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Atmospheric Measurement Techniques Discussions

Interactive comment on "Retrieving clear-air turbulence information from regular commercial aircraft using Mode-S and ADS-B broadcast" *by* J. M. Kopeć et al.

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This paper describes the first attempt to see how the ADS-B or Mode-S wind data can estimate the signal of turbulence using different methodologies. History and background study in introduction, and motivation and discussion of the dataset and methodology in section 2 and 3 has been very well documented in this study. Although authors have done to discuss several advantages and disadvantages in suggested EDR estimations using ADS-B and Mode-S emulations, the analysis from suggested methods in section 4 needs to be improved using more qualitative statistical tests to show how each method has different performance quantitatively. Detailed comments and sug-

gestions are as follows.

1) Page 11819, Line 28: EDR is ICAO standard (WMO 2010), which is robust and aircraft independent measurement for atmospheric turbulence. Only matter is how can we implement this EDR technique to all aircraft and how can we transmit this EDR signals to ground or other aircraft more efficiently and economically. I hope authors may need to emphasize the importance of the suggested new method somewhat conservatively until this method will be confirmed to be useful for accurately and independently measuring atmospheric turbulence.

2) Page 11822, Lines 14-16: Definition of the reference EDR (WMO 2003) is not clear. Did author use Cornman (1995)'s methodology for the DELICAT EDR ?

3) Page 11823, Line 13: Authors may want to mention the horizontal resolution of finally sampled data. For example, considering the airspeed is about 250 m/s, 2 Hz data will be 125 m horizontal resolution to calculate the estimate EDR.

4) Page 11823, Line 13: Authors may need to setup more objective definition of classifying the resulting data into 3 groups here. For example, RMSE of air speed or ground speed smaller than certain value during certain period time falls into group 1. Others fall into group 2 or 3 depending on RMSE or bias of air speed or ground speed.

5) As authors know, structure function method (3.2) is highly depending upon horizontal resolution of the data. 0.025 and 0.094 Hz corresponding 10 and 2.6 km horizontal resolution seem too low to get the reliable EDR result. Sensitivity to horizontal resolution would necessary to show how this method are sensitive to the data sampling frequency.

6) In table 3 and in section 4, several statistical tests like bias and Root Mean Square Error (RMSE) for four suggested EDRs against DELICAT EDR can be calculated to see how each method perform differently. Based on this, authors may say something more qualitatively. And, if some of them has biased constantly, authors may set up regression

or matching function to convert one to another. Residuals can be also calculated from the regression function.

7) In conclusion section, mentioning of suggestions for future research to overcome the current problems of ADS-B/Mode-S based EDR observation like the aircraft dependency and selecting the filtering frequency for building up more reliable EDR results, and so on.

8) If the mode-S or ADS-B based EDRs still have constant bias against reference EDR, I would recommend to check whether the Probability Density Functions (PDFs) of the mode-S and ADS-B based EDRs follow well the log-normal distribution. If they follow the log-normal distribution well, then authors can convert the mode-S or ADS-B EDR scales to reference EDR scale, as NWP model-based individual turbulence diagnostics are converted to a reference EDR-scale (Sharman et al. 2014).

I hope these questions and suggestions can help improve the quality of this paper and this journal. Thank you.

Interactive comment on Atmos. Meas. Tech. Discuss., 8, 11817, 2015.