The introduction starts with the general importance of brown carbon. Subsequently, the authors describe recent studies on brown carbon from biomass burning and coal combustion, especially those from China. However, it was not clearly discussed what the current knowledge gap is. The authors mention that 'However, few studies have directly investigated the oxidative potential (OP) of BrC emitted from combustion processes.' If

there are already some studies on the topic, it would have been better to discuss the contributions/limitations of the previous research explicitly.

Section 3 (results and discussion) describes the measurement results, and demonstrates that the values were comparable to the previous studies. Although it is always good to see the agreements of the present data with previous studies, the novelty/uniqueness of the present study was unclear. In addition, the section does not discuss the data deeply, although the data obtained by the authors were compared with that from previous studies.

The manuscript contains grammatical issues. It would have been better if a native speaker of English checked it.

Specific comments

L184 'Approximately 5 mg of the BrC fractions (i.e., HULIS, WSOC, and MSOC) derived from BB and CC were dissolved in 500 μ L deuterium oxide and then transferred to a 5 mm NMR tube'

MSOC should contain some water-insoluble fraction. I wonder if all the components of the sample have successfully been measured.

L529 'These results suggested that the primary smoke from BB and CC in this study had a weaker ROS generation capacity than ambient aerosols, which was likely due to the differences in the chemical composition of WSOC in BB and CC smoke particles and ambient aerosols'

I think that it is an important point. Do the authors have any ideas/hypothesis on how the NMR or EEM data could contribute to discussing this point?

