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 #1

The manuscript entitled 'Inter-annual variations of wet deposition in Beijing during 2014-2017: implications of below-cloud scavenging of inorganic aerosols' written by Baozhu Ge investigated the long-term variation of wet deposition at Beijing site during 2014-2017, The topic is interesting and provides important results for wet deposition process. However, before the considered publication from ACP journal, I would like to suggest to address the following concerns.

[Response]: We thank the reviewer for the valuable comments. We have prepared the point-by-point responses to address the reviewer's comments as shown below.

Major points:

1. From L109, the total of 69 full events and 6 extended events were recorded during the sampling period from 2014 to 2017. I might miss the description, but what are the available numbers at each year? From the limited observation number, it could be doubtful the long-term trends described in Section 3.1. From conclusion section, I found that the exact time period is May 2014 to November 2017. In this sense, the data on 2014 might be different because the winter and early-spring season observation is not included in this year. How can we consider this point for long-term behavior?

[Response]: Thanks for the comments. The available numbers of full events at each year are 15, 16, 20 and 18, respectively. During 2014-2017, a total of 104 precipitation events, which is almost 690 precipitation samples, were collected. Of the total number of precipitation events, 33 events (32%) were discarded from the sequential sampling analysis due to low rainfall amounts (<8 mm), which cannot satisfy the full events. Note that the precipitation samples are only rainfall (excluded snow). Most of rainfalls were occurring summer and only 1-2 events were during the winter and early-spring season in Beijing. Thus, the time period which is started from May 2014 would not lead to much difference in 2014 from the other years. This is also reflected from the similar full events at each year. Besides, the results before 2014 from the previous studies in Beijing were collected to compare with our data during 2014-2017 for the purpose of describing the long-term trends variations. We respected to the reviewer's comments,

the limited data cannot fully reflect the long-term trends of precipitation chemistry. The descriptions of "long-term trends" were changed to "inter-annual variations" in the whole text. The detailed descriptions on the rainfall events collected and selected in this study were also added in section 2.1 as "*During 2014-2017, a total of 104 precipitation events, which is almost 690 precipitation samples, were collected. Of the total number of precipitation events, 33 events (32%) were discarded from the sequential sampling analysis due to low rainfall amounts (<8 mm), which cannot satisfy the rules of full events. Altogether, 69 full events and 6 extended events were recorded over the 2014-2017 period in Beijing, as 15, 16, 20 and 18 events at each year, respectively.*"

2. It is ambiguous that what satellite data is used here only from the description in L256-258 (and related supplement). In addition, satellite observed pixel will be only one (or a few) to correspond Beijing. Is it appropriate to use such limited data? To clarify the data usage, the detail is needed at least in supplemental material.

[Response]: The level 3 product of the ozone monitoring instrument (OMI) satellite data were used in this study. The OMI instrument, which is board on the Aura satellite, can measures the solar radiation backscattered by the atmosphere and surface in the Earth (Torres et al., 2002). The data is stored in the HDF-EOS format with a resolution of 0.25×0.25, which covers the total vertical column density for SO_2 and NO_2, the standard errors, cloud information, data quality flags, and the latitude/longitude information. The OMI VCD SO_2 and NO_2 data were derived by the algorithm of a principal component analysis (Li et al., 2013), and were widely used in local regions such as Henan province (Zhang et al. 2017) and the major cities (including Beijing) in China (Tang et al. 2019). There are almost 25 pixels covering the whole domain of Beijing. To compare with the yearly trends of sulfur and nitrogen in precipitation, the vertical column density data observed from the space is better than that only observed at the surface layer. Detailed description of OMI data has been added in the supplemental material.

Minor points:

1. L65: Is "CMAQ" widely known as benchmark model? This model is used without any explanations before.

[Response]: The CMAQ model is Community Multiscale Air Quality model and is

added in the revised manuscript.

2. L133: Correct to use subscript for "4" in "NH4+".

[Response]: Thanks for the correction. The subscript for "4" in NH^{4+} has been corrected in the revised manuscript.

3. L241-244: Need discussion for NO3- and NH4+.

[Response]: Thank for your suggestion. The discussion on the ions are also included in the revised manuscript, which is as: *The R coefficients for NO_3^- and NH_4^+ show less difference than Ca^{2+}, but larger difference than SO_4^{2-}. This may relate to their complicate sources from the ambient precursors. For example, the NO_3^- in precipitation is both from the fine and coarse particles (i.e., particulate NO_3^-) as well as the gaseous HNO_3, while the NH_4^+ in precipitation is mainly from the fine particles in addition to NH_3.*

4. L249-251: Does this imply that the scavenging ratio itself would be constant over the world even though the air pollution level is different?

[Response]: No. The scavenging ratio is not a constant value over the world. It should be different due to different air pollution level as well as different rainfall type. The scavenging ratio represents the scavenging efficient of each air pollutant that is removed from the atmosphere by rainfalls. The statements in the revised manuscript are changed as "*This is similar to that reported for rainfall events in 2014 in Beijing(0.26×10^6, 0.35×10^6 and 0.14×10^6 for SNA) by Xu et al. (2017) and within the range of those estimated in the eastern United States ($0.11\text{-}0.38\times10^6$, $0.38\text{-}0.97\times10^6$ and $0.2\text{-}0.75\times10^6$ for SNA) (Hicks, 2005). Although the W ratios in this study are the same magnitude as the previous studies, some difference still exist*".

5. It will be better to unify the wording of "washout/rainout" or "below-cloud/in-cloud scavenging" throughout manuscript.

[Response]: Thank you for the suggestion. All the description of "washout/rainout" have been changed as the "below-cloud/in-cloud scavenging" throughout manuscript.

References:

Li, C., Joiner, J., Krotkov, N. A., and Bhartia, P. K.: A fast and sensitive new satellite SO2 retrieval algorithm based on principal component analysis: Application to the ozone monitoring instrument, Geophys Res Lett, 40, 6314-6318, 10.1002/2013gl058134, 2013.

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Torres, O., Bhartia, P. K., Herman, J. R., Sinyuk, A., Ginoux, P., and Holben, B.: A long-term record of aerosol optical depth from TOMS observations and comparison to AERONET measurements, J Atmos Sci, 59, 398-413, 2002.

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