General comments:

Very interesting and well written paper on how the precision of VAD scans can best be quantified using in-situ data.

Following (maybe) my comments from the pre-review, the authors now make a clearer distinction between precision and uncertainty, where the latter contains contributions from both random ("precision", zero mean) and non-random ("bias", non-zero mean) sources. This paper, as the authors now recognise, is very much about precision and only mentions bias in passing. In their example, where the VAD scan is short (not the main duty of the lidar), this might well be fair enough since the random errors will be large and may (or may not) dominate. For a dedicated VAD scanner where the reconstructions are based on 10 minute mean radial wind speeds, the random error will be extremely small. In any case for an application such as a resource assessment in wind energy, it is bias (from the radial speed itself, from the elevation angle, from the range) that matters since the final result will inevitably be aggregated from many hundreds or thousands of samples. Put simply, random errors average to zero, biases don't! I would welcome some reflections on these issues in the paper (e.g. in the introduction or in a discussion) on where the precision quantification techniques are relevant (these are probably there already) and where they are less relevant.

I am still a little disturbed by the term 'radial wind speed uncertainty' meaning a spread of deviations from the speed expected by the VAD model but have trouble finding something better: 'radial wind speed non-conformity' perhaps? In any case I would be grateful if the authors could be even clearer when they introduce the term in explaining exactly what is meant.

The paper is a little long and sometimes I got a bit lost, especially in section 3. Maybe some more sub-section headings would be useful. Also consider shortening the paper. Could the work on using the precision assessment for looking at different scanning strategies (2d, 3d, 4beam, 8beam etc.) be moved to a separate paper (it gets a bit lost here anyway)?

Specific comments:

P2, line 23: Maybe make it clearer that by 'perfectly homogeneous flow' you also mean a flow without any turbulence. Could for example just add "of turbulence and" making ".. in the absence of turbulence and measurement error.."

P4, line 27: I think you mean "resolution" not "precision" (enough of those already…) as in "angular resolution of the scanner"

End of section 2.1: You briefly mention pointing uncertainty but you don't estimate it (i.e. elevation angle uncertainty, azimuth uncertainty) and you don't even mention range uncertainty. If you are not sensing at the right height (you aren't exactly) you are not sensing the right speed. Another significant uncertainty comes from the size and shape of the probe (you touch on this later). It would be a really useful addition to the paper to make an estimate of how much (non-random) uncertainty all these things (and the los speed uncertainty and anything else) combine to (e.g. using GUM). It is not zero – it never can be. It is probably quite significant.

P7, line 1: please explain why sigma_n should be 1.

P7, equation 7: please define psi

P8. After line 2: Here it could be good to have a sub-section heading “Obtaining the radial velocity measurement precision”. Just an example.

P10, line 3: Why scalar averaging? Will it make much difference over such a short time anyway?

P10-11 – the section on interpolating the sonics using the lidar weighting function: This section strikes me as really over-complicated and unnecessary since as you conclude, the lidar senses pretty much at the sonic heights anyway (would have been a silly experimental design if it didn’t). What would be more interesting here are some reflections on what you are comparing with what. What role does the uncertainty (precision + bias) of the sonic play (and how big are these)?

P12, line 13: “Thus it is appropriate to equate precision with uncertainty in this case.” – Completely disagree with this statement. You have one observation (assuming the non-random effects to be persistent throughout the campaign) and are comparing against something that is itself uncertain. One zero error does not mean that the uncertainty is zero. This comes again in the conclusion (p15, line 4).