To Anonymous Referee #2,

The authors sincerely appreciate your review and valuable comments.

Suggested title change: "Comparison of Vaisala RS41 and RS92 radiosondes launched over the oceans from the Arctic to the Tropics"
Line 18: suggested rewording, "RS41-SGP, sonde version with pressure sensor, : : :"
Line 29-30: suggested change, "discrepancies presumably caused by the "wet-bulbing" effect on the RS92 sonde and the stagnation : : :"
Line 40: suggested rewording, "are operationally conducted : : :"
Line 43: suggested rewording, " with helium or hydrogen gas."
Line 50: suggested rewording, "Efforts to improve the quality of : : :"

➔ We corrected these five sentences and the title in the revised manuscript (Line 19, 31-32, 42, 45, 52-53).

Line 53: suggest you add reference to the end of this sentence to (Wang et al. 2013)
Reference is: Wang, J., L. Zhang, A. Dai, F. Immler, M. Sommer, and H. Vömel, 2013: Radiation dry bias correction of Vaisala RS92 humidity data and its impacts on historical radiosonde data. J. Atmos. Oceanic Technol., 30, no. 2, 197-214.

➔ We added this reference to the manuscript (Line 56).

Line 95-98: Is this special note really needed? I would suggest you eliminate this but then say: "All RS92 sonde data used in this study were processed with DigiCORA software v3.64 which includes humidity corrections for solar radiation dry bias and timelag errors due to the slow response of the humidity sensors (Dirksen et al., 2014)."
Reference is: Dirksen, R. J., M. Sommer, F. J. Immler, D. F. Hurst, R. Kivi, and H. Vömel, 2014: Reference quality upper-air measurements: GRUAN data processing for the Vaisala RS92 radiosonde. Atmos. Meas. Tech., 7, 4463-4490.

➔ This part was already deleted before the manuscript was published as a discussion paper in AMTD. (indicated by Anonymous Referee #1)

Line 128: Suggest you start paragraph with a introductory sentence something like: "A number of issues were addressed in post-processing the sounding data."

➔ We added this sentence to the beginning of the paragraph (Line 134).

Line 129: Suggested rewording: "the radiosondes oscillated vertically about the 0_C level likely due to icing on the balloon, and hence only : : :"

➔ We corrected this sentence (Line 135-137).

Line 152 and following: Is it possible to compute pressure from the RS41 GPS height data similar to what is done with RS41 SG sondes,that is sondes without a pressure sensors? Would this GPS computed pressure lead to an improved comparison with pressure from the RS92 sondes as found in Jensen 2016. If there is an improved comparison using GPS computed pressure, this could be a useful recommendation for future use.

➔ We checked the GPS-derived pressure of the RS41 radiosondes (it seems that we usually cannot obtain it by the normal use of the software). New Figure 4 shows the difference between the RS92 pressure and the RS41 GPS-derived one. The use of the GPS-derived pressure reduces the bias by approximately 0.2 hPa above an altitude of 15 km, but there is still a bias of 0.4 hPa or more at most of altitudes. The median of the difference in Fig.4 is almost the same as in Fig.3a around an altitude of 5 km. The GPS does not essentially improve the pressure bias. This description was added to section 3.1 and conclusions (Line 170-176).

Following section 3.1: It would be useful to see how these pressure difference translate into geopotential height differences. I would suggest adding another panel to Fig. 3 where you show the height differences.

➔ We added a panel to show the difference in height to Fig.3. New Figure 3b shows that the height difference increased as the radiosondes rose higher: The median of the RS41 height was greater than that of the RS92 by approximately 35 m at an altitude of 15 km, and 100 m at 22 km. These height differences correspond to the differences of pressure. This description was added to section 3.1 and conclusions (Line 166-169, 332-334).

Line 200: In discussing Fig. 6a and the differences in the T and RH profiles between the

sondes, can you speculate which sonde would be less prone to errors due to poor ventilation? Why?

➔ We speculate that the RS92 temperature and humidity would be closer to true values in this case because they changed more quickly than the RS41 ones, which suggests the better ventilation of the RS92 radiosonde.

Line 201 and following regarding Figs. 6b and 6c: The large temperature differences seen at low-levels would likely results in significant differences in CAPE and CIN. It would be informative to list these CAPE and CIN differences as additional motivation for better understanding this issue.

➔ We added the values of CAPE, CIN, and PW to Table 2, and new Table 4 lists their statistics. The large temperature differences near the sea surface shown in Fig.6b-c caused large discrepancies in CAPE (the difference in CIN was small). We added this description to the manuscript (Line 130-133, 222-224).

Line 217: Are the noisier wind speed data in this study compared to Jensen's related to the observations being taken on a ship and hence ship motion? Also is there an explanation for the large mean wind differences above 27 km in Figs 3d and 3e?

➔ Ship motion never affects the measurement of radiosondes because the radiosondes is not on the ship after the launch and the motion of the receiving system will not make any noise.

Line 241: suggested rewording: "bias was generally absent from later observations processed with V3.64 software (Ciesielski : : :).

➔ We corrected this sentence (Line 261).

Line 251 and following: It seems you are assuming that the moisture biases between the sondes are always related to issues with the RS92 sonde. Is there any independent confirmation you can provide (GPS or microwave PW estimates or preferably snow white chilled mirror soundings) that in fact show the RS92 sondes having the poorer performance. Can you discount the fact that the RS41 doesn't have slight moist bias? Regarding this, it would be instructive if you could produce a similar diagram to Fig. 18

in Jensen et al (2016) which showed PW estimates from both the RS41, RS92 and some independent estimate and then discuss the findings. Jensen et al. (2016) claim their comparison between sonde and MWR PW may have been affected by spatial moisture gradients near the launch site. Spatial moisture gradients should not be as much of an issue for your oceanic soundings, such that a PW comparison between sondes and some independent estimate could be quite instructive. Finally, if you are including PW estimates from the RS41 and RS92 sondes, it would be useful to also see CAPE and CIN differences (either in tabular or graphical form) for each sonde launch.

➔ We don't believe the biases are always due to RS92's fault only. We have no independent evidence to prove that the RS92 accuracy is worse than the RS41, and recognize the possibility that the RS41 data also might have had a bias. We added this explanation to the revised manuscript (Line 284-290). (Another researchers who participated in only the MR15-04 cruise attempted to measure PW by using a shipborne GPS, but we cannot use their GPS-derived PW at present. They found a mistake in their data processing and their data are still being reprocessed. In any case, the shipborne GPS-derived PW is expected to have an RMS error of about 3.0 mm compared with radiosonde PW (Fujita et al. 2008) and this will not be a decisive factor to judge which radiosonde is better.) Certainly the comparison between the GPS-derived PW and radiosonde PW is an interesting topic, but this is beyond the scope of the research on the difference between the two types of radiosondes.
New Table 4 lists the statistics of CAPE, CIN, and PW, and we mentioned how the differences between the RS41 and RS92 affected the calculations of CAPE, CIN, and PW (Line 270-280).

Line 251: You note that there is a residual day-time dry bias in the RS92 data but there also appears to be a night-time dry bias (at least between 3-13 km). This nighttime difference is certainly not caused by differences in the radiation correction schemes in the sonde software. Please comment?

➔ We agree with you on this point. The RS41 humidity may have a slight moist bias that is unrelated to the radiation correction scheme below an altitude of 13 km. We added this indication to the revised manuscript (Line 286-288).

Line 254: "proposed by Nuret et al. (2008) : : :" Reference is Nuret, M., J.-P. Lafore, F. Guichard, J.-L. Redelsperger, O. Bock, A. Agusti-Panareda, and J.-B. N'Gamini, 2008.

Correction of humidity bias for Vaisala RS80-A sondes during the AMMA 2006 observing period. J. Atmos. Oceanic Technol., 25, 2152-2158. It would be useful to include local time and precipitable water (PW) in table 2. The PW values would allow one to better gauge the range of moisture conditions the sondes were launched in. If you show PW values in a separate figure (see comments above) then putting them in table 2 would not be necessary. If more room is needed, the lat/lon values can be truncated to 1 or 2 decimal places.

➔ Nuret et al. (2008) was cited in the revised manuscript (Line 292). Local time and PW have been added to Table 2.

Figure 3, panels (b) and (c) appear to be switched in this figure caption. However you may want to switch these panels to make them consistent with Jensen's Fig. 8.

➔ The caption of Fig.3 was wrong. We corrected it.

Minor grammatical comments:
Line 26: suggested rewording, "4.5 km, suggesting that there : : :"
Line 37: "further studies on the causes : : :"
Line 143: "To facilitate comparison : : :"
Line 267: "range of temperatures and relative humidities"
Line 269: "was largest : : :"
Tabel 2: "Wind dir."

➔ We corrected them (Line 27, 39, 151, 306), except for the fifth indication.