

## ***Interactive comment on “Methods to homogenize ECC ozonesonde measurements across changes in sensing solution concentration or ozonesonde manufacturer” by Terry Deshler et al.***

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General comments By analyzing a suit of laboratory and field measurements comparing two ECC ozonesonde types with two different sensing solution concentrations and UV reference standards the authors derived simple transfer functions between the possible combinations. The study builds on former studies with limited data sets. The new study merges those data sets and adds unpublished supplementary data. That enables them to conclude simple transfer functions to be usable in most practical cases in order to homogenize the international ozonesonde data record. Since there is an urgent requirement for a homogenized ozonesonde data record the authors can be

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congratulated for their efforts. I strongly recommend the publication of the manuscript after some minor revisions.

Specific comments 1. From the description of the data and the way they are used it seems that there is some implemented redundancy not resolved correctly in the BE-SOS and Laramie data. This should affect the statistical errors. In both cases a set of three ozonesondes with an equal type/sensor combination are compared to another set of three ozonesondes with another type/sensor combination. In the BESOS case each ozonesonde of the first group is compared to each ozonesonde of the second group leading to 9 individual comparisons (line 348, Table 1). In the Laramie case “only” 6 individual comparisons are listed for unknown reasons (Table 1). In any case the 9 or 6 comparisons cannot be seen as independent. There can only be 3 independent comparisons. Each ozonesonde can only be used once or one has to deal with covariance matrices in the error analysis.

Good catch on the 6 Laramie cases. One of the 0.5% KI ozonesondes was eliminated from the comparison by NOAA due to a poor performance in flight. This is now explained in the text. To test the reviewers comment the covariance and correlation matrices were calculated. The correlation between identical ozonesondes and concentrations in any comparison are  $> 0.999$ . The correlation of sondes of different type or the same sonde type with different concentrations is not quite as high, but  $> 0.998$ . The correlation coefficients between any combination of the possible comparisons for any six sondes in a comparison are all very similar, which suggests to us that assuming 9 independent comparisons, from any three pairs of sondes, is reasonable. If the reviewer’s comment were followed and only three independent comparisons were made, this independent comparison could be done three different ways. Any one sonde in the first group could be compared with sonde 1, 2, or 3 in the second group, so 3 permutations of the “3 independent” comparisons are possible. The result is back to 9 comparisons. In any case the impact is minimal on our final result, and so the analysis is left as it is.

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2. At least Wallops Island used some SP 5A sondes. One should mention that those sondes had no explicit hole for the pump temperature sensor. Can you see any differences in the behaviour?

A sentence has been added noting the lack of a specific place for the temperature sensor. There is no obvious difference in the behavior of these sondes.

3. The paragraph (lines 114-125) can be misinterpreted that no other sensing solution concentrations than 0.5% and 1.0% had been used. I recommend adding that few other concentrations, i.e. 2.0%, had been used, too. A sentence has been added to clarify this.

4. The effect of different pH buffers have been mentioned twice (sections 2.4 and 5.) Which buffers had been used in the measurements? Had the same buffer been used everywhere?

A paragraph is added to section 3.1 to state that all comparisons were completed using the standard solution concentrations with the recommended buffers and the recipe for the solutions is described here.

Technical corrections 1. Please find a way to mention at least once that the pressure  $p$  in  $\log_{10}(p)$  has to be used in the unit hPa.

Thank you. This was included in the abstract and in the body of the paper the first time this is described.

2. Line 348-349: Table 1 instead? corrected

3. Line 1063: Delete one parenthesis after d. corrected

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