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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Brown carbon absorption linked to organic mass tracers in biomass burning particles" *by* D. A. Lack et al.

Anonymous Referee #1

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General Comments:

This is a very interesting manuscript about correlations between optical aerosol characteristics with chemical biomass burning tracers. However, it would greatly benefit from quantification of the observed correlations and a few minor revisions as detailed below.

Specific Comments:

1) p29130, l15-17: "The linear relationship between MAEPOM-404 nm and f60/f44 suggests that the impact of BrC can be predicted by emissions of f60-related organic matter." This statement is far to general to be based on measurements of emissions from a single fire and fuel type with fairly constant photochemical age. Even the authors

limit the validity of this statement by saying (p29136, l3-4) "The ratio of f60/f44 appears to be a good proxy for BrC absorption (for this fire)."

2) A better description of fuels and fuel types needs to be included beyond referring to Lack et al. (2012b). The only relevant description refers to a “large Ponderosa Pine forest fire “ (p29132, l1).

3) A clear definition of the quantities used to calculate MAE, that is bAbs-404-POM and mPOM, and the measurement methods used, is missing. For example, is mPOM identical to the non-refractory particle mass measured by AMS or has a correction for ammonium nitrate mass been used? Is bAbs-404-POM = (bAbs-404) - (bAbs-404-BC)?

4) Relationships between optical quantities (e.g., EAbs, AAE, and MAE) and f60/f44 are presented in figs. 2-4 and are judged in a subjective and qualitative fashion. For example, the abstract states “AAE showed a good correlation; however, the best correlation resulted from MAE". Section 3.3.2 states “. . .the MAE shows the most robust linear relationship with f60/f44", which is repeated in section 4 conclusions. What criteria do the authors use to judge the quality of these relationships; a correlation coefficient such as R2, or some quantification of robustness? In either case, these judgments need to be quantified with both procedures and quantitative results clearly stated.

Technical Corrections:

p.29131, l2: Insert a comma “,” between “hydrogen cyanide” and “potassium”.

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Interactive Comment