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Comment on acp-2022-460

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Community comment on "Potential underestimation of ambient brown carbon absorption based on the methanol extraction method and its impacts on source analysis" by Zhenqi Xu et al., Atmos. Chem. Phys. Discuss., https://doi.org/10.5194/acp-2022-460-CC1, 2022

Xu et al. examined the influence of solvent selection on brown carbon (BrC) absorption measurements and source analysis for ambient aerosols. Water, methanol, methanol-DCM mixtures, THF, and DMF were tested. Measurement results showed that DMF exhibited the highest extraction efficiency of ambient organic carbon (OC), particularly for low-volatile OC, and DMF extracts also had significant higher light absorption than other solvent extracts. Moreover, the comparison of sources between DMF and methanol extract absorption is very interesting and indicates that the methanol-extraction method will underestimate BrC contributions from non-combustion sources.

The authors suggested that DMF can extract more BrC than commonly used solvents. DMF might be an important solvent for investigating low-volatile OC in the near future. This manuscript provides very useful information for further studies on radiative forcing and sources of organic aerosols, and I recommend the publication of this manuscript in ACP, though I'd like the authors to address some minor specific comments below.

1. In this work, several solvent extracts of ambient OC were measured for light absorption, would the authors consider changing the title to "The dependence of brown carbon absorption on solvent selection and its impacts on source analysis", or something similar to highlight the differences in different solvent extraction methods?

2. Line 31. "However, undissolved OC fractions will lead to underestimated BrC absorption." What is the magnitude of this underestimation? Also, what about the mass? If the undissolved fraction has low light absorption, the underestimation might not be large, right?

3. Lines 41-42, "the light absorption of DMF and MeOH extracts of collocated aerosol samples in Nanjing showed distinct time series. Specifically, what is the difference, and do they have any common temporal patterns?

4. Lines 58-60, "The radiative forcing (RF) of the light-absorbing organic carbon, also termed "brown carbon" (BrC), is not well quantified due to the lack of its emission data and large uncertainties in *in situ* BrC measurements" The secondary formation will also add complexity on RF estimation of BrC. Please mention it.

5. Lines 261-262, "THF based on the two methods for rOC measurements (*section 2.2*) are compared in Figures S1 and S2." Would the authors consider putting these two figures in the main text? They provide very useful information.

6. Section 3.1.2. Is the difference across solvent extraction methods related to the physicochemical properties of OC? If it is true, please state which factors have a substantial influence.

7. Page 13, lines 298–299. "This is because the light absorption of DMF extracts depends less on wavelengths than other solvent extracts (Å ~4.5, Table 2)."

Page 14, lines 339–341. "In comparison to $Å_m$ (6.81± 1.64; Table 3), the lower average $Å_d$ (5.25 ± 0.64, $p < 0.01$) supports that more-absorbing BrC had less spectral dependence than less-absorbing BrC."

In Tables 2 and 3, there seems to be a negative relationship between the MAE and Å values. To illustrate that strong BrC chromophores had less spectral dependence than weak ones, I would suggest showing the relationship visually by plotting MAE vs. Å.

8. Figures 2 and 3. I would suggest the authors to put Abs365, MAE365, and Å on the y-axis.