

Interactive comment on “Techniques for analyses of trends in GRUAN data” by G. Bodeker and S. Kremser

Anonymous Referee #3

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General comments:

The paper amtd-7-11957-2014 by Bodeker and Kremser discusses the techniques that could be employed in the future to reliably quantify long-term trends in the Global Climate Observing System (GCOS) Reference Upper Air Network (GRUAN) data records.

Numerical recipes for analyzing trends and associated uncertainties are explored in a pedagogical approach. Synthetic data sets are used to demonstrate the above concepts. Then, these concepts are applied to the available radiosonde data record at one GRUAN site to show an example of temperature profile trend analysis.

The paper is well written and the approach is sound. It must be recognised that the paper does not demonstrate new techniques. In addition, the measurements time

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series is too short (2005-2014) to derive indicative conclusions.

However, the manuscript aims at providing a reference for understanding and performing scientifically sound analysis of climate trends and related uncertainties from GRUAN data, and it is successful in that perspective.

I only have the following minor comments that may help improving the paper.

Specific comments:

11962, 20: Are the coefficient estimated using a multivariate least square regression? Please specify.

11965, 22-27 (to 11966, 15): Something doesn't sound right. Please check signs and subscripts (e.g. at line 2, X should be negative and BFT2 should be BF2 instead; at line 11 in the right term BFT3 should be BF3, at line 15, in the right term BFTn should be BF_n).

11976, 24: It would be interesting to investigate quantitatively the sensitivity to orthogonalization order, in the synthetic and/or the real measurements. The authors have all they need, so I'd strongly encourage to do that.

11977, 28: "then interpretation (1) above could be excluded"; maybe I'm lost, but shouldn't be interpretation (2) to be excluded? The whole discussion is difficult to follow. Please rephrase.

11988, Figure 7: Only trends that are significant at 2-sigma level are shown. I'd suggest to make this clear in the figure caption as well.

Technical corrections:

11975, 5: Please, explicit QA/QC.

11977, 24: "on it's own" maybe a typo?