Summary

The authors investigates the trend and variability of Asian monsoon summer anticyclone (ASMA) characteristics using a novel method based on "absolute vortex moment", which can be used to describe various parameters of the ASMA such as its position, aspect ratio, among others. Given the disagreements in trends regarding ASMA strength (see Manney et al (2021) and Qie et al. (2025)), I think this study presented by Kachula et al. is a meaningful contribution as it presents yet another view on ASMA trends. In addition, the method presented here allows descriptions of vortex splitting, aspect ratio, and others, that are lacking in the literature. I think the scientific contribution of this work warrants publication after refinement of the manuscript.

General comments

- Siu and Bowman (2020) investigates the modality of ASMA and has some extensive discussions on the variability of ASMA having one, two, or more vortices. I notice that you do not refer to this work; I suggest looking at their research and adding some discussion on consistencies or differences between your work and theirs. In addition a recent work Qie et al. (2025) also investigated the trend of the ASMA. I think incorporated the finding of Qie et al. in their discussion and result interpretation.
- Throughout the interpretation of results, the three flight campaigns (StratoClim, ACCLIP, PHILEAS) are mentioned and the corresponding years are chosen for analysis, but your results for these years lack impact if we don't know what the campaign had found. Are any of the campaign's results explainable with your findings? If so I think they should be included in your discussions.

Specific comments

- It seems like one of the advantages of your method is its ability to capture complex shapes of the ASMA. For instance, in Figure 8 your method shows the tail to the west at 30N while the Ploeger method does not.
- Line 142: ASIA box is from 0E to 180E. Though this is not the norm but we often observe anticyclone stretching west of 0E. You can see this in your Figure 6. Is it possible to shift the box westward?
- Starting at line 196, the statement “During the developing (May-June)… the Santee et al. (2017) method gives lower values than our method, which means that some unwanted noise is still preserved… “ Though Fig 3 does show lower values the Santee method, I think it should be explicitly shown (perhaps with some cases) that the method Santee et. al indeed performs worse. Likewise, for the anticyclone peak phase, the authors can show that their method defines the anticyclone better.
- Line 202 states that the ASMA at 350 K does not exist. I think this statement is not true. Figure 1 below is Montgomery streamfunction at 350 K and it is evident that a closed contour (i.e. anticyclone exists).

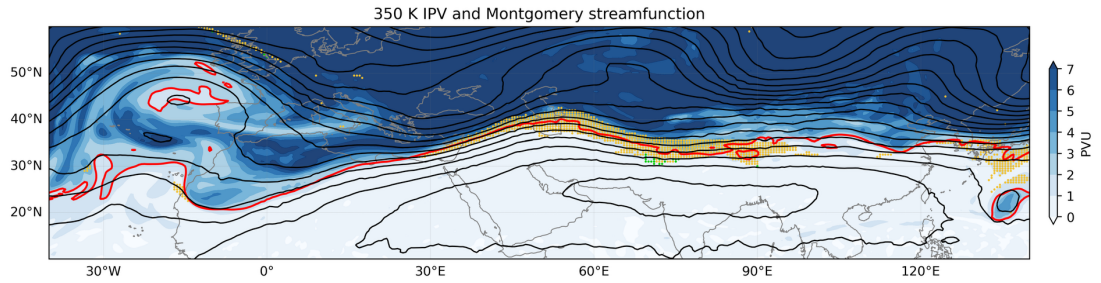

Figure 1 350 K Montgomery streamfunction (black) for 2004/06/01 18Z

- Line 250; Figure 5/6/7 – The "angle" quantity is discussed without much context. I think there needs to be some explanation on how to interpret this angle (perhaps a schematic or idealized cases) and what its implications are. For Figure 6, why is the angle related to the curvature at 60E but not the western side (e.g. 40E?).
- Figure 9/10 – Could you consider adding a subplot to show whether a JJA has 1, 2, or more maxima? I wouldn't demand this be done but think it can help us see whether a specific JJA tended to be bimodal or not.
- Line 346 – "The temporal evolution of the EK during 2022 shows that in June-September period there are more splitting like events than in 2023 at 390K." Do you infer this by seeing more higher values of blue dots verses red dots? Just asking for clarification.

Minor comments

- There are many short paragraphs, some with one sentence. I suggest revising the writing to reduce the number of these.
- Line 102 – Is this supposed to be 0.25 degrees?
- Figure 5, 6: I suggest changing the colormap. The choice of colormap depends on what you want to highlight (i.e. red/blue diverging colormap if you want to highlight positive/negative values.)
- 160-170 is hard to follow.
- Line 256 – "Both methods capture the curvature of the northern side …" Are you referring to the trough?
- Figure 12/13/14 - Not easy to distinguish between red and orange dots. Perhaps plot the mean with a line? And maybe distinguish the years with different symbols. There's too many dots, and it's difficult to compare the years.
- Line 422 - " … other studies that have not shown ASMA bimodality" I suggest revising this statement as Siu and Bowman (2020) have investigated the splitting behavior.

References

Manney et al. (2021) A Moments View of Climatology and Variability of the Asian Summer Monsoon Anticyclone

Siu and Bowman (2020) Unsteady Vortex Behavior in the Asian Monsoon Anticyclone

Qie et al. (2025) Weakened Asian summer monsoon anticyclone related to increased anthropogenic aerosol emissions in recent decades