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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Mixing state, composition, and sources of fine aerosol particles in the Qinghai-Tibetan Plateau and the influence of agricultural biomass burning" *by* W. J. Li et al.

Anonymous Referee #1

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General comments:

Because of high altitude and much less populated, atmospheric environment of Tibetan Plateau (TP) is usually thought to be insignificantly affected by anthropogenic activities. Understanding the physicochemical properties of atmospheric aerosols in TP could be helpful for us to evaluate the impact of human activity on climate change and the regional air quality. However, atmospheric aerosol characterization is not so much in the TP area. This paper described the detailed morphology, mixing state and composition of individual fine particles in TP using TEM technique. The authors have analyzed thousands of particles and clearly showed the detailed differences in

morphology, composition and mixing state under different pollution levels. Based on these research results, the authors further discussed the aerosol sources and formation mechanisms. Some of the findings from the current study are interesting and important for readers to understand the characteristics of atmospheric aerosols in TP. Therefore, in my view, this paper could be accepted by the journal after minor revisions.

I noted that one reviewer has pointed out many important points to be revised. Here I will give additional comments below, which should be addressed before the publication of the paper.

Specific comments: (1) Page 24372, line 10-11, here author said "however, aerosols of the vast grasslands of the northern TP have not been studied". It is better to briefly state why it is necessary to characterize the aerosols from the grassland atmosphere, if the physicochemical properties of the grassland aerosols are different from those in other places of TP? Page 24372, line 18-20, what is the definition of age? Why aged aerosols represent the typical chemical composition of this continental background region? If this means that fresh aerosols are very less at the sampling site and most of airborne particles are long-range transported? (2) Page 24373, section 2.1, what is the altitude of the sampling site? This information is important. The density of particles is assumed to be 2 g/cm3, what is the rationale? (3) Page 24376 and 24391, Table 1, it's better to give more data such as the standard deviation, minimum, and maximum values, because data here are statistic numbers; the mean value itself does not give enough information. (4) Page 24377, lines 5-9, the method for classification of the aerosol types should be briefly introduced, which would be helpful for readers to understand why the particles are categorized as fly ash and others are classified as mineral dust. (5) Page 24377, line 6 KCl-NaCl particle. The particle should contain K, Na, and Cl in Figure 4. The authors didn't show the crystalline of the particle. The name should be changed to K-Na-Cl. And line 17 organic carbon should be changed to organic. (6) Page 24378, line 25, 33-36 and 34-48(7) Page 24379, line14 Yak dung, (8) Page 24380, line 18, what the regional property is? Please give more specific descriptions. (9) Page 24380,

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line 19-20, I do not think primary organic aerosols are refractory. In fact, unlike mineral dust and soot, both are refractory, organic compounds in airborne particles can be completely measured by aerosol mass spectrometer and OC/EC carbon analyzer via heating evaporation, although both instruments can not give molecular information. (10) Page 24381, line 10-14, it's better to specifically mark the particles in figures 6, 9 and 10 in order to let readers easily recognize which particle is heterogeneously mixed and which is homogeneously mixed. (11) Page 24383, line 9-11, this sentence is confusing to me. (12) Page 24383, line 4 and other places throughout the paper, the authors emphasized many times that aerosols in TP are highly aged. What does the age mean? Aerosols in TP are highly aged, if this statement means that aerosols in other East Asia regions are less aged? (13) In the Figure 4 and Figure 5, EDS spectra were obtained from the individual particles or their part. The measured part on the individual particles should be marked. Otherwise, it's hard for readers to know the details. (14) In Figure 2/7, equivalent spherical diameter should be equivalent volume diameter.

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Interactive comment on Atmos. Chem. Phys. Discuss., 15, 24369, 2015.