Anonymous Referee #1

A method for retrieval of aerosol and small cloud droplet microphysical parameters using the backscatter coefficient of two wavelengths (355nm and 1064nm) of lidar is proposed in this manuscript. The algorithm is derived in detail, and the sources of error and applicable conditions of the algorithm are discussed. This algorithm only requires two wavelengths to achieve effective radius and number concentration, and is simple and stable. It is suitable for inversion of cloud base cloud droplet and aerosol with uniform mixing and relatively stable composition. The method proposed is innovative and of practical value. However, this algorithm also has certain limitations, namely the scale of particles that can be inverted is limited.

Response: Thank you very much for your nice comments. Your question and suggestion are very helpful for us to improve the quality of our paper. We appreciate the reviewer's thoughtful review and constructive comments. The following is our point-to-point replies.

Specific Comments:

1. How to determine whether the detected object meets the scope of application of the algorithm?

Answer：This algorithm is applicable for aerosols and small cloud droplets. For aerosols, particle diameter is usually 0.01~10um, while the effective particle diameter ranges from 0.6um to 1.2um for urban aerosols. Usually, water droplets larger than 2 microns are called cloud droplets. Therefore, this algorithm is suitable for the detection of urban aerosols and initial cloud formation, or for cloud lateral boundary.

2. The aerosol size distribution and cloud droplet size distribution used in section 2.2 were obtained in 2005 to 2006, and if new statistical data can be used, the conclusion would be more convincing.

Answer: Thanks, the reviewer is absolutely right. However, aircraft observation data is rare and precious, and this is the only data we can obtain. This data is also representative.

3. What is the impact of b-value changes in the Gamma distribution on the results? Quantitative data needs to be provided in the manuscript.

Answer：According to Figures 4 and 5, we can also observe that the influence of b value on the results is not significant.

The influence of b value on the results varies depending on the parameters selected. If the color ratio (355nm/1064nm) is selected for the retrieval of effective radius, the influence of b value on the results is about 5% (as shown in Figure 3c). If the lidar ratio is selected for the retrieval of effective radius, the influence of b value on the results will be slightly greater, and it might reach ~10% (as shown in Figure 3c).

4. In Figure 10, there is a sharp increase in the echo signal above the cloud layer. Is this caused by ice crystals?

Answer: According to the temperature profile in Figure 8b, it can be seen that

temperatures below 3.5 km are generally greater than 0 ˚C. Therefore, it can be concluded that the strong signal on the cloud layer is not caused by ice crystals. According to Figure 12b, it can be seen that the large values are caused by the increase of particles number.

5. Table1, Resolvable time? Minimum resolvable distance?

Answer："Resolvable time" should be "time resolution".

"Minimum resolvable distance" should be "distance resolution".

6. There are grammatical errors in the manuscript, which need to be carefully revised.

Answer：We will check and revise the manuscript sentence by sentence to avoid mistakes. Thanks.