

Atmos. Meas. Tech. Discuss., referee comment RC2
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Comment on amt-2021-131

Anonymous Referee #2

Referee comment on "Assessment of online water-soluble brown carbon measuring systems for aircraft sampling" by Linghan Zeng et al., Atmos. Meas. Tech. Discuss., <https://doi.org/10.5194/amt-2021-131-RC2>, 2021

Brown carbon (BrC) plays an important role in climate and atmospheric chemistry, but determining the mass concentration and absorption of BrC is still challenging. This manuscript reports the first direct, aircraft-based online measurements of water-soluble BrC in wildfire plumes by three methods based on liquid waveguide capillary cell and different aerosol collection techniques. The three methods are introduced in detail and a comprehensive evaluation of the measurement uncertainties are given. The authors also established new algorithms for the correction of hysteresis effect owing to the retention of liquid on the internal components of the system. This study provides a good example of online water-soluble BrC measurements and is of great value for similar measurement in the future. I therefore recommend the publication of the manuscript on AMT. I only have some minor comments as list below:

L357: The presence of Abs_{700nm} is attributed to BC particles passing through the filter (diameter < 0.22 μm). Since there is SP2 measurement in parallel, it is possible to have an estimate of the BC mass concentration in particles smaller than 0.22 μm. Is it true that a higher R² will be obtained for the correlation between Abs_{700nm} and the mass concentration of tiny BC?

L375: I think the equation given in L379 is always correct assuming an AAE_{BC}=1. Why do the authors use a simplified equation (L381) with larger overestimation for the correction of CSU PILS-LWCC?

L415: The statement is a bit confusing, seems not consistent with Eq. 4.

L390: The correction of hysteresis effect seems to strongly rely on the contrast between measurement in plume with high BrC concentration and in background with nearly no BrC. Is the method also suitable for the correction of BrC measurements with much lower temporal variability in BrC concentration?

Fig. 4C: At 2:05 there is a strong peak of CO. I am wondering why there is no BrC measured.