

Interactive comment on “ENSO Effect on Interannual Variability of Spring Aerosols over East Asia” by Anbao Zhu et al.

Anonymous Referee #2

Received and published: 13 November 2020

This study investigates the impact of ENSO on the interannual variation of spring aerosols over East Asia. They found that during El Nino year, it is often corresponding the above-normal aerosols and vice versa for the La Nina year. The reason is that during El Nino ensuing spring, the reduced precipitation increases the probability of biomass burning activities in the upstream of East Asia, then the western Pacific anticyclone transports this increased aerosol to the downstream East Asia region. They also compared different types of ENSO and found this effect is mainly from the eastern Pacific ENSO. The result is interesting, and the manuscript is well written. I have some detailed comments and suggestions listed below, but I think minor revision may be enough to address my concerns.

1. Please add line number in the revision in the whole manuscript. This way, the com-

C1

ments can be easily to track where it comes from. 2. Page-2 Line-4: Song et al. (2014) systematically discussed the aerosols effects on the East Asian summer monsoon circulation during the late half of 20th century. Please cite Song et al. (2014) here Song, F., T. Zhou, and Y. Qian, 2014: Responses of East Asian summer monsoon to natural and anthropogenic forcings in the 17 latest CMIP5 models, Geophysical Research Letters, 41, doi:10.1002/2013GL058705. 3. Page-2 Line-5: Dong and Zhou (2014) have quantified the aerosol's effect on the Indian Ocean sea surface temperature trends, belong to the regional climate response you discussed here. Please add this reference here: Dong, L., and T. Zhou, 2014: The Indian Ocean Sea Surface Temperature Warming Simulated by CMIP5 Models during the Twentieth Century: Competing Forcing Roles of GHGs and Anthropogenic Aerosols. J. Climate, 27, 3348–3362. 4. Page-2 Line-11: external forcing mainly means the forcing outside of climate systems. Here, maybe better just use factors. 5. Page-2 Line-27: why are the impacts of strong and weak events consistent? Maybe explain it a little bit from the reference you cited. 6. Page-3 Line-14: what do you mean by "from a climatological perspective"? ENSO is an inter-annual variability mode. 7. Page-4 Line-17: what CPC means? And how the CPC defines the ENSO? Should be more clearly stated. 8. Page-7 Line 20-25: At the same year, Wu et al. (2009) also proposed the similar teleconnection for the connection between preceding ENSO and EASM. Hence, this work should be cited along with Xie et al. (2009). Wu, B., T. Zhou, and T. Li, 2009: Seasonally Evolving Dominant Interannual Variability Modes of East Asian Climate. J. Climate, 22, 2992–3005, <https://doi.org/10.1175/2008JCLI2710.1>. Five years later, this teleconnection was systematically confirmed in CMIP3 and CMIP5 atmospheric-only and coupled models by Song and Zhou (2014a-b) and found as a key for models to well simulate EASM. Hence, these two references should also be included here to complete the physical picture shown here. Song, F., and T. Zhou, 2014a: Inter-annual variability of East Asian summer monsoon simulated by CMIP3 and CMIP5 AGCMs: Skill dependence on Indian Ocean-western Pacific anticyclone teleconnection, Journal of Climate, 27, 1679–1697. Song, F., and T. Zhou, 2014b: The climatology and inter-annual variability

C2

of East Asian summer monsoon in CMIP5 coupled models: Does air-sea coupling improve the simulations? *Journal of Climate*, 27, 8761–8777. 9. Page 9 Line 24: missing a CP before "ENSO (Fig. 4)"? 10. Page 9 Line 27: missing a EP before "ENSO"? 11. Page 10 Line 17: are->is 12. Page 10 Line 31: compared to "activities", I feel the "probability" may be more suitable. 13. Fig. 8: what is the definition of CA mixing ratio? 14. Fig. 11: it seems that the correlation between nino 3.4 index and aodi-ia is mainly determined by el nino event. Do you have any thoughts on this? 15. Fig. 11 caption: withblack->with black

Interactive comment on *Atmos. Chem. Phys. Discuss.*, <https://doi.org/10.5194/acp-2020-859>, 2020.