



## Spread versus uncertainty: untangling climate reconstructions

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There is great public and scientific interest in understanding the amplitude and characteristics of natural climate variability in the recent past. Climate quality instrumental records (which can be directly compared with modern measurements) only extend back to the mid nineteenth century, with the exception of a handful of European sites. Reconstructions of the northern hemisphere mean temperature by Mann, Bradley and Hughes provoked much discussion and controversy. Since their initial work, many other authors have contributed, producing a wide range of temperature estimates and a wider range of uncertainty estimates. The spread of published reconstructions cannot, of course, be expected to be provide a quantitative estimate of uncertainty: there may be common errors in many of the published reconstructions, resulting from use of the same underlying data and similar analytic methods; or there may be published reconstructions which use methods which are now known to give larger than necessary uncertainties or which do not exploit all available data (if, for instance, they are focussed on methodological issues rather than collating the latest data collections).

This paper presents a calibrated uncertainty estimate, in which two independent proxy collections are used to estimate the northern hemispheric temperature back to AD1450. The level of disagreement between the two reconstructions can be used to validate the uncertainty estimates. It is found that the use of a median instead of an arithmetic mean as a mean value estimator significantly reduces the estimated uncertainty in the hemispheric temperature reconstructions.