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Atmospheric
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Discussions

Interactive comment on "Measurement of motion corrected wind velocity using an aerostat lofted sonic anemometer" *by* W. R. Stevens et al.

Anonymous Referee #3

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The manuscript presents an interesting in situ system to measure wind at the heights relevant for fire plume dispersion modeling. The authors state that recently introduced lightweight sensor systems open the possibility of using aerostat lofted sonic anemometer usage. The advantages of this system compared to hitherto used methods such as for example unmanned aerial vehicles are discussed. The setup of the aerostat system is explained and wind information from this system is compared to a 10 m wind mast nearby. The method to derive the wind information from the system is elaborated.

The reasons of the "relatively short distance" of the sonic anemometer to the aerostat are given, but the consequences on the quality of the measurements are not discussed. The differences between the tether angle and the measured wind direction are stated

to be in good agreement, but it is left to the reader to deduce why this is important and whether the outlier of 20 degrees is problematic or not. More information could be provided about the quality of the wind information of the aerostat system compared to other systems. The data is now compared to wind measurements at 10 meters height, whereas the system measures at higher altitudes. A direct comparison with measurements at the same height would be more informative. According to the text the aerostat height varied between 10 and 400 meter, meaning a direct comparison between 10m wind mast and aerostat system at 10m altitude is in principle possible. The experiments were performed at three different days, but the reason for the choice of these days is not given.

The abstract mentions the application of the method during a prescribed forest burn and the usage of the results as inputs to dispersion modelling. However this is not discussed in the paper itself, except for the statement (p.709,l.25-27) that the wind velocity measurements were coincident with a prescribed forest burn. The authors intend to measure the wind at the height of the plume. Has this been tested in practice: what is the minimal required distance from the aerostat to the fire, how are the most relevant heights determined? Are the wind observations compared to the meteorological data which are mentioned in the introduction (p.704,l.22) or to the nearby meteorological station mentioned section 3 (p.709,l.4)? How nearby are these sites in km? How nearby to the aerostat system are the tower and airfield met data used in figure 6. Results from the application of the observed winds as inputs to a dispersion model as mentioned in the abstract could be used in a comparison with the plume of the prescribed forest fires. It could be informative to add these results.

The data shown in figure 6 show that all measurements are performed with low to moderate wind speeds. How does this system perform in strong winds? And how does it perform in low winds, is there a minimum wind speed required? Information on P.710,ll.26-28 seems to indicate this.

The article is appropriate for AMT, however important information is missing and a more

extensive discussion of the validation and verification of the wind data is needed.

Minor comments:

p.704, l.24: 5 km error at which distance from the source

p.705, l.06: hot wire anemometer and Pitot tubes which are much less precise than sonic anemometers; consider to quantify the difference in precision

p. 706, lines 11-19 are confusing. Please rewrite. For example: “Recent introduction of . . . systems . . . are small enough to be lofted” into “Recently introduced . . . systems . . . “.

p.706, l.17: Add reference

p.707, l.26,27: These two sentences contain the same information.

p.708, l.2: Can you elaborate on the effects of the “relatively short distance” on the quality of the measurements?

p.708,l.24: Is there any specific reason to choose 6, 8 and 12 february?

p.709,l.04: "nearby Val Parais"; Please quantify nearby. Are these data used in figure 6?

p.709,l.06: please rewrite this sentence: “two days of flights lasted . . .”

p.710,l.20-27: This is interesting, but could you add explicitly why it is important that the tether angle and wind velocity data are in good agreement? Is the oulier of roughly 20 degrees at 19:00 a problem?

p.710,l.10: Fig. 4 should be Fig.5

p.711,l.08: "nearby airfield", please quantify.

p.711,l.17-19: Confusing, please clarify.

Typographic remark: in the printed version figure 3 is small and difficult to read.

Figure 6 third panel: is the vertical scale correct? Comparing the green line in fig 3a with the blue line in fig 6 it seems that the wind speeds are higher in fig 3a.

Interactive comment on Atmos. Meas. Tech. Discuss., 6, 703, 2013.