The manuscript conducted model sensitivity analyses to compare a few different plume rise approaches in WRF-CMAQ over the northern peninsular Southeast Asia (nPSEA), and used the best case to study the transport of biomass burning aerosol to Taiwan. While this is an interesting and important topic, the manuscript needs to address the following comments before publication.

1. Line 13: "The boreal spring biomass burning (BB) in the northern peninsular…". Change it to "plumes from the boreal spring biomass burning"or "trace gases and aerosols emitted from the boreal spring biomass burning".

2. Line 16: Provide full name for WRF-CMAQ in the abstract.

3. Line 23: "The calibrated model greatly improves not only the BB emission prediction over…" Do you mean "improves not only the prediction of BB impact"?

4. Lines 45-47: change "overpredict the BB emissions" and "exceedance of predicted emission" to "overestimate the BB emissions" and exceedance of estimated emission".

5. The temporal and spatial domain of the study is limited. It would be nice to at least include a discussion/implication of broad application outside the time and region of the study domain.

6. Line 83: add full name for ARW.

7. Line 85: "The model domain is dynamically nested down…". I'm not sure if I understand the term "dynamically nested". Please rephrase.

8. Line 88: Add a reference for the NCEP dataset.

9. Lines 97-104: This part describes observations used in this study, and is not part of sub-section "2.1 Model Physics and Experimental Design". I suggest make it a new sub-section 2.2.

10. Table 1: In the row "Emission inventory", also include the BB inventory FINNv1.5.

11. Since the study uses the version 1.5 of FINN (FINNv1.5), please make sure to use the term "FINNv1.5" instead of "FINN" (for example Line 139) in the text.

12. Figure 2. Please check if there's any error with Fig 2a and Fig 2b. It seems that F800 has a higher top than F2000.

13. Figure 3: The legend is not clear. For example, obs should be black instead of grey.

14. Lines 216-225: Please add more discussion on the reasons of the model biases in addition to the description of the figure details.

15. Table 3: Please add in caption why some numbers are bold while others are not.

16. Lines 246-259. I'm concerned with comparing the model results of 2013 with obs of 2014. The authors need to justify the reliability of such comparison. The fact that there are a similar number of burning hotspots in model domain 2 in 2013 and 2014 is far from enough. Even if the total number of fires are similar over model domain 2 in 2013 and 2014, their spatial distributions may be different. Meteorology may be different too. I do not think such comparison is valid unless the author further justify this. Alternatively, the author could run the model for 2014 and do the comparisons, or simply compare the obs and model results for 2013 (make sure to exclude model data when obs are not available for comparisons).

17. Lines 272-287: Figure 5 shows a very interesting case study with satellite data. However, it would be better to use model results to support some of the statements instead of using the empirical statements. For example, "The aerosol layers are believed to be lifted …", "It is known that the burning aerosols…".

18. Lines 284-285: "Recently, it is proven through brute-force methods that the pollution from clusters arrived at the higher altitude in Taiwan during the winter season.". I'm not sure I understand this sentence. Please add more details/explanations (for example, what clusters).

19. Lines 297-298: By "Figure 5", do you mean "Figure 6"?

20. Line 314: "The cross-sectional profile in Fig. 6 shows that the amount of emission produced by the offline method is substantially larger". For the simulations with fires in this study, emissions should be produced by FINNv1.5, instead of the offline method.

21. Line 314-317: "The cross-sectional profile in Fig. 6 shows that the amount of emission produced by the offline method is substantially larger than the amount produced by the inline method. Therefore, the total columnar AOD data provided by 1º x 1º MODIS Terra Level 3 AOD product (MOD08_D3, Platnick et al, 2015) during the same period (20 Mar 10:30 LST) is used for the verification of the aerosol concentration." I don't see the connection here. Please explain why "total columnar AOD data provided by 1º x 1º MODIS Terra Level 3 AOD is used" because "the amount of emission produced by the offline method is substantially larger than the amount produced by the inline method".

22. Figure 8: Please add in the Figure caption which model layer/level is shown.

23: Line 384: "This is the commonly known scenario that is well studied due to the availability 385 of measurement collected at LABS." Add a reference here.

24: 393: Change "The interaction of BB with local pollutants" to "The interaction of BB plumes with local pollutants".

25: Some of the statements/conclusions made in the manuscript are not supported by the analysis/figures/tables of the manuscript. There seems to be a mix of data analysis and literature review. For example, in the Conclusion, "impact on surface sites in Taiwan" is mentioned. However, the paper does not provide analysis for surface sites in Taiwan.

26: The connection between domain 03 and domain 04 needs to be further justified. While Figure 3 shows that the enhanced pollutants in some period is due to BB, it is not convincing enough that pollutants observed at LABS they are due to BB in domain 03.