

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 #2

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General comments:

This paper reports for the first time data of PM₁ species observed at the Qomolangma site (a high-elevation site north of Mt. Everest) during a pre-monsoon period using a high-resolution time-of-flight aerosol mass spectrometer (HR-ToF-AMS). Some ancillary data (meteorology, BC, size distribution, etc.) are also presented and analyzed together with the HR-ToF-AMS measurements. Mass concentrations and fractions of PM₁ species are characterized. Impacts from local meteorological meteorology, long-range transport and biomass burning on the variations of PM₁ species are investigated

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and discussed. The measurements are also compared with those from some other remote and urban sites. The results indicate that the PM₁ level at this remote site was not as low as expected. The mass concentration and compositions of PM₁ are found to be influenced by biomass burning plumes that were transported from South Asian countries to the site. Significant biomass burning impacts caused higher fractions of organic aerosol (OA) and black carbon. Oxidation of OA during the transport enhanced the fraction of more-oxidized oxygenated OA (MO-OOA) and aerosol single scattering albedo (SSA). This paper adds new and valuable measurements of aerosol compositions and concentrations from the Tibetan Plateau, one of the less studied key regions. The analysis and the results of this paper are generally sound. The paper is within the scope of ACP and generally well written. I recommend publication of this paper in ACP after revisions. I only have some minor points for the author to consider in the revision.

Specific comments:

- (1) Line 36, the highest altitude of the TPH should be over 8800 m asl but the average altitude is about 4000 m asl.
- (2) Line 43, change “focused on” to “paid to”.
- (3) Line 70, change “heavily” to “mainly” or “exclusively”.
- (4) Line 185, change “The detailed analysis were” to “Detailed analysis was”.
- (5) Line 213, I think “starting” should be changed to “ending”.
- (6) Line 223, deleting “potential”.
- (7) Line 233, brackets are needed for the sigma value.
- (8) Line 235, change “southwest” to “southwesterly”.
- (9) Line 265, a site cannot be both in the southeastern edge and in the central of a region.

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(10) Lines 292-293 and elsewhere, “predicted” means something different. I think you calculated NH_4 and compared it with the observed one. This sentence should be reworded and NH_4+ _pred should be changed to NH_4+ _calc.

(11) Lines 549-550, “Noting the N/C ratio also displayed constantly increased trend at night, probably associated with nitrate radical oxidation”. I feel this is too speculative. You are talking about aqueous-phase oxidation. You have no measurements of nitrate radical in both gaseous and liquid phase.

(12) Fig. 9, are the fire hotspots annual averages or statistics for the measurement period?

(13) Fig. 12, why has the ALWC a unit “moles”?

(14) Fig. 13, if you intend to compare the correlations in different periods or conditions, you compare the some correlations. However, the x-axes are different for different periods. Such comparisons do not make sense.

(15) Figs. S5 and S6, give more details in figure captions.

(16) Fig. S12, you are not using discrete colors, so the color bar is not appropriate.

(17) This paper includes totally 26 figures and many figures contain several plots (partly too tiny to be easily read). When reading the paper, I felt sometimes lost jumping between the text and the cited figures. And I think many figures are not discussed to certain degree. I think the authors should show only figures that are really necessary and discussed them in detail. The presentation of the figures and their order should be improved.

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