Ms. No.: ACP-2022-256

A meteorological overview of the ORACLES (ObseRvations of Aerosols above CLouds and their intEractionS) campaign over the southeast Atlantic during 2016-2018: Part 2 – daily and synoptic characteristics

by Ju-Mee Ryoo, Leonhard Pfister, Rei Ueyama, Paquita Zuidema, Robert Wood, Ian Chang, and Jens Redemann

Dear Editor, Dr. Yuan Wang,

Thank you very much for your support and decision on acp-2022-256.
We made the technical corrections recommended by referee #2. We also incorporated the corrections into the revised manuscript. Enclosed is a point-by-point response to (referee#1)'s comments.
Thank you again for your kind support and insightful suggestions.

Sincerely,
Ju-Mee Ryoo, Leonhard Pfister, Rei Ueyama, Paquita Zuidema, Robert Wood, Ian Chang, and Jens Redemann

Response to Report #2 (Referee#2)

In this response letter, we repeat the reviewer's questions and answer them individually. Our response is marked in blue letters.

Technical Comment:

P8 L189: Do you mean: Find the height difference between where dq/dz evaluated at q=10 g kg^{-1} and height D.

⇨ No. This means "Find the height where q (specific humidity) is equal to 10 g kg^{-1} in the given domain". And this height is compared with the height determined by (2) (dq/dz is minimum). We select the higher height.

For most cases, (2) alone (Find the height at which dq/dz is a minimum at each horizontal grid point in the domains) is sufficient to detect the decoupled cloud PBLH. However, we added (3) to the detection procedure because we wanted to detect the altitude including the cloud layer above the well-mixed surface-based layer even in local disturbance conditions.

Figure R1 shows the vertical profiles of q and dq/dz at various longitudinal locations at 12Z, 20 August 2017 at 18° S. Fig. R1 (b) shows one dominant peak of dq/dz, and its minimum value is easily discerned as one height so that BLH can be easily detected. In contrast, Fig. R1(b) shows that dq/dz profile has some vertical fluctuations with their peaks similar at A (2.1 km) and B (0.9 km). The B has a low dq/dz value and is about the height where q = 10 g kg^{-1}, which is about the level of the well-mixed layer.

In short, adding the (3) helps us to detect the decoupled cloud BLH and prevents us from detecting the very low altitude value of large dq/dz due to local disturbance or convective influence near the surface.

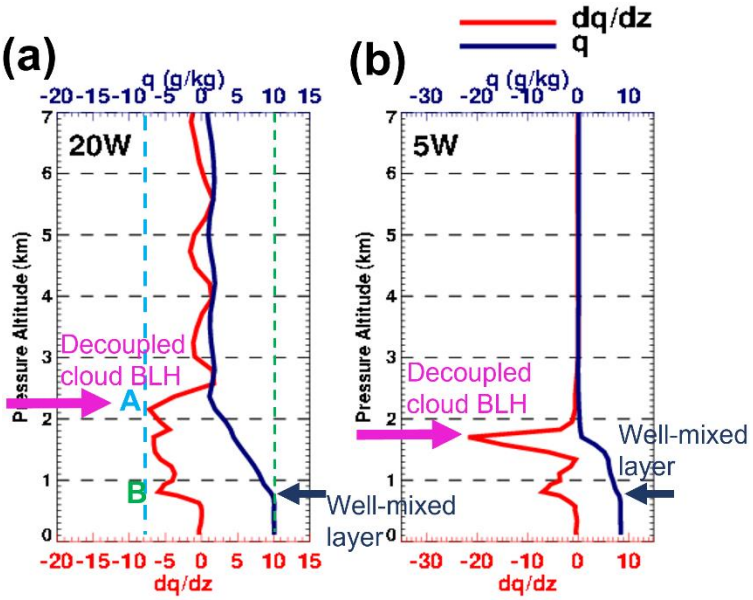

Figure R1. *Vertical profile of q and dq/dz at (a) 20° W and (b) 5° W at 18° S at 12Z, 20 August 2017. The solid red line represents the dq/dz profile, and the solid navy line represents the q profile. The magenta arrow represents the detected decoupled cloud BLH. A and B denote the height identified by dq/dz value. Data is from ERA5 model-level data.*

To help better understanding, we modified (4) (P8 L190):

⇨ (4) Pick the higher height of (2) or (3)

Into "(4) Pick the higher height of (2) or (3) to find the height at which the cloud layer is above the well-mixed surface layer."

P13 L248 illuminate

⇨ to elucidate

P13 L248 8 and 14 September 2016 were so-called “routine” flight days.

⇨ We changed it into “The 8 and 14 September 2016 flight days were denoted as “routine” flight days.”

P13 L250 as far north as possible through

⇨ to the far northern edge of

P13 L266 discussed in the following.

⇨ further discussed.

P21 Figure 6 caption.

⇨ We replaced r with “r”

P33 Figure 11 cation.

⇨ We replaced r with “r”.

P45 Figure 16 cation

⇨ We replaced r with “r” as you suggested.

P52 L819

⇨ We replaced reviews with reviewers. Thank you so much for your insightful comments.

***Additional caption changes:**

- Figures 4, 9, 14: We added “R in (d) refers to Pearson correlation coefficient between two variables in a parenthesis with its statistical significance (*p-value*).”

- Figures 6, 11, 16: We changed Pearson’s correlation coefficient into “Pearson correlation coefficient”.