Responses to the Comments of the Anonymous Referee #2

We very much appreciate the constructive comments and suggestions from this reviewer. Our point-by-point responses to the reviewer's comments are provided as follows (the reviewer's comments are marked in Italic font):

The authors have conducted a very interesting study to investigate the impacts of air pollutants from fire and non-fire emissions on air quality in Southeast Asia. To achieve this goal, they have made use of different sources of data and tools. Overall, I recommend this paper could be published after they have addressed my concerns here.

a) Line 207-211. The model calculates the visibility based on the extinction coefficient of aerosols. The authors neglect the role of relative humidity. Very high relative humidity also leads to low visibility in observations. How will this affect the final result? Can it explain the missing LVD days in the model?

We thank the reviewer for raising this critical point. As indicated in our previous paper (Lee et al., 2017), misty and fog days with high relatively humidity have been removed from the observational based LVDs. On the modeling side, the calculation of visibility is indeed based on the extinction coefficient and by also considering the hydroscopic growth of aerosols as a function of relative humidity. We have added necessary statements in the revised manuscript to make this clearer.

It is possible that due to the model resolution, observed relative humidity might not be perfectly reproduced by the model. There are other factors that could limit the performance of the model to reproduce observed LVDs such as missing critical aerosol components in current emission inventories. We have made our best effort to improve the results by, e.g., using aerosol composition measurements to correct modeled aerosol concentrations. We have revised the manuscript accordingly to indicate these potential issues in modeling LVDs.

b) This paper is too long, with 9 tables and 10 figures. The readers don't need to know so many details. So I suggest shortening this paper quite a lot. In my view, these figures and tables can be moved to the supplement. Table 1. You can just mention it in the text. Table 3. You can cite the website where the readers can find the information here. Table 5-8. Try to move some of them to the supplement. Too many details will distract the readers. Figure 6. The readers are lost when they find so much information in this figure. Figure 8-10. Yes, the machine learning techniques used here are very fancy, but they are not the key points of this paper. There is no need to display three figures to illustrate your ML results. Abstract. This is a really long abstract. I suggest shortening it.

The reviewer's point has been well received. We have shortened the paper in the revised manuscript. Table 1 has been removed. Table 3, Fig. 7 and Fig. 9 have been moved to the supplementary material. We would like to keep Fig. 6, Fig. 8 and Fig. 10 in the revised manuscript to support the points that we discuss in the paper. We have shortened the abstract in revised manuscript.

Lee, H. H., Bar-Or, R. Z., and Wang, C.: Biomass burning aerosols and the low-visibility events in Southeast Asia, Atmos. Chem. Phys., 17, 965-980, 10.5194/acp-17-965-2017, 2017.