

***Interactive comment on* “Study on variations in lidar ratios for Shanghai based on Raman lidar” by Tongqiang Liu et al.**

Anonymous Referee #2

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Aerosol lidar ratio (LR) is a key parameter for retrieving aerosols optical properties from elastic lidar measurements, and better evaluating its climatic effects. The article presents an investigation of lidar ratio (355 nm) variation of atmospheric aerosols in Shanghai from long-term Raman/polarization lidar measurements. Moreover, relation between LR at 355 nm and other factors are discussed in detail. The topic is of sufficient interest to the communities of study of laser remote sensing and atmospheric aerosol. In general, I find this manuscript to be of interest for publication and appropriate for Atmospheric Chemistry and Physics. There are several suggestions for improvement listed below that should be considered by the authors and the editors before publication.

1. The title of the manuscript is inappropriate. In my opinion, it is preferred to use “Long-

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term variation of aerosols lidar ratio in Shanghai based on Raman lidar measurement”.

2. This study discuss distribution of lidar ratio at 355 nm, it is suggested that the authors have to clearly specify it throughout the manuscript, especially mark “lidar ratio (355 nm)” in all figures.

3. Honestly speaking, this study cannot provide enough valuable LR information for improvement of the CALIPSO lidar retrieval. Because CALIPSO algorithm need LR at 532nm for seven aerosols types, not that at 355nm. However, LR at 355nm in this study would be very useful for the EARTHcare lidar in the future. Please rewrite sentences in Line 64-66.

4. Line 60-61: combine citations to “Noh et al., 2007 and 2008”. Similar to citations in line 118. Please check such problem throughout the manuscript.

5. Section 2: retrieved method of aerosol optical properties from Raman lidar is widely used and almost common knowledge among lidar community. The authors do not modify or improve the method in this study at all. So, it is suggested that section 2.2 could be compressed. More important information (such as lidar data correction) should be briefly introduce in section 2. For example, overlap correction is very important before retrieving LR from Raman lidar observation. Improper overlap correction would lead to large uncertainty.

6. LR is a really complicated parameter which not only depends on aerosol types. It is hard to identify aerosol type from LR only, without additional independent information. The authors claimed that dust aerosol is usually distributed around 1-2 km, according to range of LR variation. This conclusion is inconsistent with statement in line 193-194. It should be noted that depolarization ratio can identify dust from other aerosol reasonably, rather than LR. Please rewrite the sentences.

7. Page 9 line 247: I guess “an effort” should be “order”.

8. Page 12 line 343: change “667-hours” to ‘667-hour’.

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9. Figure 5: x-axis of this figure should be marked by date (not hour), so that readers easily understand seasonal variation of LR in Shanghai.

10. Figure 6: it is well known that dust aerosols usually show large depolarization ratio (DR). As described by the authors, LR of dust is 40-60 sr. However, LR which corresponds to large DR are in range of 100-120 sr. Please explain the reason.

11. Figure 9: Please mark the location of lidar site in all panels.

12. The English of manuscript should be further improved before publication.

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