**Reviewer 2 main comments:**

The addition of the supplemental figures that argue the study's main results are not overly sensitive to the cloud fraction threshold used to define in-situ air parcels and the expanded discussion section have improved the manuscript. I noticed that there are more grammatical errors in the added text than in the original text so I encourage the authors to do a thorough edit. I again have some minor and medium comments (with the ratio of minor to medium being larger here than for the first round) and I have made these comments on a PDF of the edited manuscript which is attached**.**

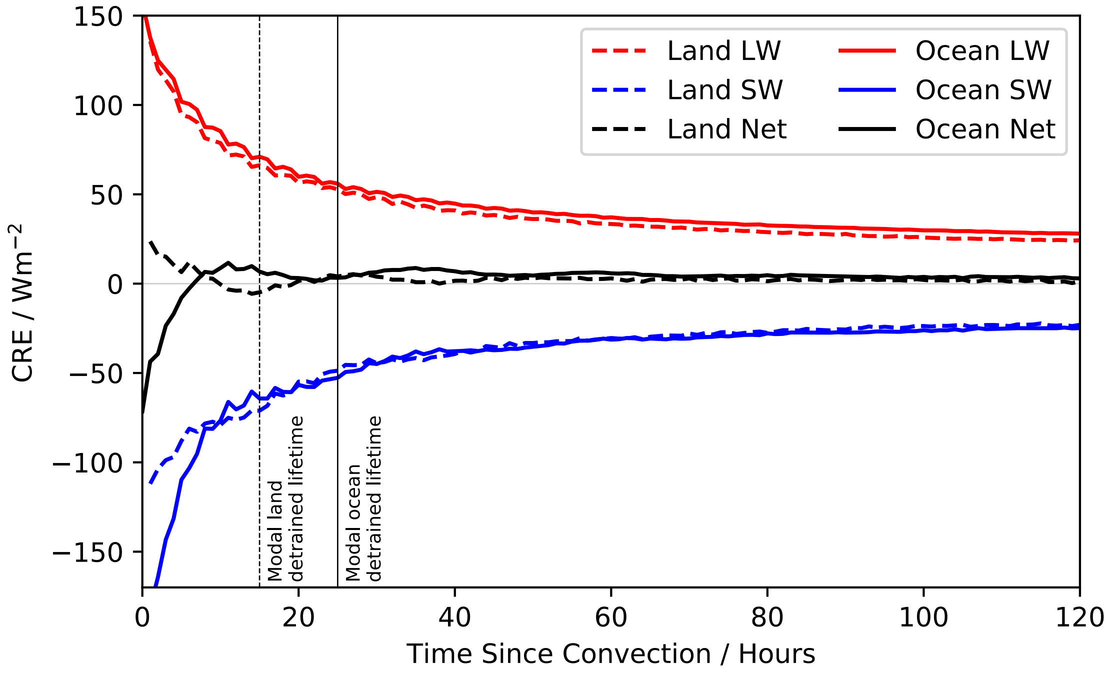
**However, I do have one medium comment that I would like to emphasize here. In response to reviewer 3's good point that the difference in the CREs between land and ocean origin cirrus can be due to the differences in the surface albedos in addition to (or perhaps even instead of) differences in the timing of the convection, the authors added a statement on lines 288-290. However, the authors say many times later in the text and also in the abstract that the difference in the timing of convection explains the differences in the CREs between land and ocean origin cirrus so it seems that the authors have not seriously considered that albedo might play a role. I think it would be quite simple to make Figure 6 using only land origin cirrus that are currently over ocean and only ocean origin cirrus that are currently over land and put that into a supplement. If that plot looks the same as Figure 6, then the authors would be in a much better place to say that the timing of deep convection is the main reason for the difference in CREs between land origin and ocean origin cirrus.**

We thank the reviewer for their continued revisions on this manuscript, which we believe is now much improved. We hope we have satisfied all the points raised.

1. The main comment raised by the reviewer is highlighted in bold. We have added a supplementary figure to show that when controlling for the albedo, the contrasts in the land-ocean SW CRE still appear. This suggests that our assumption that it is the timing of the initial convection that controls the contrast in the SW CRE between land and ocean convection is correct. We have added a sentence in the manuscript on line 293:

   ***"Some of the difference is also due to the contrast in surface albedo between land and ocean. However, Figure S3 shows that when controlling for the albedo, by only considering cirrus that exist over the ocean, there is still a significant difference in the SW CRE between land and ocean origin cirrus. This further suggests that difference in the net CRE is driven predominantly by differences in the timing of the initial convection. Further work is needed to quantify the contribution of both the albedo contrast, and the diurnal cycle difference."***

   The supplementary figure is shown below. This shows that even when the albedo is held constant, the SW CRE differs (in much the same way as Figure 7) between land origin and ocean origin cirrus.




2. During the review process, the authors also produced another Figure (Figure 5 in the new manuscript), to further show how the timing of the initial convection impacts the lifetime of the subsequent detrained cirrus. We believe this improves the manuscript further by providing a deep insight into how and why the lifetime of land and ocean origin cirrus differ as they do, and shows more generally how the timing of the initial convection is important for the subsequent cirrus evolution. This figure is shown below, with an added paragraph beginning on line 245:

**"Figure 5 shows the median lifetime of detrained cirrus clouds as a function of the local solar time that the deep convection occurred at. This further shows a strong dependence on the lifetime of the detrained cirrus to the diurnal cycle of convection, with cirrus that originates from convection that occurs during the night having a shorter lifetime than cirrus that occurs from convection during the day. For the all origin case, cirrus that occur from convection occurring between 12pm-3pm has on average a lifetime of 45 hours. In contrast, cirrus that originate from convection occurring between 9pm and midnight have an average lifetime of around 24 hours, almost twice as short. This is the case for both land and ocean origin cirrus as well, with land origin cirrus on average having a shorter lifetime, particularly for the longest lived cirrus. This shows that the difference in the lifetimes as a function of time of initial convection isn't simply showing a shift in the distribution of convection from ocean to land throughout the day. Whilst this figure doesn't control for other factors, such as the changing strength of convection throughout the day, it is further evidence for the hypothesis that cirrus decay quicker through the night than they do during the daytime."**

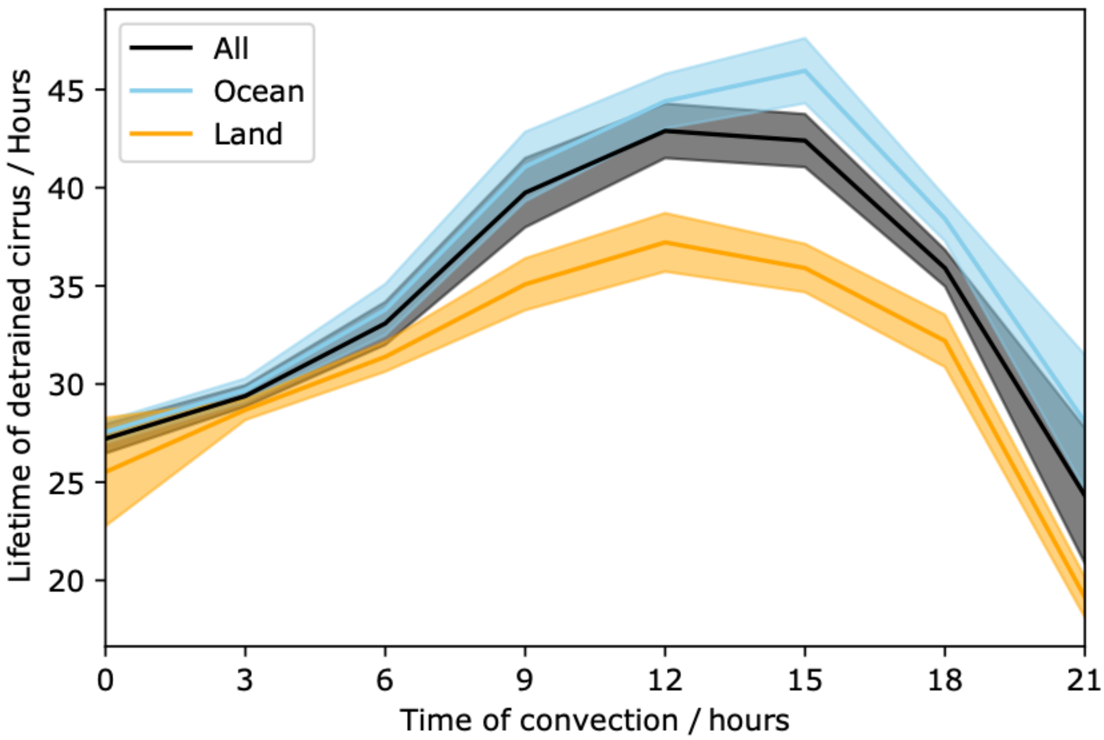



**Figure 5: Lifetime of detrained cirrus as a function of the timing of the initial convection for all, land, and ocean origin cirrus. The error bars represent the interannual variability over the study period.**

The other minor points raised by the reviewer are addressed below:

- **Line 22:** This threshold does not agree with the cited paper and seems way too small. 0.05 optical depth is almost subvisible. https://agupubs.onlinelibrary.wiley.com/doi/full/10.1029/2006GL027403 shows that cirrus clouds with LW and SW CREs between about 30 and 150 W m-2 (the ranges in Figures 5 and 6) have optical depths between 0.1 and 10. Also the same Lee et al. 2009 paper is in the bibliography twice.

  - We thank the reviewer for pointing this out. We have corrected the value based on the value given in Lee 2009 (and removed the duplicate reference) on line 25:

  ***"…thin cirrus clouds (typically defined as optical thickness below 0.3 (Lee et al., 2009))"***

- **Line 39:** I just proposed this as an alternative explanation. I don't know if this explanation or the one originally given is more realistic. Maybe you can just end the sentence after "in situ".

  - The sentence now ends on line 40 after 'in situ'

- **Line 46:** This was supposed to be removed but it is still here. You should find a reference that connects cirrus to ENSO or remove the mention of ENSO. As a reminder, Sweeney et al. 2023 is about the QBO.

    - The Sweeney reference, and the reference to ENSO, has been removed.

- **Line 62:** This argument is not clear to me. If detrained cirrus have a large net CRE with no dependence on lifetime, changes to their lifetime would still have a large impact on the radiative balance. Perhaps you mean to say that the impact is more uncertain because their properties change substantially over their lifetime.

    - It is been made clearer on Line 60 that the impact is not simply significant, but is also more uncertain, due to the time dependence of the detrained cirrus properties:

      ***"Therefore when calculating the radiative balance in the tropics, any changes in the lifetime of detrained cirrus would have a significant, yet uncertain, impact on the delicate radiative balance in the tropics, given that their properties are such a strong function of time since convection."***

- **Line 81:** The stability Iris Effect must be properly introduced

    - It is now made clear exactly what the stability iris effect is, on line 78:

      ***"(under the stability iris hypothesis, which states that the anvil area reduces as upper tropospheric stability increases, this may not be true)"***

- **Line 166:** What percentage of the cloudy pixels are used for the analyses shown in the study?
    - 12% of pixels are removed from the analysis due to uncertainty (regarding land/ocean or detrained/in situ origin). This is highlighted now in the text on line 160:

  ***"This accounts for 88% of all pixels, with 12% being removed due to uncertainty."***

  We have also corrected some lifetime CRE values that were not amended correctly in all parts of the manuscript in the last round of reviews.