

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

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This paper well documented new observation of Mode-S based wind data and its possible errors in combination with ground-based Radar and Sodar data with Numerical Prediction Weather (NWP) model data. Although authors well examined and suggested this new observation data set using triple collocation method in the manuscript, at the end author may eventually want to emphasize how this new wind observation data can be more usefully assimilated into the NWP system to forecast winds more accurately. I guess this makes this paper more meaningful not only for the observation community but also for the development the data assimilation community in NWP model. In addition, there are some questions and comments for this manuscript, which will help improve the quality of this paper.

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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.

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.

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.

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

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; 1~2 minutes. NWP; 2.5 km ; 250 m near surface growing 500 m above 3km; 1-hour.

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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 (95%). For example, author needs to 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.

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 experiments.

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 and same location or nearby location.

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