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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Intercomparison of integrated IASI and AATSR calibrated radiances" *by* S. M. Illingworth et al.

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Thank you to all of those involved, and to the referees for their helpful and insightful comments, which have been taken onboard. We have carefully considered the questions and suggestions of the referees, and detailed responses to these questions and suggestions are indicated. Reviewer comments are quoted using [...].Some changes in the manuscript have resulted from the referee's suggestions, resulting in us submitting a revised paper for publication in ACP.

Response to the "Anonymous Referee 1":

[Can you briefly discuss the AATSR issue on cloud flagging over land?]

Cloud flagging over land to high accuracy is a well-known problem. However the other

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problem for a radiometric intercomparison is that surface temperature (and cloud fields) changes more rapidly over land than ocean, and hence a much more strict time comparison is required. In addition, the radiance is more view angle dependent over land. More information on the AATSR cloud and land flags, as well as a more obvious reference on where to find more information on the subject will be included in section 3.3.

[Why you use only one day of data? This limits the statistical significance and the temperature range. Please give a more detailed comment on this item, which is the major weakness of the paper.]

Despite dealing with a limited set of data (one day of IASI measurements were analyzed) this paper is very clear both on objective and conclusions: we present the first results on the IASI absolute radiometric calibration, which will likely be useful for further climate and/or chemistry applications. The results of the study depend more on the details of the comparison and methodology so that analysis of further days, whilst valuable, are not as important as establishing a quality comparison for one day. It can be seen from the standard deviations on the mean that the random errors are already quite small for one day of comparisons.

[Can you clarify why a miss-time of maximum 20 min is a good threshold? Is this part of the Merchant et al. paper?]

Twenty minutes was chosen as a threshold value, simply because such a value had to be chosen; this value is a reasonable time constraint and will rule out the vast majority of cloud formation in a given pixel over that time. There will be cases, e.g. the tropics at around 2 pm, or near hills and mountains at anytime, but as this is a global study these anomalies will be statistically insignificant. Even ocean convection is unlikely to substantially change its properties over 20 minutes although we also have a method for looking at the IASI data itself to check cloudiness. We will add this to the paper. The work done by Merchant et al. noted that the mean absolute time difference between

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the two co-located satellite data sets was 24 min, and so we note that the 20 minute threshold applied in this paper compares favourably with this work. This detail is now included in section 3.2

[The total number of the grouping (cloudy/fractional cloudy/clear sky) would be helpful.]

The total number of groupings has now been included in figure 4.

[Fig 4 and 5: It is not obvious to me why the colour code suggests differences up to -1K and -2 K respectively, but the data points (red symbols) look much closer to the one-to-one line.]

The colour bar was incorrect. A corrected and more illustrative colour bar has been used in figures 4 and 5.

Response to the "Anonymous Referee 2":

[Page 8104, line 3: A better reference for IASI would now be the Paper by Clerbaux et al., in this special issue.]

Done.

[Section 3.3.: It would be good to provide some additional characterizations of the selected IASI scenes. Where are they mostly located (the small temperature dynamic range -Figure 4- seems to indicate few points at high latitudes)? It would also be useful to provide the total number of match-ups between IASI and AATSR for the selected day, the total number of IASI scenes within each classes (clear, cloudy,..) and the fraction of inhomogeneous pixels in them (assuming e.g. the clear-sky maximum standard deviation).]

The total number of groupings, and how these are broken up has now been included in figure 4.

[Section 3.4. There is on page 8107, line 1, a reference to the paper by Wang and Cao on the intercomparisons between IASI and AVHRR, which are on the same platform

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and hence always match spatially. But there is no further reference or discussion with respect to this. Do the present results agree with this AVHRR-IASI comparison?]

The present results agree with the Wang and Cao paper in so much as this study also observes that the IASI instrument differs in its calculation of the BT of a scene in comparison to the AVHRR. It should also be noted that since this work was submitted to the ACPD a more thorough discussion of the effect of the scan angle has been included in the paper, and an anomaly regarding the calculation of the nadir pixel size for the IASI instrument has been corrected for; this has resulted in the IASI- AATSR differences as now having absolute mean values, in the clear sky case, of 0.17 K and 0.39 K for the 11 μm and 12 μm channels respectively, with the reasons for these changes clearly discussed in the modified paper for submission to the ACP.

[Reference Clerbaux, 2007: Remove “2” after GMES.]

Done

Interactive comment on Atmos. Chem. Phys. Discuss., 9, 8101, 2009.