Interactive comment on "Contributions of nitrated aromatic compounds to the light absorption of water-soluble and particulate brown carbon in different atmospheric environments in Germany and China" by Monique Teich et al.

Anonymous Referee #3

Received and published: 29 September 2016

General comments

The authors present quantitative data on concentrations and light absorption contributions of eight nitrated aromatic compounds (NACs) measured in atmospheric particles at five different locations in Germany and China during two different seasons.

Light absorption by brown carbon is an important topic for the overall assessment of the direct aerosol effect; many open questions remain related to the extent and organic compounds involved. The diversity of measurement sites and the comparison of two different methods for light absorption assessment make this study very interesting. The

manuscript is well written. I thus recommend publication after the comments below have been addressed.

Specific comments

The focus is on WSOC and water-soluble BrC. What I am missing is an assessment/estimate of the fractions WSOC/OC and water-soluble BrC/BrC, to get an idea of comparability and validity of methods.

I am also missing a direct comparison of babs, the light absorption coefficient of particles, and Abs, and as well the calculated MAE (why was MAE not calculated for the Aethalometer data, based on babs and total PM mass/total PM organic mass, if available?) At least a comparison plot of the relative temporal evolution of these parameters for the Waldstein (summer) and TROPOS (winter) campaigns is highly interesting from both a scientific and methodological point of view and should be added to the paper (could also be in the SI).

P. 2, l. 14 – 15: With the attention brown carbon is getting in recent years (and in the rest of your introduction) this statement seems too strong here. Add "in global climate models" for specification.

P. 3, l. 3: To my knowledge, Sandradewi et al. (Environ. Sci. Technol., 2008, 42 (9), pp 3316–3323, DOI: 10.1021/es702253m) were among the first to introduce the "Aethalometer model" for the separation of BC and BrC (then traffic vs wood burning contributions). Please cite.

P. 4, l. 9 (compare comment for Table 1 and p. 4, l. 38 - 40): Give time interval for 12h mean.

P. 4, l. 33: How were they determined, based on what criteria? Please add this information.

P. 10, l. 27 – 30: Photolysis can be sink of NP as well.

Technical comments:

The abstract is relatively long and dense. It would profit from a bit of streamlining. Consider moving the sentence on p. 1, l. 34 – 24, to l. 34.

P. 2, l. 14: [. . .] are usually treated [. . .]

P. 5, l. 7: What do you mean by "distributed sources"? Not clear.

Table 1: The alignment of some of the columns is off. Please correct for better readability. Also add the sampling times (now give in Table S2) to Table 1.

Table 2: I suggest highlighting the highest and lowest values in each column/category. The light absorption contribution (in %) is given for NP and NSA individually, but there is not further mentioning of this. I assume NP is the sum of the 6 NP and NSA the sum of the 2 NSA you mention on p. 4, l. 33 -35. This kind of differentiation/grouping is only done in Table 2 – I suggest making that consistent throughout the manuscript. Do A) and B) refer to acidic and alkaline conditions? Please clarify and add this information in the table caption.