

Interactive comment on “Effects of stabilized Criegee Intermediates (sCI) on the sulfate formation: A case study during summertime in Beijing-Tianjin-Hebei (BTH), China” by Lang Liu et al.

Anonymous Referee #1

Received and published: 9 June 2019

Liu et al. presented a regional modeling study about the effects of stabilized Criegee Intermediates (sCI) on sulfate formation during the summertime in Beijing-Tianjin-Hebei, China. They found that the heterogeneous uptake involving aerosol water and gas-phase OH oxidation of SO₂ were the two important source of sulfate, while sCI oxidation pathway could be insignificant in the actual case. This study calls for the attention of a better-constrained evaluation of the role of sCI in sulfate formation in regional and global models. This manuscript is overall well-written and the discussion is sound. I recommend for publication after considering the following points:

C1

General comments:

1. About heterogeneous oxidation: It is better to show some more details about this reaction pathway since it is the most important contribution but only one parameter (γ) is involved. For example, how much is the aerosol-phase liquid water content in the model during this period? What is the total surface area of particles? What are the fractions that POA and SOA contributing to heterogeneous oxidation of SO₂? How about the sensitivity test of γ to sCI contribution?
2. About sCI profile: The authors only showed the sCI effect of SO₂. What are the temporal profiles of sCIs? How about the fates of them in the atmosphere, especially for different sCI types? Is H₂O always the predominant sink of sCIs?

Specific comments:

1. Page 2 Line 62: "Basing on" should be "based on"
2. Page 11 Line 282: "worth nothing..." should be "worth noting"
3. Figure 4: the legend for wind speed is too small
4. Figure 9: what could be the potential reasons for the dominant peak of sulfate temporal profile in S1 and S2 cases around July 10, while in other time periods much smoother and lower compared with the base case?

Interactive comment on Atmos. Chem. Phys. Discuss., <https://doi.org/10.5194/acp-2019-313>, 2019.

C2