Atmospheric Measurement Techniques Discussions

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Comment on amt-2022-87

Anonymous Referee #2

Referee comment on "Technique for comparison of backscatter coefficients derived from in situ cloud probe measurements with concurrent airborne lidar" by Shawn Wendell Wagner and David James Delene, Atmos. Meas. Tech. Discuss., https://doi.org/10.5194/amt-2022-87-RC2, 2022

This study compares the cloud particle optical and microphysical properties by cloud probe (ECP) and a concurrent airborne Lidar (OID) under different temperature regimes. The manuscript also illustrates some inconsistencies between the two measurement methods and then gives several potential reasons for the differences. This is a very useful measurement in understanding the gap between model computation and measurements for cloud particle optical and microphysical properties. Several comments are listed below.

1. In line 244, what is “ni”? I think you refer to eta_i in equation (4). A similar issue appears in equation (5).

2. For the upper right plot (B) in Figure 7, I think the median value is more reasonable than the mean value for the particle diameter measured by the ECP. Also, what is the definition of backscatter per second in Figure 5, the mean or median value?

3. The Figure 8 caption said the least square fit is the black line, but it is not black in Figure 8.

4. Figure 10 needs some help. Two different color dots are heavily overlapped. Would it be possible to change to partly transparent to better distinguish cold and warm particles, or reduce the marker size? Furthermore, the figure with the same range for the x-axis and y-axis may be better to compare.

5. The study points out that the biased low calculated backscattering from ECP. The backscattering is calculated by the measured effective diameter in this study. I am not

very clear how the effective diameter is determined in the measurement. You also mentioned a “fast-circle diameter method”. However, I did not find the related description in the supplement materials either. I think it is better to describe the measure and convert process more.