

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;
- The behaviour of the IASI data assimilation (temperature and humidity) needs further discussion. In particular, I find the discussion in Sect. 5.2 weak;
- 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?

The authors should also address the following specific comments.

Specific comments

P. 6442, L. 20: I suggest you indicate that this is often referred to as the NMC method.

P. 6446, L. 7: Uddstrom.

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

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

P. 6448, L. 14: What do you mean by “rare” observational data? Do you mean “sparse”?

P. 6449, L. 11: Fourth.

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.

P. 6461: Fig. 4: Indicate with respect to what dataset is the bias calculated.