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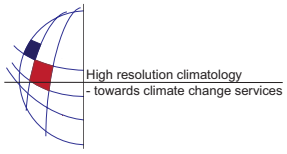

Newest developments of ACMANT

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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 in the time series of 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 temperature IHs 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, the Adapted Caussinus-Mestre Algorithm for Networks of Temperature series (ACMANT) has recently been developed. In its main detection segment two variables, namely the annual mean temperature and the difference of summer temperature – winter temperature are examined together. Step functions are fitted to the series of both variables, and a combined optimisation of the sum of squared errors is fulfilled. Monthly corrections from the main detection are set calculating harmonic function from the detected mean shift and mean seasonal difference. Advantages of the new method are a) when annual characteristics are used the noise rate is lower, than using monthly or seasonal characteristics, b) when homogenisation is applied one-by-one for series of individual months or seasons of the year independently from each-other, it is often not easy to find the relations between monthly, seasonal and annual biases, due to the random feature of detection results, c) the combined examination of two variables reduces randomness when the examined variables have shifts with the same timings.

In the first version of ACMANT the preciseness of mean linear trend of homogenised time series was significantly poorer, than those from other good homogenisation methods (PRODIGE, MASH). The causes of this shortcoming have been revealed, and now the newer version of ACMANT produces much better results, than the earlier one did. The presentation shows details about the recent methodological developments, and the efficiency of ACMANT.

The ACMANT is a fully automatic method. It can be used for networks with time series of different lengths, and it makes (also automatically) outlier filtering and gap-filling, if they are necessary. The use of ACMANT is recommended for homogenisation of temperature datasets of mid- and high-latitudes, where the quasi-harmonic annual cycle of IH-size is frequent and dominant.