

Comments on the paper
Inter-comparison of IASI and AATSR over an extended period
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I recommend publication in ATMD, taking due account of the following issues. Revisions required (need to see the revised manuscript)

FOREWORD

The paper fits within the stated scope of the journal.

This paper is based on the analysis of a large amount of satellite data within the frame on re-calibration of AVHRR and relies upon intercalibration of infrared instruments such as IASI and AATSR. Consequently, it is mainly devoted to assess “the trustworthiness of these instruments” through “a comprehensive analysis of the AATSR–IASI bias derived from their collocated pixels, over the period January 2008 through March 2011” .

If the paper does not really add new knowledge to the overall body of scientific understanding, it confirms the extreme and well recognized difficulty of being sure that instruments (“references”) are exempt from any biases or trends.

It is an ambitious work which shows that the authors have the capacity to handle - globally and over long time series - several instruments aboard several satellites.

MAJOR COMMENTS/ QUESTIONS

- 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.
- 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.
- 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”.

- 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?
- 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.
 - Table 2: Please use K instead of RU, or K **and** RU
 - Figures 2 : Specify the channel number in the legend
 - Figure 4: Is it also for Nadir-view?
 - Figure 5: Please convert RU in K
 - Figure 6: Please comment on Figure 6 the baseline temperature. Why 3 curves for 12 microns instead of 2 curves for 11 microns?
 - 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.
- 6) I was expecting Conclusion concentrating on the adequacy of this approach to the re-calibration 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 re-calibration activities. The rest of the paper, abstract and title are wider than this simple statement.
- 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: re-calibration 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.
- 8) There is an obvious lack of proofreading (for example. AVHRR instead of AATSR, comparisons / comparisions, Figure 9 does not correspond to the comments in the text, ... and other points detailed in “Technical comments”)

I hope these suggestions will help significantly improving the presentation and overall impact of this manuscript.

OTHER COMMENTS / QUESTIONS

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

- 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.
- Page 9786, line 28: Do you really mean “AVHRR”? Or rather “AATSR”?
- 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”.
- 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.
- Page 9789, line 29: specify AATSR SRF
- Page 9790, line 1: specify AATSR channel 12 microns.
- Page 9793, line : Please explain this statement: “real not pseudo channels”
- To the best of my knowledge, IASI has no pseudo channels available nor distributed.
- Page 9794, line 5: please specify in this title of paragraph 3.1, which bias you analyze.
- Page 9794, lines 13-16: Please be more specific and give references
- Page 9794, lines 23-25: You are addressing the key point of identifying the instrument which “deviates” from the other. Some groups are using, in parallel with the relative approach, a standalone approach to identify which instrument is in “abnormality”. Do you foresee adding this capability to your method?

- Page 9795, lines 21-24: how does this affect your results or number of collocations? Please quantify “low temperatures”
- Page 9796, line 26 to Page 9797, line5: Please reword this paragraph in order to help the reader understanding the -0.075K and the 0.073K values. Please reword the sentence including the expression: “inter-comparison of AATSR-IASI intercomparisons “
- Page 9797, line 17: 200K is mentioned in the text but the Figure 4 displays results starting at 210K.
- Page 9798, Line 7: please be more specific in this title. “Temporal dependence of AATSR –IASI biases”
- Page 9798, Line 10, 12, etc.: please bring some coherence in your temperature ranges (text and figures)
- Page 9799, lines 18-21: Please reword this paragraph since, as it is, it is not clear enough, at least for me
- Page 9800, lines 22: No! Current Figure 9 is for ATSR2-AIRS (see Page 9820)
- Page 9801, Paragraph 3.4: Please develop this important paragraph. Reword it and develop your last sentence
- Page 9802, line18: please consider adding some references to the statement “In addition ...with IASI”. A lot of presentations has been made in the past, by CNES or Eumetsat researchers/engineers, during GSICS Conferences and meetings and IASI Conferences.
- Page 9803, line 4-5: “in Fig. 9 below”. Delete “below”
- Page 9805, line10: your figure 7 has nothing to do with AIRS. Please check!

TECHNICAL CORRECTIONS:

- Page 9786, lines 12-14 “More recent re-calibration efforts, such as the NOAA CDR project that is aimed at recalibrating the AVHRR uses the IASI and the AATSR as references.”
Add comma “AVHRR, uses”
use/uses
- Page 9786, line 18 : Assess/asses

- Page 9793, line 19: “less than 1” you mean “less than 1K” ?
- Page 9796, line 27 : please, explicit “SI”
- Page 9796, line 28 : shows/show
- Page 9797, line 6: comparisons / comparisions.
- Page 9800, line 12 : detect/detected
- Page 9802: Blumstein 2002 . Not in the references. You mean: 2007?
- Page 9803, line 3: Complementary/Complimentary
- Page 9804, line 1: what does this extra “y. Figure 10” stand for?
- Page 9806, line 19: Tournier/Tourniers
- Page 9806, line 19: Illingsworth/Illingworth
- Page 9807: in alphabetical order Miranda..., then Mittaz
- Page 9807 line 32: Smith, D.L.
- Page 9810, Legend: Wang/Want

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