

## Comments for “egosphere-2023-3042: The Role of Naphthalene and Its Derivatives in the Formation of Secondary Organic Aerosols in the Yangtze River Delta Region, China” by Ye et al. (2023)

Ye et al. applied CMAQ model, incorporating revised Naphthalene (Nap) and methylnaphthalene (MN) emissions, as well as including new secondary organic carbon (SOC) formation pathway through 1-MN, to investigate the importance of Nap and MN for SOC formation. They found the model well-reproduced the Nap and MN if using revised emission and one-product SOC formation pathway. Additionally, the findings indicated the oxidation of Nap and MN has negligible effects on regional ozone and radical levels. The draft is well-written, and the topics fit the scope of *ATMOS CHEM PHYS* journal. I enjoy reading the draft, and I only have a few minor comments.

Minor comments:

Line 105: Figure S1 is important for understanding the paper method framework. I checked Figure S1 several times to understand the results. I would recommend moving this figure to the main text. Also, for the SOC formation pathway, the two new added pathways are all about 1-MN. Are there any new pathway for 2-MN in this work? If not, is there any default SOC formation pathway through 2-MN?

Line 166: I recommend moving table S3 to the main text. Additionally, should there be a solid case-1product-orig and base1, and case-1product and case-2product-orig?

Line 193: Why there are no results of case-1product and case-2products in figure 1 (c)-(e) and figure S4 (c)-(e)? Are they overlapped with the original emission simulations? Why do not show the results for the base1 simulation? I think comparison with the base simulation can indicate the importance of the newly added 1-MN SOA formation pathway.

Line 204: Why do you only show the metrics for case-1product in Table S4 and S5? How about the other four cases? If the results from case-1product closely align with measurements, you can simply say that the correlations with observations are higher in case-1product than in the other four cases.

Line 213: Figure 2 is interesting. Did you also check the SOC-Nap diurnal cycle in the base1 simulation? The current results show that the more SOC formation pathways do not indicate more SOC formation. It also depends on the reaction rates of each pathway. So for the default model scheme with only SOC-Nap pathway, which is also the most efficient pathway, may simulate more SOC.