

Interactive comment on “Spatio-temporal variability and light absorption property of carbonaceous aerosol in a typical glacierization region of the Tibetan Plateau” by Hewen Niu et al.

Anonymous Referee #2

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This paper reports two-years filter-based measurements of carbonaceous aerosols at two sites a typical glacierization region of the Tibetan Plateau. The dataset provided by this manuscript is important because of the unique location of the experimental site and the profound implication of carbonaceous aerosols deposition on glacier melting. However, I found that some of the conclusions were not solid and lack of sufficient data analysis (or at least relevant reference) support; many of the discussions were superficial and need to be revised. I suggest this manuscript may be accepted for a publication in ACP after the authors could address the following comments . Major concerns: 1. Despite Mt. Yulong and Ganhaizi are special sampling sites, I have not seen much interesting or unique scientific findings. Except providing the basic dataset (numerous

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descriptive words like “high”, “low”, “important”), neither was the dataset analyzed and discussed enough, nor were the conclusions obtained in a solid way. Many statements lack sound evidence or support. Here are some examples: P8, line 2-4; P10, line 17-20; P10, line 28-30; P11, line 13-15; line 23-25; P12, line 2-8; line 21-23; P13, line 27-30; P14, line 2-5; P15, line 25-29. 2. The authors claim that the sampling sites are in a typical glacier region of the Tibetan Plateau; that is not true. The two sampling sites are very close to each other: The Mt. Yulong site is likely a mountaintop site and the Ganhaizi site is located on the foot of Mt. Yulong. In this regard, the title of this MS is apparently overstated because two ground-based measurement sites are not enough to capture the characteristics of “spatio-temporal variability of carbonaceous aerosol”. Two sites are “. . . separated from the urban area, but is an increasingly popular tourist destination, with a geological museum and a golf course. Moreover, there is a spacious parking lot and a tourist dining-center in GHZ.” Local sources may be important as already stated in the text. 3. I appreciate the efforts of a global aerosol-climate model used in the study to quantify the source attribution of BC. However, the model simulation didn’t cover the sampling period of this study, which dramatically diminish the reliability and importance of their modeling work. The authors found that there was a significant inter-annual variation of carbonaceous aerosols induced by emission reduction, I don’t think they a climate model with outdated emission input can be used to infer the sources of carbonaceous aerosols measured in the current work. 4. The current form of the abstract is informative but frequently distract my focus. Please show the readers your most important and exciting findings.

Specific comments: 1. Title: overstated as pointed out above. 2. P3, line 8: missing reference. 3. P4, line 1: specify the “absorbing aerosols”. 4. Line 7: partially correct. 5. Line 13: overstated. 6. Line 17: For BC particles, 7. P6, line 27: specify the number of samples collected at the two sites. 8. P7, line 3-5: this is nonsense if you have no attempt to give more details. 9. Line 9: specify the temperature protocol you adopted. 10. Line 20: the authors suggested different values of (OC/BC)_{min} should be used to estimate SOC for different dataset (pre- or after-monsoon season), but I didn’t see the

discussion about data processing. 11. P8, line 1-4: given that “there is no standard or more perfect method of OCsec estimation (Yu et al., 2007)”, how can you claim that “BC-tracer method employed here is reliable in determining SOC concentrations.” 12. P10, line 29: needs solid evidence. 13. P11, line 9: NCO-P? 14. Line 13-15: needs solid evidence. 15. Line 17: keep a constant significance digit. 16. Line 17-20: lacking of logic. 17. Line 21: the annual average concentrations of OC and SOC. 18. Line 23-25: any solid evidence? 19. P12, line3-5: missing reference or supporting evidence. 20. Line 6: “somewhat” should be avoided as much as possible in a scientific paper. 21. Line 5-8: needs solid evidence. 22. Line 21-26: needs solid evidence. 23. P13, line 18: any reference? 24. Line 25: “apparent spatial discrepancy”?, I don’t think so. 25. Line 28-30: unconvinced evidence. Any reference? 26. P14, line 2-5: I suggest the authors to explore the effects of precipitation on the difference of carbonaceous aerosols mass loadings measured in different years. 27. Line 12-16: I am not sure if these results in previous studies were derived from TSP samples. 28. P15, line 25-27: needs more solid evidences.

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