

## ***Interactive comment on “Spatiotemporal variation of aerosol and potential long-range transport impact over Tibetan Plateau, China” by Jun Zhu et al.***

### **Anonymous Referee #1**

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General comments: This manuscript presents a study of the features of aerosols over the Tibetan Plateau (TP), including the distribution of AOD and Extinction Ångström exponent, the types and sources of aerosols. The utilization of sunphotometer measurements (CE318) is effective, which is significant to provide evidence of aerosol properties over the TP. However, some major revisions including content organization are needed. Moreover, improvement in English is needed before the paper can be accepted for publication. Therefore, I recommend publication after the authors address the following issues.

Major comments: 1.The combination of case and long-term study, ground-based and

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satellite observation analysis together with the model simulation including two models need reorganized according to the scientific goal in this study. 2.The reliability of CE318 observation should be described in Section 2.2.1. Though the authors illustrated the errors, the situation of instrument calibration should be described here. 3.What is the reason of “The CE318 observed AOD larger than 0.4 at each site is considered as the aerosol pollution 12 over TP”? An appropriate reference is needed, or the background AOD should be provided. 4.What is the role of GEOS-Chem model? According to the role of model, in the methodology, the details of model description should be shown separately. 5.In Section 3.1, the wavelength of AOD analyzed here should be given. Moreover, the authors analyzed the trend of AOD in Section 3.1, a significance check is needed. 6.What is the purpose of using CLIPSO observation data? 7.What is the relationship between the ground-based and satellite observations? Since the authors have the valuable ground-based data, an evaluation of satellite observation, including MODIS and CALIPSO, can be performed, which is a good basis to get the spatial variation of aerosol properties in Section 3.2. 8.Page 5 Line 43 and 44, the authors think the positive trend of AOD and EAE at most sites over TP is caused by the addition of fine mode aerosol mainly from the anthropogenic impact. However, dust aerosols transported to the TP over long distances also has a small particle radius, causing similar changes. Thus, the authors should also take it into consideration. 9.Figure 3 contains a lot of information, the authors need to indicate whether the values in the paper are the average, median or otherwise. 10.The authors mainly consider the anthropogenic aerosols in Southeast Asia, however, according to some research (e.g., Jia et al., AE, 2015), dust storm also occurs in the Indian peninsula. Can the authors separately estimate the contribution of anthropogenic aerosol and dust aerosol transported to the TP from Southeast Asia? Can the GEOS-Chem gives such evidence? Minor comments: 1.Page 3, Line9-10, what is the meaning of “large scale”? Spatial scale or temporal scale? The sentence need be illustrated clearly. 2.Page 3 Line 10, “satellite remote-sensing method (Li et.” should be “satellite remote-sensing method (Li et.”, in which a space is needed between “method” and “(”. In the whole manuscript, such writing

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problem should be paid attention, for example, Page 3, Line 20, there should be a space between “2007;” and “Xia”, etc. 3. Page 3, Line 27, there is mistake in grammar in sentence “there is an urgent need to. . . .”. 4. Page 4, Line 3, “2.1 site” should be “2.1 Site”. 5. Page 4, Line 6, there is mistake in grammar in sentence “site where can suffer from the local anthropogenic emissions”. 6. Before the unit, there need a space, for example, Page 4, Line 34, “2330km”. 7. Page 5 Line 41 and 42, ‘Mt\_WLG sites’ should be ‘Mt\_WLG site’.

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