

We would like to thank Anonymous referee #1 for giving constructive suggestions and comments. The referee's suggestions/comments will be included/clarified in the revised paper. The following are our responses to the referee's comments/suggestions.

Referee #1 comment 1: The conclusion that the impact of drizzle on cloud property retrievals is insignificant at the ARM Azores site is conditional. It is right for the cloud retrieval method used here based on empirical regression equations which are dependent on both solar transmission and liquid water path. However, for other types of retrieval algorithms, such as those based on radar reflectivity, this conclusion might be not applicable. I would recommend the authors to be more cautious for this claim.

Response to referee #1 comment 1: The conclusion will be changed to “the impact of drizzle on cloud property retrievals is insignificant at the ARM Azores site using a solar transmission based method”.

Referee #1 comment 2: Since the cloud retrieval method examined here is an empirical regression algorithm. This study in principle examined the role of LWP contribution from the drizzles. To examine the accuracy of cloud retrievals that are used here for Azores site, an intercomparison with in-situ aircraft observations might be optimal. Of course, it does not affect the major part this study is trying to understand without the use of aircraft observations.

Response to referee #1 comment 2: Yes, we agree that the results would be more robust if we can compare the retrieved cloud and drizzle properties with any aircraft in situ measurements. However, there was no aircraft measurement during the CAP-MBL field campaign. Future work will be performed regarding the topic if any aircraft in situ measurements were available in the newly deployed ARM Eastern North Atlantic (ENA) site.

Referee #1 comment 3: For the examination of roles of drizzles to cloud retrievals, this paper has examined the uncertainties in cloud retrievals with the method developed by Dong et al. (1998). The main error is from the relative LWP contribution by drizzles. However, various cloud retrievals exist, particularly those based on radar reflectivity or spectral radiation. If possible, it will be great if the authors can also examine the role of drizzles to other types of cloud retrievals.

Response to referee #1 comment 3: The microphysical retrievals in Dong et al. (1998) depend on LWP values, which, as described in our manuscript, compose two parts:  $LWP_c$  within cloud and  $LWP_d$  below cloud base.  $LWP (=LWP_c+LWP_d)$  has been used in previous studies, so it may be a source of uncertainty if  $LWP_d$  has been included in the calculation. In this study, we examined the impact of drizzle below cloud base and only used  $LWP_c$  to do cloud property retrievals.

Dong et al. (2014b) presented a method to retrieve cloud microphysical properties using radar reflectivity. The proposed re-dBZ relationship in Dong et al. (2014b) is based on daytime layer mean cloud particle effective radius ( $\bar{r}_e$ ), which is not affected by drizzle below cloud base as shown in this manuscript, so drizzle below cloud base should not have any effect on the radar reflectivity based retrieval method described in Dong et al. (2014b). For the impact of drizzle to other cloud retrieval methods, however, is out of the scope of this study due to lack of access to other retrieval algorithms.

Referee #1 comment 4: For page 4311 that describes the cloud retrieval algorithm, I would suggest briefly indicating or discussing the cloud retrieval uncertainties for each variables. As we know, uncertainties in LWP and sigma (logarithmic width), solar transmission and other variables could introduce errors to the cloud retrievals. The authors indicate an uncertainty of  $\sim 10\%$  in page 4316, but that is too simple to know details. Knowing the cloud retrieval uncertainties is very importance since this information could help us know the uncertainty contribution from the drizzle is significant or not compared to other influential factors.

Response to referee #1 comment 4: The LWP value has an uncertainty of  $20 \text{ g m}^{-2}$  for  $\text{LWP} < 200 \text{ g m}^{-2}$ , and  $10\%$  for  $\text{LWP} > 200 \text{ g m}^{-2}$  (Dong et al., 2000; Liljegren et al., 2001), and the solar transmission ratio ( $\gamma$ ) has an uncertainty of  $5\%$  (Kato et al., 1997). Miles et al. (2000) summarized the size distribution parameters derived from in situ data reported in literature and proposed a mean value of  $0.38$  for the logarithmic width ( $\sigma_x$ ) with a standard deviation of  $0.13$  for marine clouds.

Regarding the uncertainties described above, error analyses have been conducted in previous studies. Dong et al. (1998) analyzed sensitivities of the parameterized  $\bar{r}_e$  to errors of LWP and  $\gamma$ :  $10\%$  of changing (increasing or decreasing) in LWP will result in the parameterized  $\bar{r}_e$  change within  $10\%$ , and  $10\%$  of changing in  $\gamma$  can vary  $\bar{r}_e$  by  $12.4\%$ . Dong et al. (1997) conducted a sensitivity study about the change of retrieved cloud properties to the change of  $\sigma_x$  and found that the variation of the cloud-droplet size distribution with has no effect on the retrieved  $r_e$ , while the cloud-droplet number concentration changes by  $15$  to  $30\%$  as the  $\sigma_x$  varies from  $0.2$  to  $0.5$ .

From our manuscript, the contribution of drizzle  $\text{LWP}_d$  to total LWP is less than  $4\%$ , so the retrieval uncertainty from drizzle below cloud base is insignificant when it compares to those uncertainties from  $\gamma$ ,  $\sigma_x$  and LWP values.