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Atmospheric Measurement Techniques Discussions

Interactive comment on "Inter-comparison of IASI and AATSR over an extended period" *by* M. Bali et al.

M. Bali et al.

manik.bali@noaa.gov

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We really appreciate the anonymous reviewer for his thorough review, constructive suggestions, and inspiring comments. We truly believe the quality of the paper will reach a new level by integrating comments from all the reviews.

Comment 1) In order to make the paper more accessible and readable, I strongly recommend presenting, in the text as well in the figures, all the results in K rather than, for some of them, in radiance units. This will facilitate the comparison with other results given in other parts of the paper.

All the inter-comparisons are in Brightness Temperature. There are only two places where we have presented in Radiance Units and the figures donot influence the AATSR

– IASI inter-comparison. These are 1. When we test the impact of shift of SRF in 12 micron AATSR. Since AATSR has a radiance based calibration scheme (not a temperature based scheme) this SRF shift study can only be done in radiance space. The results illustrated in Fig 6 are not compared with any temperature based results and also does not influence our conclusions of the AATSR IASI bias study. 2. When corrected reference radiance is produced by comparing with ATSR2. The corrected radiance (not the Brightness Temperature) can be directly plugged into the AVHRR recalibration equation as it takes radiance as input not BT.

Comment 2) Please make clear that, throughout the paper, when you refer to IASI channels, they in fact are "AATSR pseudo channels derived from IASI observations". This, in particular, will impact the title of some paragraphs. Answer: Added Line 260-262 before the beginning of the result section stating that IASI/AIRS radiances are in-fact convoluted radiances and that we refer to convoluted radiances of IASI / AIRS when we say IASI radiance or AIRS radiance. Typically convolution is the expression used in the inter-calibration and GSICS communities and pseudo is less used.

Comment 3) Biases, limitations, and assumptions are most of the time clearly stated. I would have liked seeing a more serious quantification of a number of points. Among them the error associated to the way you generate these AATSR like channels from the nominal individual IASI channels observations. Please quantify this point, e.g. based on simulations with a forward radiative transfer model by comparing such simulations to the approach you have chosen: "the IASI spectrum for these collocations is integrated over the AATSR SRF (Eq. 1) to get IASI representative radiances".

Answer: Added Line 254 -259 . This gives an estimate of the un-certainties associated with the method of convolution used here.

Comment 4) The intercalibration is a "relative" approach and is able to estimate inter instrument biases: how do you detect, e.g. in case of trends, which instrument deviates from the other? How do you plan to handle this?

Answer: Added a new subheading on relative approach . Line 263 - 281

Comment 5) Besides, my most serious concern is a lack of care in the way the Figures are presented and plotted. Since they are – so far - the only real quantitative way of assessing the pros and cons of this work, I would recommend revisiting their presentation according to the following remarks: - Table 1: SD for standard deviation. [Corrected] - Table 2: Please use K instead of RU, or K and RU [explained above] - Figures 2 : Specify the channel number in the legend [Channel numbers are in heading or caption] - Figure 4: Is it also for Nadir-view? [Specified Nadir View in the heading] - Figure 5: Please convert RU in K [Answered Previously]

- Figure 6: Please comment on Figure 6 the baseline temperature. Why 3 curves for 12 microns instead of 2 curves for 11 microns? [Subsection 3.3.1 comments have been added]

- Figure 7 and Figure 8: Try to make these figures more readable: i) define one key color/legend for all of them instead of one in each figure ii) use an y-range adapted to the curves, not to a frame including the key color/legend - Figure 9: i) adapt this figure to comments in your text ii) convert numbers in K. It will be easier to compare to all other Figures given in K and not in RU.[addressed above]

6) I was expecting Conclusion concentrating on the adequacy of this approach to the recalibration of AVHRR. Instead, the authors give a new description of figures that has already been given or that should have already been given in the text. Moreover, when reading the last sentence of the Conclusion, one can deduct that the core of the paper was only devoted to assess the capability of AATSR of being a reference in recalibration activities.

Answer: Conclusion adequately changed to address this point.

Comment: 7) In its current state, writing is a bit confusing. The information is not always conveyed clearly enough to be understood by the basic reader. Among the various

topics: recalibration of AVHRR, identify/correct the AATSR biases, use of AIRS/ATSR2, comparison AIRS/IASI, . . ., the main thread is quite difficult to identify. It would be wise that the authors rank in order of importance the messages they want to convey in order to help the reader not getting lost in the profusion of instruments they consider and which are not of equal importance in their demo.

Answer: Several places have been modified to address this point. First introduction now has clear goals. Then the conclusions has clear answers to these goals.

Comment 8) There is an obvious lack of proofreading (for example. AVHRR instead of AATSR, comparisions / comparisons, Figure 9 does not correspond to the comments in the text, . . . and other points detailed in “Technical comments”)

Answer: Attempted to address this point in the new text.

OTHER COMMENTS / QUESTIONS In addition, some points are raised below that I hope will further improve the clarity of the manuscript.

Comment- Page 9786, lines 24-25 Please reword the following sentence: “In fact, taking into account a small bias the AATSR–IASI bias is close to the AATSR pre-launch bias implying that IASI can get close to pre-launch levels of accuracy”. It is not clear as it is.

Answer: Modified this sentence. Comment - Page 9786, line 28: Do you really mean “AVHRR”? Or rather “AATSR”?

Answer: We mean AVHRR because our study established that IASI does not have scan angle bias which means that the scan angled dependence bias seen by Mitttaz and Harris, 2011 between AVHRR-IASI was due to AVHRR scan angle dependence bias.

Comment Page 9789, line 5-10: At this place, this discussion is not coherent with your demo. It comes too early. Move it to the “Conclusion”? In addition, please be more specific: what do you intend by “small size”.

Answer: - In order to show continuity, reference to a similar previous study done with a smaller sample size by Illingworth is made here. Removed the small size part from here to bring coherence.

Comment - Page 9789, line 20-24: this sentence is really very difficult to understand. Furthermore, the statement on the “bias in 11 and 12 microns spectral bands of the IASI stay same. . .” requires being specified: which bias? With respect to what? Also, note that IASI has nominally no “bands” but individual spectral channels.

Answer: - Made changes to this part of the text to make it more coherent. In the section on convolution method (section 2.3) we have indicated that we are comparing with convoluted IASI radiances .

Comment - Page 9789, line 29: specify AATSR SRF Done - Page 9790, line 1: specify AATSR channel 12 microns. Done. . ..

Comment - Page 9793, line : Please explain this statement: “real not pseudo channels”

Corrected . . .(they are convoluted radiances)

Comment - To the best of my knowledge, IASI has no pseudo channels available nor distributed.

Comment - Page 9794, line 5: please specify in this title of paragraph 3.1, which bias you analyze. Specified . . .. Comment - Page 9794, lines 13-16: Please be more specific and give references

Comment - Page 9794, lines 23-25: You are addressing the key point of identifying the instrument

Done

Interactive comment on Atmos. Meas. Tech. Discuss., 8, 9785, 2015.