Comment on egusphere-2022-653
Anonymous Referee #1


This manuscript described three typical transport phenomena in megacity clusters using MAX-DOAS network in China. The authors elaborately discussed transport processes and their possible effects. It is significant for us to deeply understand the physical and chemical processes of air pollution events. However, due to my concerns with this manuscript that I outline below, I believe there should be some minor revisions done. If the authors can address my concerns, I do believe this work can be a positive contribution to the journal of ACP.

General comments:

- Section 2.2, Line 139: the spectra measured with a solar zenith angle (SZA) of >75° to avoid the strong impact of stratospheric absorbers. Please elaborate the impact clearly.
- Section 2.3, Line 154: the clouds have large impacts on the data quality. Please describe this procedure and put it into the Supplementary materials.
- What is the estimated measurement uncertainty?
- Section 3.1, Line 264: ‘After 16:00, the high-extinction air mass shifted MTL from 300–1000 m toward the surface at SJZ, with the AEC gradually exceeding 0.5 km$^{-1}$ (Fig. 5)’. Which shift do you want to emphasize, the shift of MTL caused by the high-extinction air mass or the shift of air mass? Please reorganize the sentence.
- 9: Why is the data missing at NC and XH stations during March 6-22, 2021?
Technical comments:

Line 177, ‘the wind speed in the southwest-northeast direction (WS)’ □ ‘the wind speed (WS) in the southwest-northeast direction’

Line 191-192, ‘Due to the large discrepancy in their vertical distribution, the MTLs of various pollutants were bound to have different varying characteristics’ □ ‘Due to the large discrepancy in the vertical distribution of various pollutants, their MTLs were bound to have different varying characteristics’


Line 264, add space between ‘MTL’ and ‘from’, the logic of this sentence needs to be reconsidered.

Line 302: ‘According to the selection standards described in Supplement Sect. S3, we confirmed that March 15 was a dusty day’ and ‘dusty day’ is used in the following paragraphs. However, in Supplement Sect. S3, the date when the dust storm happened is defined as ‘dust day’. Please use the unified definition between the manuscript and the supplementary materials.

Line 360, ‘two stations assigned to the dark group (DG) located on the right’ □ ‘two stations assigned to the dark group (DG) are located on the right.’

Line 411, ‘four periods: west-to-east, YRD to NCP, transformation, and NCP to YRD’ □ ‘four periods: West-to-East, YRD-to-NCP, Transformation, and NCP-to-YRD’. To keep in accordance with captions in Fig 12.

Fig. 11: the date format of ‘yyyy-mm-dd’ is different from that of other figures. Please take the unified date format.

Fig. S11-15: ‘surface, 500 m, 800 m, 1000 m and 1500 m’ □ ‘surface, 500, 800, 1000 and 1500 m’