

Interactive comment on “Climate modulation of the Tibetan Plateau on haze in China” by X. Xu et al.

Anonymous Referee #1

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Review Comment: In this paper, the observational and modeling studies show a relationship between the haze events over CEC and Tibetan Plateau (TP). I think it is a very interesting paper. It provides a new perspective to investigate the causes of the haze pollution in China. I believe this manuscript is appropriate for publication in Atmospheric Chemistry and Physics and would recommend publication subject to primarily minor revisions outlined below.

1. In this paper, which are the simulation results? Which are the observed results? Please comment on these. 2. How to separate the time series into three phases in Fig.1? How to define the haze event in the figure? Please comment on these. 3. Please give us the more detailed information about CO₂ emission. 4. “In accompany with an unceasing increase in the Chinese pollutant emissions in recent decades, the

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significant interannual variations of haze occurrences in CEC have evolved with the trends of slow ascending from the 1960s to 70s, less changing during the 1980s–1990s and sharply rising with a trend reaching 13.0d/10a going into the 21st century (upper panel of Fig. 1), implying that climate change could also play an important role in the variations of haze events in CEC apart from the anthropogenic dimension of pollutant emission sources related to the rapid industrialization of China.” I think this conclusion looks a little messy. You need to give us more evidence to prove this point. 5. Fig.3: Surface wind speed or wind speed at 10 m? Please check it. 6. Could you give us the information about pollutant emission in lower TP's Q1 (1996,2002) and higher TP's Q1 (1998,2003)? 7. As we known, dust is one of the absorbing aerosols in the atmosphere, which can influence the climate directly by modulating the radiation budget, affect the microphysical properties of clouds, and alter the surface albedo of the ground covered by snow or glacier. TP dust could impact on regional and global climate (e.g., Lau et al., 2006,2010; Huang et al., 2007; Chen et al., 2013). Could you consider the climatic effects of the TP dust in this paper? I am wondering whether there is a relationship between TP dust and haze over CEC. References: 1. Lau, K. M., M. K. Kim, and K. M. Kim (2006), Asian summer monsoon anomalies induced by aerosol direct forcing: The role of the Tibetan Plateau, *Clim. Dyn.*, 26(7-8), 855–864, doi:10.1007/s00382-006-0114-z. 2. Lau, W. K. M., M. K. Kim, K. M. Kim, and W. S. Lee (2010), Enhanced surface warming and accelerated snow melt in the Himalayas and Tibetan Plateau induced by absorbing aerosols, *Environ. Res. Lett.*, 5, 025204, doi:10.1088/1748 9326/5/2/025204. 3. Huang, J., P. Minnis, Y. Yi, Q. Tang, X. Wang, Y. Hu, Z. Liu, K. Ayers, C. Trepte, and D. Winker (2007), Summer dust aerosols detected from CALIPSO over the Tibetan Plateau, *Geophys. Res. Lett.*, 34, L18805, doi:10.1029/2007GL029938, 2007. 4. Chen, S., J. Huang, C. Zhao, Y. Qian, L. R. Leung, and B. Yang, Modeling the transport and radiative forcing of Taklimakan dust over the Tibetan Plateau: A case study in the summer of 2006, *J. Geophys. Res. Atmos.*, 118,2013.

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