Atmospheric
Measurement
Techniques
Discussions

Interactive comment on "An Assessment of the Impact of ATMS and CrIS Data Assimilation on Precipitation Prediction over the Tibetan Plateau" *by* Tong Xue et al.

Anonymous Referee #3

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Review on "An Assessment of the Impact of ATMS and CrIS Data Assimilation on Precipitation Prediction over the Tibetan Plateau"

General comments:

This paper evaluates the impact of ATMS and CrIS radiance data on the precipitation prediction over the Tibetan Plateau (TP). Since sparse conventional data are available in the TP region, satellite radiance data provide much needed data coverage. With the metrics used in this study, ATMS data are found to have some positive impact in terms of FSS, ETS, and POD, but degrade the system in terms of bias. The use of CrIS data has neutral impact. Overall, this study is interesting and relevant to the scope of AMT. I recommend publication after the following questions are addressed.

Specific comments:

The data usage percentage of CrIS is low. Is the full spectral data file, instead of a subset file, used and read in the GSI?

Section 2.2.1. Model top is set at 10hPa. This may affect the performance of some high peaking channels. Higher model top may be beneficial.

Line 179. The sentence "the ATMS and CrIS satellite radiance data can be read in GSI via CRTM 2.1.3" is not appropriate. After ATMS and CrIS data are read into the GSI, simulated brightness temperatures are calculated via CRTM. The CRTM is considered as observation operator.

Lines 192-195. QC1 is only applied to microwave, a different cloud detection algorithm should also be applied to infrared. Emissivity check is performed not only over ocean but also over land. Regarding QC4, please clarify "retrieved the profiles which meet criterion in QC1 and QC2' – retrieval is conducted? Careful quality control is key to successful data usage.

Figures 4 and 5. The color scheme of the color bars need to be improved. It is not easy to tell different blue/red color levels.

The results in Fig. 5 indicate that, compared to the use of conventional data, the use of ATMS radiance data degrade the monthly mean precipitation, especially in the region of [25N,30N] and [77E, 80E] where conventional data are available. Does this indicate inconsistency between the two types of data? The negative impact of ATMS can also be seen in Fig. 11 (i). The information on the values of ATMS and CrIS observation errors and gross error cut-off will be helpful.

This is a comment – the rainbelt is close to the edges of the D02 domain, not sure if this may affect the results or not.

Due to the forecast model deficiencies, it is shown that it is challenging to improve precipitation forecast. With the water vapor channels available, it would be interesting

to examine their impact on moisture analysis field.

Lines 427-430. Although it is true that microwave can penetrate clouds, I assume only clear-sky radiance data are used in this study.

Reference. Volume and page numbers are missing in one reference. Journal name is also not correct. The correct information is provided below: Zhu, Y., J. Derber, A. Collard, D. Dee, R. Treadon, G. Gayno, J. Jung: Enhanced radiance bias correction in the National Centers for Environmental Prediction's Gridpoint Statistical Interpolation data assimilation system. Quarterly J. Royal. Meteorol. Soc., 140, 1479-1492, 2014.

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