This is a sensitivity study on the efficiency of different regional SO_2 emission control scenarios in reducing sulfate pollution in China. The authors ran GEOS-Chem chemical transport model for 4 different emission reduction scenarios, all of which cut the overall SO_2 emissions from China by 8% from the 2010 level but distribute the reductions differently. In one scenario, the SO_2 emissions are cut uniformly over the entire country, while in the other three scenarios, the reductions are limited to three main source regions (North China, South China, and Southwest China). The authors then compared the resulting reductions in national average sulfate, population-weighted sulfate, and export of sulfur (SO_2 + sulfate) to the West Pacific for different scenarios, and concluded that controlling SO_2 emissions from North China will have the greatest benefit in terms of reducing national average sulfate and export of sulfur species, while controlling SO_2 emissions from South China will have greater benefit in reducing population-weighted sulfate concentration. Sensitivity tests were also conducted to investigate the effects of meteorology and the amount by which SO_2 emissions are reduced on the conclusion. Overall, this is a well-designed study with interesting results that may have some implications for pollution control strategies for China. The writing is understandable (although can still use some improvement) and the figures are mostly clear. I feel that the paper would be suitable for publication in Atmos. Chem. Phys. after the following comments have been addressed.

Specific Comments:

1. The authors compared the model simulated AOT, sulfate, and sulfate deposition with measurements, but only briefly mentioned the regional comparison results for AOT, which is not a direct measurement of sulfate. I wonder if the authors can comment on the regional biases in modeled sulfate and how the biases can affect the conclusions of this study.
2. Again, AOT over China can be affected by a number of factors such as dust and humidity. Have the authors looked into other satellite datasets such as SO_2 for model evaluation?
3. I understand that this is merely a sensitivity study, but can the authors comment on the actual SO_2 emission change during and/or before the study period (given that the emission inventory seems to be available for multiple years)? How do the actual national/regional trends compare with the different scenarios tested in the study?
4. I assume that the population weighted sulfate concentration can be calculated on a grid-box basis instead of for each province – by weighing the sulfate concentration with a ratio between population density in each grid box and the national average population density? Some provinces seem to be in more than one study region and that may lead to uncertainty in the population-weighted sulfate.
5. Can the authors comment on the seemingly larger bias in the modeled sulfate for the second half of the period covered by Figure 3a?
6. It will be useful to mark the scenarios for Figures 4b and 4c.
7. Can the authors point out where the “other regions” in Figure 6b are? Northeast China?
8. Can the authors provide an explanation for the more dominant role of gas-phase photochemistry for North China than South and Southwest China? Less humidity? Stronger NO_x emissions? Also how does the presumably stronger washout (and shorter lifetime) in the southern part of China affect the conclusions of the study?