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Climate of the Past Discussions

Interactive comment on "Millennial temperature reconstruction intercomparison and evaluation" *by* M. N. Juckes et al.

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C) PROXY SELECTION AND PROCESSING: (Continued from Multidisciplinary Review 1)

Vagueness of A Priori Proxy Rules and Criteria: A priori rules must have some logical reason for their inclusion and must be applied consistently. However, in the instant case, some explanation is needed. 1) The first rule says ". . . AD 1000 to AD 1980 (with some series ending slightly earlier, as discussed below)." , but does not discuss either which proxies it refers to, or the justification for including them while other proxies are omitted based on the same rule. 2) Rule two, implies using individual series rather than proxy compilations, such as MBH98 or Yang E. China. Why was Yang included and not the other compilations? 3) Rule three, in contrast to the overwhelming majority

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of studies, specifies older data in preference to newer data without a specific reason for the choice. What is the justification for using older data? 4) Rule four specifies using northern hemisphere proxies with one unsupported exception. How is the southern hemisphere gridcell connected to northern hemisphere average temperature and how does one southern hemisphere proxy adequately represent NH tropical temperatures? 5) The unstated archive rule is used to exclude Indigirka, but fails to exclude un-archived Yang and the use of other series that do not match archived data. 6) There is no rule about the geographical spacing of proxies, or the use of several proxies from a single location or temperature gridcell. Why are proxy geographic locations and distributions unimportant?

Proxy selections not following a priori rules: The following proxies (including proxies used in the Yang Composite) do not meet the stated rules for proxy selection: 1) Guliya: differs from archived version, bad dating; 2) Dunde: differs from archived version; 3) Dulan: unarchived; 4) S Tibet 1-12 (12 separate proxies): starts 1100, ends 1950, unarchived; 5) East China: unarchived; 6) Great Ghost Lake: unarchived; 7) Jiaming: ends 1960, unarchived; 8) Jinchuan: ends 1950, unarchived; 9) Japan: ends 1950, unarchived; 10) Tornetrask: differs from archived version; 11) Taimyr: differs from archived version; 12) Methuselah Walk: ends 1979; 13) Indigirka: Meets all criteria, but not used.

Dual-Use Proxies: Some of the proxies have been used in previous studies as proxies for other climate variables. 1) Greenland ?O18 from Fisher et al.: This proxy was originally used by Fisher as a proxy for precipitation. (Fisher 1996). 2) Arabian Sea G. bulloides: This proxy is used as a precipitation proxy in Treydte et al (Nature 2006), a temperature proxy in Moberg et al (Nature 2005), and a wind-speed proxy in Anderson et al. (Anderson 2002) Also, David Black, a published specialist (Science) in G. bulloides, has pointedly disavowed the use of G. bulloides off Venezuela as a proxy for temperature, as he considers it a proxy for trade wind strength. Since these proxies were originally treated as precipitation or wind proxies, a) what reason do we have to

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believe that they are also temperature proxies, and b) what procedure was used in the UR to remove the effects of the confounding variables?

One Proxy Used Twice: Polar Urals (Briffa MXD version, Yamal Briffa 2000). These two proxies have the same location, and differ only by the substitution of one proxy in the group.

Geographical Locations: These are shown in SOM Figure 1.There are several areas with more than one UR proxy (two in Northern Fennoscandia, two in Quelccaya, four in western US). As there is no a priori rule for the spacing of the proxies, this opens the door for speculation about basis of the selection because the immediate impact is to skew the reconstruction toward the densely represented sites. At a minimum, the proxies in the same temperature gridcell should be averaged to provide no more than one value per temperature gridcell. (Mann 2003)

Tree-Ring Processing: The validity of any given proxy depends on the processing that the proxy has undergone. The investigators of the Yamal Proxy (Hantemirov 2002) say it should not be used in multicentennial reconstructions such as the UR. Justification for its use is needed.

D) PROBLEMS WITH METHODS. Before using a method such as CVM, we first need to provide a theoretical and practical foundation for the procedure. For example, it would be very useful to take the gridcell temperatures for the locations of the proxies and, using CVM, see how well the actual temperatures do at recreating the actual NH data record. This should be done with a calibration and a validation period, to see how well the CVM method is able to predict out-of-sample results. There is no indication in the MITRIE paper that this has been done.

Assumption of Stationarity: The CVM method assumes that the variance in the climate is stationary. Eduardo Zorita comments that “In the case of a stationary signal and stationary noise: once the variance is matched in a calibration period, under stationarity assumptions, its is matched in all periods.” http://tinyurl.com/yd8pmv

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However, the Union Reconstruction is used to show that the recent temperature is significantly higher than the historical temperature, viz: “The reconstructions evaluated in this study show considerable disagreement during the 16th century. The new 18 proxy reconstruction implies 21-year mean temperatures close to 0.6 K below the AD 1866 to 1970 mean.” This, of course, means that the assumption of stationarity is unfounded. In fact, there is a large signal in the variance of the Union Reconstruction itself, which is shown in SOM Figure 2. As this figure shows, the standard deviation of the UR varies by a factor of two over the time period, as well as containing an overall trend. Thus, the assumption of stationarity is not supported by the data.

Error Estimation: Error is estimated using the MBH98 style “confidence interval estimation”, and makes claims related to these. The Wegman report explicitly stated in relation to MBH that these type of claims were unsupported by MBH98. The paper says “A reconstruction using 18 proxy records extending back to AD 1000 shows a maximum pre-industrial temperature of 0.25 K (relative to the 1866 to 1970 mean). The standard error on this estimate, based on the residual in the calibration period is 0.149 K.” and “A new reconstruction made with a composite of 18 proxies extending back to AD 1000 fits the instrumental record to within a standard error of 0.15 K. This reconstruction gives a maximum pre-industrial temperature of 0.25 K in AD 1091 relative to the AD 1866 to 1970 mean. The maximum temperature from the instrumental record is 0.84 K in AD 1998, over 4 standard errors larger.” The reason why this error estimate is incorrect is detailed in the SOM.

(Further discussion of these and other issues is continued in Multidisciplinary Review 3.)

Interactive comment on Clim. Past Discuss., 2, 1001, 2006.