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Adapted Caussinus-Mestre Algorithm for Networks of Temperature series (ACMANT)

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ABSTRACT
Any change in technical or environmental conditions of observations may result in bias from the precise values of observed climatic variables. The common name of these biases is inhomogeneity (IH). IHs usually appear in a form of sudden shift or gradual trends in the time series of any variable, and the timing of the shift indicates the date of change in the conditions of observation. The seasonal cycle of radiation intensity often causes marked seasonal cycle in the IHs of observed temperature time series, since a substantial portion of them has direct or indirect connection to radiation changes in the micro-environment of the thermometer. Therefore the magnitudes of temperature IHs tend to be larger in summer than in winter. A new homogenisation method (ACMANT) has recently been developed which treats in a special way the seasonal changes of IH-sizes in temperature time series. The ACMANT is a further development of the Caussinus-Mestre method, that is one of the most effective tool among the known homogenising methods. The ACMANT applies a bivariate test for searching the timings of IHs, the two variables are the annual mean temperature and the amplitude of seasonal temperature-cycle. The ACMANT contains several further innovations whose efficiencies are tested with the benchmark of the COST ES0601 project. The paper describes the properties and the operation of ACMANT and presents some verification results. The results show that the ACMANT has outstandingly high performance. The ACMANT is a recommended method for homogenising networks of monthly temperature time series that observed in mid- or high geographical latitudes, because the harmonic seasonal cycle of IH-size is valid for these time series only.

KEYWORDS
Statistical Method Development, Observed Climatic Data, Temperature, Time Series Analysis, Data Quality Control, Homogenization, Efficiency

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