

Response to reviewer #2

The authors study black carbon (also called soot) collected in Noto Peninsula, Japan. SP2 was used to evaluate the particle absorption of soot-containing particles under ambient air and through one heater denuder. The study found absorption enhancement have not changed or decrease after the heating process. The phenomenon is contrast to the expectation. The TEM was employed to observe the particles and provided the direct the evidence here. They found that the heating process can make particle charring and brownist which can enhance particle absorption in short wavelength. Finally, the authors suggest the 781 nm was selected to reflect soot coating/shell.

In this study, the authors also characterize the particle CF, AR, and RP. These parameters can indicate soot mixing structure. Also, these results can be used to explain the SP2 results. These results are interesting and improve the understanding the links between soot-containing particle optical properties and mixing state. I would like to make one minor revision before the paper can be published in ACP.

(reply)

We appreciate the valuable comments from the reviewer. We have considered the comments carefully and replies are described below.

P25092 L1 leeward – downwind

(reply)

We have replaced the word according to the comment.

P25097 Eabs should be expressed by on formular

(reply)

We have added the equation to calculate the E_{abs} values.

P25096 L10 what kind of diffusion dryers? After the dryer, what is the air humidity? Please give more description.

(reply)

We have used diffusion dryers with silica gel and the relative humidity in the cell of the PASS-3 was lower than 11% throughout the observation period. We have added the information in the revised manuscript.

P25098 In figure 1, what place can be installed the single particle sampler? Please mark it.

(reply)

The sampling line for TEM analysis was placed downstream of the PM10 inlet. We have added the explanation in section 2.3. The lines for continuous measurement in Fig. 1 and the sampling line for TEM analysis were separated in downstream of the PM10 inlet to stabilize the flow rate of continuous measurement.

P25098 L19-22 where did the authors used the experiments?

(reply)

The sentence was not correct. We thank your comment. In this study, shapes of Pt/Pd shadow were used to discriminate morphological types, but we did not measure the shadow length and particle height. We have corrected the sentence.

P25100 make definition for brownish particles

(reply)

We have replaced the brownish particle with the brownish materials and added the definition at the first appearance, as follows.

“This can be explained by the increase of “brownish materials” by heating. Here, the “brownish materials” are defined as the materials which were generated by heating in the TD and had significant light absorption at shorter visible wavelengths, to distinguish with ambient brown carbon particles.”

Section 3.2 it is difficult to understand the section. I would like to suggest the authors shorten this part. I know that the authors want to make source identification. But I don't think NO_x/NO_y can indicate the air aging because of the complicate the weather during the long-range transport. From the continent to japan over East China sea, the humidity, temperature changed a lot. Therefore, it is better to delete L11-22 P25101. Figure 3b should be removed. Other can be kept depending on the authors.

(reply)

We have removed these sentences in section 3.2 in the revised manuscript, according to the comments. The quantitative estimation of the plume age using NO_x/NO_y data in section 3.3.1 has

also been removed in the revised manuscript.

P25102 “In the present study, no clear negative correlation between the Eabs and the ratio of NOx to NOy was observed, although the Eabs was expected to increase in the aged air mass if BC was thickly coated during transport.” That’s why the authors could find good negative correction.

(reply)

We have removed the sentence in the revised manuscript.

3.3.2 section. Could the authors make more clear structure? For example, type 1 could be one paragraph. And next type 2...

(reply)

We have moved most of the section to SI section according to the comments by Referee #1 and revised the structure of the manuscript.

P25109 L 21 ile?

(reply)

This should be “percentile”. We have corrected the word.

Figure 2, make large clear and large graph.

(reply)

This figure has been revised, according to the comment.