"Large particulate nitrate formation from N_2O_5 uptake in a chemically reactive layer aloft during wintertime in Beijing" by Wang et al.

The authors explore the mechanisms for particulate nitrate (pNO_3^-) during wintertime haze events in Beijing, China. Comparing simultaneous ground-based and tower-based observations, the authors investigated the significance of pNO_3^- via N2O5 heterogeneous uptake as a function of altitude. The work shows the effects of the pNO_3^- formed aloft on the surface $PM_{2.5}$ the following the morning. Given the significance of this work, I recommend this manuscript for publication after significant revisions.

1. Although the experiment design is well thought and the analysis appears to be solid, the technical writing needs significant improvement. I recommend the authors to use professional technical writing services in English to improve the penmanship and eliminate any grammatical errors. Example sentences to be reviewed carefully and reformulated are line 66 – 70, line 178-179, 180 – 183, 186 – 190, 194-195, 205-213, 242 – 244, 275-278, 292-295 etc.

2. I am assuming eq.1 (line 164) is for the nitrate radical production rate (P_{NO3}), not the rate of change in O_3. As the authors mentioned the availability of O_3 is driven by its reaction with NO.
3. Use subscript for O_x throughout the text
4. The authors define and discuss "particle nitrate convert efficiency" (sigma) in line 305-310. Chang et al.[1] gives an excellent review of N2O5 chemistry and I suggest the authors read this as they discuss and introduce parameters regarding N2O5 conversion. I do not believe it is necessary to introduce a new parameter "particle nitrate convert efficiency" in this case.
5. In that regard, the authors need to extend the literature search and include more references on N2O5 heterogeneous uptake and wintertime haze events outside the Beijing area. For more references on relevant topic, review publications of Chang et al.[1-2], Lurmann et al. [3], Brown et al. [4], Green et al. [5], Wang et al. [6], Prabhakar et al.[7] etc.

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