

## Comment on amt-2021-343

Anonymous Referee #2

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Referee comment on "Laboratory characterisation and intercomparison sounding test of dual thermistor radiosondes for radiation correction" by Sang-Wook Lee et al., Atmos. Meas. Tech. Discuss., <https://doi.org/10.5194/amt-2021-343-RC2>, 2022

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The manuscript by Lee et al. provides the description and the metrological characterisation of a dual thermistor radiosonde (DTR) comprising two sensors with different emissivities. The work described in the manuscript is done and continuity with previous efforts of scientific community and of the authors themselves. The use of DTR has the main objective to improve the adjustment of the daytime solar radiation effect on the temperature sensors which is a critical issue for all radiosonde types.

The manuscript is well structured and, beyond the introduction, sufficiently well written. The metrological characterisation of the DTR is detailed and comprises of the major steps needed to fully characterise investigated sensor. Nevertheless I have major concerns about the scientific quality of the manuscript which are detailed below.

There is a strong imbalance between the metrological characterisation of the DTR and the scientific discussion related to the assessment of the DTR performance in the atmosphere.

- The metrological characterisation of the solar radiation correction and the quantification of the uncertainty budget for the DTR are not supported by sufficient validation of results: the comparison with the RS41, which can be assumed in the context of the manuscript as a "community standard" (although the only reference is known to be the cryogenic frostpoint hygrometer), is quickly presented and lacks of discussion for the differences shown in Fig. 9. This is a very important aspect to show the performances of the DTR measurements. A broader discussion on the consistency with the RS41 should be included.
- The experimental set up discussed in the manuscript looks sufficiently robust, although this could be compared with previous experiments available in literature in order to show what are the pros and cons of the metrological characterization carried out by the authors. A few assumptions in the manuscript must be well justified by means of references or quantitative results. For example, when the term  $(T_{B\_raw} - T_{W\_raw})$  is used

instead of  $(T_{B\_on} - T_{W\_on})_{UAS}$  to obtain the irradiance using Eq. (10) in the adjustment of the DTR measured profile, this is done without justifying their effect on the measurements compared to the results obtained in the laboratory experiments. Also the uncertainty due to the solar radiation correction is smaller than for other radiosondes (according to the literature) and a comparative discussion could be provided in the benefit of the reader.

- The manuscript introduction is not well written and lacks of fairness and accuracy. I strongly recommend the authors to pay great care in writing inaccurate or wrong statements. Specific comments on the introduction are provided in a revised pdf version of the manuscript along with several specific comments, attached to this review.

Please also note the supplement to this comment:

<https://amt.copernicus.org/preprints/amt-2021-343/amt-2021-343-RC2-supplement.pdf>