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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Chemical characterization of submicron aerosol and particle growth events at a national background site (3295 m a.s.l.) in the Tibetan Plateau" *by* W. Du et al.

Anonymous Referee #2

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The paper entitled of "Chemical characterization of submicron aerosol and particle growth events at a national background site (3295 m a.s.l.) in the Tibetan Plateau" present the first high-time resolution chemical composition measurement in the Tibetan Plateau where the chemical composition and distribution are important factors for evaluating the climate forcing of aerosol. PMF analysis is applied on organic mass spectra and obtains two factors and the results show biomass burning emitted aerosol is an important source for primary and secondary OA. In addition, at this remote area, the paper also shows new particle formation (NPF) events are an important chemical process

and aerosol source. The topic of this paper is interesting and suitable for publication in ACP. I agree this paper for publication after revising following comments and suggestions below. Specific comments: Section 2.1: add several sentences for describing the meteorological conditions of study period, such as air temperature, precipitation, and wind condition. Section 2.2: What is the environment condition for instruments? What is the length of inlet and the size of critical orifice? Because the particle loss can be a problem at the high elevation sampling site, so these issue should be considered. In addition, does the SMPS work well at such high elevation site? Section 3.1, p13524, line 9-14: the chemical composition of PM1 during the two clean periods may reflect the aerosol composition at the free troposphere which the contribution of sulfate were much higher than those non-clean periods, can the author give some explanations for this phenomenon. Section 3.1, P13524 line 25 to P13525 line 4: As illustrated at section 3.4, sulfate can be from the new particle formation (NPF) as sulfuric acid is an important component for NPF. Acidic PM1 particle was also observed at QSS at the Qilianshan Mountain at the northeastern TP which use filter measurement by MOUDI (Xu et al., 2015). Section 3.3: Are the diurnal pattern of these two factors evidently? It is better to show diurnal variations in the Fig. 5 which is useful to support the results of PMF analysis. In addition, it is interesting that the OOA is highly oxidized, but the possible explanations are not given by the authors. The aqueous processes may be an important factor for this highly oxidized OOA because the extremely high RH (seems more than 95% in Fig. 1) during night-time every day. Section 3.4: It is not easy to say which species is the major contribution for NPF using the whole size range aerosol composition. But it is not other better way to get the small size range chemical composition using ACSM. One suggestion is to get some information from single particle composition if these data are available.

Technical comments: P13517, line21: ∼200000 km2 → ∼2000000 km2 P13525, line 20: decreases → decreased to P13526, line 22: large plumes → large peaks P13527, line 25: Figs. 5b and 6 → Fig. 5b and 6; the different correlation → the weak correlation P13528, line10: rationable → rasionable P13528, line25: check the number of 3.9 ug

m-3 P13530, line15-19: “The results . . .. . . this period” is a repeat information. P13531, line7: change → variation P13532, line2: Y. M. Zhang et al. (2011) → Zhang et al. (2011) P13532: line10: 5 September or 4 September

Reference: Xu, J. Z., Zhang, Q., Wang, Z. B., Yu, G. M., Ge, X. L., and Qin, X.: Chemical composition and size distribution of summertime PM2.5 at a high altitude remote location in the northeast of the Qinghai–Xizang (Tibet) Plateau: insights into aerosol sources and processing in free troposphere, Atmos. Chem. Phys., 15, 5069-5081, doi:10.5194/acp-15-5069-2015, 2015.

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