

Comment on wcd-2022-31

Anonymous Referee #1

Referee comment on "Non-linear intensification of monsoon low-pressure systems by the BSISO" by Kieran M. R. Hunt and Andrew G. Turner, Weather Clim. Dynam. Discuss., <https://doi.org/10.5194/wcd-2022-31-RC1>, 2022

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?
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.
3. Line 59: Fig. 3 instead of Fig. 2.
4. Lines 109-110: Which region did you choose for the analysis?
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)?

6. Line 140: What do you mean by "half a phase"?

7. Line 143: I could see both phases 1 and 2

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?

9. Figure 5 and text: How do you calculate LPS propagation velocity?

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.

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?

12. Figure 6: "all such LPSs" - including those in phase 0?

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.

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?

15. Line 285: this is rather difficult to conclude here.

Looking forward to the answers and revised manuscript.