

Geosci. Model Dev. Discuss., referee comment RC2
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Comment on gmd-2022-133

Anonymous Referee #2

Referee comment on "Data assimilation for the Model for Prediction Across Scales – Atmosphere with the Joint Effort for Data assimilation Integration (JEDI-MPAS 1.0.0): EnVar implementation and evaluation" by Zhiquan Liu et al., Geosci. Model Dev. Discuss., <https://doi.org/10.5194/gmd-2022-133-RC2>, 2022

Summary:

This paper summarizes the first implementation of the JCSDA JEDI-enabled data assimilation (DA) framework for MPAS (JEDI-MPAS 1.0.0). The paper begins with a brief description of the formulation MPAS model, and includes specific details on the implementation of dual resolution (30 and 60 km) 3DEnVar, including a detailed description of the background error covariances as implemented using JEDI. The paper also discussed the choice of analysis variables and variable transforms, observation processing and QC. Notably, it gives a detailed description of the all-sky microwave AMSU-A radiance assimilation for both non-precipitating and precipitating cloudy situations to update all five hydrometeors analysis variables.

The validity of the JEDI-MPAS 1.0.0 system is demonstrated through a series of one-month cycling DA and long forecast experiments comparing the baseline system (conventional plus GPS observations) with the progressive addition of microwave radiances from AMSU-A, AMSU-A all-sky and MHS. Skill comparisons with GFS cold start forecasts are also made.

Overall, the paper is well-written, complete and contains appropriate references and citations. It will provide a useful reference for both developers and users of JEDI-MPAS, as well as general JEDI developers and users.

Specific Comments:

Line 286: This line "Overall the mean and RMS give the same indication regarding the four

experiments' relative performances." Is not clear. What is meant by "give the same indication"?

Line 305: What is the relevance of this comment? "Note that the majority of radiosonde temperature observations in GSI's ncdiag files is expressed in terms of Tv." Also, "is" should be replaced with "are".

Lines 313 and 357: An experiment "cldmhs" is mentioned in two locations in the text. Do you mean "clrmhs"?

Line 437: Suggested wording changes: *less-advanced* and fewer observations.

Figure 1: The caption for this figure is insufficient.