

This paper describes the implementation and evaluation results of Polarization Diversity Pulse Pair (PDPP) technique on a W-band (94 GHz) airborne radar. In Earth Science research, atmospheric wind and cloud/precipitation Doppler velocity measurements using spaceborne Doppler radar are still challenging due to the Doppler spectrum broaden caused by platform ground speed and turbulence in the weather target system. PDPP has been proposed for future spaceborne radar to mitigate the challenge in Doppler measurements. Although PDPP has been used for ground-based radar, its performance on a fast-moving platform, such as aircraft and spacecraft is still needed to be studied. This paper discusses the benefits and limitations of PDPP approach for spaceborne application based on airborne measurements. In my view, it represents a substantial contribution to research progress that is in line with the scope of this journal. This paper is well written and organized. The technical approach is valid and results are in good quality. Therefore, I would recommend for publication after revision.

1. EarthCARE CPR is designed for cloud vertical velocity measurements while WIVERN is target for horizontal wind retrieval. Have the author done or planned to do any horizontal wind retrieval based on airborne data?
2. Figure 17, why the surface velocity estimated by staggered PRT technique (green curve) folded at some antenna position, but not the others.?
3. What is the cross-pol isolation of NAWX channels? The SNR in the data case shown in Figure 9 seems high so the surface contamination from cross-pol seems not very significant. Is there any data case with weaker cloud/precipitation layer(s)?
4. Page 2, Line 79, "94Ghz" to "94GHz".
5. Page2, Line 105, "... a low pair repetition frequency (PRF)..." to "... a low pulse repetition frequency (PRF) ...".
6. Page2, Line 129, please spell the full name of "WIVERN".
7. Page 3, NAW, NAWX (and later NAX) are used through out of this paper. Please clarify that NAW is W-band alone, NAX is X-band alone in case of confusion.
8. Page 3, Line 189, "(Zrnic and Mahapatra, 1985) have ..." to "Zrnic and Mahapatra (1985) have ...".
9. Page 3, Line 204, "... ; (assuming a ...) to "... ; assuming a ...".
10. Page 3, Line 207, "... greater than 0.9 ...", what greater than 0.9? ρ ?
11. Page 5, Table 2, "[-40°-40°]" to "[-40° to 40°]" .
12. Page 5, Table 3, the T_2/T_3 ratio is 3:4, 5:6. But on Page 3, Line 190-194, it states that $T_2/T_3 = 2:3$ is optimal and the PDPP waveform was also designed for 2:3. Need to be consistent.
13. Figure 4, Has the water vapor and gas attenuation been corrected?
14. Figure 5, "The NRC Convair ..." to "(a) The NRC Convair ...". "... show aircraft heading, roll angle, beam incidence angle and aircraft altitude." to "... show aircraft (b) pitch, (c) roll angle, (d) beam incidence angle and aircraft altitude."
15. Page 8, Line 316, "Wivern" to "WIVERN".
16. Page 8, Line 340-344, PVV and PHH could be different for large rain drops and for surface return at high incidence angle.
17. Page 10, Line 438, what is "PP10 mode"?

18. Page 10, Line 450, 454 (and later in the paper), at X-band dBZ is used instead of Z_e .
19. Page 11, Figure 9 caption, "... an V-pulse..." to "... a V-pulse..."
20. Page 12, Line 505, "... (see (Torres et al., 2004) for details)." to "... (see Torres et al., 2004 for details)."
21. Page 12, Line 511, "Wivern" to "WIVERN".
22. Page 12, Line 512, and Page 14, Line 619, " V_d " to " v_D " so it will be consistent with the equations.
23. Page 12, Line 565, delete the sentence "Again it is ..." (duplication of Line 561).
24. Page 12, Line 600, "Fig. 13 shows PDPP..." to "Fig. 15 shows PDPP..."
25. Page 15, Figure 15, the color table is highly compressed from range -20 dBZe to 68 dBZe. Could use -20 dBZe to 40 dBZe?. Also please change "dBZ" to "dBZe" for W-band reflectivity.
26. Page 15, Figure 16 caption, "(b) estimated velocity of the precipitation along the direction of the antenna beam" to "(b) estimated velocity of the precipitation along the direction of the antenna beam based on PDPP measurements and after removal of aircraft motion".