

Dear Anonymous Reviewer #1,

Thank you for your feedback regarding our paper *Radiative Influence of Dust Aerosols on the Evolution of Tropical Storm Hermine*. We plan on implementing the following changes to our paper in response to your feedback. We hope that these changes will make the paper more understandable and scientifically rigorous.

- 1) We plan on removing all references to microphysical changes between the models. This will include ice nuclei and cloud effects.
- 2) The novelty of the study lies in the validation of the numerical simulation using field campaign data for a real tropical storm case. Previous studies have mostly focused on idealized experiments. Direct in situ dust measurements from aircraft are rare, and their availability provides a unique opportunity to evaluate and constrain the model simulation. Without these aircraft measurements, the amount of dust represented using CAMS initial conditions alone would have been approximately 50% lower than the observed dust amount. This observational constraint is a key aspect of the study's novelty. We plan to highlight this point more clearly in the Results and Discussion sections to avoid confusion.
- 3) In the EXTRA experiment, all initial dust values derived from CAMS were doubled. AOD was used as the primary metric to estimate the approximately 50% underestimate in dust loading. Because this difference was imposed through the initial conditions, the comparison between simulations was performed at early forecast times, before substantial model evolution could obscure the effect of the initial dust perturbation. This information should be included in the Results section. We will move the relevant discussion there and add additional clarification in the revised manuscript.
- 4) Dust concentrations were listed first because it is the dust concentration differences that led to all of the other differences presented later in the paper. Dust concentrations are analyzed in the Results section and the differences found between the in-situ measurements and CAMS data (see comment 3.)
- 5) We will add more details about the track differences. Specifically, we plan on citing additional studies that have examined the influence of dust aerosols on tropical cyclone track. The similarity of the simulated tracks indicates that large-scale environmental differences were unlikely to be the primary cause of the differences shown later among the experiments. Therefore, the track analysis serves two purposes: it provides context and justification for the subsequent comparisons, and it is also a result in its own right. We included it in the Results section because previous studies have shown that dust can influence tropical cyclone track, and thus it is important to document whether such effects occurred in our simulations.
- 6) We will go into more detail in the Discussion section.

- 7) We will review the figures and improve their readability by adjusting font sizes, titles, and layout. The flight trajectory was used to sample the model output along the aircraft path, providing the most direct way to compare the research flight observations with the simulations. Although the aircraft trajectory is not itself an independent atmospheric variable, it provides the spatial and temporal framework needed to make a point-by-point comparison between the in situ dust measurements and the corresponding model fields.
- 8) We will make the topic sentences stand out more and make them more descriptive.

Specific comments:

L187- Background information about dust's impact on radiation will be added to the literature review, and this will reference that.

L268- Please see comments for 5)

In Figure 3, the white space is an area where there is no data. We will add this in the caption to make it more clear.

Thank you for your detailed comments and feedback regarding our paper. We hope that the planned corrections and amendments will clear up some of the confusion and benefit the scientific community.