

Review of “Evaluation on the effect of regional joint control measures in changing photochemical transformation: A comprehensive study of the optimization scenario analysis” by Li et al.

This manuscript investigated the effects of joint local and regional regulations on air pollution during the 2<sup>nd</sup> World Internet Conference held in Jiaxing, Zhejiang. Both modeling and measurements were used for the evaluation. The authors performed careful case studies by controlling the meteorological conditions, air mass backtrajectory, etc. Different emission reduction plans were proposed based on different scenarios. In particular, it is recommended to implement regulation along the transport channel to the receptor-site. This is an important study to develop effective control strategies to mitigate air pollution in China. Overall, the manuscript is well-written and the analysis is solid. I recommend publication after minor revision.

#### Comments

1. Line 202. Please show the equations to calculate the metrics. Also, “Index of Agreement” should be as “IOA”.
2. Figure 2. Please include NMB, NME, and IOA (Table 2) in the figure.
3. Line 241-244. This sentence has grammatical error.
4. Figure 3-7. In panel (d), please specific if the PM<sub>2.5</sub> time series is from modeling or measurement.
5. Figure 8 and Figure 9. These two figures are really intriguing. Why is “[SO<sub>2</sub>] after control” is similar to “[SO<sub>2</sub> during control]”, but “[SO<sub>4</sub>] after control” is much higher than “[SO<sub>4</sub> during control]”? The opposite trend is observed for [NO<sub>2</sub>] and [NO<sub>3</sub>]. Please make similar figure for the [SO<sub>2</sub>]+[SO<sub>4</sub>] and [NO<sub>2</sub>]+[NO<sub>3</sub>], which should better represent the effect of regulation. Another potential plot is the partitioning of SO<sub>x</sub> and NO<sub>x</sub> (e.g., SO<sub>2</sub>/(SO<sub>2</sub>+SO<sub>4</sub>)). Interesting chemistry may be inferred from these analyses. Also, can the model reproduce these observations? Last comment, please consider to change the x-axis label from dates to “before/during/after regulation”.
6. Line 511. “reduction in PM<sub>2.5</sub> concentrations” is not accurate. It should be “PM<sub>2.5</sub> decline ratio”.
7. Figure 14. It is surprising to see that the decline ratio is typically ~10% after such strict regulation policies. What are the sources of the residual PM? From transport?

8. Effect of local emission reductions in Jiaxing and Figure 18. Regional control only has slight extra benefit over local control. Does it suggest that less strict regulation should be implemented in nearby cities?