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**Interactive
comment**

Interactive comment on "Seasonal variation of fine and coarse-mode nitrates and related aerosols over East Asia: Synergetic observations and chemical transport model analysis" *by* Itsushi Uno et al.

Anonymous Referee #1

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This paper is well written and focuses on the fine and course aerosols (especially nitrate) transport and transformation processes in long-range transport (LRT) from China to Japan. The authors analysis the transformation process including heterogeneous reaction of SO4–, NO3-, NH4+ and their precursor gases by using the Chemical Transport Model (CTM) and measurement system. The author's CTM model reproduces well the temporal variation of aerosol observation in Kyushu. The authors demonstrate that the course particle is majority of total nitrate and the heterogeneous formation of dust and sea-salt nitrates is important process of course nitrate. Additionally, the authors

suggest a critical importance of inclusion of aerosol microphysical processes in nitrate modeling. This paper is a leading study in which the formation mechanism of nitrate in East Asia is analyzed quantitatively by using the CTM and aerosol observation.

Minor comments: 1. Line 5 of page 3: It is better that "We also examined" is changed to "We focused on" because the nitrate analysis is strong point in this paper.

2. Chapter 2: Monitoring site information should be added.

3. Line 11 of page 3: "Aerosol Chemical Speciation Analyzer and NHx measurement" is better.

4. Lines 18-19 of page 5: Which version of EDGAR is used in this paper? The targeted year of EDGAR and REAS? Which emission inventory for volcanic SO2 is used? Biomass burning emission is included in the simulation?

5. Lines 14-15 of page 6: "The precipitation difference is important for ***" is not clear. Some explanation needs to be added.

6. Line 12 of page 7: Why the high CO is a product of LRT? High CO concentration may be influenced by local emission sources.

7. Line 14 of page 8: "The increase in" should be deleted?

8. Line 23 of page 9: It is better that "(a) NHx" is changed to "(a) f NH4+, C NH4+, and NH3" such as "(b)".

9. Line 1 of page 10: Why is the modeled HNO3 overestimated?

10. Figure 1: The time should be considered in the unit of SO2 emissions such as "Kg/year/grid".

11. Figures 3, 5, 6, 8, 10 and A1: The number of "0" or "5" outside right axis should be deleted.

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