

Interactive comment on “Technical Note: Trend estimation from irregularly sampled, correlated data” by T. von Clarmann et al.

Anonymous Referee #2

Received and published: 23 February 2010

This paper describes a methodology for an accurate calculation of trends using a dataset that has its own representation biases. A particular focus is the problem of using a dataset composed of observations from various sites, inhomogeneously representing the global distribution, with samples that do not cover the same time periods. This aspect is critical to avoid possible biases associated with trend estimates. Therefore, I would recommend publication in ACP but provided the following general comments be addressed, in particular that an illustrative example be added to the discussion.

General comments:

C11094

The paper is clearly written and the method and calculations are presented in an educational way (although some errors should be corrected and some points could be clarified – see reviewer 1 and specific comments). However, I fully agree with reviewer 1 that, even though this paper aims at presenting a methodology, it needs to include a practical example. An illustration would help the reader through this very technical paper but also – and probably more importantly – demonstrate the quality of (and the need for) this approach. This would not need to be a complicated trend analysis but rather a direct application on a simple case study along with sensitivity tests.

Another general comment is the possibility to use satellite observations for spatial variability evaluations (and hence correlations) to be included in the S_y covariance matrix. While it is true that satellite observations allow quasi global coverage with quite long records for several parameters (allowing applicability of the methodology proposed at different time periods), the question of vertical resolution should be mentioned.

For temperature or water vapor, but also trace gases, etc., the vertical resolution in the troposphere is at best several kilometers, with lack of sensitivity to the surface layer for several sensors. Limb sonders allow better vertical resolution but with sampling only the ULTS and higher. Since in situ observations are often done at the surface, this may cause a series of additional difficulties. This should be discussed. Again, a specific example of application would be most helpful.

Some more specific comments:

I will here only detail the points which have not been raised by reviewer #1.

p. 27677 – last sentence (first of following page): not clear although it is were the objectives of the paper is presented... I would recommend cutting this long sentence in 2.

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p. 27678, l. 18: again, to demonstrate this, an applied example of this effect would be very interesting! Has it already been highlighted? If so, it should be mentioned and a reference should be provided.

p. 27681, eq 13: an introduction on how this equation was derived might be helpful.

p. 27682: the authors should discuss what parameters should be included in S_{sat} , and how the incompatibilities in vertical resolutions between surface measurements and satellite measurements may be accounted for.

p. 27682: References on how this is done in the literature would be useful.

p. 27684-86: this part is rather difficult to follow. An example and illustrative figures (on the methodology and the results) is, again, necessary.

As already mentioned by reviewer #1, the notations to differentiate scalars/vectors/matrices should be reviewed.

p. 27687, l. 5: two 'and'...

Interactive comment on Atmos. Chem. Phys. Discuss., 9, 27675, 2009.