

Interactive comment on “Northern Hemisphere temperature patterns in the last 12 centuries” by F. C. Ljungqvist et al.

Anonymous Referee #2

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My major concern is whether it is appropriate to simply average different type of proxies, since for example, speleothems can have very different characteristics as tree rings.

It is nice that the paper includes a large variety of proxies for the purpose of fully describing the spatio-temporal pattern of the temperature evolution. Instead of conducting the temperature reconstructions as typically done in the literature, this paper directly uses the proxy anomalies to study the climate evolution. This approach sounds reasonable as most reconstructions anyway assumed a stationary relationship between proxies and temperatures along the time, so the trend of proxies will reflect the trend of temperatures. However, the averaged proxy series computed in this paper has some disadvantages compared to using the reconstructed temperatures. The reason is be-

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cause the relationship between the temperature and proxies can be very different depending on the type of proxies. For example, the tree ring and speleothem are of completely distinct temporal characteristics and thus their relationship with temperatures are expected to be different. But it seems all the proxies are treated equally in the paper except for the interpolation and smoothing procedures. Moreover, the proxy series carrying a large amount of noise is not downweighted accordingly in the averaged series. Therefore, the gridded proxy anomaly in Figure 3 may not be very faithfully representing the temperature evolution. I would suggest that the weights of the average should at least take the correlation between each type of proxy and temperatures into account, which hopefully can, to some extent, capture the different characteristics of proxies. More discussions about integrating different proxies can be found in Li, Nychka and Ammann (2010).

Li, B., D. Nychka, C. Ammann, (2010), "The value of multi-proxy reconstruction of past climate". *Journal of the American Statistical Association* ,105, pp 883-911.

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