Atmospheric
Measurement
Techniques
Discussions

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

S. de Haan

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Dear Dr. Jung-Hoon Kim,

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:

- *1) There are several abbreviations that need to be fully explained at the first time. For example, in Page 12634, Line 12, and Page 12635, Line 19: First abbreviation of Mode-S EHS needs to be fully spelled in both abstract and introduction section. In Page 12635, Line 10: Again, first abbreviation of AMDAR needs to be fully explained here first. In Page 12635, Line 20: Again, first abbreviation of NWP needs to be fully described here first.*

  I think I explained all abbreviations at first occurrence

- *2) Page 12635, Lines 21-25: In section 2, the data used is described. In section 3, the triple collocation methodology is discussed. In section 4, the method of collocation and the assumptions made are described. The last section is dedicated to the conclusions and outlook.*

  I have changed the text

- *4) Page 12637, Lines 3-4: It may be good to mention what will be horizontal grid spacing of the data. For example, considering that the true airspeed of aircraft is 250 m/s, typical horizontal resolution of this data will be 1 km - 5 km.*

  The following lines have been added:

  "Consequently, wind and temperature are observed at these same rates and with a typical cruising speed of 250 m/s the horizontal resolution of this data is between 1 and 5km, for a single tracking radar."

- *5) Page 12637, Lines 5-6: What percentage of data passed quality control? How many data you used in this paper ?*

  About 20% pass quality control; added to the text

- *6) In section 2, the author well described a schematic overview (example snapshot) of observation data at certain period of time overlapped with part of NWP*

domain in Fig. 1 to show how all observation data are coincident with each other. In accordance with this, author needs to make an additional table to describe the detailed information or features about each observation dataset. Example is suggested as follows. Therefore, readers can easily understand what kind of data author used in this study at a glance. Data type; Horizontal grid spacing; Vertical resolution; Temporal resolution. Mode-S EHS; 1-4 km; Variable; 4 -10 seconds. Radar; 2 km (example); 100 m (interpolated using multiple PPI scans); 5-10 minute. Sodar; 1 km (example); 20 m near surface or single layer; 12 minutes. NWP; 2.5 km ; 250 m near surfaace growing 500 m above 3km; 1-hour.

A new table summarizing the data has been added

- *7) Page 12642, Line 13: After applying the triple collocation methodology, how many data pairs you used during the research period (9-month between Jan-Sep 2013) ? It is unclear that is the errors in figs 3-6. Here, the definition of error can be somewhat confused with the statistical confidence interval (95to make sure this is the errors based on 10 subsets of half portion randomly selected from the full (original) data sample during the research period.*

The size of the data sets have been added to the text; The errors are based on the full data set.

- *8) Periodic behaviour of residual errors with respect to azimuth angle in Figures 3-5 may be due to the fact that u wind is way stronger than v wind component in Northern hemisphere. And, the location focused on this study (Fig. 1) seems to locate near seashore where sea breeze normally occur west-east direction due to the meridional position of coast line. So, first of all, the authors may want to see the mean (median) of wind speed and direction before looking at the errors of residuals from each experi- ments.*

The reviewer is absolutely right; in the Netherlands the wind direction is dominated by a westerly flow; words are added. The errors from the mean radial wind

speed are investigated (solid line in Fig 4).

- *9) In meteorology, we normally consider the true wind is the wind observed by radio- sonde. So, after we assimilate the observation data into the NWP model grids we finally compare those estimation against the observed wind from radio- sonde to show how the forecast has been improved by assimilating available observation data. Therefore, I'm curious how the wind estimation from two combinations (Mode-S EHS/Sodar/NWP and Mode-S EHS/Radar/NWP) can be different from the radio-sonde wind data during this research period. Author can easily compare these estimated winds from triple collocation method against observed radio-sonde wind data at the same time.*

Reasoning for not using radiosonde observations is given in the introduction:

"Although radiosonde observation are regarded as a reference in meteorology, these ob- servations are not exploited in this study. At present, due to budget cuts, only one launch per day at 00UTC is performed. At that time the number of aircraft landing at or departing from Schiphol airport is very low (that is 01LT or 02LT depending on summer- or winter- time) and thus this will hamper the number of collocation, especially in the boundary layer. Furthermore, the distance between the radiosonde launch site (De Bilt) and the airport is more than 30 km. The Sodar is installed at Schiphol airport."

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