

Interactive comment on “Adding Four Dimensional Data Assimilation by Analysis Nudging to the Model for Prediction Across Scales – Atmosphere (Version 4.0)” by Orren Russell Bullock Jr. et al.

Anonymous Referee #1

Received and published: 19 February 2018

General comments:

This paper looks at the use of nudging on a MPAS-A model using data from NCEP Final Analysis Data. It is a form of down-scaler, where additional value is being added by increases in vertical and horizontal resolution.

The paper is overall well written. It has scientific relevance.

I do have a few comments:

- 1) Biggest problem I see is that in Figures 10-14 – the RMSE for the NCEP FNL data on C1

its own without MPAS is not included. Is that because it is not a standard output within the NCEP FNL data? If it does exist it should be included in those plots. Otherwise we don't know whether we are actually getting additional value from this product. a. This issue needs to be resolved or at the very least explained before publication. Maybe the RMSEs need to be compared against those from the CMAQ model. b. If this paper is the first step to creating a competitive product it needs to say so.

The above issue is between what I would consider to be borderline between a minor revision and a major one.

I am struck by the gross similarity between FDDA target and MPAS with FDDA in Figures 2-8. It would be good to see plots where the differences between FDDA target and MPAS with FDDA were presented. Can you give some theoretical reasoning for choosing the time-scale forcing to be around 55 minutes – it seems to be a bit on the strong side. The weaker forcing for q is around $9 \frac{1}{4}$ hours. Maybe this exists in the WRF version.

Specific comments:

Pg 3 Can the paper be a bit more specific on the details of how the NCEP FNL data is created?

Throughout the paper the resolution of the NCEP FNL data is described in terms of 1 degree resolution which is around 100km. Given that MPAS resolution is described in terms of km can you mention the FNL data resolution in km to avoid the readers needing to do the conversion themselves.

What is the timestep of the MPAS model?

Technical corrections:

Can you use Figure throughout and not have a mixture of Figure, Fig. and (Fig. 9) on pages 6-10.

Pg 9 line 11 RMSA -> RMSE Pg 9 line 30 remove dot : For January 2013

Pg 26 and Pg 27 Figures 7 and 8 need to include hyphen between 500 and 300 hPa

The plots in Figure 16 do not print out well. Can the units be included in the graph.

Interactive comment on Geosci. Model Dev. Discuss., <https://doi.org/10.5194/gmd-2017-246>, 2017.