

The manuscript 'Multimethod determination of the below-cloud wet scavenging coefficients of aerosols in Beijing, China' written by Danhui Xu investigated wet scavenging process during APHH-Beijing. The authors tried to clarify well-known but not well-understood wet deposition process based on theoretical measure, field observation, and numerical model. The findings through this study is essential to understand the wet deposition process and also can contribute to refine the wet deposition scheme in CTMs and reduce its uncertainty. Although I would like to recommend to publish this manuscript, the following comments should be addressed with in-depth discussion for furthermore understanding.

Major points:

- P8, L192-193 (Symbols used in this manuscript):
I could follow the results and discussion section; however, it will be straightforward to use T, F (or O), and M to indicate theory, field observation, and modeling calculation, and these expressions are easy to catch discussion. Or, please include the rationale to use same M for field observation.
- P9, L220-227 (Discussion on BWSCs in Figure 3):
More discussion is required on the following two points.
 - What is M1 difference calculated by SMPS, POPC, and SPAMS? The particle size should be referred, though this can be partly covered in Figure 4. Please explicitly define the box plot shown in Figure 3. What percentiles (and/or average) are used to draw it?
 - M2 and M2' can generally agree with M1; however, the significant point should be the distinction of chemical species. From M1 of SPAMS, it seems no difference on SNA whereas M2 and M2' calculated larger BWSC for S. What are reasons to these results of SNA?
- P10, L256-257 (Relationship of BWSC and precipitation shown in Figure 5):
Data in 2014 summertime is essential to see this relationship; hence detail descriptions of this summer campaign is needed (will be appropriate introduced in Section 2.1). When compared winter results with summer results, it should be noticed that BWSC of NO₃ (up to 10⁻³ sec⁻¹) is greater than that of SO₄ and NH₄ during summertime. This is reversed finding during wintertime, because BWSC of SO₄ is greater than NO₃. What is reasons of these BWSC differences found in summer and winter?

Minor points:

- P2, L39: Do developed countries really have clean atmosphere?
- P2, L40-42: Which species are underestimated in MICS-Asia?
- P2, L42-44: How about sulfur species in TF-HTAP?
- P3, L47-48: Are these estimations suggested the importance of below-cloud scavenging based on what?
- P3, L49-51: Also, are these estimations based on what?
- P3, L47-51: If these estimations are based on model, how can we say its importance under the large uncertainty of modeling treatment?
- P3, L57: Does this sentence regarding gravity refer dry deposition?
- P4, L90-L92: I am not sure the meaning of “rarely in autumn winter” and “typical rainfall in winter”, and these expressions will make some confusion. How rare the winter rain and what is the typical rain?
- P4, L111-L112: Here, “in the winter of 2016” indicates averaged VWA concentrations during APHH-Beijing 2016 campaign? It will be helpful to show the period (on L98). In addition, VWA concentrations during previous studies (Pan et al., 2013, 2012; Xu et al., 2017) can be added here for the discussion to strength the polluted episode analyzed in this study.
- P4, L118 and L122: Where is the sampling location of SPAMS and POPC? Same as wet-only sampler or SMPS?
- P4, L111-L123: I feel the summary of these observation dataset listed in one table (full name, abbreviation, target species, and short explanation, etc.) can help the reader to understand these observations used in this study.
- P5, L125-: The authors can put the notice that abbreviations are available in supplemental material.
- P7, L184-185: More information of NAQPMS will be needed. What kind of numerical model? Are there any previous studies show the modeling performance by NAQPMS? This can also motivate the authors to improve the model performance through this study.
- P8, L200-201 (Figure 1): Please include hourly (or finer time-scale) precipitation in Figure 1. We cannot catch the rainfall intensity from this sentence. Especially, we can see slight increase of aerosol concentration (except NO₃) before 12:00 and what is the relation of this increase and precipitation? In my personal opinion, hourly concentration averaged during 11 November to 11 December is not needed here; remove this or add the discussion.

- P8, L208: From what to decreased by nearly 6 $\mu\text{g m}^{-3}$ in the air? Need to add the variation about N and A.
- P9, L244: Typo of “Fig. 4”?
- P10, L259: Figure 5 shows R^2 , hence “coefficient of determination” is appropriate (or, Figure 5 include typo of R?).
- P10, L277-P11, L295 and caption of Table 2: To include the information of ambient concentration before the rainfall events (stated in P11, L285) is useful if explicitly stated in the caption.
- P11, L294: I guess that NMB is usually ‘normalized mean bias’. Is this typo or some kind of another metric?

Technical comments:

- P8, L203: Typo of “NAAQS”?
- P13, L331-332: Check this reference style. There is no information related to volume, page, and year.
- P14, L354-356: Check this reference style regarding the location of year.
- P15, L390-391: This is not the latest edition.
- P16, L445-447: Check this reference style regarding the location of year.
- Throughout the manuscript, please unify “APHH” or “APHH-Beijing”.
- Throughout the manuscript, please remove period “mg.m-3” and “ $\mu\text{g.m}^{-3}$ ”.