Reply to the final comments of the Referee #2

Reply:
The presentation of the equations is improved, but I still have trouble with your notation.
The prime symbol has not the same meaning for all variables. I would suggest to use the prime symbol (') only for alpha and P. The z' and dz' inside the integrals should be then replaced by another letter, maybe a greek letter...
Equation 5 looks different compared to the first version. I presume the new one is the correct one.
Response to referee:
Thank you for the comment and reviewing the equations again. We think that replacing z' and dz' with another letter will be confusing as it is a standard mathematical notation.
Indeed we found a mistake in Equation 5 and corrected it in the new version.

Reply:
How does the LWC profiles provided by DALES look like? ... almost linear so that alpha increases according to z ^ 2/3, like in Donovan et al. 2015?
Response to referee:
Yes, the LWC profile increases according to z^(2/3).

Reply:
It is true that the extinction does not change in the higher bins as fast as for the cloud base region, but to assume it as zero will mostly result in an underestimation of alpha_0' and thus of the retrieved extinction coefficient.
From section 4.4, should I understand that the 95% accuracy means that you get values 5 % smaller than the real ones? The underestimation should be cleary stated in the abstract and in the conclusions as it is a very important aspect about the retrieval scheme.
Response to referee:
No, as indicated in the manuscript the 95% is the mean accuracy. Not in all cases is it underestimated. To illustrate this we provided Figure 4 where exact error can be seen for each profile and each height within the cloud.

Reply
Please explain this clearly on the text... That Figure 2 shows the retrieved alpha' when one assumes Eq. (7) for the whole range, i.e. alpha=-1/2 d ln(ATB)/ dz. And not by using Eq. (5).
What should I get from Figure 2? That the normalization height is chosen where the slope method delivers the closest value to the true extinction profile? i.e. the blue line?
Response to referee:
An additional note was added in the manuscript. Figure 2 together with Figure 3 are used to illustrate that the choice of the normalisation interval is crucial for the presented method. The extinction estimated from the slope method can get noisy if chosen too high above the cloud base height. As this alpha_0 is used to initiate the inversion it is important that its value is close to the true extinction.

Finally two questions to Figure 5 and 6:

In Figure 5, why do you select such large ranges for tau up to 15 and for the error up to 30%?

In Figure 6, what is here A_alpha, the accuracy? the slope?

Response to referee:

In figure 5 we wanted to illustrate that the error of the retrieval can vary per profile and per height within the cloud. The highest value of the error obtained was 30% hence the scale. For the optical thickness we chose the value of 15 as that was the maximum value obtained for heights above 500m and we wanted to keep all the scales consistent (the scale for Radar reflectivity and Attenuated backscatter was up to 600m).

In figure 6 Alpha_a is the accuracy. We added an explicit note in the manuscript.