The authors analyzed the effects aerosol on lightning during daytime and nighttime in the Sichuan Basin and tried to explain the reasons for the differences in the effects. This manuscript has some scientific significance, but there are some major comments that need to be addressed by the authors.

1. There is no outstanding innovation in this paper, including analysis methods and conclusions. The authors are requested to extract the innovative points of this paper in the introduction and emphasize the innovative points in the conclusion, on the premise of adjusting the research content.
2. Line 81. In this paper, the data with 0.5° spatial resolution are selected to discuss the relationship between aerosol and lightning activity in the Sichuan Basin. Is it statistically significant to analyze the data with such rough resolution in such a limited space?
3. It is suggested to use the satellite lightning data to verify the ground-based lightning data used in this paper.
4. Line 95. First, there is an obvious error. The spatial resolution of the AOD data of MERRA-2 is not 0.5°×0.5°, please check and confirm. Since the resolution is not 0.5°, how to match and discuss with other data is a major problem. Secondly, the AOD data selected in this paper are reanalysis data. In the study area, the authors did not compare with the satellite observation and ground-based observation, so it is obviously unreasonable not to verify the availability of the data.
5. Line 105. What is the time resolution of the thermodynamic and cloud-related data selected in this paper? Please clarify. TCIW and TCLW are reanalysis data. Currently, a variety of satellite products provide ice water path and cloud water path, please replace them with satellite observation data.
6. The wind shear is calculated using 925 and 500 hPa latitude and longitude winds, which is approximately from the ground to 5km. What does this kind of wind shear mean for a thunderstorm cloud? Wind shear in the middle and lower troposphere might be considered.
7. Line 134. How could a low-pressure system, which tends to bring rainy weather, cause heavy air pollution? This is very puzzling.

8. In section 3.2, How are clean and polluted subsets defined? When defining the polluted subset, is AOD used on the day of lightning or before the thunderstorm when there is no precipitation? Because of the significant wet deposition of precipitation, it is not reasonable to choose the aerosol on the day of lightning to define the polluted and clean subset.
9. Line 593. the caption does not correspond to the figure, figure b and c.
10. In Figure 4, there is little difference in lightning between the polluted background and the clean background between 13:00 and 18:00, and there is more lightning in the polluted background in the rest of the time. However, it is not rigorous to describe the difference between day and night in the whole paper, because the difference is only seen from the figure between the afternoon and other times.
11. Line 600, Which variable has a spatial resolution of 0.1°? The resolution described in the above data description is 0.5°.
12. In Figure 7b, in period 2 (in red), the fitting line between wind shear and lightning may not be suitable, as it should rise first and then fall. And why the apparent difference in the relationship between wind shear and lightning at the two different period (red and blue)?
13. Line 256, TCL?
14. In Figure 8b, it is generally believed that ice particles directly determine the activity of lightning. In period 1 (blue), lightning has no obvious relationship with ice water. How to explain this?
15. In Figure 8, the authors analyze the relationship between lightning and TCLW and TCIW. But in Figure 9, only TCLW is analyzed, not TCIW. Does lightning depend more on liquid water than ice water? The connectivity and logic here need to be improved.
16. Figure 9c is not well understood. Does it refer to the effect of TCLW on temperature? What is the physical mechanism by which TCLW affects surface temperature?
17. In Figures 11 a and b, lower TCLW corresponds to more lightning in period 1, while this relationship is reversed in period 2. Why does liquid water have opposite effects

on lightning in different periods?

18. In Figure 12, the authors suggest that aerosol inhibit convective activity during the day through ARIs, but in the absence of any evidence presented above, this speculation is unconvincing.
19. The authors attempted to explain the difference between the effects of aerosols on lightning during the day and tnight, using a schematic diagram. The authors suggest that aerosol do not exhibit radiative effects at night. Previous study (Fan et al., 2015) have suggested that in the Sichuan Basin, aerosols make the boundary layer more stable through radiation effects in the daytime, which makes the convection more vigorous at night. The viewpoint that aerosols do not affect lightning through radiation effects at nighttime cannot be accepted.

Fan, J., D. Rosenfeld, Y. Yang, C. Zhao, L. R. Leung, and Z. Li (2015), Substantial contribution of anthropogenic air pollution to catastrophic floods in Southwest China, Geophys. Res. Lett., 42, 6066–6075, doi:10.1002/2015GL064479.

20. The prominent nocturnal convective activity in the Sichuan Basin is mainly due to the relative thermal difference between the Sichuan basin and the Tibetan Plateau and the cold advection from the Tibetan Plateau to the east at night (Jin et al., 2013). The authors should consider these factors in studies to clarify the cause of the aerosol effect on nighttime lightning.

Jin X., Wu, T., Li, L. 2013. The quasi-stationary feature of nocturnal precipitation in the Sichuan Basin and the role of the Tibetan Plateau. Clim. Dyn., 41:977–994.