

Atmos. Chem. Phys. Discuss., referee comment RC2  
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## Comment on acp-2022-241

Anonymous Referee #2

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Referee comment on "Measurement report: Contrasting elevation-dependent light absorption by black and brown carbon: lessons from in situ measurements from the highly polluted Sichuan Basin to the pristine Tibetan Plateau" by Suping Zhao et al., Atmos. Chem. Phys. Discuss., <https://doi.org/10.5194/acp-2022-241-RC2>, 2022

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Comment on " Measurement report: The first in-situ PM<sub>1</sub> chemical measurements at the steep slope from highly polluted Sichuan Basin to pristine Tibetan Plateau: light absorption of carbonaceous aerosols, and source and origin impacts"

The manuscript gave measurement results of the PM<sub>1</sub> aerosol measurement at the steep slope from the Sichuan basin to Tibetan Plateau. In general, the measurement results are interesting and important to the related researchers. However, the paper was not well written and lack of some logic. Some major revisions were necessary.

Major Comments:

1 This manuscript requires corrections in punctuation, spelling, formatting, and references. Some examples are given in minor comments.

2 The title should be simplified and I can't get the main point of the manuscript from the title.

3 The abstract should be rewritten. The author should give the highlights and potential scientific meaning of this paper, and thus some brief introduction should be removed.

4 As noted on page 4 line 40, their goals are to understand EC or BrC light absorption difference between the highly polluted basins and clean TP and reveal the corresponding mechanisms and provide a basic data set for optimization of regional climate modeling. They give the PMF results of the measurement. However, the PMF results were not discussed in their results. And the discussion of the PMF should relate to the light absorption properties of aerosols.

5 The uncertainties of the method of deriving the BC, BrC, and MAC should be discussed.

6 When considering the primary definition of  $MAE_{EC}$ , it is determined by the core size distribution (emission sources), refractive index (coating chemical components), coating thickness (aging scale of BC), and some other factors. The author gives the relationship of  $MAE_{EC}$  with many inorganic components in figure 6, please give the reason why they also relate the MAE with these factors.

7 In section 3.3, the author gives Regional and long-range transport impacts discussion. How were their results related to the previous sections?

Minor Comments:

1 Page 1: line 19: the "third pole", line 21 less: fewer, line 26 on the east side of

2 Page 8, line 25: this line should be in the introduction part.

3 A table that summarizes the measurement sites (name, location, altitude) should be included in the manuscript.

4 Page 9, line 4: the explanations of the higher OC/EC ratios with the altitude were not convincing. It can also result from stronger EC emissions at lower altitudes.

5 Figure 1: the text and location are not clear, it should be reorganized.

6 Figure 2: EC fraction should be EC absorption. BC fraction should be BrC absorption.

7 Figure 4: The  $R^2$  is not described here. Why not give the  $R^2$  of spring in figure 4(b)?

8 Figure 7: why did the author give the  $R^2$  here?

9 Figure 10 should be placed in the supplement.