Homogenization of the global temperature

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The global land temperature trend may be biased due to remaining inhomogeneities. Well-homogenized national datasets on average clearly show more warming than global collections (GHCN, CRUTEM, GISTEMP, etc.) when averaged over the region of common coverage. We will present the temperature trend differences for several dozen national temperature series.

This finding makes research into statistical homogenization more pressing. We have estimates for the uncertainties due to remaining inhomogeneities from numerical validation studies. We urgently need analytic work on the uncertainties in a certain dataset or station that is based on the inhomogeneities found and the network characteristics.

Recent improvements in the quality of homogenization were largely due to the introduction of multiple breakpoint methods that can work with inhomogeneous reference series. These multiple breakpoint methods, however, do not have an optimal method yet to determine the number of breaks whose position can be accurately determined. The joint homogenization of all series simultaneously promises an optimal solution of the problem that also the reference stations have inhomogeneities. Also work on the selection of the best correction model (annual, seasonal, monthly, daily of the only the means or also of the higher moments) is needed.

The homogenization of daily data is even harder. Only inhomogeneities in the mean, but not in the variability around the mean are used. Corrections in the variability are applied deterministically, while many error sources are not perfectly predictable. The correction of daily data should probably be treated similarly to downscaling.