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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Photochemical processing of aqueous atmospheric brown carbon" *by* R. Zhao et al.

Anonymous Referee #2

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This is a nice systematic study of the effect of OH oxidation and photolysis on different types of brown carbon (BrC) compounds dissolved in water. The authors have clearly demonstrated using highly relevant model systems that photochemical processing of BrC can lead to significant changes in BrC optical properties on atmospherically relevant time scales. The authors also did experiments with biomass burning aerosols to demonstrate that these types of photochemical processes may be occurring in actual ambient particles, and are not limited to laboratory model systems. I have no major suggestions for improving this paper. It is well written and could be published essentially as is. Only Minor suggestions and corrections are provided below:

2959, line 10: this should be "crucial for"

2959, last paragraph: the model BrC systems described in a series of papers by the Laskin and Nizkorodov groups are also examples of what you call "imine BrC". Please add appropriate references for completeness.

Page 2960, line 10: another study that demonstrated that evaporation promotes formation of imine BrC is Nguyen et al. "Formation of nitrogen- and sulfur-containing light-absorbing compounds accelerated by evaporation of water from secondary organic aerosols" J. Geophys. Res. 117 (2012) D01207.

Page 2960, line 20: The study by Zhong and Jang (1014) on photochemical processing of biomass smoke in a chamber (which you cite later in this paper) should be mentioned here for completeness.

Page 2966, line 8: When defining MAC, provide a formula to show that you are dealing with a bulk (as opposed to aerosol) value. The recommended definition would be MAC = bulk absorption coefficient / material density.

Page 2969, line 24: "dynamic" is not the most suitable word to describe the observations in my opinion.

Figure 3a and Figure 6: these figures would be easier to look at if the spectra were plotted as lines (without markers) as you do in Figure 8a.

Interactive comment on Atmos. Chem. Phys. Discuss., 15, 2957, 2015.