The authors would like to thank all reviewers for their kind words and feedback. A point-by-point response to the reviewer's comments is provided below.

Reviewer 2

I have only one comment, in the statistics of hydrometeor layer properties estimated for days where CloudSat overpassed within 200 km of the ENA station, 4 hrs KAZR and ceilometer observations around the overpass are taken into consideration (Figures 3 and 4). Why do the authors use such a wide time window for their comparison when for cloud-comparison purposes, a length scale of a few tens of kilometers and a time scale of a few minutes is generally acceptable (e.g. Blanchard et al., 2014)? This question is more puzzling in the discussion of the limitations of CloudSat observations, highlighted in Figure 4, with cloud observations up to 1:30 hour time difference with the time of the overpass. I suggest that the authors use a smaller time window for the evaluation of CloudSat performance with KAZAR measurements and provide a justification for the use of this time window and the consequences on the homogeneity of the scene. Similarly, in the discussion of the differences of the statistics observed, it would be good if the examples/arrows pointing to the different CloudSat underestimations/limitations are given in cases that these limitations are visible in the clouds captured from CloudSat and KAZAR collocated cloud observations.

Following the reviewer's suggestion, the authors modified their intercomparison time window by reducing it from ± 2 hrs to ± 1 hr around the overpass. The region size and time period used now match those of Protat et al. [2009] which we now cite in the revised version of the manuscript. A mention that this methodology is based on a compromise between keeping the domain size small enough to maintain its homogeneity and capturing a number of cases large enough to reach statistical significance was also added to the revised manuscript.

"To illustrate how the aforementioned example is representative of the general picture of the WMBL cloud regimes at the ENA, we also compared statistics of hydrometeor layer properties estimated for all instances where CloudSat overpassed within 200 km of the ENA and boundary-layer clouds were the dominant cloud type (Fig. 3 and 4; 103 out of the 138 overpasses). For this comparison, only KAZR and ceilometer observations taken within ± 1 hr of the overpass are considered. The predominance of boundary layer clouds is established using KAZR observations taken within ± 1 hr of the overpass time. Instances with less than 30% (in time) high or cold clouds are deemed dominated by boundary layer clouds; high or cold clouds present in these instances (if any) are filtered out of the analysis. This region size (for the spaceborne observations) and time period (for the ground-based observation) were selected to match those of Protat et al. [2009] and constitute a compromise between keeping the domain size small enough to maintain its homogeneity (~ 99% ocean by area) and capturing a number of cases large enough to reach statistical significance (103 overpasses)."

The authors are happy to report that this modified methodology produces results still supporting their initial conclusions. Slight adjustment were made throughout the text to match the revised numbers. For example:

"Although not expected to perfectly match, the large hydrometeor cover discrepancy between the KAZR (48.1%) and CloudSat-CPR (27.2%) suggest that the CloudSat-CPR fails to detect clouds in more than a few (on the order of ~40%) of the atmospheric columns it samples (Fig. 3a)."

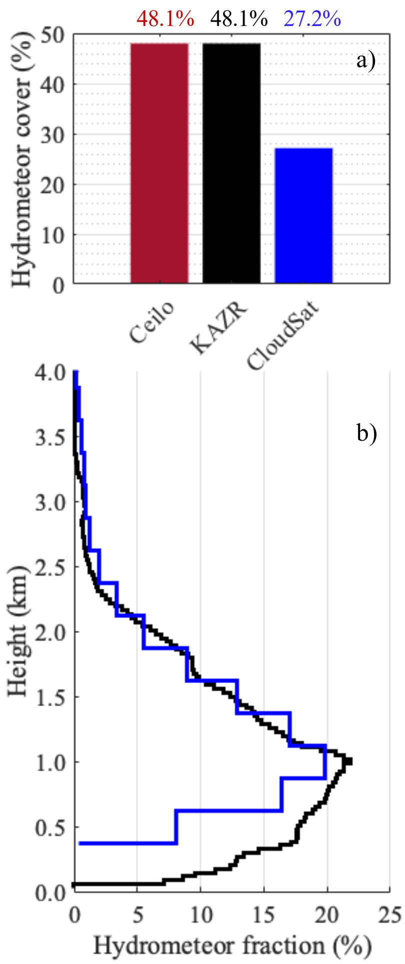

Figure 3. *For 103 instances where CloudSat overpassed the 200-km radius region centered on the ENA observatory, a) fraction of observed profiles with cloud or rain (i.e., hydrometeor cover) and b) hydrometeor fraction profile. Both estimated from CloudSat-CPR observations within a 200-km radius of the ENA observatory (blue) and ground based KAZR observations collected within ± 1 hr of the CloudSat overpass (black). Fractions are estimated based on the total number of observed profiles excluding those determined to contain high, deep or ice clouds.*

As well as for example:

“2) The distribution of KAZR-detected cloud top heights also shows the presence of cloud top modes near 1.2 km and frequent occurrences near 2.2 km that are only partially detected by the CloudSat-CPR (Fig. 4a). These elevated cloud tops modes are likely related to the several echo bases between 1.5 and 2.0 km that nearly all went undetected by the CloudSat-CPR (Fig. 4b).”

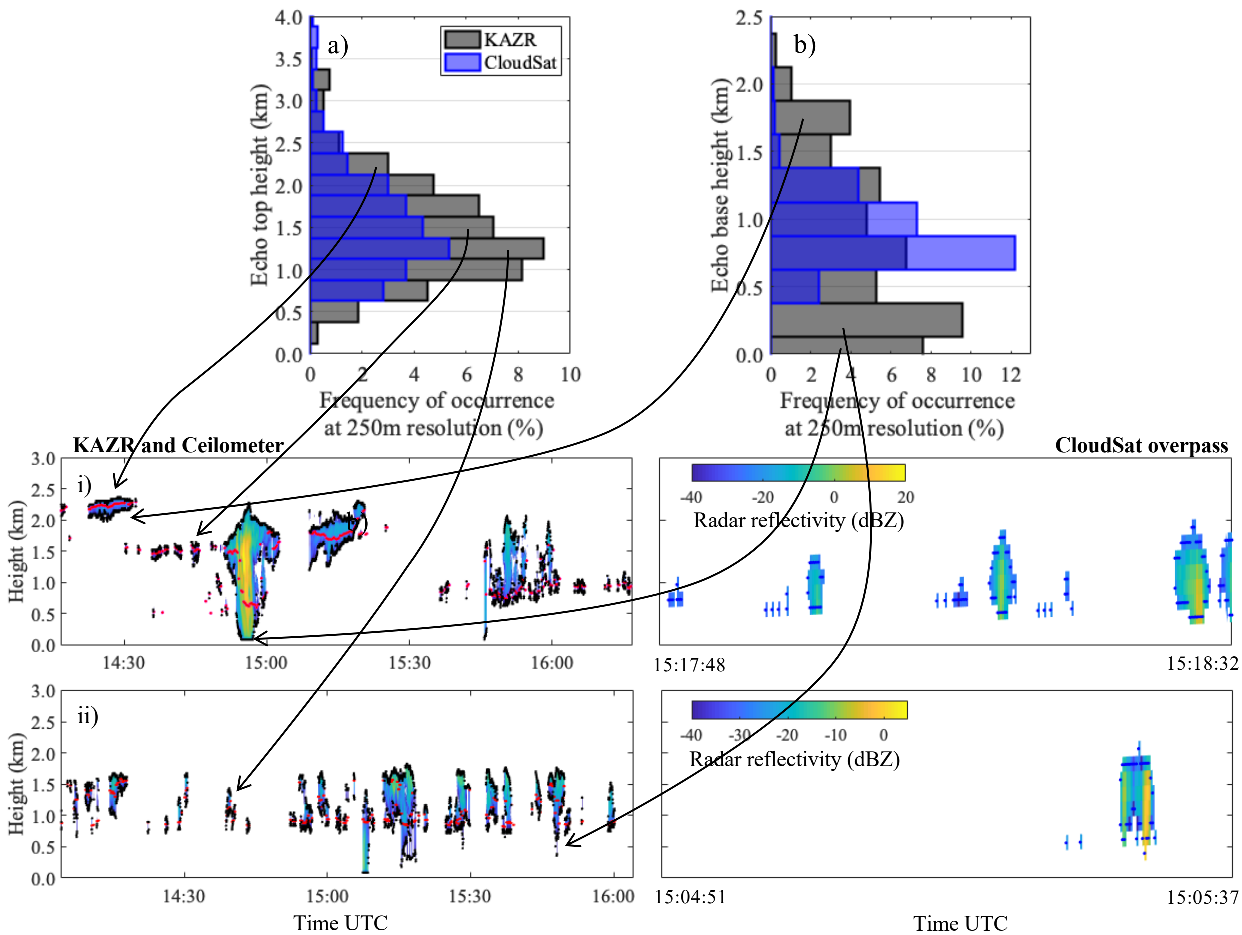

Figure 4. For 103 instances where CloudSat overpassed the 200-km radius region centered on the ENA observatory, distribution of a) echo base height, and b) echo top height, estimated from CloudSat-CPR observations within a 200-km radius of the ENA observatory (blue) and ground-based KAZR observation collected within ± 1 hr of the CloudSat overpass (grey). For references are examples of hydrometeor radar reflectivity measured on i) Feb. 11, 2017 and ii) Oct. 24, 2016 by the ground based KAZR within ± 1 hr of the CloudSat overpass and by the CloudSat-CPR within 200-km of the KAZR location. Dots on these figures represent the boundaries of the radar echo (black and blue dots for the KAZR and the CloudSat-CPR respectively) and the location of the ceilometer-determined cloud base (red dots).

The rest of my specific comments are only to encourage more clarity in the presentation of the results or technical corrections.

1. Page 4, line 313 – 326: Although mentioned in the legend of Figure 5b, the CloudSat blue line in fig. 5b is not mention in the paragraph.

We would like to respectively point out that the CloudSat blue line is mentioned in the appendix.

"The gaussian range weighting function depicted in Fig. 2 produces a forward-simulated surface echo return similar, in intensity and vertical extent, to the surface echo observed by the CloudSat-CPR under clear sky conditions (compare the royal blue line and black lines in Fig. 5b)."

2. Page 11, line 391: There is a typo in the factor.

The sentence was revised.

"The vertical stretching of cloud tops results from additional power being focused between a factor of 0.0 and 0.5 times the pulse length on the leading edge of the pulse (comparing the range-weighting function of EarthCARE-CPR to that of the CloudSat-CPR; respectively the black and blue line on Fig. 2)."

3. Page 15, line 510: Apart from a ceilometer, the synergy with the EarthCARE lidar (ATLID) could help correct the cloud top height.

We would like to thank the review from this recommendation. It was added into the text.

"Synergy with the collocated Atmospheric Lidar (ATLID) could potentially help correct cloud top height, however, such corrections would only be possible in single layer conditions and alternative techniques would need to be developed to improve the EarthCARE-CPR's ability to accurately estimate the vertical extent of multi-layer boundary layer clouds."

Reference:

Blanchard, Y., J. Pelon, E.W. Eloranta, K.P. Moran, J. Delanoë, and G. Sèze, 2014: A Synergistic Analysis of Cloud Cover and Vertical Distribution from A- Train and Ground-Based Sensors over the High Arctic Station Eureka from 2006 to 2010. J. Appl. Meteor. Climatol., 53, 2553–2570, https://doi.org/10.1175/JAMC-D-14- 0021.1.

Protat, A., D. Bouniol, J. Delanoë, E. O'Connor, P. May, A. Plana-Fattori, A. Hasson, U. Görsdorf, and A. Heymsfield (2009), Assessment of CloudSat reflectivity measurements and ice cloud properties using ground-based and airborne cloud radar observations, *Journal of Atmospheric and Oceanic Technology*, *26*(9), 1717-1741.