Atmos. Chem. Phys. Discuss.,
https://doi.org/10.5194/acp-2019-52-RC1, 2019
© Author(s) 2019. This work is distributed under
the Creative Commons Attribution 4.0 License.

Atmospheric Chemistry and Physics Discussions

Interactive comment on "The wet deposition of the inorganic ions in the 320 cities across China: spatiotemporal variation, source apportionment, and dominant factors" *by* Rui Li et al.

Anonymous Referee #1

Received and published: 22 May 2019

Deposition of inorganic ions is an important indicator of air pollutant emissions and has potentially large impact on ecosystem. Attributed to its large size and complicated sources of atmospheric components, China is of big diversity on inorganic ion deposition and it is great challenge to quantify the spatial and temporal patterns of deposition. Based on intensive sampling and chemical analysis at sites across the country, this work presents informative results on wet deposition of ions, and analyzed the seasonal and annual changes in deposition. The sources of the deposition were evaluated as well based on specific statistic or arithmetic methods. In general, the paper is of comprehensive information and well organized. Before it can be accepted for publication, however, some issues should be further stressed or discussed, and certain information

needs to be clarified as well. Details follow.

Major comment: 1. Section 2.1: sampling site. One of the most valuable contributions of this work is the sampling and chemical analysis at a great number of cities and sites across the country. However, the strategy of the site selection is unclear. How many sites are located in urban and how many are in remote/suburban regions? Such kind of information is helpful for audience to judge the representativeness of the sampling.

2. Section 2.2: Regarding the sampling, it is unclear whether the sampling covers the whole studying period for all of the sites? Or the sampling period varied by site? If so, what's the reason? Moreover, the frequency of sampling collection should also be described.

3. Section 2.5, what's the purpose of this section? Was the method applied for the spatial pattern of wet deposition? Is it related with the spatial interpolation? The method should be explained more carefully.

4. Lines 285-294, Section 3.1, the author stated the decreasing trend of SO2 and NOx emissions resulting in the increased pH for the studying period. In Section 3.2, they presented that the peak sulfate and nitrate peaked in 2014, which seems contradicting to the inter-annual variation of SO2 and NOx emissions. Could you explain the possible reasons?

5. Lines 383-385. This statement might not necessarily true for China, as coal burning and some industrial sources are also very important sources of NOx. Vehicle cannot dominate the growth of NOx emissions and thereby NO3- concentrations in precipitation. Moreover, what do you mean by "linearly increase"?

6. Section 3.2.2. The seasonal variation of sulfate and nitrate concentrations in precipitation could also be influenced by some other factors. For example, if high temperature in summer elevated oxidation of precursors, how could it result in smaller concentrations? Is it possible that more abundant rainfall dilute the concentrations? Moreover,

heating in south China is not as frequent as in north. Here I suggest the authors make a more detailed classification of sampling sites and check the difference between north and south China, and that between rural and urban sites.

7. Line 482. The Ca was extremely high in summer, but the dust emissions might not be high in summer due to precipitation. I guess there are some other reasons besides those mentioned by the authors.

8. Lines 664 and 665. Ca emissions could also from some coal burning and industry sources. That means anthropogenic sources could contribute to Ca. I feel that the uncertainty of the method should be discussed here, as you indicate that the contribution from human activities was almost zero for Ca. Moreover, over one third of sulfate was expected to come from natural sources (AF=66.65%), what are they?

9. Minor issues: Lines 216-217, do the “rain” and “precipitation” mean the same thing in eqs (8) and (9)? Line 223, what is FA? Line 288, Liu or Lu? Line 297-298, why compared with 2000? Should it be 2010? Line 741 increased or decreased? Lines 842-843, rewrite the sentence. It is not clear.

Interactive comment on Atmos. Chem. Phys. Discuss., https://doi.org/10.5194/acp-2019-52, 2019.