

Review of “A machine learning-based perspective on deep convective clouds and their organisation in 3D. Part II: Spatial-temporal patterns of convective organization”

By Sarah Brüning and Holger Tost

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## **Recommendation**

Minor revisions

## **General comments**

The reviewer appreciates the authors’ efforts to improve the manuscript. The previous comments primarily concerned clarifications of the methodology, interpretations, and descriptions. The authors have substantially revised the manuscript, and the reviewer finds that the earlier concerns have been adequately addressed.

For this second review, the reviewer again provides comments focused on clarification, as the manuscript has undergone significant modifications since the previous version. The reviewer considers the paper acceptable for publication, provided that the points specified below are adequately addressed.

## **Specific comments**

L5-7, “Our analysis emphasises that the most important distinction between all detected clouds and strong convective organisation may relate to a larger cloud area, a lower cloud top and core height, and a shorter lifetime. Weak. Weak convective organisation tends to occur with smaller clouds with fewer cores, and a shorter lifetime.”:

The first sentence is unclear about which characteristics apply to "all detected clouds" versus "strong convective organisation". It is also unclear whether the two sentences are consistent with each other. Please revise to clarify the intended comparison.

L10, “over the remote Atlantic Ocean”: The phrase is ambiguous. Please specify the geographical extent or latitudes of the area referred to.

L30: The most standard reference to “self-aggregation of convection” is

Bretherton, C. S., Blossey, P. N., & Khairoutdinov, M. (2005) An energy-balance analysis of deep convective self-aggregation above uniform SST. *Journal of the Atmospheric Sciences*, 62(12), 4273–4292. <https://doi.org/10.1175/JAS3614.1>

The authors should also note the earlier reference to the radiative convective equilibrium simulation than Held et al. (1993) is

Nakajima, K., & Matsuno, T. (1988) Numerical experiments concerning the origin of cloud clusters in the tropical atmosphere. *Journal of the Meteorological Society of Japan*, 66(2), 309–329. [https://doi.org/10.2151/jmsj1965.66.2\\_309](https://doi.org/10.2151/jmsj1965.66.2_309)

Caption of Figure 1, The first line: “we show how the derive a contiguous 3D cloud field from 2D data by a machine learning-based extrapolation” should be “... how to derive ...”

L147, “To reduce noise, we first apply a Gaussian filter with a sigma value of 0.5 to smooth the input data.”: Please describe the spatial scale of the Gaussian filter. What effective scale is used for the analysis?

L181, “land-sea mask”: Contiguous convective clouds consist of multiple points and may generally include both land and sea grid points. How can the land or sea type of clouds be classified?

L188, “at least 15 min”: Does this require at least two time steps (i.e., more than 15 minutes), or is a single snapshot (i.e., 15 minutes) sufficient?

L195, “Approximately 75 % of cloud tracks occur over ocean, with land-based tracks comprising the remaining 25 %”: What is the ratio of land and sea areas within AOI? Does the ratio 75% larger than the area fraction of sea within AOI?

Figure 4: It is difficult to read from the figure whether the contribution over land is larger or smaller than that over the sea. Moreover, it is unclear whether the “all” category represents the sum of the land and sea contributions. Could you please clarify what “all” refers to?

L352-368: It is unclear whether the “differences” mentioned in line 352 refer to the values of JJA minus those of MAM. The description in this paragraph does not appear to be consistent with Fig. 9. For example, the statement “ROME displays

more complex behavior along the period, with an overall increase around the AOI in JJA" (lines 356–358) seems inconsistent with Fig. 9(c), which clearly shows an increase in ROME across the entire domain.

L352: The term "summer" is not an appropriate abbreviation to refer to JJA. "Boreal summer" or simply "JJA" is more suitable.

L369: Please refer to "Table 4" at the beginning of the paragraph.

L378, "additional regional factors": What factors would affect the results? The large-scale circulation is an example.

L405, "more common": The contribution over land is smaller than that over the ocean in all cases. The phrase "more common" is unclear and may be misleading.

L598: Please spell out "DBSCAN" and "HDBSCAN" and provide appropriate references for both.