

## REVIEWER No. 1

I thank the authors for considering my comments and I am satisfied with the responses, the related changes in the manuscript, and the references provided. I think the study analyzes important aspects that have not been reported before. I found only a few typographical errors: I only have spotted few typos:

**Reply:** *We thank the reviewer for the comments and the typographical errors listed below, they are corrected accordingly.*

- line 154: " One limitation on the lead detection by the divergence-based method is that only detects new openings" -> "is that it only detects"

**Reply:** *Corrected in track-changed document line 149.*

- line 198: "addition to the target classification, The presented case study of 18" -> "classification. The presented"

**Reply:** *Corrected in track-changed document line 201.*

- line 212: "Atmospheric Rivers (AR); (Martin-Ralph et al., 2020)" -> "Atmospheric Rivers (AR) (Martin-Ralph et al., 2020)"

**Reply:** *Corrected in track-changed document line 214.*

- lines 294 and 297: I recommend "Coupled: " instead of "Coupled."

**Reply:** *Thank you for the recommendation, it has been changed in both cases in track-changed document lines 295 and 297.*

- line 340 "low-lever MPC" -> "low-level MPC"

**Reply:** *The typo is corrected in track-changed document line 339.*

- line 502 ") when al cloud depths a" -> ") when all cloud depths a"

**Reply:** *The mistake has been rectified in track-changed document line 508.*

- line 563 "n cloud properties has not be reported pre" -> "n cloud properties has not been reported pre"

**Reply:** *Thanks for spotting the error, this has been rectified. In track-changed document line 572.*

## REVIEWER No. 2

The authors have addressed my questions well. I would suggest publication with a minor as below.

For one of the major comments -- significance of the coupling cases when  $LF < 0.02$ , in addition to the explanation in the response document, the authors really should have made corresponding modifications in the main text. At the minimum level, the last paragraph on page

2 can be incorporated where appropriate. This helps clarify and provide context to better deliver the content.

**Reply:** *We thank the reviewer for the suggestion. In section "4.2 Statistical Analysis" it has been included the explanation for including coupling and decoupling cases when  $LF < 0.02$  as part of the description of the analysis presented in that section. Lines 372 to 379 in track-changed document.*

REVIEWER No. 3

Dear Authors,

You have clarified my concern adequately. However, I found that some of the responses are worth mentioning in the main text, as listed below.

**Reply:** *We agree with the reviewers and the concerns have been addressed below:*

Is it better to integrate more of the response to my general comments? For example, in the track-changed manuscript L536-540, the author may want to state that 'the relationship between LWP vs. LF and SIC is practically preserved' when constraining the cloud-top to 2.5km, as well as adding a discussion on it. This would add to the robustness of the result, regardless of the specific cloud type, but more on the coupled vs. decoupled distinction.

**Reply:** *Thank you for the suggestion, the findings regarding cloud-top below 2.5km have been elaborated and included in the results as well as in the conclusion sections. See lines 471 to 480 and 545 to 549 in the track-changed document.*

Similarly, I found that the discussion of IWC/LWC retrieval uncertainties (sources) is informative in assessing the relative error. It is at least worth a few words or sentences in the revised Section 3.1 (L200 - 209).

**Reply:** *we agree that the discussion of retrieval uncertainties is informative, and it has been added to the manuscript in the methodology section when the Cloudnet algorithm and retrievals are described. In the track-changed document in lines 185 to 193.*