The authors appreciate the reviewers for reviewing our manuscript and providing constructive comments. As suggested, we carefully revised the manuscript thoroughly according to the valuable advices, as well as the typographical, grammatical, and bibliographical errors. Listed below are our point-by-point responses in blue to the review's comments (in italic).

Anonymous Referee #2

This manuscript examines the performance of nine models within MICS-Asia III in capturing wet and dry deposition with observation from a plenty of sites. There are a number of grammar issues and typos. I would enough the authors to check carefully and improve the quality of writing. Besides, the scientific quality would be largely improved if the authors could provide more results to explain the differences between models and observations.

[Response]: We would like to thank the reviewer for the valuable comments. Detailed explanation of differences of reactive nitrogen wet depositions between models and observations have been further discussed and been addressed as independent paragraphs in sections 3.1.1 and 3.1.2 of the revised manuscript.

"Sections 3.1.1:

Regarding to the comparison over the whole of East Asia reported in the overview of acid deposition in MICS-Asia III (Itahashi et al., 2020), *similar overestimation was found in M5 and M11 while underestimation in M2, M4 and M14. It should be noted that the EANET sites are mostly located around Japan, Korea and Southeast Asia, and only 8 sites are located in China. The similar performances between the validation in East Asia and China indicated the general underestimation (overestimation) of M2, M4 and M14 (M5 and M11) were reliable in these models. For the rest of models, different results were found between China and East Asia, i.e., the simulated N_{ox} wet deposition in M1 was significant overestimated in China (Figure 6 of Itahashi et al., 2020), but comparable with the observations over the rest of East Asia. Due to the absence of the observations for atmospheric NO_2/NO_3^-, we cannot validate their model performances directly. Instead, another companion paper (Chen et al., 2019b) reported that most of models overestimated NO_3^- concentrations based on 14 sites in China with most sites located in NC (Figure S5 of Chen et al., 2019b). In summary, the relationship between the atmospheric concentration of NO_3^- and the wet deposition in NC was not obvious, which is also same as that found in East Asia (Itahashi, et al., 2020).*"

"Sections 3.1.2:

The underestimation of N_{rd} wet deposition was also found over the whole of East Asia reported in the overview of acid deposition in MICS-Asia III

(Itahashi et al., 2020). This implies the current CTM models might underestimate prediction of N_{rd} *wet deposition not only in China but also in the whole of East Asia. The close correlations between the atmospheric concentration of* NH_4^+ *and wet deposition of* N_{rd} *with overestimation in the atmosphere but underestimation in precipitation were found over all of East Asia (Itahashi et al., 2020). In this study, the consistent relationships in NC were also found in the results of Chen et al. (2019b) (overestimated* NH_4^+ *concentration) and in this study (underestimated* N_{rd} *wet deposition). Bae et al. (2012) reported the below-cloud scavenging process was important in the simulation of* N_{rd} *wet deposition, which was not explicitly separated in-cloud and below-cloud scavenging but computes it as a whole in the CMAQ model. Note that the wet scavenging process in most of models (including M11 and M12) of MICS-Asia III were similar with that treated in CMAQ module except M13 (Table 1). It is too simple to accurately simulate wet deposition with the absence of accurate below cloud wet scavenging simulation. This would be one reason for the underestimation of* N_{rd} *wet deposition, especially considering the high concentration of gaseous ammonia in the surface layer of NC (Pan et al., 2018; Kong et al., 2019).*"

Besides, the grammar issues and typos have been corrected in the whole manuscript. After carefully check and polish of English, the quality of writing has been improved according to the help of a native speaker. Following are the responses to the comments.

Specific comments are listed below:

Line 52: Typo: WRF-CAMQ should be WRF-CMAQ

[Response]: It has been revised.

Line 105: Typo: shown should be showed

[Response]: It has been revised.

Line 123: uncompleted should be incomplete

[Response]: It has been revised.

Line 179: driving should be driven

[Response]: It has been revised.

Line 292: may not due to should be "may not be due to"

[Response]: It has been revised.

Lines 292-294: What would be the reason for the differences?

In many places, wrong tense is used. For example, in line 295: showed should be shows. Please also change the tense in other places.

[Response]: It is clearly shown in Table 2 and Table 3 that the spatial correlation coefficients R is higher in urban sites than that in rural sites for N_{ox} wet deposition and non-significant difference between the two categories sites for N_{rd} wet deposition. There are many reasons including emissions, chemical conversions and deposition processes in the models might lead to the different performance of N_{ox} wet deposition between urban and rural sites. However, the formations of NO_3^- from its precursors NO_x are more complicate than the other species due to the complicate chemical reactions. The companion paper (Chen et al., 2019) also showed the relatively low R value of the simulated NO_3^- concentration at 31 sites over East Asia (0.29-0.65) compared with that of SO_4^- (0.46-0.76), NH_4^+ (0.34-0.75), BC (0.65-0.80) and $PM_{2.5}$ (0.71-0.83) by 12 models in MICS-Asia III. This indicated that most of the current CTM models were more difficult to accurate predict complicated reactive species (i.e., NO_3^-) than inert substance (i.e., BC). Consider most of NO_x were emitted in urban region, the more aged air mass that experienced complete degree of chemical reactions were usually characterized in rural area. Thus, the large difference in rural sites than that in urban sites among the multi-models would be reasonable. In response to your second comment, the tense in the whole manuscript has been checked and changed accordingly.

Line 312-314: The differences might result from multiple reasons, including emissions, chemical conversions, deposition processes in the models, etc. There is no evidence or analysis showing that is caused by the coarse grid.

[Response]: We agree with that the differences are from multiple reasons in the simulation of wet deposition process. We calculate the standard deviation (SD) of the observed and simulated yearly wet deposition for Nox in 9 sites over PRD region. Since these 9 sites are located relative close to each other (Figure 1 of manuscript), the SD represents the differences among the sites. The results showed that the observed SD was 5.85 and was much higher than all of the simulated SD (0.90-3.12). This indicated the coarse grid couldn't capture the large differences in the observations at a local scale.

Lines 335-343: This could be one of the reasons with the assumption that models can accurately capture these processes. Is it possible to compare rainfall events, which does not require high resolution of deposition data

[Response]: Thank you for this valuable comment. We agree that the detailed validation such as the duration and intensity of the rainfall events could be helpful to better understand the performance of the wet scavenging process in the model. However, the sampling interval of wet deposition is mostly daily, weekly, or event yearly in Southeast of China and North of China. Additionally, the sampling periods of these measurements were not consistent across site. Besides, the current meteorological models have difficulty in capturing the timing of precipitation events. We believe the comparison between observations and simulations in monthly data of wet deposition is an appropriate approach and this analysis could provide a broad overview in China currently. Anyway, the rainfall event simulation is our future target and will be taken more focus in the next.

Lines 575-576: correlations between observed depositions between emissions

[Response]: It has been revised.

Line 662: importance should be important

[Response]: It has been revised.

Reference：

Bae, S. Y., Park, R. J., Yong, P. K., and Woo, J. H.: Effects of below-cloud scavenging on the regional aerosol budget in East Asia, Atmos Environ, 58, p.14-22, 2012.

Itahashi, S., Ge, B., Sato, K., Fu, J. S., Wang, X., Yamaji, K., Nagashima, T., Li, J., Kajino, M., Liao, H., Zhang, M., Wang, Z., Li, M., Kurokawa, J., Carmichael, G. R., and Wang, Z.: MICS-Asia III: Overview of model inter-comparison and evaluation of acid deposition over Asia, Atmos. Chem. Phys., 2019, 1-53, 10.5194/ acp-20-2667-2020, 2020.

Kong, L., Tang, X., Zhu, J., Wang, Z., Pan, Y., Wu, H., Wu, L., Wu, Q., He, Y., Tian, S., Xie, Y., Liu, Z., Sui, W., Han, L., and Carmichael, G.: Improved Inversion of Monthly Ammonia Emissions in China Based on the Chinese Ammonia Monitoring Network and Ensemble Kalman Filter, Environ Sci Technol, 53, 12529-12538, 10.1021/acs.est.9b02701, 2019.

Pan, Y., Tian, S., Zhao, Y., Zhang, L., Zhu, X., Gao, J., Huang, W., Zhou, Y., Song, Y., and Zhang, Q.: Identifying ammonia hotspots in China using a national observation network, Environ Sci Technol, 2018.

Tan, J., Fu, J. S., Carmichael, G. R., Itahashi, S., Tao, Z., Huang, K., Dong, X., Yamaji, K., Nagashima, T., Wang, X., Liu, Y., Lee, H. J., Lin, C. Y., Ge, B., Kajino, M., Zhu, J., Zhang, M., Hong, L., and Wang, Z.: Why models perform differently on particulate matter over East Asia? – A multi-model intercomparison study for MICS-Asia III, Atmos. Chem. Phys. Discuss., 2019, 1-36, 10.5194/acp-2019-392, 2019.