

There are some minor issues needed to be resolved before accepting for the final publication. A list is given below:

1. It is strongly suggested that the authors carefully doublecheck the manuscript before submitting the next revision.
2. Abstract: L29, November 14; L32-33, it is not necessary to say "in non-hygroscopic or hygroscopic mode" , I suggest to remove this expression; L36, literature (lower case); L38, concentration (singular).
3. L167, referring to.
4. L190, a mean of.
5. L274 and throughout the whole manuscript, the numbers after "equation" are suggested to be consistent, either in the parentheses or just the numbers.
6. L284, with secondary particles; L286, measurement data; L294, "And" should be deleted.
7. L299, Fig. 2., check throughout the paper. There should be a space between the Fig. and the figure number.
8. L306, corresponds to.
9. L324, for which, otherwise the conjunction which does not have a role in the clause.
10. L332, kSOA values.
11. L337 and throughout the manuscript, literature. Use singular instead of plural form.
12. L348, with those by AE33, data is in plural form.
13. L353-354, what is "electronic devices recording signals" ?
14. L355, were retrieved if applying...
15. L356, given the measurement bias, no "that" in between.
16. L359, 3.1 subsection title is suggested to change to "A comparison and validation of of retrieved mixing state and density of BC"
17. L362, present not presented.
18. L367, that should be deleted, and this is not a clause.
19. L378, Chen et al. (2020).
20. L380, the "," between "using a tandem... SP2" should be deleted.
21. L383, what is "those" being represented? it seems to referring to the mass fraction.
22. L385, coating processes.
23. L388, what is its referring to? BC density or BC, from the sentence, it seems BC density. Suggested to be modified.
24. L390, due to that? What is "that" for? Please delete.
25. L393, lift? rising seems better.
26. L394, with secondary inorganic aerosol.
27. L400, the continuous or the continuing.
28. L404-405, The campaign average values of the bulk and internally mixed BC densities are ...
29. L407, are not void-free spheres.
30. L408, with those observed at other sites...
31. L410, within the range of density from field measurements.
32. L415-416, there is a "," after e.g.
33. L419, as was summarized and ...
34. L422, a peak value at ..., because it is not the peak value.

35. L433, in large biases.
36. L436, same issue as #23.
37. L448, represents the range of BC density in the atmosphere. The lower and upper limits are just two values.
38. L451, delete "And" .
39. L461, much worse than the use of...
40. L462, at night or during nighttime.
41. L465, particles are; delete "And now" .
42. L466, delete ";" .
43. L468, delete "those" .
44. L473, as the fraction of organics is.
45. L480, the reference from Ren et al. (2018).
46. Subsection title is suggested to change to "N_{CCN} prediction based on the real-time variations of BC density and mixing state.
47. Figure 7. Predicted CCN number...
48. L494, what are those periods?
49. L498-499, A better closure at S=0.23% is because the bulk k of particles is closer to that at the critical diameter of 100-150 nm.
50. L504, what is CCN closure? Do you mean CCN number concentrations? Same in L531.
51. L521, range or ranges.
52. L526, The uncertainties of the NCCN prediction are -28 % ~11 %...
53. L529, the variations of BC density.
54. L530, a great significance of accounting for...
55. L541, in future studies.
56. L542, provide more comprehensive understanding of the variations of BC density. Why do you use variability?
57. Assessing not accessing.