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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Chemical characterization of long-range transport biomass burning emissions to the Himalayas: insights from high-resolution aerosol mass spectrometry" *by* Xinghua Zhang et al.

Anonymous Referee #3

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In this study, a filed study was performed from April 12 to May 12, 2016 at a high-altitude site (QOMS) in the northern Himalayas using an Aerodyne high-resolution time-of-flight aerosol mass spectrometer (HR-ToF-AMS) along with other collocated instruments, with the target to characterize the chemical composition, sources, and transport mechanism of polluted biomass burning aerosols from South Asia to the Himalayas during pre-monsoon season. As highly-time resolved aerosol measurement in such high altitude regions are very rare and important, the data set provided by this work is thus very valuable. The authors also performed a comprehensive analysis on

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Discussion paper

this dataset, and the findings, conclusions are well supported by such analyses. Overall, the manuscript is also well written and documented. The topic also fits well in the scope of ACP. I thus recommend this manuscript can be published after some revisions. General comments 1. In Fig. 2, the summary of temporal variation of meteorological parameters and various HR-ToF-AMS data are present. Dose all parameters show consistent time solution, e.g., 5-min? Especially f60 values, which shows unexpectedly smooth trend. Please give clear introduction.

2. The average mass contributions of PM1 species during the entire sampling period and as a function of the total PM1 mass concentrations was analyzed in section 3.1.3 and Fig. 3. Organic aerosol and black carbon are the two dominant PM1 species in this study. In addition, the author suggested that organic compounds and BC have been revealed as two dominant components of BB aerosols. However, with the continuously enhancement of pollution mainly due to the biomass burning emissions, why the contribution of BC does not increase as that of organics?

3. In this study, the diurnal variations of all PM1 species showed similar patterns that related with the dynamics of planetary boundary layer (PBL). Is there any measurement of PBL height at QOMS?

4. In the section 3.4.2 or Fig. 9 and 11, the author give the fire hotspots statistics, e.g., number, average and max FRP for each cluster or periods, how did the author calculated? The total statistics for the whole areas (5-55° N, 40-135° E) that you selected or other approach?

5. In the section 3.4.3, you discussed the evolution of BB emission aerosol, it will be very good if you could show behavior of organic nitrate during this period.

6. The author give the identification of the two polluted periods (PP1 and PP2) and two clear periods (CP1 and CP2) in section 3.4.2, however, the initial usage of these distinct periods are in Fig. 2 and section 3.3.1, thus make reader more confuse.

7. Change "transportation" to "transport" in the whole manuscript.

8. Line 43, "...on the environment and climate change in the TPH region since they are very susceptibility to the global climate" changed to "...on the environment and climate change in the TPH since this region is very susceptibility to the global climate".

9. Line 49, "had frequently been observed " changed to "had been observed frequently"

10. Line 64, "south Asia" changed to "South Asia", and similarly anywhere else.

11. Line 213, 387, and 500, "QOMS" was the abbreviation of "Qomolangma Station ", so change "QOMS site" to just "QOMS".

12. A recent study in the TP region can be included in Line 84 of the introduction part (Wang et al., Environ Sci Technol 2017, 51, (24), 14072-14082). In addition, a few new studies and reviews that summarizes the application of advanced AMS techniques can be added in Line 77-83 (Li et al., Atmos. Environ. 2017, 158, 270-304; Wang et al., Environ. Sci. Technol. Lett. 2016, 3, (4), 121-126; Wang et al., Atmos. Chem. Phys. 2016, 16, (14), 9109-9127.)

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