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# *Interactive comment on* "A wing pod-based millimeter wavelength airborne cloud radar" *by* J. Vivekanandan et al.

**Anonymous Referee #1**

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I always appreciate papers describing new radar systems and am glad to see a paper on this new airborne radar. Besides providing information of use for radar designers of other new systems, they are important to document radars that will be used for future science measurements. Hence, his paper will presumably provide the documentation for interpreting future science measurements from HCR (and resulting publications). Overall, the paper is a clear description of HCR. I have some minor questions and/or comments below (some very minor).

p. 119, line20 – does "Polarization" require capitalization?

p. 121, line 14 – "HIAPER wing store instrumentation philosophy" – I don't quite understand this phrase, specifically "wing store".

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p. 122, line1 – the authors could note here that the antenna choice is explained in section 3.2.

p. 122, line 21 – will the 5% duty cycle allow the phase B pulse compression or will that require a larger duty cycle?

p. 122, line 24 – is the receiver bandwidth also modified as the pulse width is changed? Presumably, yes (as implied p. 127, line 19).

p. 124, line 21 – were there any requirements on the antenna peak sidelobes?

p. 124, line 25 – it would be good to also give the surface reflector accuracy in SI units. Is the quoted RMS surface accuracy sufficient to not raise far sidelobes?

p. 126, line 22 and also Figure 5 – how is the velocity accuracy computed, via published formula (e.g., Bringi and Chandrasekar) or other?

p. 127, line 9 - does this take into account that the samples are not independent? Equivalently, how many independent samples does this correspond to?

p. 128, line 1 – this is number of independent samples based on 0.1 s averaging?

p. 128, section 5.1 – what are your requirements (or goals) for calibration accuracy? Any estimates of the calibration accuracy you'll get with H pol (no noise diode) versus V pol (noise diode)?

p. 129, section 5.1.2 – a problem with varying the DSD parameters over their naturally occurring ranges is that I think it implicitly assumes that the parameters are independent. However, if there is correlation between various DSD parameters, it is ignored in the simulations. Looking at it another way, the simulation DSD parameters, if varied independently, may visit regions of R-D-N space that are not seen in nature. A second problem here is that the rain rate is stated to be between 5 and 10 mm/h but the model uses between 5 and 20 mm/h. A third problem is that point measurements of rain rate (I didn't notice mention of how the 5-10 mm/h was ascertained) can't easily easily be

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compared with radar. What is the difference in volumes of the two measurements? Lastly, to better pin down the expected reflectivity, wouldn't other DSD measurements be needed? The comparison here is interesting but, without an error analysis, concluding that the radar is low by 1.5 dB seems dubious.

p. 134, lines 22 and 23 – do "Northwesterly" and "Southwest" need capitalization?

p. 140, Hubbert and Bringi – "copular" -> "copolar"

p. 143, Table 1 – sensitivity should state the pulse width used

Figure 3 – I would recommend labeling the blocks with a larger font; even when blown up with a pdf reader, they are difficult for me to read.

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