Atmospheric Chemistry and Physics Discussions

Atmos. Chem. Phys. Discuss., referee comment RC2
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Comment on acp-2021-129

Anonymous Referee #2

Referee comment on "Investigating the impact of Saharan dust aerosols on analyses and forecasts of African easterly waves by constraining aerosol effects in radiance data assimilation" by Dustin Francis Phillip Grogan et al., Atmos. Chem. Phys. Discuss., https://doi.org/10.5194/acp-2021-129-RC2, 2021

General Comments:

The authors perform experiments with the GFS model which includes the radiative effects of aerosoles through data assimilation (GDAS). Those runs are called aerosol-aware runs. The control runs do not include the aerosol effect. Both types of runs were performed for the whole of August and two AEWs in 2017 which resulted in Hurricanes Gert and Harvey. The authors found for the time averaged analysis over August 2017, that in the aerosol-aware run the AEJ and the WAM were accelerated and the temperature in the Sharan boundary layer increased, which lead to a modification of the vorticity structure and an increase in the northern and a decrease in the southern circulation. The authors also showed that in the aerosol-aware runs the errors of forecasting the AEW out of which Hurricane Harvey formed were reduced, but no improvements were found for the AEW out of which Gert formed.

The paper is very well written, the aim of the paper and the results are very clear. I think this paper will be of interest to the scientific community. I only have very minor comments.

Minor comments:

- p. 5, l. 137: Did both storms occur in this period? Seems like this is a period for Harvey and not Gert. Maybe this is coming later but it would be good to state somewhere for

which period both sets of runs where computed.

- p. 6, l. 150: Should it say "who use" instead of "which uses". If the latter is preferred, you may want to add "paper" to the sentence.
- p. 6, l. 172: Use capital "H" for 'hurricane here.
- p. 7, l. 180: Sometimes you include a space between the unit and the value and sometimes not. It would better to be consistent. This is an issue that can be sorted at type setting.
- p. 7, l. 187-190: Are those averages for the whole of August and based on the 34 forecast runs you mentioned earlier? So far you only spoke about the period 25-28 July 2017. Better to say which data set those averages are based on.
- p. 8, l. 201 and other: m s^{-1} instead of m/s.
- p. 9, l. 220: The text says "modulus" and the caption of Fig. 4 says "moduli". Why do you change between singular and plural? What exactly is a "relative vorticity amplitude modulus"? The caption says sqrt (zeta^2) is shown.
- p. 9, l. 233: Have you averaged over 700 and 850 hPa to get the streamlines shown? The caption says only streamlines at 700 hPa are shown.
- p. 10, l. 241: Avoid using "clearly".
- p. 12, l. 292: It would be good to add a noun after "this".
- p. 13, l. 319: Better to state clearly what you mean by "this".
- p. 13, l. 328: Another hanging "this". Please be more precise.
- p. 15, l. 373 and l. 376: I would suggest expanding the acronyms "UAlbany" and "UW" to their official names.
- Fig. 2: You could add the times that are shown in this figure to the caption. What are the dots referring to? 6hly times?
- Fig. 3: Replace "plots" with cross sections. Remove hyphen between "zonal-wind".
- Fig. 9: Which unit is shown on the colour bar?
- Tab. 1: Maybe say the location of the wave is either onshore or offshore. Initially I though you meant and onshore waves, which would be travelling in a westward direction.