

Interactive comment on “Estimates of Mode-S EHS aircraft derived wind observation errors using triple collocation” by S. de Haan

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Dear reviewer,

I would like to thank you for the very helpful, good and valuable comments and the time you have taken for evaluating my manuscript. I think I have answered all questions raised. Below you will find my response to your remarks and questions. I included your review items in *italic* for clarity.

With kind regards,
Siebren de Haan

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The response to the review:

- *p 34 ll 22/23: too small/ too large error -> under/overestimation of the error*
text changed accordingly
- *p 34 l 23: loose -> weak*
text changed accordingly
- *p 35 l 11: relatively -> relative*
text changed accordingly
- *p 35 l 12: which -> that*
text changed accordingly
- *p 36 l 4: finally -> last*
text changed accordingly
- *p 37 ll 26/27: Velocity variances alone do not cause echoes, hence poor vertical range around sunrise and sunset. I suggest to state: ... echoes generated by small-scale density fluctuations that are associated only with thermally driven turbulence, which is not always present.*
text changed accordingly
- *p 38 l 7: seems similar but is a different thing: 3-dimensional wind profile -> profile of the 3-dimensional wind vector*
sentence has been rephrased: "the full 3-dimensional wind at specific heights can be determined."

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- *p 39 | 6: "are collocation in time" is not really clear I think it is meant "are regarded as belonging together"*

sentence has been rephrased:

"Observations are regarded at the same when the time difference is less than 5 minutes."

- *p 39 | 17: What is mean by "has a three-hour cycle"? Surely not the time step. Do you mean "the model stores the state (variables) of the atmosphere every three hours (of model time)"?*

paragraph as been rephrased to:

"Note that the model has a three hour cycle (a new run is started every three hours), which reduces the collocation time window to 10 minutes every three hours because we use the three hour forecast only in this study."

- *pp 39 ff, para 3.1: In aviation, the terms altitude (distance to sea level), height (dis- tance to surface) and elevation (distance of surface above sea level) are rather well established. Could you check the whole text to use these accordingly throughout and to avoid ambiguous naming of similar quantities (i.e. elevation ANGLE)*

I changed the terms to altitude and added ANGLE wherever deemed appropriate

- *pp 39/40, para 3.1.1/2: A sketch would be really beneficial, here!*

Good suggestion: I added a sketch to explain the vertical collocation method

- *p 39 | 23: You need surface pressure, too. Or am I wrong?*

you are absolutely right; surface pressure is added.

- *p 40 | 2: Could you be more specific about the neighboring elevations? Is it "closest elevation (cone) plus one above and one blow" (i.e. three) or is it "the nearest elevation above and the nearest elevation below" (i.e. two) ?*

I rephrased this to: "data points of two closest elevations "

- *p 41 1st para: Does "resolution" denote the smallest increment in data position or in data value?*

it is about accuracy

- *p 43 ll 12-21: Am I right that a general offset in the wind direction or of the radar azimuth would create such a pattern? If so, how are these accounted for? Apparently this was an issue addressed in your earlier paper about deriving Mode-S wind.*

The corrected Mode-S EHS derived wind information is used in this study

- *p 44 ll 5-14: The differences are on the order I expect from comparing two SODARS separated by your collocation cell half-width. Did you determine if (and how) your vary with changed dimensions of your collocation cell?*

good suggestion however we set the collocation cell to 2.5 km to match the resolution of Harmonie

- *p 44 l 21: "clearly below one": Well they are but giving the actual order (a number) would read even more convincing.*

a number is added

- *p 44 l 26: Your conclusion about SODAR three-beam mode does not convince me. Again, did you consider a simple azimuth offset.*

I added this suggestion to the text

- *pp 45-47: Paragraph 4.2 is significantly harder to read than the rest of the text. The (almost) lack of structuring paragraphs makes it difficult to follow (at least reading just once) and to filter out the things to remember. In particular, I am not sure, if I got right what the first half of page 46 wants to state. Given the*

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importance of this discussion, this paragraph should be carefully revised for more clarity.

I re-arranged this paragraph

- *Table 1: Could be removed. The information is mostly given in the text, too.*

I decided to keep the table.

- *Figure 2: Numbers are too small and a lot of space is wasted. I suggest to rearrange for more clarity.*

figure is updated

- *Figure 7: Is almost unreadable (if printed black/white): Using different line styles (full, dashed, points) for lower, middle, upper pair of heights could help a lot.*

figure is updated

- *Figure 8: Similar to Fig7, but less dramatic.*

figure is updated

Interactive comment on Atmos. Meas. Tech. Discuss., 8, 12633, 2015.

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