Clim. Past Discuss., 2, S288–S290, 2006
www.clim-past-discuss.net/2/S288/2006/

Climate of the Past Discussions

Interactive comment on "On the verification of climate reconstructions" *by* G. Bürger and U. Cubasch

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Received and published: 18 August 2006

We hope the following comments help to clarify most of the remaining issues raised by rev. 3.

ad 2) ("narrow scope"): - In a strict sense, only a few reconstructions are actually *independently* verified (following, e.g. Fritts 1976 or Cook and Kairiukstis 1990): among them are Briffa et al. 1988/90/92; MBH98/99; Cook et al. 2000; Luterbacher et al. 2002/4; Guiot et al. 2005; Rutherford et al. 2003/5). Their reported verification estimates reflect sample properties and should be bootstrapped as outlined in our study. Most other studies report as a "verification" statistic simple correlations to the instrumental data. Although these are not directly affected by our analysis it is evident that the strong trend inflates that statistic as well.

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We agree with the rev. that the exact meaning of "verification", and thus the scope of our analysis, has to be set out more clearly.

ad 3) ("detrending"): - We emphasize that in our study detrending is not used at all, and criticisms thereof apply, if at all, to other published material.

Having said that, it is certainly not a "central consistency problem" of any of those publications. Note that Eq. (1) of the rev. is wrong (the additional $B_2 t$ term), since the preprocessing detrends proxy **and** temperature to derive a regression relation. This special prefiltering of data is one possible approximation among many others, such as, e.g., PCR (see also Fritts 1976). It was intended by von Storch et al. 2004 to base the estimation on more d.o.f's. So far, it has nowhere been demonstrated that short-term proxy-temperature covariations are per se of different characteristic than long-term covariations. As long as that is the case the approximatioin remains valid and should be dismissed only on the grounds of poor calibration statistics.

ad 4) ("precise and concise"): - Agreed (but see rev. 1).

ad 5) ("missing at random"): - We have mentioned before that for this study the MAR criterion is irrelevant as it is trivially satisfied (we have practically no missing values). It *is* relevant for reconstructions that employ the full set of temperature grid points, since those are not MAR as our nonsense regressor shows. But to clarify: This paper has the sole purpose of **verifying** a number of regression models with practically no missing values, by using the sparse grid of (almost) fully available temperature values.

ad 7) ("RegEM"): - Schneider 2001 introduces RegEM as an iterative method to estimate mean and covariance from an incomplete dataset. RegEM offers several options to achieve this goal, among others, the mapping between knowns and unknowns in the iteration. RegEM provides those estimates along with the completed dataset that is derived from them.

Now would it be convincing if - after convergence is achieved - the final estimates of

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mean and covariance crucially depend on those options? - I guess not.

From the statistical folklore one knows how to built regression type mappings from mean and covariance, and this is what we do in the **MDL** step. As a side effect, if the **MDL** step uses the same mapping type as the RegEM iteration the completed data are identical to the direct RegEM output.

ad 9) ("rescaling"): - We fully agree with the rev's reservations against rescaling. It is, however, not the purpose of this study to define the optimum reconstruction but to re-assess the verification of **existing** ones. If that is not clear from the current manuscript it will be clarified accordingly.

ad 10) ("RegEM vs. EM"): - As mentioned before, mapping 22 proxies from the AD 1400 network to temperature, defined from 80 or something cases, is a well posed estimation problem. When RegEM was first applied to that network (by Rutherford et al. 2005) it would have been interesting, at least, if its performance was compared to the much simpler EM.

ad 11) ("applied RegEM options"): - Agreed.

Interactive comment on Clim. Past Discuss., 2, 357, 2006.