This manuscript tries to understand a long-standing problem in the context of the Indian monsoon: the relationship between intraseasonal oscillations and the generation of low-pressure systems. Few recent studies have shown the association, but here the authors provide a detailed overview and try to understand how LPS are modulated by ISO phases in both rainfall intensity and propagation speed. Dynamical and thermodynamical aspects are investigated and the authors concluded that the nonlinear frictional convergence and anomalous boundary layer convergence both are important for LPS intensification. This work has immense scientific importance in understanding monsoon dynamics. I enjoyed reading it! There are a few points that still need to be clarified:

1. Line 5: Provide some explanation about the phases before this statement. How do you get the phases?
I think given that the BSISO is a well-documented phenomenon in tropical meteorology, the abstract is probably not a suitable place to include this level of detail. However, following this suggestion, we have now expanded the description in the Data section: "In short, empirical orthogonal function analysis is applied to outgoing longwave radiation and 850 hPa zonal wind fields over a region covering most of South and Southeast Asia (40-160°E, 10°S-40°N). The first two principal components then describe a phase space that describes the northward propagating variability often linked with MJO activity. This phase space is described in polar coordinates, giving the BSISO an amplitude and a phase. Although the phase is a continuous circular variable, it is typically discretised into integers 1-8.".

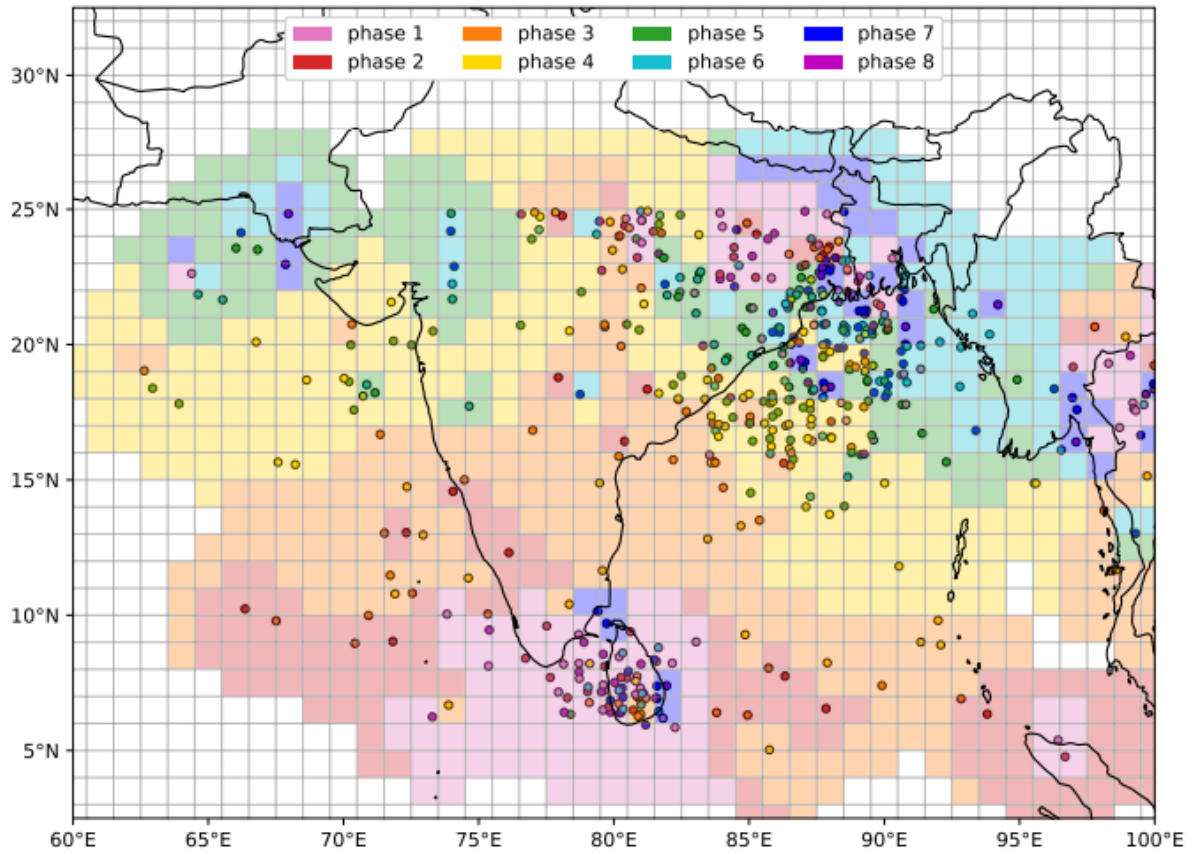
2. Line 47: The results presented in Figures 1-3 are interesting. While you discussed data and methods later in Section 2, putting these figures in the introduction does not tell the source of the dataset. I suggest moving these figures to the main Results and keeping a discussion based on earlier studies in the introduction.
We have made this change – pushing the three introductory figures and related discussion into a new Section 3.1 "Effect of the BSISO on the mean monsoon".

3. Line 59: Fig. 3 instead of Fig. 2.
Corrected. Thank you.

4. Lines 109-110: Which region did you choose for the analysis?
We have updated the LPS data section to include this information: "For this study, we consider only those LPSs that impact the Indian subcontinent, rejecting tracks that do not pass through [70-90°E, 4-24°N]. We also only consider LPSs that spin up during the summer monsoon, i.e., between June 1 and September 30. This leaves a total sample of 885 tracks from 1979 to 2018."

5. Figure 4: What is the meaning of the color over the grid points where there are no LPS formed during the period of analysis (e.g., near the Himalayan foothills or the western equatorial Indian Ocean)?
This is an inverse-square-weighted circular mean, and so is defined everywhere.

However, we agree that to colour grid squares far away from any LPS genesis is meaningless and have updated the figure to reflect that. Our new figure (below) colours squares white if there is no LPS genesis within 300 km during the study period.




6. Line 140: What do you mean by "half a phase"?
We have added a footnote here to explain: “Recall that BSISO phase numbers are discretised from a continuous circular distribution, with e.g., ‘phase 3' including phase numbers between 2.5 and 3.5. In the discrete space used in our maps, half a phase is the difference between being in the spatial centre of a phase and being at its boundary.”

7. Line 143: I could see both phases 1 and 2
We agree and have amended the wording to reflect this as follows: “Taking into account all the analysis so far, the general sequence of events is an increase in vorticity, simultaneous with an increase in LPS genesis (e.g. during phases 1 and 2 over Sri Lanka), followed by increased TCWV and precipitation (e.g. during phase 3 over Sri Lanka).”

8. Lines 146-147: How do you conclude this if the "amplitude is insufficient for the phase to be well defined"? Did you disregard the amplitude and considered just the phase in these cases?

We did not phrase this clearly. What we meant here was that the overall distributions of both sets (amp<1, amp>1) of LPS genesis points is similar. In other words, both sets possess maxima over the head of the Bay of Bengal and Sri Lanka, with minorities over the Indo-Gangetic Plain, Arabian Sea, and central Bay of Bengal. We make no phase-related claim here. The wording has been revised to reflect this: "The remaining 362 LPSs that spin up during 'phase 0' – i.e., when the BSISO amplitude is insufficient for the phase to be well defined – have genesis points distributed similarly to the 523 plotted in Fig. 4, i.e., maxima at the head of the Bay of Bengal and over Sri Lanka with additional contributions from the Indo-Gangetic Plain, Arabian Sea, and central Bay of Bengal."

9. Figure 5 and text: How do you calculate LPS propagation velocity?
This is calculated as the displacement vector between successive timesteps divided by the length of the timestep itself. The propagation vectors are then averaged according to the phase in which they occur. We have added a short sentence at the top of the paragraph explaining this: "The vectors are computed for each LPS timestep and then grouped according to the BSISO phase in which they occur."

10. Lines 160-165: The large-scale circulation during the genesis day of the LPS could be very different when the LPS is matured (maybe 4-5 days later). How do you interpret the results? This analysis is based on the genesis days as I understand it.
No, the analysis is based on simultaneous days. We have now clarified this at the top of the section by adding "The vectors are computed for each LPS timestep and then grouped according to the BSISO phase in which they occur." Even so, the BSISO has a period of 30-60 days, meaning it usually sits in a given phase for 4-8 days.

11. Figure 6: Is this precipitation on genesis day or averaged over the lifespan of the LPS? If it is the later case as it appears looking into the number of samples, how do you consider the BSISO phase as LPS life may span across multiple BSISO phases?
Neither. As with propagation, the composites are based on simultaneous BSISO phase, to ensure a fair comparison. For example, consider a five-day LPS, for which the BSISO phases on each day are 4 4 4 5 0. Precipitation from the first three days goes into the composite for phase 4, precipitation from the fourth day goes into the phase 5 composite, and data from the fifth day are excluded. We have added the following text to clarify this: "As with propagation (and hereafter), compositing is done according to simultaneous BSISO phase, meaning a single LPS may be distributed across several composites."

12. Figure 6: "all such LPSs" - including those in phase 0?
Yes. We have updated the caption to reflect this.

13. Lines 190-195: Phase 5 in both cases increases the anomaly in rainfall: this could be related to the fact that LPS may have a lifespan across different BSISO phases.
As we clarified in our response to point #11, the composites are constructed using simultaneous, rather than genesis, BSISO phases. Therefore, although this is a good

suggestion, it is not valid here. If I had to speculate, I would suggest that during phase 5, based on Figure 2, there is anomalous TCWV in a band (stretching across central and southern India) that both northern and southern LPSs can access.

14. Lines 275-280: Did you do the compositing based on BSISO phase 5 days without any LPS activity and with LPS activity, and saw the differences?
This is correct, except the background includes all days (not just non-LPS days, although they comprise the majority). As we explain in the original text: "To obtain the BSISO background contribution, we compute the mean three-dimensional anomalous relative vorticity over India and the surrounding region during BSISO phase 5, and then sample this field using the relevant LPS tracks as we would for a normal composite. To limit the effect of monsoon onset and withdrawal, the anomalies are computed using monthly means; e.g. the anomaly for 26 June 2016 is computed using June mean vorticity."

15. Line 285: this is rather difficult to conclude here.
Agreed, we have replaced this with a generalisation: "This represents an intensification of the monsoon trough, through which we can explain its structure: its greatest effect just above the boundary layer (at about 850 hPa, where monsoon winds are typically strongest) and the asymmetry favouring higher values towards the west reflects the fact that LPSs are more commonly found in the eastern part of the monsoon trough."

Looking forward to the answers and revised manuscript.