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Atmospheric Measurement Techniques Discussions

Interactive comment on "High frequency boundary layer profiling with reusable radiosondes" *by* D. Legain et al.

Anonymous Referee #1

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General comments

This manuscript describes an interesting and modern implementation of a dual-balloon radiosounding technique which allows recovering the instrument at the end of the flight. A recovery rate of 80% is demonstrated and it is shown that in several cases the instruments could be reused. This method is thus of significant interest to the scientific community for economic reasons. From a scientific point of view, the method offers also interesting perspectives, namely the possibility to sense atmospheric parameters both during ascent and descent of the carriers along a preconfigured trajectory and to overcome obstacles. Convincing examples are shown from two recent field campaigns.

The manuscript is generally well written and fits clearly the scope of the journal. I thus recommend publication after minor correction along the suggestions provided below.

Especially, clarifications are required on a few points in the text and a few figures merit improvement.

Questions and suggestions

It would be interesting to quantify the difference between the expected vertical speeds of the balloons and the observed ones. How close are they to the nominal values of 5 m/s and 3.4 m/s used in the simulations?

How is the measurement accuracy affected by the difference in vertical speed at ascent and descent? I think namely about the influence of ventilation on temperature and humidity measurement.

It seems to me that a 22% error in the simulated position of the landing point is quite large (P3347) and may prevent recovery of the sondes in most practical applications. For example 22% of a 40 km distance represents 8.8 km. The results from BLLAST experiment contradict this interpretation since 80% recovery was achieved. I thus guess that the flights in this experiment were made over short distances. This should be stated (or even better quantified in km) by the authors.

It is shown that the horizontal wind is critical for performing a good simulation of the landing point. Could it be attempted that the measured wind from the sonde is used for updating the simulations in real-time?

Would a 3D wind field from a model forecast provide more accurate results instead of a single vertical profile?

P3340/L16: indicate that the 80% recovery is for BLLAST campaign

P3341/L18: explain what is meant by "passive" and "active" recovery

P3341/L19: as long as the quoted systems are not described or their cost is given, it cannot be understood what is challenging and what is inconvenient.

P3344/L12: from figure 3 it seems that the flight is valid on 21 Oct 2012 at 15:00

P3344/L23: “the landing point is extrapolated from the last wind measurement” add “provided by the sonde.”

P3347/L12: how is the vertical wind speed derived from the in-situ measurements of the sonde and how accurate is this retrieval?

P3347/L15: how much does the 22% error represent in km?

P3348/L19: “About a dozen” give the exact number.

P3349 – 3350 and Figure 8 and 9: the plots related to radar in these figures are hardly readable and I am not sure that they are actually necessary, unless the impact of the precipitation detected with the radar on the trajectory of the balloons or on the measurements of the radiosondes is explained.

P3340/L19-20: could the increase of humidity in the low levels and decrease at mid-levels be interpreted as convergence and divergence, respectively, due to the over-turning circulation associated with convection? The mid-level decrease in humidity can also be due to condensation/precipitation.

Figure 4: explain why the ground receiver is not operated at the launch site.

Figure 5: The text in the captions is not easy to follow. . . I suggest you introduce first the case of 21 October at 15h for which the trajectories are plotted with the yellow markers and for which the wind profile is displayed in Figure 3. Then mention the other markers corresponding to other flights.

If different wind profiles are used on the same day (e.g. 21 Oct 10:50 and 14:50), mention this also in the caption.

Figure 7: I guess it would be more instructive for the reader to have the error given in km, or at least to give the mean distance so that the percent error can be converted in km.

Figure 7a: in the header, replace “estimated” with “expected” or something like that

because estimated suggests that the vertical speed is calculated in some way.

Figure 8: the red vectors and white and red squares mentioned in the captions are undistinguishable in the radar figure. The labels of the color scale are also not readable. It is also hard to see the descent profiles in plots (a) and (b).

Figure 9: similar remarks as for Figure 8.

Figure 10: is it hard to see the light colors.

Interactive comment on Atmos. Meas. Tech. Discuss., 6, 3339, 2013.