

Interactive comment on “Impacts of AMSU-A/MHS and IASI data assimilation on temperature and humidity forecasts with GSI/WRF over the Western United States” by Y. Bao et al.

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Received and published: 7 August 2015

Response to reviewer1 General comments This paper is of interest in that it provides information on the incremental value of assimilating conventional observations and various satellite observations, differentiated by frequency (microwave and infrared). For this reason, I think it is worth publishing once the authors address the following general comments: – The English language used in the text could be improved;

Answer: Yes, please check we have modified the English writing.

– The behaviour of the IASI data assimilation (temperature and humidity) needs

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further discussion. In particular, I find the discussion in Sect. 5.2 weak;

Answer: Yes, you are right, because IASI data has 8461 channels, but we only used 279 channels based on previous studies, more experiments are necessary for future study.

– Radiance vs retrieval assimilation of satellite data – at the earlier stage of the review I asked a question on whether the assimilation approach in the paper, as I understood it, was fair (retrieval assimilation for conventional data; radiance assimilation for satellite data). As far as I can tell, the authors did not address this question. I think it would be worth at least discussing if the impact of satellite data assimilation would be the same if retrievals rather than radiances were assimilated (as far as I can tell, this is not discussed in the paper). Is any advantage from the satellite data assimilation mainly coming from assimilating radiances or from the spatio-temporal characteristics of the satellite data?

Answer: As known, in most of weather agencies, such as NOAA, they have already given up retrieval data assimilation. There is a lot of discussion in previous studies, for example: Derber J. C. and W-S Wu. 1998, The use of TOVS cloud-cleared radiances in the NCEP SSI analysis system. Mon. Wea. Rev., 126, 2287–2299. The main reasons probably come from the following two aspects: 1) The retrieved data error is an extra error for a data assimilation system, the direct radiance data assimilation will avoid the impacts of the potential double error. 2) The retrieval products are generally obtained based on the one dimensional variational approach, in which the model background field has been first used. And then the background field is used again in the process of regional or subsequent data assimilations to improve the model initialization. It is not reasonable that the background field have been used double time.

The authors should also address the following specific comments. Specific comments
P. 6442, L. 20: I suggest you indicate that this often referred to as the NMC method.

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Answer: Yes, Please check line 20 on page 5.

P. 6446, L. 7: Uddstrom. Answer: Done

P. 6446, L. 14: Would it be better to plot histograms of OmA and OmB? Often, this approach is taken in the literature.

Answer: yes, the histograms of OmA and OmB are often plotted in the some literature, but the scatter plot is also good way to directly show the impacts of data assimilation.

P. 6447, L. 15: Why is this interesting? Avoid subjective statements.

Answer : The word 'Interestingly' was removed.

P. 6448, L. 14: What do you mean by "rare" observational data? Do you mean "sparse"? Answer : Yes. The word "sparse" is better.

P. 6449, L. 11: Fourth. Answer : Yes.

P. 6458: Fig. 1: I suggest you change the background colour for the land, as the surface pressure locations in the left-hand panel are difficult to see. Answer: You are probably right. Actually we tried several times using various colors. Because there are many types of datasets used in this study, we found the background color in current plots appeared to be the best color combination.

P. 6461: Fig. 4: Indicate with respect to what dataset is the bias calculated. Response: Actually we identified the bias calculation, the bias calculation referred to the observations, which is mainly from conventional data.

Please also note the supplement to this comment:

<http://www.atmos-meas-tech-discuss.net/8/C2463/2015/amtd-8-C2463-2015-supplement.pdf>

Interactive comment on Atmos. Meas. Tech. Discuss., 8, 6439, 2015.