Responses to the comments of the editor
(The comments are displayed with Italic and bold font)

1) Lines 32-37: I don't understand the message. This is the abstract and must be crystal clear and in correct English.
It has been revised to: "In addition, by comparing the simulations including versus excluding an excessive atmospheric heating up to 12 $K\ day^{-1}$ produced by absorbing black carbon aerosols, we find that the semi-direct effect resulted from this heating is to lower the cloud top as well as liquid water path while increase cloud fraction, thus to delay the intense cloud break-up until the later afternoon when convection is further strengthened.".

2) Pg 2, lines 40-46 are understandable but I am concerned that the technical editors might correct the grammar and change what you intend to say.
We have revised the sentences to: "Low-level stratiform clouds (LLSCs) have a higher albedo and a larger cloud cover than many other types of clouds (Hartmann *et al*., 1992; Chen *et al*., 2000; Eastman and Warren, 2014). Their reflection of solar radiation is important to Earth's radiative budget. LLSCs often occupy the upper few hundred meters in the planetary boundary layer (PBL). Their appearance can be persistent when associated with a high-pressure system with a large-scale subsidence that stabilizes the PBL. LLSCs are often formed over cooler subtropical and mid-latitude oceans, constantly covering more than 50% of these areas (Wood, 2012)".

3) Lines 71-72: unclear
It has been revised to: "Indeed, it is still difficult to estimate the indirect effect of aerosols and thus to minimize the uncertainty associated with this effect in the climate models (Boucher *et al*., 2013; Li *et al*., 2022)".

4) Lines 74-77: unclear
Revised to: "Previous studies had investigated aerosol-cloud interactions in LLSCs using high-resolution Large-Eddy Simulation (LES) models. Many of these studies were on the cases over ocean (*e.g*., Ackerman *et al*., 2004; Sandu *et al*., 2008; Twohy *et al*., 2013; Flossmann and Wobrock, 2019), where latent heat flux at the surface plays a more important role in the life cycle of LLSCs than sensible heat, while the latter dominates in the cases over land (Wood, 2012; Ghonima *et al*., 2014)".

5) Lines 129-130: please make this understandable.
Changed to: "Majority of them, however, only addressed the response of LLSCs to the aerosol abundance rather than aerosol effects associated with different chemical compositions (such as the semi-direct effect of black carbon) by taking the advantage of measurement data obtained during the field campaign".

6) Line 240: you never mentioned the boundary conditions for the model. Is it doubly periodic? How do you apply forcings?
These are described in the Model settings section. We could rearrange the subsections. While we do not believe this would be a critical issue since the reader can have the information a few paragraphs later. We thus decide to keep the current structure.

7) Line 257: "You should say that LIMA predicts mass as well as number.
Added "mass as well as".

8) Line 263: "Only the sedimentation of drizzle…"
Done.

9) Line 280: You still haven't explained which S you use. If it's A-R & Ghan then it's not a pseudo prognostic approach. Which one is it??
Abdul-Razzak and Ghan is used in ORILAM. We have indicated this by adding "(though without the correction of Thouron et al., 2012)".

10) Line 298, please tell the reader what value of k (inverse of distribution width) that you used.
For continental condition since airmasses arrived Save came from various continental sources as suggested by the measured aerosol properties. Indicated in the revised text.

11) Line 305: How many subtiles did you use?
It is described two paragraphs down in the Model settings, as "…using data from Savè supersite, with the typical vegetation consisting of shrubs, crops, or taller trees, assuming a flat surface in the area around Savè".

12) Line 312: "alongside" ◊ and
Done.

13) Line 410: "a more homogeneous"
Done.

14) Line 458 "reasonably well", not "successful"
Done.

15) Line 507: Why "blocks"? Don't you mean columns? Also, you must mention that the low LWP columns are < 25 g/m2 or this makes no sense at all.
Now reads as: "…columns (*e.g.*, with LWP < 25 g/m^2; Petters *et al*., 2012),".

16) Lines 635-641: This shows that the authors do not understand the issues. Your model doesn't represent sedimentation of cloud drops. The sedimentation of large drops is not responsible for this process. Therefore, the sedimentation feedback (Bretherton) does not apply. Perhaps the evaporation entrainment feedback by Wang, Wang, and Feingold (JAS, Vol 60,2003) is acting. But regardless, these lines of text are wrong and should be removed or rewritten after a careful read of the relevant papers.
These statements (with modification) perhaps are still useful here to indicate the additional feedback of LLSC proposed by previous studies. We have modified the section to make it more clearly as: "Note that sedimentation thus evaporation of larger droplets (smaller than drizzles though) from entrainment zone and cloud base could likely create a thermodynamic perturbation as well (*e.g*., Stevens *et al*., 1998; Jiang *et al*., 2002). Consistent with certain previous findings

(*e.g.*, Bretherton *et al*., 2007), in a LES simulations using passive aerosol profile for July 4-5 DACCIWA case, Dearden *et al.* (2018) found that the sedimentation would remove larger cloud droplets from the entrainment zone thus, through a feedback, lead to a cloud deck with higher LWP while smaller CF than the case where such a sedimentation is completely excluded. Since the sedimentation of non-drizzle droplets is not included in our model, our results cannot be used to directly address this issue".

17) Line 675: remove "much"
Done.

18) Line 685-688: You say "Interestingly". Please explain why!
Modified to: "Modeled clouds in POL and REF appear to dissipate earlier and much faster than in CLEAN in the later afternoon, largely due to their smaller droplet sizes (Fig. 11, bottom panel)".

19) Lines 697-700: Again, you're not representing the sedimentation of small cloud drops so this does not apply. So, the "different opinions" are not relevant here. Again, these lines of text are wrong and should be removed or rewritten after a careful read of the relevant papers. Maybe the Wang et al. (2003) mechanism is relevant but you will need to be the judge of that.
Removed.

20) Line 730: I don't think your references are appropriate given that Bretherton showed that the Ackerman result was a sedimentation-entrainment feedback. The best you can say is that the entrainment of dry air evaporates cloud water more efficiently when the drops are small (Wang et al. 2003).
Ackerman et al., 2004 is now replaced by Wang et al. 2003.

21) Lines 751-753: "more water vapor tends to condense..". Where do I see this?
This Is a misquotation and has been corrected. The new sentence now indicates the TKE reduction as shown in the figure.

22) Line 760: "appear to be" ◊ are (be clear!)
Done.

23) Line 761: I cannot see where TKE is reduced below the heating layer.
It should be "just below the top of the heating layer", and has been corrected now. This can be seen from the panels of 14UTC.

24) Line 770" "massive" ◊ strong
Done.

25) Figure 13: please align the timescale in panel a) with those in b) and c)
Done.

26) Fig. 14: y-axis label in 1) and b): are these really differences?

Yes. As a comparison, the maximum cloudy sky quantity is about 300 W/m^2 as shown in Fig. 6(a). Since the discussion of Fig.14 is mainly on the result displayed in the panel (c) while panel (a) and (b) were barely mentioned, we decide to remove the panel (a) and (b) from the figure.

27) Line 834: You say "Interestingly" but this is not new, so please remove this word, or provide the interesting aspect.
Removed.

28) Line 840: You say that droplets are found to evaporate more easily but you didn't show it, you just surmise, since you haven't actually calculated the water budget and the evaporative contribution. Please reword.
Modified to: "Clouds influenced by higher aerosol concentrations and thus having higher number concentration and smaller sizes of cloud droplets evaporate more easily and this can lead to a lower cloud fraction".