We thank the Referee for his/her time and his/her constructive comments. We have complied with most of the proposed changes. In the following, the comments made by the Referee appear in black, our replies are in blue and additional text included in the revised MS appear in red.

This study investigates the inhibiting factors that led to the failed cyclogenesis of the mesoscale convective system (MCS) Pierre Henri (PH), observed during the CADDIWA field campaign. Using high-resolution airborne observations and a convection-permitting Meso-NH model, the authors analyze the interactions between the Saharan Air Layer (SAL), the Saharan Trade Wind Layer (STWL), cold pools, and upper tropospheric (UT) dry air. The study finds that: 1) the STWL, a relatively underexplored feature, played a significant role in increasing convective inhibition (CIN), contributing up to 40% of CIN during the mature phase of PH; 2) cold pools generated by convection further suppressed cyclone development, with their CIN contribution peaking at 50% post-intense phase; and 3) UT dry air limited the MCS's anvil expansion, with relative humidity below 15% between 7 and 11 km altitude, covering 18% of the MCS environment during dissipation. The findings are well-supported by observational data and validated against numerical simulations. I only have two minor comments for the authors to consider.

The study focuses on the failed cyclogenesis of one MCS (PH), but it is unclear how representative these findings are for other storms in the Cape Verde region. It would be interesting to more comprehensively compare the findings in this study with past ones on failed and/or successful Cape Verde cyclogenesis cases to improve the broader implications. At the end of the conclusion, we added: "This study examines the failed cyclogenesis of a single MCS. As such, it remains uncertain how representative our findings are for other storms forming in the Cape Verde region. In this case, warm and dry Saharan air intruded to the southwest of the MCS — an area previously identified as unfavorable for cyclone intensification in the presence of SAL dry air (Shu and Wu, 2009). However, in that study, SAL dry air was characterized using relative humidity between 600–700 hPa, and not within the STWL. It would therefore be valuable to refine this type of systematic analysis by focusing specifically on the STWL. Moreover, Shu and Wu (2009) investigated the weakening of named tropical cyclones. In contrast, there is as yet no comprehensive study of failed cyclogenesis events, such as the one presented here for a single case. Such a study is needed to better understand the wider implications of our results, particularly with regard to the influence of STWL. A crucial aspect of such a study would be to document the vertical distribution of dust at high resolution. Rather than relying solely on lidar data obtained during a field campaign, systematic monitoring of the STWL could be carried out using ground-based or space-based lidar systems. Combined with back-trajectory analysis, aerosol observations could be potentially identified as dust, depending on aerosol origin. In addition, it is essential to monitor the dryness of the STWL with specific measurements, as this is an essential characteristic of this layer."

While the study effectively shows that STWL increased CIN, the mechanism of STWL intrusion into the MCS and its modification of convective processes needs clearer explanation. I suggest further elaborating on how weak low-level circulation allows STWL intrusion based on the current analysis. We refer to the mechanism of STWL intrusion into the MCS when commenting Fig. 7b. To clarify the point, the sentences are now "At 1.5 km height, streamlines with speeds below 10 $\mathrm{m\,s^{-1}}$ and dust concentrations above 15 $\mathrm{cm^{-3}}$ are present from the west up to the southwestern convective cells (Fig. 7b). An almost closed circulation pattern with an approximate diameter of 40 km is at the center of the convective cells, which prevents the STWL intrusion. However, a weak converging circulation to the southwest of the MCS facilitates the intrusion of the STWL into the nearby convective cells, as shown by the presence of dust concentrations above 15 $\mathrm{cm^{-3}}$."
In the conclusion, the sentence lines 419-420 "The weak low-level convergent circulation facilitates its intrusion from the southwest into the convective core of MCS Pierre Henri. " is now "Its intrusion from the southwest into the convective core of the MCS is facilitated by a weak low-level convergent circulation due to the absence of a marsupial pouch at this level."

References

Shu, S. and Wu, L.: Analysis of the influence of Saharan air layer on tropical cyclone intensity using AIRS/Aqua data, Geophys. Res. Lett., 36, L09 809, https://doi.org/10.1029/2009GL037634, 2009.