

A method for homogenising the extremes and mean of daily temperature measurements

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In order to be confident in the analyses of long-term changes in daily climate extremes it is necessary for the data to be homogenized due to non-climatic influences. Here we present a new method of homogenizing daily temperature data that is capable of adjusting not only the mean of a daily temperature series but also the higher order moments. This method uses a non-linear model to estimate the relationship between a candidate station and a highly correlated reference station. The model is built in a homogeneous sub-period before an inhomogeneity and is then used to estimate the observations at the candidate station after the inhomogeneity using observations from the reference series. The differences between the predicted and observed values are binned according to which decile the predicted values fit in the candidate station's observed cumulative distribution function defined using homogeneous daily temperatures before the inhomogeneity. In this way, adjustments for each decile were produced. We demonstrate this method using daily maximum temperatures at various locations in western Europe and an artificial dataset with known inhomogeneities introduced. Results show that given a suitably reliable reference station, this method provides reliable Higher Order Moment adjustments.