Dear authors,

Based on the recommendation of the reviewers, I am making the following decision.

1. The manuscript is very long (45 pages) covering many areas (e.g., gas-phase chemistry, aerosol nucleation, inorganic aerosol thermodynamics, emission, model configuration coupled versus prescribed SST runs). To make the manuscript more readable to the readers, I request you to break the manuscript (text and experiments) into two papers. For this manuscript, please only include the parts on gas-phase chemistry, aerosol nucleation, emission (their numerical experiments and associated discussion). Leave out the rest of the model development and evaluation (e.g., inorganic aerosol thermodynamics) for the another paper. The title of your manuscript needs to be changed correspondingly to reflect the changes in the text.
2. One reviewer has serious issues with the treatment of inorganic aerosol thermodynamics you have. You can find the detailed comments in the reviewer report. Although this part has been left out for the current manuscript, you may consider these comments when you prepare your next paper.

Based on my own reading of your manuscript, I have the following three comments, mostly minor and to clarify the text:

1. Page 1, Lines 17 and 21, and also in the text. Please explain what you mean "highly-simplified" and "explicit" for inorganic aerosol thermodynamics.
2. Page 7, Line 162. Please note that MOZART has been coupled with MAM.
3. Page 11, section 2.2.3. Since you have used the ISORROPIA to treat the gas-particle partitioning (based on the bulk aerosol and gas thermodynamics equilibrium) for HNO3/HCl, why do you also use the default CAM5 gas-aerosol transfer method to partition the gas and aerosol (based on the irreversible treatment)? Clarification is needed to explain what do what and for what purpose.