

***Interactive comment on* “Evaluating two methods of estimating error variances from multiple data sets using an error model” by Therese Rieckh and Richard Anthes**

Anonymous Referee #1

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The paper compares two simple methods for estimating error variances from double or triple collocated data using simulated and real data. The error estimation methods are the two and three cornered hat methods (2CH and 3CH). The paper is interesting, but should be considerably improved. The present version is not suitable for publication.

The presentation is rather sloppy, and it looks more like a report than a scientific paper. For instance, equations (18b-c-d) are essentially the same equation, and indicating cancelling terms by crossing them out (pages 11 and 12) is not the style of a scientific paper. Variance is defined, but MS (equation (2) and further) not.

More seriously, the authors seem to assume that their data are well calibrated and do

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not contain any representativeness errors - at least these problems are nowhere mentioned. Therefore they are surprised when pairwise 2CH error estimates are different from each other and from 3CH error estimates, attribute this to biases, and work this idea out in section 7. But the differences may very well be a matter of representativeness. Both in 2CH and 3CH the "true" signal is the common signal shared by the two or three observation systems under consideration, and the "true" signal is determined by the system with the lowest resolution, see Stoffelen (1998). The authors should consider this.

Another serious point is that the authors assume their error model to be valid without any further justification. A scatter plot of the data - the starting point of all analysis of data from multiple sources - would be helpful here. It will show if any calibration issues play a role and if errors indeed can be assumed to be independent of the observed value. The current presentation is more of a "trial and error" type. This should be considerably improved.

A minor point: the link to Wriley (2003) gives no information on the history of the 3CH method.

[Interactive comment on Atmos. Meas. Tech. Discuss., doi:10.5194/amt-2018-75, 2018.](#)

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