



EGUsphere, referee comment RC1  
<https://doi.org/10.5194/egusphere-2022-782-RC1>, 2022  
© Author(s) 2022. This work is distributed under  
the Creative Commons Attribution 4.0 License.

## Comment on egusphere-2022-782

Anonymous Referee #1

---

Referee comment on "Characteristics of fine particle matter at the top of Shanghai Tower" by Changqin Yin et al., EGU sphere, <https://doi.org/10.5194/egusphere-2022-782-RC1>, 2022

---

The author conducted chemical composition measurement at high altitude, expanding our understanding on aerosol chemistry at mid-upper PBL. I suggest major revision for the manuscript prior to be finally published in ACP.

- The collection efficiency was chosen as 0.5. In fact, the composition dependent CE was more precise. The author should compare these two methods and evaluate whether default CE influence NR-PM<sub>1</sub> species quantification.
- PMF source apportionment was performed for entire study, with two-factor solution being resolved. Considering that the emissions sources could be different in different seasons, PMF should be done separately during each season. Did the author try to do ME-2 analysis with constrained POA profiles to improve results?
- Simultaneous measurements of chemical compositions at Shanghai tower and the ground benefit the comparisons of vertical differences. In line 140-145, the author compared nitrate at SHT with previous studies. The question is that meteorology significantly impacts PM concentrations. The author simply compared the annual average nitrate contribution with surface measurements, without considering the sampling sites, seasons and meteorology. Another question is why higher nitrate aloft owed to lower temperature. Is it possible that other pathways also contribute to nitrate formation?
- The author said throughout the study that SHT is close to the top of PBL but no PBL data was shown. The PBL is dynamically varied during daytime and nighttime, and the PBL height might lower than 600 m under severe haze pollutions.
- In line 155-165, it is confused that the author described the maximum and minimum temperature and RH in detail solely. In fact, the meteorology was linked to chemical compositions. Discussing the influence and interaction between meteorology and PM is more charming. Why the author showed the daily average values in Table 1?
- In Sec. 3.2.2, please give the definition of anomaly. Is it calculated by comparing with annual average or history records? Why were they anomaly?
- In line 202-203, the author state that extra aerosol productions contributed to higher PM<sub>2.5</sub> concentrations at SHT than surface. Please elaborate the conclusion.
- In line 205-210, the author said that exchange between SHT and surface only exits in daytime. If nocturnal PBL is higher than SHT, nighttime exchange can also occur. Nighttime PM<sub>2.5</sub> at SHT was not independent from the ground level.

- In Sec. 3.2.4 and figure 4, the author can also plot and discuss mass fractions of NR-PM<sub>1</sub> during daytime and nighttime separately.
- In figure 6, NO<sub>2</sub> at SHT increased by 21.8-61.4% from 08:00 to 12:00, while they were reduced at ground level during this time. Thus, vertical mixing could be the explanation rather than vehicles. In fact, the peak at morning at surface was attributed to traffic during morning rush hour.
- In line 62, "vatical distribution" might be a typo.
- Please uniform the subscripts of sulfate, nitrate and ammonium throughout the study.