

## ***Interactive comment on “Vertical characterization of aerosol optical properties and brown carbon in winter in urban Beijing, China” by Conghui Xie et al.***

### **Anonymous Referee #1**

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This manuscript studied aerosol optical properties at ground level and at 260 m on a meteorological tower in Beijing in the winter. The findings of this paper were mainly that 1) the mass absorption cross-section MAC of BC ( $\lambda = 630$  nm) was strongly associated with the mass ratio of non-refractory BC materials to refractory BC; 2) the MAC of BC increased with the formation of secondary aerosols; 3) brown carbon was a major component to the total absorption. I recommend publication with reference to the following comments.

1. BrC was determined based on the optical property of aerosols, i.e. the difference between the total absorption and the absorption by BC at 370 nm. Then the absorption

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by BrC was apportioned to the OA factors from PMF analysis of AMS data. However, this paper did not discuss the compositions of the BrC. Since HR-AMS can measure the molecular fragments, the authors should also discuss the evidence of BrC from the molecular composition.

2. The authors measured 50 vertical profiles of bsca and babs, but just presented 10 profiles and discuss several ones. Did the other profiles have the same evolution with the discussed ones? The authors should presented all the aerosol optical property profiles and the meteorological parameters, at least in the Supplementary materials.

3. Line 4 in page2: The abbreviation of non-refractory BC as rBC will cause confusion. Rewrite this sentence.

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