

## ***Interactive comment on “Optical Properties and Aging of Light Absorbing Secondary Organic Aerosol” by Jiumeng Liu et al.***

**Anonymous Referee #1**

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This paper reports laboratory experiments aimed at understanding the formation of brown carbon (BrC) from various VOCs under different conditions. Studies on the evolution (aging) of the BrC formed are also presented. This work is a systematic analysis aimed at helping to interpret a number of ambient studies that showed BrC levels varied between cities with different mixtures of emissions.

The paper is highly relevant and interesting, it highlights the importance of anthropogenic SOA to BrC. I have only minor comments.

Are not many of the VOCs tested and attributed to anthropogenic SOA (eg, re discussions on urban SOA), also produced in biomass burning? If so, I would suggest the results have broader impacts than just what is discussed here.

Line 179: Suggest changing: which likely explains, to: which could explain, . . . I really

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don't know of ambient data supporting Lin et al (2014). For example, Washenfelder et al. (2015, *Geophys. Res. Lett.*, 42, 10.1002/2014GL0624442015) saw no evidence that isoprene SOA contributed to ambient BrC at a remote site in Alabama as part of SOAS where the aerosol is acidic (ie, papers show that it was acid catalyzed isoprene SOA, eg, see Xu et al, *P. Natl. Acad. Sci.*, 112(1), 37-42, 2015).

Last line of section 3.1, (lines 228-230) I think ambient data that includes actual light absorption coefficients are needed to make this statement. The logic of the line is unclear.

In section 3.4, the authors might also want to consider showing changes in the complete spectra, not just changes in absorption at 365 nm. This may prove useful when comparing to ambient data. This could go in supplementary material.

Line 372-373 regarding the discussion that alpha pinene and isoprene SOA produces little BrC. Again I would suggest the authors look at Washenfelder et al. As noted above, there is no evidence for isoprene SOA, but maybe pinene SOA from night-time reaction with NO<sub>3</sub> radical.

Line 385, typo, ranged ?

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