

DISCUSSION OF: A STATISTICAL ANALYSIS OF MULTIPLE TEMPERATURE PROXIES: ARE RECONSTRUCTIONS OF SURFACE TEMPERATURES OVER THE LAST 1000 YEARS RELIABLE?¹

BY L. MARK BERLINER

The Ohio State University

I join the authors in expressing dissatisfaction with some paleoclimate analyses. I endorse their claim that there has been underestimation of uncertainty in paleoclimate studies. The implication that additional participation of the statistics community is needed is undeniable. However, our priorities should be to contribute rich statistical analyses that (i) model the processes and data and (ii) offer useful information regarding the issues of climate change. If achieving these goals requires that we do not continue with questionable assumptions, nor merely offer small fixes to previous approaches, nor participate in uncritical debates, so be it.

The authors note that it is common to assume that proxy observations are linearly related to climate variables and they proceed with this assumption. This seems untenable to me (for an extreme example see the Yellow River data in Figure 6). Even if linearity is plausible, lumping all spatial-temporally distributed data of various types, qualities, and degrees of relationship to climate variables into a variance–covariance based summarization (principal components or EOFs) with no underlying analysis gives me pause. I am not surprised by difficulties in then extracting usable information. Performing various tests and analyses based on these reductions seems of little interest; indeed, it seems to me that they serve as a distraction.

Leaping ahead, though I strongly endorse the application of Bayesian analysis in this context, the concerns of the previous paragraph remain active regarding the Bayesian analysis in this article. Indeed, much like other analyses, the assumption is that regressing onto principal components with coefficients constant in time captures enough of the structure of the process to base the modeling on a stationary, AR(2) model. This places a reliance on the principal components that I find highly questionable. At a minimum, it seems to me that using spatially distributed and proxy dependent regression coefficients should be considered. Such an approach is closer to what I would call a “modern Bayesian analysis.”

To provide perspective I return to my remark regarding “uncritical debates.” The overarching conclusion of the authors seems to be that warming is real, but

Received September 2010; revised September 2010.

¹Supported by NSF Grant ATM-0724403.