This article provides a nice and thorough description of the expected performance and added-value of a scanning spaceborne Doppler radar with polarization diversity. The article describes the ability of such an instrument to retrieve atmospheric winds from Doppler measurements at W band. The originality of this study is that it considers the scanning operation of a Doppler radar from space, whereas many such studies have focused on the nadir-looking case (with EarthCARE in mind). For scanning radars, error sources such as NUBF become particularly important.
The article is well written and the Authors do a good job of reviewing the existing literature and establishing a niche to be addressed. Another strength of this article lies in the use of spaceborne (CloudSat granules), reanalysis (wind fields) and field-campaign (LDR climatology) data for the simulations. The sensitivity analysis places the results of this study in a wider and more realistic context.
Three error sources are investigated in detail, viz. NUBF, wind shear and cross-talk between orthogonal polarization channels. Analytical formulae (Eqs 3,4)are provided to correct for the first two types of Doppler errors. Results of the simulations indicate a high skill of the NUBF correction and of the shear correction (albeit only for larger SNR).

For all the aforementioned reasons, this article is particularly relevant as the scientific community designs future spaceborne clouds and precipitation radars. I therefore recommend it for publication once the following points will have been addressed.

Detailed comments and suggestions (*technical questions in italic*)

- My biggest editorial comment is that the readability of the article could be significantly improved by revising its punctuation (*please, include commas where necessary*). This would really help in conveying the message across without the reader having the read sentences multiple times.

- *A point made by the Authors is the limited amount of spatial variability of the input data (due to the smearing and coarse horizontal sampling of satellite and reanalysis data), and thereby a possible under-estimation of NUBF and wind shear errors. Since, NUBF and wind shear biases are mostly sub-footprint effects, I was wondering if there was any merit in spatially interpolating (if possible with an order higher than linear) the input data (satellite, ECMWF) to a finer resolution, before computing the Doppler velocity errors?*

- **Abstract**
  - Page 1, Line 24 (P1L24): “enable a full capture…”?

- **Introduction**
  - P2L5: “water vapo~~u~~r” …
  - P2L12: “In this approach, active…”
  - P4L26: “…100 orbits…” please remove the tilde superscript.

- **Section 2**
  - P4L30: “… Doppler radars, two …”

- **Section 3**
  - P5L22: “Therefore, we…”
  - Titles of Figs 4,5,6: Please use a single notation for WIVERN (or Wivern) throughout the article;
  - P6L3: “…Cape Verde Islands…”
  - P9L1: “~~In order~~ To simulate…”
  - P9L9: “~~In order~~ To produce…radars, two aspects…”
  - *P9L10-13: For attenuation, do the Authors 1) correct for attenuation in the CloudSat viewing configuration (using the 2C-RAIN products?), 2) generate unattenuated Z in the WIVERN look direction (and resolution), and 3) add attenuation in the WIVERN viewing direction?*
    - *If not, how much of a limiting factor is it for the realism of your simulations, especially for large off-nadir look angles?*
    - *If so, then regions with invalid radar data aloft (due to attenuation or multiple scattering) would invalidate radar data in their “shadow” to the surface (along the viewing direction). This limits the amount of radar data available for the statistical analysis. Could you assess/comment on the penalty incurred by this effect?*
  - Fig6 legend: “… 40m/s).”
  - P10L9: “Here, we… sources of errors, which …”
  - P10L14: “In fact, the…”
  - P10L14-15: Please clarify where the shear comes from: To the best of my understanding, it is the component of the spacecraft velocity along the line-of-sight that causes the shear in all none-nadir look directions.
  - P11L1: Which “black arrow” are you referring to? There are quite a few in Fig.3…
  - P11L4: “…size, this … gradient, this…”
  - P11L5: Please specify in which figure, we can find the volumes 11 and 6.
  - P12L3: “…radars, notional…”
  - P12L5: “…Similarly, …”
  - *P12L7-9: Wouldn’t the dominant contribution come from the vertical only if the look angle exceed 45 degrees? It seems to me that more than a “dominant factor”, the key here is that, for non-nadir look angles, the gradient in the direction orthogonal to the Boresight (“eta”) becomes correlated to the vertical gradient. Please clarify.*
  - P13L1: shouldn’t it be “~~antenna~~ reflectivity-weighted”?
  - P13L19: “…dB, the..”

- **Section 4**
  - *P15L22-33: For a pulse-pair radar, the noisiness would be injected when building the (I,Q) voltage samples, and this noisiness would affect both reflectivity and velocity (Approach described in Zrnic 1975 or Sirmans and Baumgartner 1975). Is your addition of noise to the WIVERN Doppler data consistent with the (I,Q)-based approach?*

- *P16, Fig 11: Errors reported in terms of standard deviation, wouldn't it be better to express them in terms of RMSE, which would account for effects of biases; That would maybe also help the reader understand Fig.11 …*
- *Do the Authors have recommendations for a better correction of wind-shear-induced errors over a wider range of SNR values?*
- P16L5: "…0.4 km…" please remove the tilde superscript.
- P17L4: "1m/s… errors documented here"
- P17L20: "Clearly,…"
- P17L24: "Overall,…"
- P17L25: "near to .. 4 km": Do you mean "around 2 and around 4 km", or, "between 2 and 4 km of altitude"? Please clarify.
- Fig12: Please use the same horizontal-axis limits to ease comparisons between the subfigures.
- P18L2: "Again, this… e.g. ~~the~~ T_{hv}…"

- **Section 5**
  - P19L12: "… assimilation, properly…"
  - P19L14: "… integration, both…"
  - P19L24: "… meantime, cloud…"

- **References**
  - P22L1: "… WIVERN: A new…"
  - P23L7: "… Pawswson, C. Reynoldsldslds": Please revise