

This study investigated the emission factors (EFs) and light absorption of carbonaceous components, including water-soluble organic carbon (WSOC), humic-like substances (HULIS), and water-insoluble organic carbon (WISOC), from burning crop residues (wheat and corn). Also, the influences of biofuel moisture and burning conditions on EFs and brown carbon (BrC) absorption were analyzed by using data of modified combustion efficiency (MCE). Although a clear dependence of EFs on MCE values was illustrated, the influence of burning conditions on biomass burning (BB) BrC absorption can hardly be observed or validated. This might be due to the limit in sample number, smoldering combustion conditions (MCE = 0.68 – 0.88), or uncertainties in the calculation of mass absorption efficiency (MAE_{λ}). Before the acceptance to publication, the following issues should be addressed.

1. Page 5, line 137. Why total OC was used to represent the concentration of extracted OC?

In Page 127, it was stated that “total OC was analyzed by a thermal/optical carbon analyzer (Subset Laboratory)”.

These two “total OC” should be different. The first is used to calculate EFs of OC, while the second is derived for MAE_{λ} calculation.

Furthermore, the authors can perform better estimation on extracted OC (or WISOC) mass by measuring residue OC on filter samples after solvent extractions. Then the calculation of MAE_{λ} of WISOC will be less uncertain.

Typically, the residue OC would account for ~10% of the total, and WSOC contributed more than 50% of total OC in this work. Then the inter-sample variability of residue OC will lead to substantial uncertainty on the estimation of WISOC mass and absorption.

2. The dependence of EFs on burn conditions was well illustrated in Figures 3 and 4. But Figure 7d-f did not show any influence of burn conditions on light absorption. Figure 7a-c and Figure 3b-d tell the same thing—smoldering combustion has higher EFs of carbonaceous aerosols.

Page 11, lines 296-297, “Furthermore, the MAE_{365} of WSOC and HULIS emitted from straw burning were slightly higher under less efficient burning conditions (Figures 7d, 7e)”

In previous studies, MAE values tend to be greater under more flaming conditions or higher burning temperatures. The observation results reported here seems not reasonable.

Due to the sample number limit and small variability in MAE_{365} for most observations, the light absorption of BB BrC did not show any dependence on burn conditions.

Page 12, lines 339-342, the final conclusion “Our results suggested that the influence of varied combustion efficiency on the emission levels and light absorption of BBOA

could surpass the differences between biofuel types. Thus, the burning efficiency or combustion conditions should be taken into consideration when estimate the influence of biomass burning.” was not fully supported by the experiments results.