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Interactive comment on "Photo-degradation of atmospheric chromophores: type conversion and changes in photochemical reactivity" *by* Zhen Mu et al.

Anonymous Referee #1

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The manuscript "Photo-degradation of atmospheric chromophores: type conversion and changes in photochemical reactivity" addressed the photochemical degradation of atmospheric COM and a loss of this material of 70% within 7 days of light exposure. The involvement of reactive oxygen species also was addressed. Grammar should be checked and grammatical errors are distracting in reading the manuscript. The presented data does not add a lot of additional information on the photochemical behavior of aerosols. Previous studies described in detail the photochemical kinetics on more relevant SOA. It is not clear to me what the novelty of this paper is and perhaps the authors need to strengthen and highlight better the novel contribution. It also was not helpful to see limited details in the method sections. More specifically, it is not clear to

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Discussion paper

me how the aerosols generated here in the lab resembles similarity to once in the atmosphere. An explanation is needed why the combustion of wheat straw, corn straw, rice straw and wood was chosen to generate aerosols. To elaborate on my assessment, please see more specific comments below:

Actinometry needs to be undertaken to confirm the dose of light in the reaction chamber, otherwise it is not clear what the exposure was according to the geometry and pathlength.

Line 128: what was the dilution factor? Line 134: How many samples were used to create the model? Were water soluble and methanolic samples combined in the dataset to create the PARAFC model? How were the EEMs of the methanolic extract measured?

Line 150: Was is isocratic and at what retention time did TMP elute?

Figure 3: The raw absorbance should be converted to apparent absorption coefficient a, so that it is normalized to pathlength.

Line 220: It is very easy to contaminate fluorescence samples that than show protein-like fluorophores. How did the blank samples compare? Was this protein-like fluorescence apparent in controls? This needs to be carefully addressed so that QA/QC can be assessed.

Line 240: Triplet state of what?

Line 270-280: It is well known that singlet oxygen is photochemically generated and very well correlated to UV-vis absorption, so this all seems to me a generic trend that has been described previously in detail, even in SOA. I am also not convinced that an ill-defined and not quantifiable low-energy 3COM* even exists and less so being the main precursor of singlet oxygen, but of course this is debatable.

Interactive comment on Atmos. Chem. Phys. Discuss., https://doi.org/10.5194/acp-2020-1223,

2020.