

Atmos. Meas. Tech. Discuss., referee comment RC3  
<https://doi.org/10.5194/amt-2021-374-RC3>, 2022  
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## **Comment on amt-2021-374**

Anonymous Referee #3

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Referee comment on "Comparison of GRUAN data products for Meisei IMS-100 and Vaisala RS92 radiosondes at Tateno, Japan" by Shunsuke Hoshino et al., Atmos. Meas. Tech. Discuss., <https://doi.org/10.5194/amt-2021-374-RC3>, 2022

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The paper presents results of a series of dual soundings of the IMS-100 and RS92 radiosondes at the Tateno site and compares the data from these flights using a set of processing algorithms following GRUAN Data Product (GDP) principles. My main issues with the current draft of the paper are the clarity of the description of the data processing steps and whether there are enough robust conclusions drawn from the intercomparison results given the detailed uncertainty information provided by the GDP processing.

In terms of specific comments:

[line 18] It would be useful to state the weight of the RS-92 sonde so that the relevant lightness of the RS-11G sonde (85g) is clear.

[line 31] expand first use of 'LC'

[line 56] change 'ant' for 'and'

[line 80] and Table 2/3 – tables 2 and 3 identifies the uncertainty sources in the temperature and RH products and these include identification of correlated and uncorrelated sources – but this is the only reference I could see in the paper to this separation of uncertainty source classes. Discussion should be included in the main text about this separation and the implication for the expected level of agreement in the intercomparison of multiple flights.

[lines 81 – 101] The section on the RH correction could be clearer in terms of the processing steps made as well as the justification (and robustness) of the assumed values of the key parameters. So, for example three parameter values are given without source information [lines 91-92] and then only two are apparently used in the calculation [lines 93-95].

[lines 130-132] The parameters in the text are not consistent with the parameters given in Figure 7 and Tpend is undefined.

[line 165] missing comma after 'plastic'

[line 195] according to Fig 9 the RH for iMS-100 does decrease in the stratosphere, just not as rapidly as for the RS-92 results.

[line 205] should 'logistic regression' be 'logarithmic regression'?

[line 207] more explanation of the source of this expression would be useful, for example the reason for the altitudes of ST1 and ST2 and why RH and VMR values are both included.

[lines 211 – 220] I had a number of questions over the uncertainty screening section. Firstly, the purpose of the uncertainty screening should be clarified in terms of what data issues it aims to address - as the GDP processing aims to provide detailed uncertainty information this information should, in itself, define how many points would lie outside the uncertainty bounds for a given confidence limit. This is fully expected within a data distribution and outliers should not be eliminated on this basis, particularly if a later assessment looks at the level of agreement between two data sets. Secondly, it is stated that the coefficients are determined empirically based on a 90% criterion - was this done of the complete data set (and so, by default excludes 10% of the data)? Finally, since the uncertainties for T and RH are significantly different for day-time and night-time flights it would seem sensible for separate screening criteria to be used for the two cases.

[line 231] some parameters in this equation are undefines (REGSEE and s)

[line 237] is this criteria correct, or should it say that profiles with more than 10% of abnormal points are excluded?

[line 239] what was the criteria for 'abnormal wind data' in this context?

[line 251] should this be the sum over  $j$  from 1 to  $M$  (as in eq 18) ?

[line 255] 'MVD' is undefined.

[lines 297-298] The evaluation of 'consistent' and 'in agreement' should take into account the effect of the uncertainty screening and correlated/uncorrelated uncertainties (see previous comments)

[line 309-310] clarify what is meant by 'differences...are small' – point by point differences or systematic differences over multiple flights? Small compared to expected difference given uncertainties (which would imply uncertainties are over-estimated) or consistent with expected uncertainties? And similarly for 'seasonal variations are large', with possible reference to the earlier point about correlated and uncorrelated uncertainties.

[line 322] same comment as for lines 297-298

[line 343] is this the standard or expanded uncertainty? Also, the uncertainty on both barometers should be considered when comparing the results.

[line 365] what does 'small enough' actually mean ? See previous comments on evaluating consistency.

[line 376] see previous comments on evaluating consistency.

[lines 378 – 405] the summary should be updated based on the points raised above.

[line 412] GRUAN data product (rather than processing)

[Figure 3] as SEA is an acronym should it be capitalised?

[Figure 7] wonder if the first box should be modified as current content implies that the wind info is derived from a single lat and long value?

