Dear Editor

Our manuscript acp-2020-1162 entitled “Long term variation of aerosols lidar ratio in Shanghai based on Raman lidar measurement” has been revised according to the editor’ comments. We appreciated editor’ suggestions and endeavors. In the revised version, we checked and revised the manuscript carefully according to the editor’ comments

In the following, we will give an item-by-item response to editor’ comments. Editor’s comments are in black. Authors’ responses are in blue.

Best wishes.
Qianshan He

1. Line 79, "Influencing factor" should be changed to "influence factor".

R: We appreciated the editor's suggestions and have revised it. Similarly, we have also changed other same expressions in the manuscript.

*Using the observational data of Raman lidar in Shanghai from 2017 to 2019, 355 nm LR was retrieved and its variations and **influence factors** were analyzed.*

*The volume depolarization ratio (δ) was positively correlated with LR, and it also decreased with the increase of height, indicating that vertical distribution of particle shape was one of the **influence factors** of the variations of LR with height.*

*In addition, studying the **influence factors** of LR in Shanghai can be conducive to understanding the LR variation characteristics and determining the source of pollutants. With these motivations, the vertical and temporal variations of LR and its **influence factors** in Shanghai were analyzed using the results retrieved from Raman lidar, which laid a solid foundation for quantitative study of pollution and its causes in the future.*

*3.2 Analysis of **influence factors** of LR*

*As mentioned previously, the vertical variations of absorbing aerosols and their **influence factors** played an important role in evaluating the radiation effect of aerosol and studying the cause of pollution (Mishchenko et al., 2004).*

*The aerosol 355 nm LR was retrieved, and the variations of LR and their **influence factors** were analyzed.*

2. Line 31, "355nm, 532nm and 1064nm" should be "355 nm, 532 nm and 1064 nm".

R: We have revised it according to editor's comments.

*To our knowledge, the LR at **355 nm, 532 nm and 1064 nm** are usually assumed to be 50 sr in China.*

3. Line 76, "also can provides" should be "also can provide".

R: We appreciated the editor's suggestions and have revised it.

*On the one hand, the range-resolved LR obtained from ground-based Raman lidar can not only be used to compare with 355 nm LR obtained from ATLID (Atmospheric LIDar) on the EarthCARE (Earth Clouds and Radiation Explorer) planned to be launched by ESA (European Space Agency) (Liu et al., 2020; Nicolae et al., 2018), but **also can provide** a reliable basis for the inversion hypothesis of elastic lidar in Shanghai and surrounding areas, and improve product reliability from elastic lidar network such as the Asian dust and aerosol lidar observation network.*

4. Line 99, the full name of "UTC" is needed.

R: We have added the full name of "UTC" in the revised manuscript.

*The time in the paper without special explanations was UTC (**Universal Time Coordinated**).*

In addition, we have also revised the first paragraph of the introduction. And, some grammatical errors in the manuscript have been corrected.

Aerosols in the atmosphere can affect the earth's climate by absorbing and scattering solar radiation (direct effect of aerosols) (Huang et al., 2014; Wang et al., 2013) or

acting as cloud condensation nuclei which can affect cloud physical properties and precipitation (indirect effect of aerosols) (Huang et al., 2006; Liu et al., 2019a and 2019b; Yan and Wang, 2020). In general, the vertical distribution information of aerosols is required to improve our understanding of aerosol climate effects (Ferrare et al., 2001; Sicard et al., 2011). For example, Wang et al. (2020) found that dust-forced radiative heating decreased significantly as the transport height of dust aerosols decreased. A study by Lu et al. (2020) showed that anomalous elevated aerosol layers above 2 km led to warming in the upper atmosphere (+0.32 K/day) and cooling on the surface (−0.04 K/day). In addition, results of Liu et al (2019b) showed that the aerosols mixing with cloud layer in the vertical direction can significantly reduce the effective radius of ice particles and prolong the life of clouds.

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