Atmos. Chem. Phys. Discuss.,
doi:10.5194/acp-2016-634-RC1, 2016

Atmospheric Chemistry and Physics Discussions

Interactive comment on "Morphology and Mixing of BC Particles Collected in Central California During the CARES Field Study" *by* Ryan C. Moffet et al.

Anonymous Referee #1

Received and published: 15 August 2016

This study shows mixing states of individual BC particles from relatively fresh and aged samples using STXM. The data is valuable for those who study aerosol mixing states and BC climate impacts. The technique used in this study is unique and includes important information of mixing states of BC, organic, and inorganic matters. The manuscript is well written, and I believe the manuscript contributes to the community.

P: Page L: Line

Specific comments 1: P1L23 "the contribution of fresh BC emissions at the urban site was relatively small". The sentence somehow contradicts to that in P6L17-19 "This result is expected considering that the T0 site is located in a source region for freshly emitted BC particles", P6L31-32 "It is probable that most of the particles sampled dur-

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Discussion paper

ing CARES are substantially aged and/or that the aging time (and subsequent collapse into compact shapes) is rapid" and P7L4-5 "Hence, the presence of more particles with lower convexities is consistent with the presence of fresh emissions at T0.". I suggest mentioning that "aging was rapid" or similar wordings.

2: P3L27: Please briefly describe how inorganic dominant region was obtained from the carbon edge regions in addition to the reference (Moffet et al., 2010). What kind of inorganic was detected here?

3: P3L28: Delete "to" from "to to".

4: P4L6: Please briefly describe how "35%" was used for the threshold. I believe the thresholds in STXM imaging are important to distinguish the materials.

5: P5L6: Please define (or refer the caption in Fig. 3) "OCBC, OCBCIN, OC, IN, INOC" in the main text in addition to the caption Fig. 3.

6: P6L26-27: "suggests that restructuring of the particles to more compact shapes upon transport is negligible" and Figure 5. I suggest discussing how useful to discuss the shape of BC using relatively low pixel size resolution (35 nm) comparing to BC monomer size ($\sim$40 nm). Although the particle in Fig. 1 has fractal shape, most particles in Fig 2 do not show BC branches or BC monomers. I wonder if the BC images in Fig 2 is due to BC restructuring or a lack of image resolution.

7: P7L18: "3.2" should be "3.3"

8: P8L11: "Specifically, the phase of the organic and inorganic material must be considered" and Figures 2 and 7. This comment is a suggestion. In Fig. 2, it looks most BC locate inside of organic matter and outside of inorganic particles. It may be interesting to see if such difference is statistically true using the similar plot of Fig. 7.

9: P10 Figure 1. 9.1: Please add a scale bar. 9.2: In Figs.1C, E and H, the organic matter in E is larger than that in Fig.1C (COOH distribution), especially for particle 1. Is this artificial effect or real distribution? The BC Map (G) also looks similar enhancement

(e.g., images B vs G for particles 1 and 2). I think the choice of threshold relates to this issue. 9.3: Images E, F, and H: When focusing on relatively large inorganic dominant particles (e.g., right upper particle or left bottom particles), I see some inorganic rich inclusions coated by organic. However, in the combined map (H), I do not see such features but see organic only in the rim. Please explain what happen here.

10: P15L4: “see illustration above plot): ”Take out “)” or add “(“.

Interactive comment on Atmos. Chem. Phys. Discuss., doi:10.5194/acp-2016-634, 2016.