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Atmospheric Measurement Techniques Discussions

Interactive comment on "Matching radiative transfer models and radiosonde data from the EPS/MetOp Sodankylä campaign to IASI measurements" *by* X. Calbet et al.

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We would like to thank you for your positive comments on the paper. Referee's comments are included here in bold letters for clarification.

Please find below the reply to the referee's specific comments:

We agree with the referee that Pougatchev et al. paper should be included as a reference. Thank you for pointint that out.

» **p. 4500 Line 20: In my opinion, the spatial resolution of IASI-measurements**

is 25 km and more. At nadir, the instrument samples data at intervals of 25 km along and across track, each sample having a maximum diameter of about 12 km. The diameter of IFOV is not equal to the spatial resolution!

Agreed, thank you for pointing out this correction.

»**p. 4504 Line 29: A reduction of 5% of the radiation dry bias appears to be low. If it means 5% in absolute terms of relative humidity, I recommend adding delta RH. But I doubt that this is the correct number. Assuming that the true rH in 300 hPa is 60%, then "RS92 old" measures 45% and "RS92 new" (new coating of humidity sensor contacts) measures 49.75% under cloudless daylight conditions (the reduction of bias is about 5% RH): Assuming that the true rH in 300 hPa is 10%, then "RS92 old" measures 7.5% and "RS92 new" (new coating of humidity sensor contacts) measures 8.3% under cloudless daylight conditions (here is the reduction of bias lower than 1% RH): 5% is likely deduced from Kivi et al. (2009) Figure 6, right panel and means an averaged value of (RH old – RH new) / RH new. If that was the case, it should be corrected.**

We get slightly different values for the "RS92 old" ideal measurements: 46.5% and 7.7% for real values of RH of 60 and 10% respectively. This gives a relative difference between old and new (RH old – RH new) / RH new of about 6%, which is the number quoted in the paper (about 5%).

We do have to clarify this better in the text and mention that it is a relative percentage of relative humidity.

»**p. 4506 Lines 9-11 In addition, it would be interesting to find out where (exactly) the sondes have drifted away from the launch location passing UT und LS (compare remarks p. 4509 lines 27 -29).**

We will try to modify the figure to show this, if it is possible to show it in a simple way.

»**p. 4509 Line 12 I recommend restructuring the text for clarity purposes. Con-**

sider adding the headline "5.4. Comparisons".

Agreed. We will introduce a new headline as suggested.

»**p. 4509 Lines 27 - 29 In a first study, it should be allowed to make certain assumptions about spatial IASI radiance variability in a special wave number region; but in further work the spatial variability should be discussed. Question: Where can I find the definition of corresponding IASI-IFOV, is it the nearest to the Sodankylä site?**

Agreed. This will be clarified in the paper.

»**p. 4510 Lines 8 – 9 It's obvious, that a correction of RS92-humidity profiles is needed. Without a doubt, an interpolation is better than a single profile. But why are the spectra of interpolated profiles so closely related to the corrected RS92 spectra and noticeably deviant from the CFH spectra? We know that the atmospheric layers that most significantly contribute to the top of the atmosphere radiances in the spectral region between 1500 and 1800 cm-1 are located in the mid to high troposphere and lower stratosphere. My own testing of LBLRTM 11.7 reveals the highest sensitivity between 500 and 350 hPa. CFH sondes usually fly through this layer (see Fig. 3) approximately 40 min before satellite overpass, RS92 sondes fly through this layer approximately 15 min after satellite overpass. Thus, the interpolation should be closer to RS92, but not this close.**

There is an effect which has not been discussed or pointed out in the paper, mainly not to confuse the reader. Even though radiosondes drift in space because of the wind, the fact is that the air they sample is very close to the column of air that is above them at radiosonde launch time. This is because the radiosonde drifts with the winds, but so do the air parcels that the radiosonde measures as it ascends, and they both tend to drift in the same direction and roughly in the same quantity becuase the wind at different altitudes is the same for both. In practice this means that a radiosonde which is launched at satellite overpass time will more or less sample the same air parcels

that the satellite has observed at overpass time. Therefore, it is to be expected that a radiosonde launched five minutes before overpass will be much closer to the satellite measurements than one launched one hour before. This effect also implies that the geolocation drift of the radiosonde is not so important as other effects, as is effectively shown in practice in the paper.

> **p. 4510 Line 19 I'm not sure about the following wording "slight displacement of one Gaussian figure with respect to the others". Does it mean "slight displacement of one histogram"? p. 4510 Lines 24-25 I'm not sure about the following wording "In this case, all three Gaussian curves overlap", it might be better to separate Gaussian curve and histogram or distribution of residuals**

Agreed, there is a confussion between histograms and Gaussian curves. This will be clarified.

> **p. 4511 Lines 10-11 : : : and two time interpolated?**

Thanks for spotting the typo. "Two" should be removed.

We would like to thank the referee for his/her remarks and comments which have been very helpful and will undoubtly improve the paper.

Interactive comment on Atmos. Meas. Tech. Discuss., 3, 4497, 2010.