

Weather Clim. Dynam. Discuss., referee comment RC2
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Comment on wcd-2022-10

Anonymous Referee #2

Referee comment on "Stochastically perturbed physics-tendencies based ensemble mean approach in the WRF model: a study for the North Indian Ocean tropical cyclones" by Gaurav Tiwari et al., Weather Clim. Dynam. Discuss.,
<https://doi.org/10.5194/wcd-2022-10-RC2>, 2022

The paper mainly describes results from WRF ensemble model simulations at 9 km grid spacing using stochastically perturbed physics-tendencies. The authors use the ensemble-mean approach along with digital filter initialization to the initial and boundary conditions to analyse two TCs that made landfall in India. The experiments showed that the ensemble-mean approach, the digital filter initialization approach, and the combination of both methods lead to improvements in the track forecast. Only the combined methods showed an improvement in intensity forecast.

Major comments

- I'm struggling to see how the paper explains processes (dynamics) of TCs and what we learn about TCs.
- From reading the introduction the main aim of the paper is to compare different WRF model configurations and their ability to forecast TCs. I can see the rationale behind that, but the model experiments do not give us new insight into understanding TCs. Maybe the benefits and links to operational forecasting could be made clearer.
- At 9-km grid spacing convection has to be parameterised. Several studies have shown that going to higher resolutions of 4 km and below, where the convective parametrisation needs to be switched off, the intensity of TCs is captured better than in coarser model runs. Have you tested the impact of grid spacing on the model results?
- Are you using fixed SST values for the simulations?
- The ensembles seem not to have a lot of spread, even when you are randomly perturbing the initial conditions and perturbing the stochastic physics. Might your ensemble be underrepresenting the uncertainties?
- Do you have any observations (maybe microwave satellite data/imagery) that gives

insights into the observed structure of both storms? I like the plots that show rainfall accumulation in comparison to the observed rainfall. How good is ASCAT at representing the windspeed in TCs?

- I find that parts of the paper are quite descriptive.

Minor comments

- The manuscript (including the abstract) contains too many acronyms, which reduces its readability.
- 49-50: The text could be worded better. I noticed also in other places that the text could be more precise. I suggest going through the text carefully again.
- 67, L. 73: Remove "very".
- 122: "Horizontal grid spacing of 5 minutes" – It seems something has gone wrong here.
- 143: Dot instead of colon after Table 1.
- "IMD" is undefined. The definition only comes in l. 395, which is in the conclusions.
- Is the "best member" defined only based on the track?
- 185: "relatively some more error" – Please be more specific.
- 234: What does "making the results more perspective" mean?
- It seems nothing from Section 5 has made it into the abstract. What are the key results from this section?
- 362: "the tuned experiments" – Are you referring to all the other runs discussed in the manuscript?
- 363-364: "a hot spot in the central-east ARB pulled the cyclonic circulation towards it" – Not sure what you mean. Are you referring to a maximum upward latent heat flux? The whole section 5.2 could be written in a more precise manner.
- 415: You have discussed the wind structure but not any storm dynamics.