

Interactive comment on “Clutter Mitigation, Multiple Peaks, and High-Order Spectral Moments in 35-GHz Vertically Pointing Radar Velocity Spectra” by Christopher R. Williams et al.

Anonymous Referee #1

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Review – Clutter Mitigation, Multiple Peaks, and High-Order Spectral Moments in 35-GHz Vertically Pointing Radar Velocity Spectra

This study presents techniques to process 35 GHz cloud radar vertical spectra, such that high order moments may be estimated, and thus microphysical and dynamical information retrieved. The paper first demonstrates the effectiveness of a linear interpolation method to remove clutter with zero Doppler shift, using a nearest neighbour power drop characteristic signature for point and distributed targets. The authors then discuss the identification of multiple spectral peaks, and finally a “shift-then-average” technique to improve the quality of high order moment estimation.

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I suggest the manuscript is published after consideration of the following points.

General comments

Page 3 paragraph 2 – this paragraph discusses potential clutter sources for wind profilers which are not an issue at Ka band. It should be noted here that wind profilers operate at a range of frequencies, and thus at a range of sensitivities to clutter. Birds and bats are not a problem at lower VHF frequencies for example.

Page 3 line 15 – insects are mentioned here as presenting with narrow spectral peaks, but not mentioned again in the paper. Can the techniques described be applied to insect interference?

Page 6 paragraph 4 (near line 20) – how did you decide only 3 points should be interpolated across? Is this a function of the number of spectral points?

Page 8 line 20 – I think it should read power drops LESS than 3 dBm for clutter-free spectra. I am also curious as to why you discuss 3 dBm as the demarcation, and then choose 2 dBm for the threshold? The discussion indicates this it to be conservative, but perhaps this point could be made more clearly?

In general, the use of thresholds should be justified.

Technical corrections

Page 3 line 3 – “vertically point” should read “pointing”

Page 3 line 14 – first reference to KAZR, and thus should be defined as it is on page 4 lines 9 & 10

Page 4 line 13 – sentence does not make sense, perhaps remove “the clutter from the stationary ground clutter targets”

Page 4 line 23 – remove “from nearby structures”

Page 6 lines 13 & 25 – “abscissas” should be abscissa

Page 6 line 19 – remove either “in linear units” or “linear interpolation”

Page 6 line 24 – should read “illustrate the relatively”

Page 8 line 5 – “away from either 3-point interpolation” should read “away from THE 3-point interpolation”

Page 13 line 14 – “calculated high-order moments” should be calculates

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