Response to referee comment #1

- Around line 55, I noticed the explanation of the increase in the signal/clutter ratio. It sounds like the clutter varies by lambda^4, but it's the particle reflectivity. Consider re-phrasing to clarify.

Rephrased as follows: the smaller wavelength (W vs Ka and Ku), which favors larger signal-to-clutter ratios due to the different wavelength dependence of surface versus hydrometeor reflectivity

- Line 79, the description of theta_b being the along range beamwidth isn't clear to me. When I looked up Kanemaru's description, it is "the −6-dB width of the two-way antenna pattern in the cross-track direction." This seems clearer.

It was indeed an error, corrected as suggested.

- In section 2.1, I think it's clear now that the Gaussian is used for all radars. I had originally understood from what's now line 112, that the full pattern was used for WIVERN. Apparently, it's only the beamwidth and gain for the Gaussian model. To avoid confusion, the use of the patterns mentioned in line 112 could be explicitly stated.

Phrase added to clarify that we, in the paper, are using for the simulation the full antenna pattern.

- In trying to decipher my original comment about Figure 2 and clutter at the 14 m/s wind, it appears that I misread something. Your comment is that "To be so the sigma0 need to drop roughly 60 dB…" Figure 2 shows the case of a 40 dBZ at nadir versus the -20ish thermal noise. Hence, to get to the thermal noise level, the clutter needs to be suppressed by the 60 dB you mention in your reponse, correct?

Yes, a phrase to clarify the point has been added: Even in these extreme conditions the surface signal would still be above the thermal noise because the σ 0 in nadir conditions will be approximately 20 dB so that the WIVERN surface profile will look like the blue curve in Fig. 3 reduced by approximately 50 dB = 60−(20−10) dB.

- The figure captions need revision to match the layout, e.g. Figure 6 caption say top/bottom versus figures that are left/right. Same with Fig. 7, except the caption is right/left but panels are top and bottom.

Captions have been adjusted accordingly.

- The choice of colors for CloudSat and EarthCARE make them difficult to distinguish in some plots, e.g., Figure 13.

Colors have been adjusted accordingly.

- In re-reading the text in Section 3.3 and examining Fig. 15, I wanted to verify that delta-Z is only hydrometeors; in other place Z_e for the hydrometeors uses a superscript "hydro".

Yes DeltaZ is referring to difference in effective reflectivities of hydrometeors, the symbols have been adjusted accordingly.