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Atmospheric Measurement Techniques Discussions

Interactive comment on "Temperature profiles with bi-static Doppler-RASS and their accuracy" *by* B. Hennemuth et al.

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General comments:

This paper describes a method to improve the bias correction of Doppler-RASS temperature profiles in the lowest range gates of a Doppler-RASS system. Starting from the analytical corrections developed by Kon the authors derive an improved empirical correction taking into account the finite aperture of the radar antennas. The improved method is applied to Doppler-RASS temperature data taken at a few different locations and compared to (surface) observations. The results before and after the correction are analysed and presented for location Munich Airport where surface measurement at 2 and 10 m are available. The set-up and methods applied are sound.

However especially under unstable conditions there remains a small mismatch between the corrected potential virtual temperature profiles and the surface measurements. The authors do not assess the errors in the observations, nor do they show corrected profiles for different values of the effective diameter Ae in comparison to the surface observations. Therefore it is not clear if the corrected profiles shown are the best fit to the surface observations or have been optimised in some other way.

I would suggest that the authors describe in more detail how they arrived at the applied value of Ae = 0.8 and how this affects the observed differences with the surface measurements.

In see fig. 7 the profiles in unstable conditions seem to have a small offset over the full range compared to the measurement at 10 m. Whereas in fig 9 it seems more like the lowest gate is more deviating than the other gates. It is not clear from the paper if these differences fall within the expected errors (not discussed) or that further investigation to optimise the bias correction is necessary.

A direct comparison of measured (virtual) temperatures at the same height as the lowest gates of Doppler-RASS in e.g. a meteorological tower of sufficient height could help to investigate the observed differences in more detail. This would give the method a more firm base than the assessment based on comparison with mainly surface measurements.

Specific comments:

1) Eq. 1: Units should not be included in the equation in this way. It would be better to explain the units in the text below, or otherwise the units and variables should be clearly distinguished in the equation itself

2) par. 4.2: in the comparison with a simple empirical correction the reference height for the simple correction is chosen at 100 m while the empirical correction nearly vanishes at 150 m. Why is the reference height not chosen at 150 m?

Technical correction:

Abstract, line 6: ‘efficient’, the term ‘effective’ seems more appropriate

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