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Estimating the likelihood distribution of past temperatures from tree ring data

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There have been many studies exploiting tree ring data to estimate temperatures in the past millennium. This study uses tree ring data from the National Climate Data Center and applies a Bayesian statistical analysis in order to estimate the likelihood distribution of temperatures in the last millennium. The analysis avoids making any assumption about residuals having Gaussian distributions: it is found that distributions are strongly non-Gaussian with exponential tails. It is found that anomaly distributions obey a chi-squared law to a good approximation, and this can be exploited to estimate the number of degrees of freedom in the data and the significance of the estimated temperatures. The sensitivity of the archived tree ring data to temperature appears to have an age dependence, with older records showing greater sensitivity.