[Review comments in red, author response in black]

Reviewer #2

Abstract
Lines 22 – 24: See my comments on section 5.2: corresponding modifications are needed here.
Agreed. The text will be changed to read
"[….] with uncertainties of < 0.2 K for the temperature and < 1.5% RH for the humidity sensor."

1 Introduction
Lines 32 – 35: The sentence "The network consists … in the processing chain." Is very long, complicated and difficult to follow for a reader.
The sentence will be rephrased and restructured to increase readability.

Line 36: "the only GRUAN data products" Should this be " the only sources of the GRUAN data products"?
For clarity the sentence will be changed to start with
"[...]the GRUAN data products for the Vaisala RS92 and the Meisei RS-11G radiosondes are the only [...]"

3 Change management
Line 192: "each other's uncertainty coverage factor"
the coverage factor only specifies the confidence level at which an uncertainty is given; therefore this text should probably be "the uncertainties of the data at the 95% confidence level"
We agree with this comment and the sentence will be changed accordingly.

Lines 207 - 208: "consider the metrological quantification aspects that are necessary in the current case."
such as? to which aspects are referred here?
Aspects such as type B (instrumental) expanded uncertainties (absolute for each radiosonde), relative uncertainty in the comparison, traceability of involved instrumentation, and assessment of the comparability with independent ancillary results.
These are referred to here since this is the key aspect in adopting a metrological approach, where other reference instruments are adopted to make the evaluation traceable to standards and with a documented uncertainty budget. The manuscript will be modified to include these aspects listed above.

5.2 Results of the laboratory characterization
There is a clear shortcoming in Section 5: This paper emphasizes several times the metrological aspects but no uncertainty values are given for the calibration systems in Section 5.
Thank you for pointing out this omission. We will include information about the uncertainty of the references for the temperature and relative humidity.

The uncertainty of the reference Pt100 temperature sensor is 0.04K (1 sigma), certified by DAkkS (the national accreditation agency in Germany).
The uncertainty of the relative humidity of the air over the reference salt mixtures is at most 0.5%RH, as reported by Greenspan (1977) doi: 10.6028/jres.081A.011.
A reference to Greenspan (1977) and a statement about the calibration uncertainty of the reference temperature sensor will both be included in the updated manuscript.

Line 324: "from its width it can be inferred that the calibration uncertainty is smaller than 0.1 K."
o Such conclusion cannot be drawn without knowing the uncertainty of the reference. (Basically, you may possibly conclude that the equivalence between your reference and Vaisala's reference is within 0.1 K but the link to the SI realisations is still missing.)
A link to SI realisations is provided by the certification by DAkkS. The calibration uncertainty of the Pt100 0.04K (1 sigma).
For clarity, Figure 4 will be updated to show the percentiles that mark the boundaries of 1-sigma and 2-sigma ranges. The boundaries show that the calibration uncertainty of the RS41s temperature sensor is within 0.2K (1 sigma).
The text will be changed to reflect this.

Lines 328 - 329: "which means that the uncertainty of the humidity calibration is smaller than 1 %RH."
o Same comment as for temperature above.
The uncertainty of the relative humidity of the air over the reference salt mixture at room temperature is at most 0.5%RH, as reported by Greenspan (1977).
Table 4 will be updated to include the uncertainty in the relative humidity of the air over each reference salt mixture.
Taking into account the uncertainty of the RH references and the histogram distributions at each tested RH level (discussed further in the following points), we will change this statement to "[..]the uncertainty of the humidity calibration is smaller than 1.5 %RH."

o Moreover, the uncertainty of the reference (both at Vaisala and Lead Centre) is significantly at different RH-levels; therefore analysing them together in single histogram is misleading.
In Figure 5, histograms will be added for the measurements at 0, 11, 33, 75, 100 %RH. We will discuss the calibration uncertainty of the radiosonde's RH sensor at each of these levels.

o Asymmetry of the histogram indicates probably some systematic differences between Vaisala and Lead Centre at some measurement points.
The asymmetry of the histogram in Figure 5 is due to an error in the analysis, where we used incorrect reference values at 33%RH. We want to thank the reviewer for this comment, which prompted us to re-check our analysis of the measurements. The incorrect reference values at 33%RH caused a shoulder in the histogram at around -0.75%RH. With the correct reference values, this

shoulder disappears and the histogram distribution becomes more symmetric, although a slight asymmetry remains.

This remaining asymmetry is caused by the positions and shape of the histograms at different RH levels, which does indeed show discrepancies between the reference salt mixtures and the calibration by Vaisala. A statement to this effect will be added in the manuscript.

o Finally, for me it looks strange that in Fig. 4 all visible data fall in claimed uncertainty but here a significant amount of data fall out from the range of claimed uncertainty.

The updated Figure 4 shows that ±0.5 K covers more than 2 sigma of the distribution of the differences between the RS41 temperature sensor and the Pt100 reference. In fact only 32 of 1406 measurements (2.2%) are outside the ±0.5 K range.

We agree that due to the non-Gaussian shape of the distribution ±0.1K does not cover 1 sigma, and that ±0.2K is more appropriate. The text will be changed accordingly.

6 Metrology
Lines 400 - 414:
o It's unclear to me why these two last paragraphs of this Section are needed here: I suggest focusing them in facilities/services/results developed/obtained at national metrology institutes that can be benefited in the transition from RS92 to RS41 (and in radiosonde measurements in general)

The last two paragraphs will be removed, but we would like to keep a sentence referring to the Meteomet project, that concerns the investigation of environmental factors on the uncertainty of meteorological measurements and therefore is relevant to the paper.

10 Summary and outlook
Lines 670 - 672 "2. Comparison with external references show calibration uncertainties of < 0.1 K for temperature and < 1% RH for the humidity sensor."
o Ref. to my comments in Section 5.2, I don't agree with this sentence.

Agreed. The text will changed to read uncertainties of < 0.2 K for temperature and < 1.5% RH