

Interactive comment on “All weather IASI single field-of-view retrievals: case study – validation with JAIVEx data” by D. K. Zhou et al.

Anonymous Referee #3

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The paper is an important contribution to the area of advanced atmospheric remote sensing. The scientific approach is sound, the quality and the volume of the data are adequate to stated objectives. My opinion is that the paper has to be accepted. However, there are some issues that require more detailed explanation as well as some graphical materials may be reworked for the purpose of clarity. In particular, I would like to point at the following aspects:

- (i) On the p. 21005 l. 18 " The IASI retrieval presented herein uses 5008 spectral samples for the EOF regression retrieval and 1697 samples for the second step physical retrieval, as 20 indicated in Fig. 1." What are the criteria for channels selection?
- (ii) Starting the same page and further in the text the term "accuracy" is not defined

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and used loosely, what causes some confusion.

(iii) On the page 21006 the bias of the retrievals from simulated spectra is introduced. What is the cause? Addition of the random noise to the spectra can not result in the noticeable bias (considering the large number of the sample and provided that the forward model in the retrievals is the same as the one used for the spectra simulation.

(iv) Considering the magnitude of the STD for temperature in the Figure 5 it contains seasonal variations. That may be misleading when compared to the STDE of the retrievals. Seasonal variations are reproduced by climatology and models quite accurately, so no retrieval skill in that.

(v) On the page 21009 the sentence starting at line 5: "Fitting residuals shown in Fig. 7a and b for clear conditions are much smaller than fitting residuals shown in Fig. 7c and d for cloudy conditions; this is expected since there are more variables to be retrieved under cloudy conditions." This statement in its current form is not true. In general, the more fitting parameters we have the smaller residual can be made. That doesn't necessarily mean better quality of the retrieval. Probable cause of higher residual under cloudy conditions may be the cloud forward model error.

(vi) General comment to the graphics: most of the figures are very busy, that result in a small size of individual panels what make very difficult to capture the details. My suggestion would be to decrease the number of the panels per figure and, maybe, the total number of the panels in the paper by removing redundant and not very informative pieces. For example, Figure 13, the panels d, e, f) showing temperature profiles: they reflect stable gradient in the troposphere, hence, don't make much sense; the adjacent panels showing the differences do the job. On the same figure for RH: it may be beneficial to show on the same graph all three drop-sonde profiles and three differences. That would illustrate that the differences/errors are noticeably smaller than natural variations of the RH profile.

(vii) In the Figure 14, panels b) and f) exhibit the same structure in the area between

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26ON and 29 ON. At the same time b) is the RH field as observed by AIRS and f) is the difference between AIRS and IASI. From the text it is not clear why this illustrates the consistency of the satellite data.

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