High resolution climatology
- towards climate change services

Homogenising time series: Beliefs, dogmas and facts

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For obtaining reliable information about climate change and climate variability the use of high quality data series is essentially important, and one basic tool of quality improvements is the statistical homogenisation of observed time series.

In the recent decades large number of homogenisation methods has been developed, but the real effects of their application on time series are still not known entirely. The ongoing COST HOME project (COST ES0601) is devoted to reveal the real impacts of homogenisation methods more detailed and with higher confidence than earlier. As part of the COST activity, a benchmark dataset was built whose characteristics approach well the characteristics of real networks of observed time series. This dataset offers much better opportunity than ever to test the wide variety of homogenisation methods, and analyse the real effects of selected theoretical recommendations. The author believes that several old theoretical rules have to be re-evaluated. Some examples of the hot questions, a) Statistically detected change-points can be accepted only with the confirmation of metadata information? b) Do semi-hierarchic algorithms for detecting multiple change-points in time series function effectively in practise? c) Is it good to limit the spatial comparison of candidate series with up to five other series in the neighbourhood?

Empirical results – those from the COST benchmark, and other experiments too – show that real observed time series usually include several inhomogeneities of different sizes. Small inhomogeneities seem like part of the climatic variability, thus the pure application of classic theory that change-points of observed time series can be found and corrected one-by-one is impossible. However, after homogenisation the linear trends, seasonal changes and long-term fluctuations of time series are usually much closer to the reality, than in raw time series. The developers and users of homogenisation methods have to bear in mind that the eventual purpose of homogenisation is not to find change-points, but to have the observed time series with statistical properties those characterise well the climate change and climate variability.