Final response
(Manuscript "EGUSPHERE-2025-376")
Reviewer 1

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1 Introductory remarks

We would like to thank the reviewer for taking your time to give us constructive and detailed feedback. In the following sections, we address all comments. For every comment, you can find (1) the comment, (2) the author's response (both with lines from initial manuscript), and (3) the author's changes in the revised manuscript. The lines given for **author's changes in the manuscript** refer to the lines in the **revised manuscript**.

Based on all referee comments, we focus the revision on improving the clarity of the written expression, in particular the description of our methods and the results. While the methods used in the manuscript did not change, we aim to focus on describing the data and results more directly. This includes, in particular, the distribution of organisation indices, their connection to cloud and core properties, and differences for the percentile-based subsets of organisation. As the period of six months may to too short to derive a distinct seasonality, we revise the description of hemisphere- or season-based subsets and replace the term "seasonal" changes with "monthly" changes which we observed during the period. Moreover, we changed the abbreviation "DCC" to "cores". Throughout the manuscript, we replace terms like "convective activity" with a more direct description of the cloud properties (cloud area, core number). We changed the figure labels in the following way:

- 1 -> 1
- 2 -> 3
- 3 -> 4
- 4 -> 5
- 5 -> Removed
- 6 -> Removed
- 7 -> 6
- 8 -> 9
- 9 -> 14
- 10 -> 15
- 11 -> 16
- 12 -> 8
- 13 -> Removed
- 14 -> 13

- New: 2 (Summary of cloud tracks: Latitude, Surface type, Month, Lifetime, Daytime of first detection, number of cores)
- New: 7 (2D histogram of average relationship between organisation indices and cloud/core properties)
- New: 10 (Summary of percentile-based subsets P90 and P10: Spatial distribution grouped by surface type (land,ocean) and month (March-May,June-August))
- New: 11 (Summary of percentile-based subsets P90 and P10: Surface type, number of cores, month, lifetime)
- New: 12 (Correlation matrix for organisation indices, cloud properties, and core properties for all cloud tracks, P90, and P10)

2 General comments

- **Comment**: The reviewer's main request is to clarify the description of the results. For example, the term "convective activity" is used without clearly specifying its characteristics, leading to confusion rather than clarification. Although the manuscript presents various findings on geographic distributions and seasonal evolution, it would benefit to present a summarizing analysis that highlights the key conclusions. In particular, the differences in convective organization between sea and land, as well as between the Northern and Southern Hemispheres (Figs. 14 and A1), remain unclear and should be clarified.
Author's response: Thank you for your comment. We revised the manuscript focusing on improving the written written to clarify the description of results. In the original manuscript, we used the term "convective activity" to describe either the occurrence of convective clouds and their associated properties, such as the cloud area and number of cores; however, we revise the text to address observed characteristics more directly. A summarizing analysis highlighting the key conclusions will be added in Sect. 5.1. Based on the reviewer comments, we revise the analyses throughout the manuscript to focus more on a direct comparison of convective organisation indices and the cloud/core properties than a seasonal/hemispheric division (as the depicted period may only contain six months from one year of data).
Author's changes in the manuscript: Please see Sect. 4 (Results) and Sect. 5.1 (Summary of key findings) of the revised manuscript.

- **Comment**: Moreover, many of the key results are not exclusively derived from the unique three-dimensional dataset with continuous object tracking. Ideally, the analysis should emphasize aspects uniquely obtainable from this dataset. It was disappointing that the authors chose indices of convective organization that could be derived from 2D imagery alone. The authors should clearly summarize the advantages of their unique dataset and highlight how it advances our understanding of convective organization.
Author's response: All key results can be obtained from the cloud trajectories in ML-based 3D dataset. In the revised version, we add an extended description of the data and derived cloud and core properties to provide more clear information on how we retrieve the properties used for analysis (Sect. 2.4). We agree that using a organisation index adapted for 3D data may provide further insights. However, to our best knowledge, there exists no 3D index - unfortunately, designing such a novel index was out of scope for our study. In contrast, the aim of our study is rather to apply established indices and combine the information with cloud and core properties derived from our 3D dataset (e.g., core size, core height). Here, we see a major advantage of our approach, which is a simultaneous retrieval of horizontal (area) and vertical (height) cloud and core properties with a high spatial and temporal resolution, and a broad coverage over land and sea. Otherwise, receiving these data from 2D imagery or ground-based radar may be particularly challenging - moreover, compared to studies using only CloudSat, we may detect a considerably higher number of clouds. When applying the framework to a climatological time series, we may contribute to close data gaps in current research.
Author's changes in the manuscript: We add a more detailed description of the satellite data, the machine-learning approach, the detection framework, and associated limitations in Sect. 2.1-2.5 (Data) and Sect. 5 (Discussion).

- **Comment**: The characteristics of the dataset, especially the 3D objects obtained through the machine learning method, should be described more clearly in this paper, even if detailed explanations are provided in Part I. In particular, it remains unclear whether the identified 3D objects are smoothly connected over time.

Author's response: We add a more detailed description (with revised visual overview) of the workflow for the machine learning method and the framework to detect convective clouds and cores in Sect. 2 of the revised manuscript. Here, we address characteristics of the satellite data, the ML algorithm, and the linking step in more detail: in Sect. 2.2, you may find that the predicted data has a temporal resolution of 15 minutes, between which the linking step smoothly connects the cloud objects.
Author's changes in the manuscript: Please see Sect. 2.1 (Satellite data), Sect. 2.2 (3D cloud field reconstruction), and 2.3 (Detection and tracking of convective clouds and cores) in the revised manuscript for a more detailed description of the dataset.

3 Specific comments

In the next section, we shortly address your specific comments. Changes will be added in the revised manuscript.

- **L26**: "convective organisation (or aggregation)": The authors should distinguish "convective organization" and "convective aggregation" by giving their definitions.
  Author's response: Thank your the comment, we add a more clear definition and revise the written expression in the manuscript.
  Author's changes in the manuscript: See, e.g, Sect. 1, lines 25-31: "Although the term convective organisation has become increasingly popular in climate research, it is often used vaguely. Mapes and Neale (2011) broadly summarise organisation as "non-randomness in meteorological fields in convecting regions". This definition induces a clustering of deep convective cells which is ubiquitous in the atmosphere, particularly in the tropics. However, the underlying mechanisms remain insufficiently understood (Muller and Bony, 2015). While convective organisation is difficult to quantify in observational data, idealised model configured in radiative-convective equilibrium (RCE) could demonstrate a large-scale clustering of convective clouds which is known as self-aggregation of convection (e.g, Held et al. (1993); Wing et al. (2017))."

- **L30**: "The spatial distribution of convective clouds is not arbitrary.": This sentence is unclear.
  Author's response: We agree and change the text in the revised manuscript.
  Author's changes in the manuscript: We removed the sentence in the revised manuscript.

- **L37**: "several regions": It is unclear. What types of "regions" are meant in this context?
  Author's response: The term "regions" points toward the convective cores within a MCS. In the revised manuscript, we change the text to be more clear.
  Author's changes in the manuscript: We removed the sentence in the revised manuscript.

- **L44**: "So far, the models show convective organisation increases with a warming climate": Wing et al. (2020) also showed a change in convective organization with warming in RCEMIP.
  Author's response: Thank you pointing this out, we add the reference pointing to RCEMIP studies.
  Author's changes in the manuscript: See above, lines 25-31: "Although the term convective organisation has become increasingly popular in climate research, it is often used vaguely. Mapes and Neale (2011) broadly summarise organisation as "non-randomness in meteorological fields in convecting regions". This definition induces a clustering of deep convective cells which is ubiquitous in the atmosphere, particularly in the tropics. However, the underlying mechanisms remain insufficiently understood (Muller and Bony, 2015). While convective organisation is difficult to quantify in observational data, idealised model configured in radiative-convective equilibrium (RCE) could demonstrate a large-scale clustering of convective clouds which is known as self-aggregation of convection (e.g, Held et al. (1993); Wing et al. (2017))." and lines 34-40: "Self-aggregation increases with the size and proximity of convective clouds and affects the radiative feedback, large-scale circulation, and moisture distribution in the vicinity of a cloud cluster (Hartmann et al., 1984). For instance, an idealised model setup shows that an aggregated state consists of a single moist region surrounded by dry regions. Moreover, the feedback between convection, surface fluxes, and radiation further drives aggregation (Tobin et al., 2012). Research shows that self-aggregation may increase with a warming climate (Wing et al., 2020). However, there remain uncertainties connected to a large model spread (Bläckberg and Singh, 2022)."

- **L58-60**: "At the same time, food security and a high climate risk expose West Africa to multiple threats (Berthou et al., 2019). Changing atmospheric conditions could intensify those hazards.": We know that these points are

important but not specifically related to the current research. These sentences should be moved to the final section, instead of the introduction, or removed.
Author's response: We agree and remove the sentence from the manuscript.
Author's changes in the manuscript: We removed the sentence in the revised manuscript.

- **L104-105**: "It is characterised by lower temperatures and a strong vertical ascent, which we identify by an extensive vertically contiguous 105 layer and a high radar reflectivity (e.g., Igel et al. (2014); Takahashi et al. (2017)).": Vertical ascent is not directly analyzed by the proposed method, neither in Igel et al. (2014) nor in Takahashi et al. (2017). This sentence should be modified.
Author's response: You are right, we will rewrite this section to be more clear.
Author's changes in the manuscript: Please find the updated description of the cloud and core detection framework in Sect. 2.1-2.3. and add in lines 139-142: "We use the ML-based predictions of the radar reflectivity as input data for the detection framework. While radar reflectivity does not directly measure vertical velocity, it may provide information for detecting hydrometeors associated with convective cloud development (Luo et al., 2008)."

- **L173-174**: Please describe the methodology of the moving windows in more detail. What types of iterations are applied to calculate the indices?
Author's response: We add a more detailed description in Sect. 3.2, together with a visualisation of the approach in Fig. 3.
Author's changes in the manuscript: We update the description of the moving windows in Sect. 3.2, lines 261-270: "To assess regional variability in convective organisation, we refrain from computing organisation indices over the entire domain. Instead, the AOI is partitioned into overlapping 3° × 3° grid cells (e.g., Semie and Bony (2020); Tobin et al. (2012)). Given that the spatial extent and number of convective cloud elements affect the resulting index values, it may be beneficial to mitigate artifacts arising from cloud systems intersecting grid boundaries. In response, we implement a moving-window approach. The initial window is anchored at the northwestern corner of the AOI (27°–30° N, 27°–30° W) and is incrementally shifted by 1° in both the zonal and meridional directions (Figure 3). For each time step, the spatial organisation indices (SCAI, COP, and ROME) are computed within a 3° × 3° window. To enhance statistical robustness and reduce sensitivity to window placement, we calculate a local mean across adjacent overlapping windows, assigning the averaged value to the central grid cell. This approach may reduce boundary-related discontinuities and contribute towards a more stable representation of convective structure, particularly in regions where cloud systems span multiple windows (Jin et al., 2022)."

- **L179**: "the frequency distribution shows an overlap of lower index values for all indices": This sentence is unclear. What does this mean by an overlap?
Author's response: The distribution of all indices (SCAI, COP, ROME) indicates that lower values occur more often than high values. We change the text in the revised manuscript.
Author's changes in the manuscript: We revise the description of the results in Sect. 4.1 and remove the sentence. In the revised mansucript, see lines 277-284: "Figure 4 (a) shows that SCAI values predominantly range between 0 and 1, with a peak concentration between 0.2–0.4. Oceanic regions have a slightly higher frequency of SCAI values lower than 0.4, whereas values higher than 0.4 are more common over land. This finding may suggest SCAI detects stronger convective organisation over water. COP values are mainly distributed between 0.1 and 0.75, with the highest density between 0.2–0.45. Over the ocean, values above 0.4 are more frequent, whereas over land, lower values dominate — again pointing to stronger convective organisation over the ocean (Figure 4, b). ROME displays a right-skewed distribution, with most values falling below 15,000. Differences between land and ocean are minor compared to SCAI or COP (Figure 4, c). Overall, the results may indicate a marginally stronger convective organisation over oceanic regions, with ROME showing the weakest land–sea contrast."

- **L230-232**: What is the meaning of "a diverging convective activity"? In Fig. 7a, we cannot see where the maximum cloud area is. Where is "a lower cloud lifetime" in Fig. 7c?
Author's response: In the original manuscript, we meant to describe a concurrent existence of clouds with a single core and multiple cores (which may be observed in Fig. 5 of the old manuscript). In the revised manuscript, we change the figures and text to be more clear and describe the relationship between organisation indices and cloud/core properties more directly. In Figure 7 (now: 6) (a), we show the average cloud area

associated to cloud tracks occurring in the respective 3° x 3° subset of the grid. We change "lower" to "shorter" lifetime and revise the description of the figure.
Author's changes in the manuscript: Please see Sect. 4.2 (Spatial patterns and statistical relationships). Spatial patterns observed in Figure 6 are described in lines 306-324.

- **L244,245**: What does "convective activity" mean in the sentences, and which figure shows this? Which figure and location show "a higher convective activity comes with a lower area ratio, a higher number of DCCs, a larger cloud and core area"?
  Author's response: Here, we used the term "convective activity" to refer to the cloud properties (cloud area) and the number of cores associated to a convective cloud, whereas a cloud with more cores often comes along a larger area. In the revised manuscript, we focus to describe the relationship between organisation indices and cloud/core properties directly and revise the text to be more clear.
  Author's changes in the manuscript: Figure 8 is now Figure 9. The description can be found in Sect. 4.3 (Temporal variability of cloud properties and organisation indices), lines 351-367. Moreover, we add an analysis of temporal changes in the correlation coefficient over land and sea in lines 368-377.

- **L254**: "the convective organisation is overall weaker around the equator": In 4.1, "convective organization" is not clearly defined and is not specifically described. The definition of organization must be clarified.
  Author's response: The definition of organisation can be found in Sect. 1. In Sect. 4.1 of the revised manuscript, we add a more detailed description of the indices to introduce a differentiation between weaker and stronger convective organisation. Following, lower values of SCAI (or higher values COP or ROME) may be associated to an enhanced clustering of convective clouds, indicating a stronger convective organisation. In contrast, higher values of SCAI (lower values COP or ROME) correspond to a more dispersed spatial distribution of convective clouds. Hence, they induce a weaker convective organisation.
  Author's changes in the manuscript: See for the definition of convective organisation Sect. 1, lines 25-27: "Although the term convective organisation has become increasingly popular in climate research, it is often used vaguely. Mapes and Neale (2011) broadly summarise organisation as "non-randomness in meteorological fields in convecting regions" and Sect. 3.1, lines 210f.: "Convective organisation describes the contrast between convective cells randomly distributed in space and time from those clustering together inducing a stronger convective organisation (Pendergrass, 2020)."

- **L255**: "Their impact on large-scale patterns of organisation is limited compared to MCSs": The meaning of this sentence is unclear.
  Author's response: In the original manuscript, we wanted to state that large MCSs with multiple cores may be more frequently associated to convective organisation, compared to convective cells with a single core. Since we do not classify convective regimes, such as MCSs, we revise the manuscript to be more clear.
  Author's changes in the manuscript: We removed the sentence from the revised manuscript.

- **L263**: "(Figure 9, a-b,g-h,i-j)": Fig.9-j does not exist.
  Author's response: Thank you for the remark, we change the figure description accordingly.
  Author's changes in the manuscript: Description and label of updated Figure 9 (now Fig. 14) can be found in Sect. 4.4.3 (Spatial distribution of percentiles), lines 454-479.

- **L264**: "Figure 7" should be "Figure 6". Figure 7 does not show seasonal distributions.
  Author's response: You are right, we change the text in the revised manuscript.
  Author's changes in the manuscript: We remove Figure 6 in the revised manuscript. A description of the spatial distribution of temporal differences in MAM and JJA can be found in Figure 9 (Sect. 4.3, 351-367).

- **L274**: What does "convective activity" indicate here?
  Author's response: Originally, the sentence corresponds to clouds with multiple core regions. We remove the term "convective activity" and describe instead e.g., the number of cores to make the text more clear (see Introductory Remarks).
  Author's changes in the manuscript: For a revised analysis between cloud properties and convective organisation, please see ,e.g., Sect. 4.4.2, lines 445-453: "While we detect statistically significant differences between percentile-based subsets and the dataset with all cloud tracks, the effect sizes for cloud and core properties remain mostly small to moderate. Our results indicate that strong convective organisation (low SCAI, high

COP and ROME) tends to co-occur with larger cloud and core areas, slightly less and lower cores, and slightly shorter lifetimes. The highest effect sizes may be found for the CTH, core height, and cloud lifetime. Weak organisation (high SCAI, low COP and ROME) is associated with smaller clouds, lower CTH, fewer cores, a smaller core area, lower core height, and shorter lifetimes. Here, we observe the highest effect sizes for the cloud area, number of cores, and cloud lifetime (Table 6). These findings - and the differences between the two percentile-based subsets - suggest that different aspects of cloud and core morphology may contribute to the strength of convective organisation."

- **L274-279**: In Figure 7, which index is used to define a most or least organized group?
  Author's response:T he analysis is based on combing the subsets filtered by the percentiles of all indices (SCAI, COP, ROME) to identify hotspots of convective organisation. This includes the 10th percentile of SCAI and the 90th percentile of COP and ROME, which are used as thresholds to filter the dataset of all cloud tracks to reveal only cloud locations associated to the 10 % strongest or weakest convective organisation. We add a more detailed explanation in the revised manuscript.
  Author's changes in the manuscript: Please see Sect. 4.4, lines 379-390: "To identify regional patterns of convective organisation and their effects on cloud properties, we adopt a percentile-driven approach. There exist no universally defined thresholds to distinguish between weak and strong convective organisation. In response, we compute the 10th, 25th, 75th, and 90th percentiles based on the distribution of each organisation index (SCAI, COP, and ROME) using the cloud tracks between March to August 2019 (Table 5). These percentiles serve as thresholds to classify the data into subsets of weak and strong convective organisation, as induced by the interpretation of the indices: strong organisation may be related to low SCAI and high COP/ROME, weak organisation to high SCAI and low COP/ROME (Biagioli and Tompkins, 2023; Semie and Bony, 2020). Following, regions of strong convective organisation are defined as cloud tracks with an index value below the 10th percentile for SCAI or above the 90th percentile for COP and ROME. Conversely, regions of weak organisation correspond to values that lie above the 90th percentile for SCAI or below the 10th percentile for COP and ROME. To identify spatial and temporal patterns of convective organisation, we create two subsets from all data points in the dataset, whereas one represents the 10 % strongest convective organisation (Q10 for SCAI; Q90 for COP and ROME, hereafter: P90), and the other representing the 10 % weakest convective organisation (Q90 for SCAI; Q10 for COP and ROME, hereafter: P10).". In Sect. 4.4.4, we visualize the spatial distribution of these subsets (P90, P10), see lines 486-489: "In contrast to the former analysis, we examine the spatial distribution for clouds in the two subsets (P90, P10) (Section 4). These subsets of the 10 % strongest (P90) and the 10 % weakest (P10) convective organisation may help to identify cumulative hotspot regions averaged over the three indices. The data may allow us to analyse spatial patterns and temporal changes of convective organisation across two seasons from spring (March to May, MAM) to summer (June to August, JJA)."

- **L303-304**: "Overall, organised clouds (P90) come along a larger cloud anvil area, a longer cloud lifetime, a lower CTH, a lower area ratio, and more and larger DCCs": It is unclear from Figure 13 to see these relationships. The relationships between the indices and these properties should be directly compared. A part of the comparison between the indices and the number of DCC is shown in Fig. 4g-i.
  Author's response: Thank you for your comment, we will add a more detailed analysis of the relationship between convective organisation and cloud and core properties in the revised manuscript. These analyses can be found in Sect. 4.2 (for overall correlations between organisation indices and cloud/core properties) and 4.4 (for the comparison of percentile-based subsets to all cloud tracks).
  Author's changes in the manuscript: See Sect. 4.2, lines 325-334, and Sect. 4.4.2, lines 415-452.

- **L320-336**: The authors describe notable characteristics which can be seen from Fig. 14. However, some points are not convincing from the figure. Please check whether the description is consistent with the figures. For example, in L328-330, I cannot see a noticeable narrowing in summer (JJA) for ROME. The differences in the effect size are significant according to the numbers in the Figure, but not clearly visible.
  Author's response: Thank you for your remark, we revise the figure. Based on the reviewer comments, we add new analysis to investigate differences between subsets of organisation and focus less on seasonal differences (as the dataset covers only a six-month period). Hence, Figure 14 (13 in revised manuscript) shows a more direct comparison between the distribution of the organisation indices, cloud properties, and core properties for all cloud tracks, the 10 % strongest convective organisation, and the 10 % weakest convective organisation. These

analyses may provide insights on how cloud/core properties are related to convective organisation.
Author's changes in the manuscript: See Sect. 4.4.2 (Relationship between organisation subsets and cloud properties), lines 415-452, for a revised analysis of the relationship between organisation and cloud/core properties.

- **L350, L359-360**: "the microphysical cloud properties": Cloud anvil area is a cloud macrophysical characteristic rather than a microphysic property. It is true that cloud microphysics affect cloud anvil area through the balance between sedimentation and the outflow, the present study does not examine microphysical cloud properties specifically.
Author's response: You are right, we change the term to "microphysical cloud properties" to "cloud properties" throughout the text in the revised manuscript.
Author's changes in the manuscript: Introduced in Sect. 2.5, lines 186-189: "We filter the cloud trajectories to exclude possibly non-convective tracks from the analysis. For that purpose, we employ three criteria: (a) One or more core regions for at least 15 minutes, (b) radar reflectivity of higher than 0 dBZ at 10 km height for at least 15 minutes, (c) minimum CTH of 10 km and maximum CBH of less than 5 km for at least 15 minutes. While we do not require the convective clouds to have a CTH higher than 10 km at every time step during their trajectory, we discard trajectories that never reach the CTH threshold. After filtering the dataset, we receive 375,000 uniquely labeled 3D cloud objects, each190 associated with a continuous time trajectory and structural information about cloud and core properties (Figure 1, b)."

- **L361-362**: "For continental cloud clusters in the northern hemisphere, we find more distinct results regarding the relationship between DCCs and the degree of organization": This is one of the noticeable results discovered in this paper. However, this conclusion is indirectly shown by the figures in 4.1.2. The authors are suggested to show a more direct analysis showing the conclusion.
Author's response: Thank you for your comment. Since we found overall only small differences between oceanic and continental clouds, we aim to focus on a more direct analysis of the relationship between convective organisation and cloud properties in the revised manuscript. Based on the reviewer comments, we modify the division into subsets for each hemisphere; however, we describe changes that may be associated to the shift of the ITCZ in boreal summer. Revised analyses may be found in Sect. 4.4.2, 4.4.3, and 4.4.4. A discussion of potential drivers and influences on organisation may be found in Sect. 5.2.
Author's changes in the manuscript: Please see, e.g., Sect. 4.4.3, lines 460-467: "As shown in Sects. 4.1 and 4.2, high SCAI values - indicating weak convective organisation - are typically concentrated near the equator. In spring, low SCAI values (Q10) occur over the equatorial Atlantic Ocean and land/sea areas south of 15° S. High values (Q90) appear over equatorial Africa (0°–15° N), especially in rainforest zones, and Cameroon. The IQR peaks near the equator, particularly over the Ivory Coast, Guinea, Benin, Angola's coast, and Lake Victoria (Figure 14, a–c). In summer, values shift north to 0°–15° N, with SCAI Q10 regions over the Atlantic and coastal West Africa. High SCAI (Q90) values occur in spring over the Congo and Central African Republic. The IQR also shifts north in summer, with hotspots over the West African plains, Jos Plateau, and Congo River basin (Figure 15, a–c).", Sect. 4.4.4, lines 499-504: "n summer, the spatial distribution of strong convective organisation shifts northward. Regions with a frequent occurrence of strong convective organisation emerge over the Atlantic Ocean and become more widespread across the West African plains, including areas around the Niger and Congo rivers (Figure 16, c). Weak organisation, on the other hand, is concentrated primarily over continental Africa, especially between 15° and 30° E, with a peak located just north of the Congo River (Figure 16, d)" or Sect. 5.2, lines 559-567: "We also detect a link between convective core occurrence and organisation that may follow the northward migration of the ITCZ in boreal summer. As the ITCZ shifts, it may alter regional circulation, surface energy balance, and moisture availability — particularly influencing cloud development over the northern Sahel and southern Sahara, as observed by, e.g., the spatial distribution of SCAI between June and August (Section 4.4.3). These changes may be associated with increased humidity, educed subtropical subsidence, and deeper ascent within the tropical rainbelt (Fontaine and Philippon, 2000). Together with strengthened meridional pressure gradients (Lavaysse et al., 2009), they may contribute to the occurrence of large convective systems with multiple cores. This observation may be reflected in our results as a northward displacement of convective clouds and an increase in cloud area, core area, and core number over continental Africa in July and August (Section 4.2, Section 4.3)."

- **L468**: Spell out "JAS".
Author's response: Changed abbreviation "JAS" to "Journal of Atmospheric Sciences".

Author’s changes in the manuscript: Changes can be found, e.g., in lines 650, 681, or 685.