Atmos. Meas. Tech. Discuss., 6, C163–C165, 2013
www.atmos-meas-tech-discuss.net/6/C163/2013/

Atmospheric Measurement Techniques Discussions

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

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Received and published: 5 March 2013

General Comments:

This paper describes wind speed measurements taken from a tethered helium balloon to assist in plume dispersion modelling. Such a system would be valuable in improving dispersion models and studying atmospheric boundary layer phenomena (night-time stability onset, entrainment/venting etc.). However, the system described takes 15 minute averages of the recorded data, which is seemingly corrected for balloon motion. As such all turbulent contributions to any flux is ignored which may contribute a significant component of heat and particle transport throughout the plume. The proximity to the aerostat envelope to the anemometer will produce significant rotation of the airflow streamlines and possibly enhance turbulence. It is unclear why a three axis sonic

anemometer has been used, unless the intention is for the third axis observation to be used to average across all three orthogonal axes and negate any streamline rotation effects. However, this is not made clear and is unnecessarily complicated. Alternative measurements taken from radiosondes with slow ascent rates is likely to produce a better observation of the mean wind speed. The paper concludes that observations from meteorological stations is potentially unsuitable for use in plume dispersion modelling. This is an unsurprising conclusion following analysis of any simple radiosonde data plot.

Specific Comments:

pp706:8 – the aerostat motion is mentioned as being smaller which in many cases is true. However, the motion is significantly more complex than that of a UAV and extremely non linear, especially over the sampling periods mentioned of 10-20Hz with such a small aerostat, having low inertia.

pp706:16 – the system used by Brooks(2008) was too heavy for use on an aerostat. A Systron Donner Motionpak is described in Brooks(2008) which is a small lightweight package not entirely dissimilar to the MTi package used. I therefore do not agree with this statement.

pp707:4 – the DASS system seems unnecessarily complicated with significantly more processing power than is required. This, in turn, is likely to be heavy and require a larger battery which contradicts the point made on pp706. Perhaps its use is for with relevance to a larger instrument, as hinted. This should be made explicit.

pp707:26 – how were the data synchronised? Are the sensors polled or streamed? Is there a poll delay?

pp708:10 – was any tuning of the MTi-G required? How was this achieved?

pp709:20 – Figure 4 does not demonstrate reliability of the orientation of the system. The comparison between the Tether angle is different by up to $\sim 25^{\circ}$ at times.

pp710:5 – Correction algorithms can be applied for non changing fields caused by local ferrous materials. Are the pumps active? The VOC data would enhance the value of the instrument. If not applications of algorithms such as that found in Alonso 2002, Crassidis 2005, Camps 2009 might be of use.

pp709:12 – sentence starting 'Changes in . . .' would read better if placed at the end of the previous paragraph

pp717 – I am unclear what is gained from demonstrating the raw 10Hz data?

pp719 – the colours in the plot legend do not match the plot

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