Weather Clim. Dynam. Discuss., referee comment RC2
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Comment on wcd-2022-31

Anonymous Referee #2

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-RC2, 2022

Monsoon low pressure systems (LPS) are responsible for a major part of summer monsoon rainfall over the Indian subcontinent and are also linked with extreme precipitation. This timely paper investigates the relationship between monsoon LPS and Boreal summer intraseasonal oscillations (BSISO), one of the dominant modes of intraseasonal variability affecting the South Asian monsoon. The authors show in detail the way BSISO affects the LPS genesis and precipitation. They find the modulation of LPS by BSISO occurs through dynamic rather than thermodynamic changes. Using the QG-omega equation they show that the anomalous vorticity changes are driven mostly by the differential vorticity advection and further explore how the various factors affect the structure of anomalous vorticity. Overall, I find the results are sufficently novel and of great scientific importance. I have a few clarifications/corrections listed below, and I'd be happy to recommend it for publication once these points are addressed.

Comments :

L12-13: The phrase "Contributions from BSISO and anomalous BSISO circulations " is confusing. Better to rephrase contributions from BSISO as from the "mean/background" BSISO circulation.

L37 : Do phases 4 and 5 bring enhanced convection over all of India or just a specific region there?

Liked this novel way of presenting different phases in Fig1. Does individual maps of precipitation for various phases show similar behaviour of northward propagation of the precipitation peaks.

I would suggest moving the figures 1-3 from introduction to results section.

L59-65: I know it's been cited earlier in the introduction but it might be a good thing to mention the earlier studies that show intensification of background vorticity related to BSISO here.

Fig 4: Would it be meaningful to color the grid boxes with no LPS? How sensitive is the classification with the grid sizes and the classification criteria. It might be better to use k-means clustering or may be a simple criterion like the phase to which the majority of LPS points within some radial distance belong to.

L135 : Lots of phase 7 and 8 points are also there over Sri Lanka.

L140: It's unclear what half phase means.

L144: Any reason why increased TCWV would follow LPS genesis. Wouldn't TCWV be a factor determining the LPS genesis?

Figure 6: Are these the precipitation plots for all the LPS times and not just for the genesis? If so, how are the phases assigned for the later stages of LPS. Is it based on the phase at the time of genesis or does it change with time along the LPS track?

Figure 6 and in other places too : What does "all such LPSs" refer to, does it include phase 0?

L186-188: What would be the nature of the changes in the background environment that result in uniform increase in rainfall. For eg, even a uniform increase in moisture would result in precipitation increasing in the region of convergence but not a uniform increase everywhere.

L189: "rotated two phases earlier", the maxima is still at phase 5 isn't it? Only the negative anomalies shift. Any reasons for that.

L268: Wouldn't vorticity always have a maxima in the centre as you are tracking the LPS using vorticity maxima.

L285-286: Can this be deduced from the storm centre analysis alone.

L288: Fig13 instead of 15.

Since it's the phase rather than the amplitude of BSISO that's affecting the LPS modulation, I'm just curious on how the background states vary for phase 0. Are the background conditions similar across the phases irrespective of the amplitude?

Typos :

L43 : "extrems"