Firstly we would like to thank the reviewers for reviewing this paper, and for their perceptive comments. Below we respond to each of the comments that were not addressed at the technical review stage:

**Response to Review 1 Comments**

1) *Line 57 The authors discuss the assumption of the homogeneity of the wind field with some references. However, the reviewer believes that the discussion at least should mention some of the existing approaches to deal with such distorted wind fields. Browning and Wexler 1968, Waldteufel and Corbin, 1978 presented first approaches leading to the velocity azimuth display and the volume velocity processing. It may be suitable to include this pioneer works.*

Unfortunately the Aberystwyth MST radar has a limited number of beam azimuth angles available, so VAV and VAD techniques cannot be used with our data set. Nevertheless, we agree that this is potentially a useful technique for instruments that can exploit these approaches, and will reflect this in the introduction of a revised manuscript.

2) *Line 78 The authors mention that anisotropic scatter can alter the beam pointing angle to move closer to the zenith, which is often referred as aspect sensitivity. As mentioned by the authors is this theory not supported by spatial interferometric measurements (e.g. Kawano and Fukao, 2001, and many others). Is it possible to investigate this with the here used MST radar? Does the MST radar have interferometric capabilities?*

Unfortunately the Aberystwyth MST radar does not have interferometry capabilities, so we have been unable to pursue this further.

3) *Line 76-104 The discussion of the aspect sensitivity is based on the work of Hocking et al., 1986 and is essential for the conclusions of the authors concerning the wind measurements. The discussion should maybe extended regarding the effect, that some MST radars with beam steering capabilities show a power drop for the oblique beams due to the beam steering itself compared to the zenith beam. Do the authors correct for this effect considering the antenna radiation diagram for the off-zenith beams using NEC simulations or other approaches?*

We don't perform any corrections of this sort, however results from previous studies with the MST radar (Hooper and Thomas, 1998, in particular) suggests that if there is such an effect it will be quite small. Secondly, our effective pointing angle corrections only use echo powers from oblique beams (specifically the 4.2° and 6.0° zenith angle beams), thereby avoiding any step change in echo powers between vertical and oblique pointing angles.

**Response to Review 2 Comments**

We were fortunate to have the opportunity to address the majority of these comments as part of the technical review, and the discussion document greatly benefited from the resulting changes. There were only four points for which adjustments were not made to the discussion manuscript, and these are discussed below:

> *(2) The introduction appears to be a bit long, with some potential for shortening*

After reviewing the introduction we decided to retain the material present at the technical review, because we were concerned that any omissions could cause confusion when discussing the results.

> *(3) Line 20-22: Most boundary layer radar wind profilers in Europe and Asia operate at L-band (1.29 or 1.357 GHz), while UHF (915 MHz) is frequently use in North America. This definition of the radar bands follows the "IEEE Standard Letter Designation for Radar-Frequency Bands" according to IEEE Std 521-1984. By the same token, free troposphere and lower stratosphere are also covered by UHF systems (e.g. 404, 449, 482 MHz radars) and not only VHF.*

The text was adapted for publication of the discussion paper to say that UHF also covers the free troposphere and lower stratosphere. Whilst the IEEE document does catagorise 1-2GHz as L-band, the convention in the field of radar meteorology is still to refer to these frequencies as UHF, so we have retained the UHF terminology to avoid confusion.

> *(4) Line 22-23: The minimum achievable temporal resolution of wind measurements with these radars depends on the state of the atmosphere. For example: It will be difficult to perform wind measurements with 10 min resolution in a convective boundary layer since the usual retrieval assumptions (e.g. homogeneity) are not fulfilled and averaging is required to "restore" these assumptions in a statistical sense for the mean wind field. The authors are invited to comment on the limitations of this assertion.*

We agree that a 10 minute averaging time in the convective boundary layer may generate winds with large errors, and we discuss the importance of temporal averaging later in the introduction section. Our intention here is to highlight the temporal resolution imposed by the cycle time of the radar. Even though the errors in these winds may be large, directly measured vertical velocities (from the vertical beam) for example, can provide useful information at these single-cycle time scales. Given that the temporal averaging is discussed elsewhere in the introduction, and that this paper focuses on the free troposphere, we haven't made any changes at lines 22-23.

> *(12) As the typical measure for wind uncertainty in an NWP context is the RMS vector difference or the RMS of the vector components, it would be highly welcome if the authors could provide either measure as a function of height.*

We agree that such a measure would be more useful. We have calculated the RMS errors in horizontal wind components, combining the effects of beam separation (shown in Figure 7 of the discussion paper), and errors associated with aspect sensitivity corrections (Figure 10b). The combined RMS error is shown in Figure 1 (below). A revised manuscript would quote these values, rather than the horizontal projections used in the discussion paper.

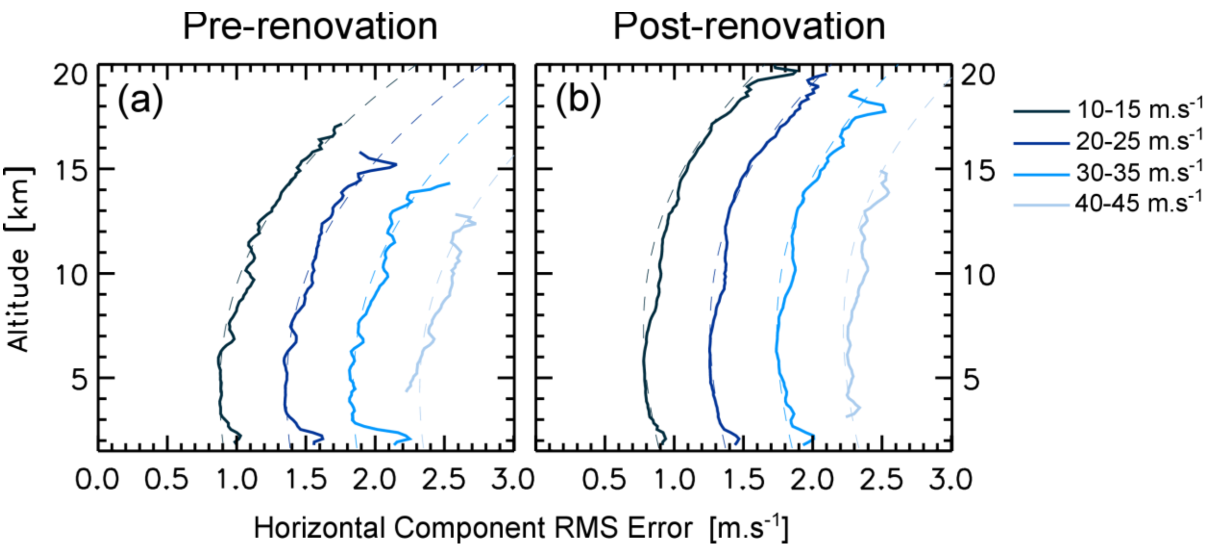


**Figure 1** - RMS error in horizontal wind components at different horizontal wind speeds. Curves show the combined error from beam separation (Figure 7 in discussion paper), and aspect sensitivity corrections (Figure 10b in discussion paper) before and after the renovation (panels a and b respectively). Different shaded curves correspond to the different horizontal wind speeds described in the legend. Pre-renovation and post-renovation curves use all wind directions in 2009 and 2012 respectively. The dashed lines are an approximation to the solid lines.

**References:**

D. A. Hooper and L. Thomas. Complementary criteria for identifying regions of intense atmospheric turbulence using lower VHF radar. *J. Atmos. Sol.-Terr. Phys.*, 60(1):49-61, 1998