



Advantages and applicability of commonly used homogenisation methods for climate data

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Homogenisation of climate data is a very relevant subject since these data are required as an input in a wide range of studies, such as atmospheric modelling, weather forecasting, climate change monitoring, or hydrological and environmental projects. Often, climate data series include non-natural irregularities which have to be detected and removed prior to their use, otherwise it would generate biased and erroneous results. Relocation of weather stations or changes in the measuring instruments are amongst the most relevant causes for these inhomogeneities.

Depending on the climate variable, its temporal resolution and spatial continuity, homogenisation methods can be more or less effective. For example, due to its natural variability, precipitation is identified as a very challenging variable to be homogenised.

During the last two decades, numerous methods have been proposed to homogenise climate data. In order to compare, evaluate and develop those methods, the European project COST Action ES0601, Advances in homogenisation methods of climate series: an integrated approach (HOME), was released in 2008. Existing homogenisation methods were improved based on the benchmark exercise issued by this project.

A recent approach based on Direct Sequential Simulation (DSS), not yet evaluated by the benchmark exercise, is also presented as an innovative methodology for homogenising climate data series. DSS already proved to be a successful geostatistical method in environmental and hydrological studies, and it provides promising results for the homogenisation of climate data. Since DSS is a geostatistical stochastic approach, it accounts for the joint spatial and temporal dependence between observations, as well as the relative importance of stations both in terms of distance and correlation.

This work presents a chronological review of the most commonly used homogenisation methods for climate data and available software packages. A short description and classification is provided for each method. Their advantages and applicability are discussed based on literature review and on the results of the HOME project.

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