Reviewers comment #1

General: The author compared Halo doppler lidar using several scanning configurations with several in-situ wind measurement instruments, discussed analysis of boundary layer structure using retrieved Halo backscatter signals and wind measurements in conjunction with WRF simulations and demonstrated restoration of Halo wind data with low SNR regions combined with WRF simulations. While this is a moderately interesting piece of work, it contains nothing particularly new. This paper is significantly lacking in a number of areas in including writing, and scientific content. The paper can be acceptable with major revisions.

1. Author should discuss uncertainties for these instruments (tethered balloon, meteorological mast, and radiosondes).

Response:

These are discussed now throughout chapter 2, along with the description of the instruments.

2. The author should consider the influence of weather conditions on lidar wind retrieval with different elevation angles.

Response:

The campaign took place in calm weather conditions. The effect of boundary layer stability, which changes during the day, on the wind uniformity assumption is manifested and discussed in the current revision in l. 301.

3. I think a 30-minute averaging time is too long and will remove some features of wind speeds and direction.

Response:

We do agree that shorter averaging periods, of the order of 10 minutes, are preferable. However, in this work, a relatively wide range of scan configurations (methods and angles) was examined, which resulted in lower data availability specific to each method. A choice of time averaging shorter than 30 minutes did not yield sufficient data per period to attain meaningful averaging.

4. How many wind profiles are used to get Tab.2?.

Response:

For the meteorological mast

96 average profiles when each average has 9-12 lidar profiles, this resulted in 192 points for comparison.

The tethered balloon data went through a few filtering stages:

low speed winds filtering (<2m/s), filtering of large variation of heights during the averaged period. Furthermore there was lower availability of data due to maintenance issues.This resulted in 74 points (each point is an average of 9-12 lidar profiles) for comparison.

This is embedded in table 3 in the revision.

5. I am concerned about the fig.9 and 10.

5.1 Aerosol density above 2000 m from 5:30 and 6:00 is higher than from 17:30 and 18:00. However, lidar background noise is low at night. Combing them, author should show SNR of Halo to prove it.

Response:

The SNR profiles corresponding to the two refered time ranges are plotted in the revision (fig.8). Indeed, lower SNR values are evident for the time range 17:30-18:00, which corresponds to the discrepancy between lidar and radiosonde observations.

5.2 Aerosol density between 1500m and 2000 m from 5:30 and 6:00 is lower than from 17:30 and 18:00. However, the wind difference of lidar and radiosonde between 1500m and 2000 m from 5:30 and 6:00 is still better than from 17:30 and 18:00. Can author explain it and what cause it?

Response:

The major decline of snr and attenuated backscatter values for the evening radiosonde launch starts at above 1800 m (fig.6 and fig.8 in the revised ms) . This corresponds to the sharp deviation in wind speed and direction between Lidar and radiosonde observations (fig.11 b,c in the revised ms).