

Interactive comment on “Validation of wind measurements of two MST radars in northern Sweden and in Antarctica” by Evgenia Belova et al.

Anonymous Referee #1

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General comments

The article compares the wind measurements of two VHF radar systems with wind measurements from radiosondes and corresponding results from model runs to make statements about the quality of the radar wind measurements. This approach is quite legitimate in case of comparison with the results of another measuring device (e.g. radiosondes). The shown comparison of the wind measurements of ESRAD and radiosondes confirms the underestimation of the wind obtained from FCA analyses but with significant differences between the zonal and meridional components. Since these differences are also well reflected in the comparison of the model results, I wonder if it

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could be caused by an instrumental effect. A direct, numerical comparison with results from the literature would help to better classify the results found.

The validation of the radar wind measurements of the mobile radar system in Antarctica was only performed in comparison with corresponding model results. In my opinion, no conclusions about the quality of the radar measurement results can be drawn from such a comparison. However, the fact that the results of the measurements and model calculations agree on average, allows to conclude a reliability of the measurement procedure within the scope of the discussed deviations. Nevertheless, the fact that clear differences between the horizontal components were also found in this comparison raises the question of possible causes, which should be dealt with in more detail in the chapter "Discussion".

Specific comments

P2 L52: The description of the antenna array, especially the division of the 288 antennas into 12 subgroups which are connected to separate receivers should be accompanied by a sketch or corresponding reference. The reference given later on page 3 (Kirkwood et al., 2010) describes the ESRAD antenna as 6 groups of 4x6 antennas = 144 antennas, which points to the original system description but is different from the number given above. The knowledge about the arrangement of the groups in the antenna field and their assignment to the receivers (spaced antennas) used for FCA analysis is important for the quality assessment of the method.

Table2: I recommend to add information about the pulse length and pulse shape used in the experiments to the table. This helps to better understand the argumentation used in the discussion (P12, L257).

Table2: Which points are meant by "number of points = 39"?

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P3, L75: As already mentioned, the antenna geometry of the antenna groups, i.e. size and distance to each other, should be listed here.

P5, L119: The "poor performance at lower height" should be explained in more detail.

Table3: See my recommendations for Table 2.

P8, L172: I recommend to indicate the distances between the centres of the three adjacent antenna arrays.

P9, L207: I think that the comparison of a model result with corresponding measurements can lead to the statement that the model can reproduce the measurements well. On the other hand, I do not believe that such a comparison can lead to the conclusion that the measurements are accurate.

P12, L246: The statement made here that the comparison of the ESRAD-FCA wind measurements with those of the radiosondes is consistent with results from the literature should be supported by corresponding concrete examples (figures or numbers and references). The reference to Reid et al. (2005) at the beginning of the discussion lists differences in wind speed in the comparison between radar and radiosonde measurements. Since this is based on more than 3000 measurements, perhaps a comparison of wind speeds (magnitude) should be added to this study.

P12, L257: The specification of pulse length and form in tables 2 and 3 can be used here for a more detailed explanation.

P12, L260: The information about a separate antenna field used for data acquisition is missing in the system description 3.1 and should be added there, possibly accompanied by a sketch.

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Summary: I recommend that the differences between the deviations of the zonal and meridional components and possible causes, which in my opinion are significant, should also be addressed here.

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