**Authors' Response to Reviewer' Comments**

We would like to thank the reviewer for the thoughtful comments and suggestions to improve the manuscript. We address each comment individually below, with the reviewer' comment **in black** and our responses **in blue** and the revised text **in green**.


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 **Response to Reviewer #3:**

This manuscript describes measurements of brown carbon and black carbon contributions to aerosol light absorption at a site near Guangzhou, China. The measured brown carbon light absorption is correlated with organic aerosol (OA) composition measured with an AMS. A multiple regression analysis is used to characterize the relationship between brown carbon light absorption and different types of OA species that were obtained via PMF/ME-2 analysis of the AMS data. This manuscript is well written and the work that is described is good and will be of definite interest to the readers of this journal. I recommend publication after the authors address a few minor comments.

We thank the reviewer for the suggestions. Below is the response to each suggestion.


1.    The authors mention that there is a correlation of brown carbon absorption with N-containing ions. It would be very useful if the authors could provide a table of the N-containing ions that are observed so that they could be potentially used as tracers and checked for in other sites as well.

**Reply:**
Table S2 below shows the N-containing ions and their Pearson's correlation coefficients ($R_p$) between absorption at each wavelength and the DBE of each ion. This table has been added to SI as Table S2.

**Revised text:**
**Table S2:** N-containing ions and their respective DBE and Rp respective with each wavelength

| Ions | DBE | Rp_370 | Rp_470 | Rp_520 | Rp_590 | Rp_660 |
|------|-----|--------|--------|--------|--------|--------|
| CHN | 2 | 0.52 | 0.46 | 0.40 | 0.40 | 0.44 |
| CH4N | 0.5 | 0.34 | 0.37 | 0.32 | 0.34 | 0.41 |
| CH5N | 0 | 0.18 | 0.21 | 0.17 | 0.21 | 0.28 |
| C2HN | 3 | 0.25 | 0.18 | 0.15 | 0.13 | 0.12 |
| C2H2N | 2.5 | 0.51 | 0.45 | 0.38 | 0.38 | 0.43 |
| C2H3N | 2 | 0.46 | 0.38 | 0.32 | 0.31 | 0.33 |

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|---|---|---|---|---|---|
| C2H4N | 1.5 | 0.44 | 0.44 | 0.37 | 0.38 | 0.45 |
| C2H5N | 1 | 0.24 | 0.21 | 0.17 | 0.18 | 0.21 |
| C2H6N | 0.5 | 0.32 | 0.35 | 0.30 | 0.33 | 0.40 |
| C3H7N | 1 | 0.09 | 0.06 | 0.05 | 0.05 | 0.06 |
| C3H8N | 0.5 | 0.36 | 0.42 | 0.36 | 0.37 | 0.43 |
| C3H9N | 0 | 0.47 | 0.48 | 0.42 | 0.43 | 0.47 |
| C4H2N | 4.5 | 0.59 | 0.52 | 0.45 | 0.43 | 0.48 |
| C4H4N | 3.5 | 0.59 | 0.53 | 0.45 | 0.44 | 0.48 |
| C4H5N | 3 | 0.59 | 0.51 | 0.43 | 0.42 | 0.44 |
| C4H6N | 2.5 | 0.58 | 0.51 | 0.43 | 0.42 | 0.47 |
| C4H8N | 1.5 | 0.55 | 0.51 | 0.43 | 0.42 | 0.47 |
| C4H9N | 1 | 0.06 | 0.08 | 0.06 | 0.06 | 0.07 |
| C4H10N | 0.5 | 0.54 | 0.52 | 0.44 | 0.43 | 0.49 |
| C4H11N | 0 | 0.38 | 0.39 | 0.34 | 0.36 | 0.40 |
| C5H5N | 4 | 0.58 | 0.53 | 0.45 | 0.44 | 0.49 |
| C5H6N | 3.5 | 0.55 | 0.51 | 0.43 | 0.42 | 0.48 |
| C5H7N | 3 | 0.56 | 0.51 | 0.43 | 0.42 | 0.47 |
| C5H8N | 2.5 | 0.49 | 0.48 | 0.41 | 0.41 | 0.47 |
| C5H9N | 2 | 0.51 | 0.47 | 0.41 | 0.40 | 0.43 |
| C5H11N | 1 | 0.29 | 0.30 | 0.25 | 0.26 | 0.29 |
| C5H12N | 0.5 | 0.51 | 0.49 | 0.41 | 0.42 | 0.46 |
| C6H6N | 4.5 | 0.49 | 0.48 | 0.40 | 0.40 | 0.46 |
| C6H8N | 3.5 | 0.53 | 0.49 | 0.41 | 0.41 | 0.46 |
| C6H9N | 3 | 0.52 | 0.50 | 0.43 | 0.42 | 0.47 |
| C6H10N | 2.5 | 0.53 | 0.49 | 0.41 | 0.41 | 0.46 |

| | | | | | |
|---|---|---|---|---|---|
| C6H11N | 2 | 0.45 | 0.46 | 0.40 | 0.40 | 0.45 |
| C6H12N | 1.5 | 0.44 | 0.44 | 0.38 | 0.38 | 0.45 |
| C6H13N | 1 | 0.41 | 0.44 | 0.38 | 0.39 | 0.44 |
| C6H14N | 0.5 | 0.34 | 0.38 | 0.31 | 0.32 | 0.37 |
| C7H9N | 4 | 0.51 | 0.50 | 0.43 | 0.42 | 0.48 |
| C7H10N | 3.5 | 0.52 | 0.49 | 0.42 | 0.41 | 0.47 |
| C7H11N | 3 | 0.49 | 0.48 | 0.41 | 0.40 | 0.45 |
| C7H12N | 2.5 | 0.47 | 0.47 | 0.39 | 0.38 | 0.44 |
| C8H14N | 1.5 | 0.40 | 0.45 | 0.38 | 0.38 | 0.43 |
| C8H15N | 1 | 0.35 | 0.39 | 0.33 | 0.34 | 0.39 |
| CHNO | 2 | 0.52 | 0.43 | 0.38 | 0.36 | 0.37 |
| CH2NO | 1.5 | 0.54 | 0.47 | 0.42 | 0.42 | 0.45 |
| CH3NO | 1 | 0.53 | 0.45 | 0.40 | 0.39 | 0.42 |
| CH4NO | 0.5 | 0.52 | 0.45 | 0.40 | 0.41 | 0.45 |
| CH5NO | 0 | 0.52 | 0.47 | 0.42 | 0.41 | 0.45 |
| C2HNO | 3 | 0.17 | 0.08 | 0.07 | 0.04 | 0.01 |
| C2H2NO | 3.5 | 0.51 | 0.46 | 0.39 | 0.39 | 0.43 |
| C2H3NO | 2 | 0.48 | 0.39 | 0.34 | 0.34 | 0.36 |
| C2H4NO | 1.5 | 0.51 | 0.45 | 0.39 | 0.39 | 0.44 |
| C2H5NO | 1 | 0.57 | 0.50 | 0.44 | 0.43 | 0.48 |
| C2H6NO | 0.5 | 0.54 | 0.49 | 0.43 | 0.42 | 0.47 |
| C3HNO | 4 | 0.51 | 0.41 | 0.36 | 0.34 | 0.37 |
| C3H3NO | 3 | 0.56 | 0.47 | 0.41 | 0.39 | 0.41 |
| C3H2NO | 3.5 | 0.58 | 0.48 | 0.41 | 0.40 | 0.43 |
| C3H4NO | 2.5 | 0.59 | 0.50 | 0.43 | 0.43 | 0.46 |

| | | | | | | |
|---|---|---|---|---|---|---|
| C3H6NO | 1.5 | 0.54 | 0.49 | 0.43 | 0.42 | 0.48 |
| C3H8NO | 0.5 | 0.40 | 0.44 | 0.39 | 0.40 | 0.47 |
| C4H2NO | 4.5 | 0.55 | 0.46 | 0.41 | 0.40 | 0.43 |
| C4H4NO | 3.5 | 0.58 | 0.51 | 0.44 | 0.43 | 0.48 |
| C7H6NO3 | 5.5 | 0.64 | 0.56 | 0.48 | 0.47 | 0.51 |

2.      The authors do not mention how the N-containing ions are distributed across the various OA components. Are they primarily in the BBOA component or are some also found in the LVOOA as well?

**Reply:**
The reviewer raised an important point. They are distributed within all the OA factors, while the relative contribution is higher in BBOA.  However, as in the signal intensities are already normalized in the PMF analysis, the distribution of these fragments among the OA factors also depends on the mass concentration of each OA factor. This information is shown below in Figure S2 and added to SI as Figure S2.
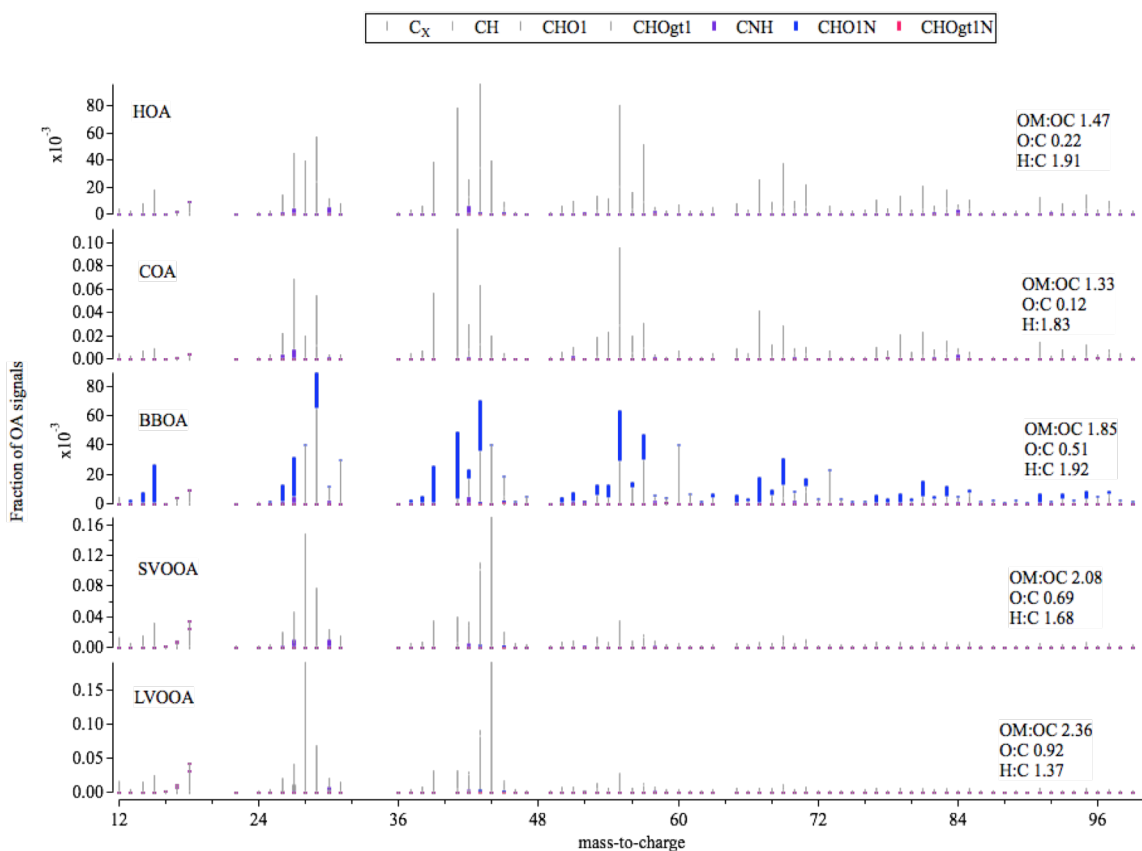
3.       It would be interesting to see the diurnal cycle in the multiple regression analysis results of scattering at one or more wavelengths.

**Reply:**

We thank reviewer for the suggestion. We agree that the diurnal cycle will provide very insightful information.  However, the information with diurnal cycle from multiple regression analysis can be reflected from the loading contribution from each OA factor. The mass absorption coefficient (MAC) for each OA factor is constant across time. In the multiple linear regression, the diurnal variations across different wavelengths bear the same feature with mass loadings of OA factors. The reason is that absorption coefficients are tightly related to the mass concentration of each OA sources (absorption coefficients=MAC*mass concentration).  Nevertheless, this information is shown below in Figure S3 and added to SI as Figure S3.

**Revised text:**
The diurnal variation of absorption coefficients from each OA component and its relative contribution to absorption at 370 nm is shown as follows. Overall, there was no obvious diurnal variation for the absorption coefficients of LVOOA, while there were obvious nighttime and rush hour increases for HOA. The absorption coefficients of BBOA also slightly increased during nighttime and decreased in the mid-day. As these absorption coefficients are tightly related to the

mass concentration of each OA source, they shared exactly the same diurnal pattern as the mass concentration of each OA factors.