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Comment

Interactive comment on “Assessment of GPS radiosonde descent data” by M. Venkat Ratnam et al.

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Interactive comment on "Assessment of GPS radiosonde descent data" by M. Venkat Ratnam et al. Anonymous Referee #2

The authors have made an attempt to assess the GPS radiosonde data during the descent collected at Gadanki station in India. They find that there are small mean differences in temperature, relative humidity, and horizontal wind speed. They attribute the differences to the diurnal variations of these parameters and then suggest to record the radiosonde descent data because they could be useful for meteorological operations and scientific studies. I would recommend the manuscript to be published with major revisions.

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Reply: First of all we thank the reviewer for going through the manuscript carefully, appreciating the actual content of the manuscript and providing constructive comments/suggestions, which made us to improve the manuscript content significantly.

Major concerns: 1. There are very few or no radiosonde descent data in the atmospheric boundary layer (ABL), especially during the monsoon season. This weak point should be mentioned in the abstract and/or conclusions. We know that in the free atmosphere (above ABL) the atmospheric state does not change much within 3 hours. This can explain why there are quite small differences between ascent and descent measurements.

Reply: The reason for having less radiosonde descent data during some seasons is already mentioned in the original manuscript. Note that non-availability of descent data is not because of the technical limits of radiosonde but because of background environment. Our station is surrounded with 0.3 km to 0.5 km hills and when the descent radiosonde happens to descent back of the hill, the link for data transfer will not be there. Thus, we will miss first few kilometres during that time. However, this may not be situation at other locations and data can be obtained until close to the surface even during descent if no obstacle is there. This point is clearly mentioned again in the conclusion section as suggested.

2. The authors should explain in more detail under what circumstances the descent data are useful. For example, it can be stated that the lower the minimum descent altitude, the more valuable the radiosonde descent data. Otherwise, small difference between ascent and descent measurements implies that the descent data provide very few additional information.

Reply: We have understood reviewers concern. We mean to say that, the difference between ascent and descent data is small and most of the times within expected diurnal variation suggesting that descent data is also useful for scientific purposes. However, descent data should be recorded to the lowest possible level as most of the applications

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are there below boundary layer as reviewer rightly pointed out. The difference between ascent and descent is small only when atmosphere is quiet. For instances during disturbed weather conditions such as deep convection or thunderstorm activity, the sensor will be sensing different air masses while ascent and descent and in such cases the descent data is precious.

Minor comments:

1. In lines 8-11 on Page 10363 it is stated that “Originally named a radio-meteorograph..., a name apparently derived by H. Hergesell from a combination of the words “radio” for the onboard radio transmitter and “sonde”,”. However, according to the Wikipedia (<http://en.wikipedia.org/wiki/Radiosonde>), it is Robert Bureau who coined the name “radiosonde”. Please check it.

Reply: We have obtained the above said information from the very first paper published in Nature in 1901 and we strongly believe our information is correct.

2. Line 15 on Page 10363 . The number of upper-air stations could be more precise. Or , an internet link for more information should be given.

Reply: We have provided the number of upper-air stations more precisely by quoting the internet link as suggested in the revised manuscript.

3. The local times of routine balloon launch should be mentioned somewhere.

Reply: We have mentioned the local time of balloon launch in the data section as suggested.

4. Lines 3-4 on page 10364 “However, Aerosonde has not been much in use probably due to the complexities involved and cost factor”. I think that the more important factor is that Aerosonde measurement ceiling is very limited. Miniature autonomous Aerosonde can’t replace radiosone.

Reply: We agree to this point and corrected in the revised manuscript.

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5. Lines 3-5 on page 10366. “Number of balloons reaching close to the surface (0–1 km) in descent is highest in the pre-monsoon season and least in the monsoon season. Note that more than 50% of balloons reached 5km (in descent) in all the seasons”. The minimum altitude in descent is up to both topographic condition and balloon drift distance. In this case, the topographic condition around Gadanki station is not ideal.

Reply: You are right. When the station is surrounded with hills, this study has limitation and is clearly mentioned in the revised manuscript.

6. In Figure 3, (b) and (c) might be displaced in error.

Reply: We are sorry for this error and is corrected in the revise manuscript.

7. In lines 20-21 on Page 10369 it is stated that “Thus, in principle, it can be concluded that during the ascent and the descent same air masses are probed”. Strictly, it's not true. If it's strictly true, the descent measurements cannot provide any useful information.

Reply: We mean to say this under normal conditions. However, during disturbed conditions the air masses will be different and difference can be found more. Note that more differences between ascent and descent do not mean that they are error but only mean that they are sensing quite different air masses.

8. The values of percent in Table 1 are not well interpreted/explained.

Reply: We have added few more sentences to explain in detail what is observed from this table.

9. In lines 3-7 on page 10372. “... In the case of RH, there is a difference of about 10% between the ascent and descent data with higher RH during descent phase below 10 km and reverse above that altitude.” Why there is a reversion?

Reply: In fact, as also pointed out by other reviewer, and mentioned already is the original manuscript, note that RH observations from normal radiosondes are accurate up

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to -40°C which roughly corresponds to 12 km in our case. Since RH values reported at higher than 12 km are erroneous, we have removed that part in the revised manuscript as also suggested by other reviewer.

10. In Figure 7, it is seen that in most cases the differences are small, but very large sometimes. The cases with very large difference should be in depth examined.

Reply: This is out of scope of the present study and will be taken up in future investigations.

We sincerely appreciate the reviewer for going through the manuscript carefully and offering potential solutions for improving the content further.

—END—

Interactive comment on Atmos. Meas. Tech. Discuss., 6, 10361, 2013.

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