

Interactive comment on “Fine particle pH and sensitivity to NH₃ and HNO₃ over summertime South Korea during KORUS-AQ” by Ifayoyinsola Ibikunle et al.

Anonymous Referee #2

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The manuscript entitled ‘Fine particle pH and sensitivity to NH₃ and HNO₃ over summertime South Korea during KORUS-AQ’ written by Ifayoyinsola Ibikunle investigated whether the sensitivity of particulate nitrate depends on HNO₃ or NH₃, and extended this estimation for unavailable NH₃ cases. The conclusion of HNO₃ dependence in most cases is informative for the appropriate reduction of nitrate pollution in South Korea. I would like to consider the publication of this manuscript from Atmospheric Chemistry and Physics; however, some points should be addressed with in-depth discussion.

Major points:

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Expression of season: As described in L55-56, the KORUS-AQ campaign was conducted from 26 April to 18 June 2016. I have questioned the expression of “summer-time” to mention this period through this manuscript (including the manuscript title). This can be late spring for Asian meteorological situation.

Flight altitude: The data used in this study is filtered for the flight altitude below 1 km and the authors stated as “which is often within the boundary layer” in L232. As shown in the flight trajectories in Figure 7, the flight during KORUS-AQ both covered Korean Peninsula including adjacent oceans. I am wondering the simple assumption of 1 km altitude could be free troposphere over the ocean. Please also see the below comment.

Nitrate concentration field: As shown in concentration filed in Figurer 7 and Figure S1, nitrate concentration filed below 1 km analyzed in this study posed relatively lower concentration over South Korea (even in over Seoul Metropolitan Area) and higher concentration over oceans. This result could be related to the above mentioned point, and impressed me that the nitrate behavior is different over land and oceans due to the simple 1 km assumption for data analysis.

Implications for policy making: Based on the above comment, the nitrate concentration over oceans will be regarded as free troposphere (not within boundary layer) behavior, and in this case, nitrate could be dominated by the long-range transport from mainland China as introduced in L48. If so, the conclusion of “NO_x control” means Chinese emission regulation and therefore careful discussion is required. Although the source attribution will be beyond the focus within this study (as stated in L419-422), do the authors put some relevant information in this point?

Minor points:

L231: RH is firstly used in L143.

Figure 6: Taking into accounts the discussion after Figure 8, the color used in this Figure 6 indicating HNO₃- or NH₃-dominant seems to be confusing.

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Wording: Through this manuscript, the expression of ammonia and NH_3 , and nitric acid and HNO_3 seems to be not unified. It will be better to unify these expressions.

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