Homogenization of ECA&D temperature series: finalization and validation

Antonello A. Squintu (1), Gerard van der Schrier (1), Yuri Brugnara (2), Else van den Besselaar (1), and Petr Stepanek (3)

(1) KNMI, R&DWD, De Bilt, Netherlands (antonello.squintu@knmi.nl), (2) University of Bern, Department of Geography, (3) Czech Globe, Brno

Homogenization of temperature series is a fundamental step in climatological analysis. Inhomogeneous series may lead to erroneous estimates of climate indices and trends. Artificial signals may be introduced by changing features (locations, replacement of instruments or changing in the surrounding) of the stations throughout the years. For these reasons, the undocumented change points (metadata is often absent or incomplete) have been detected in the European Climate Assessment & Dataset , identifying their timing and amplitude. The method for break detection is based on the agreement of three different methods (Kuglitsch et al., 2012). Once the breaks have been found, the series have been adjusted by calculating the amplitude of the changes in the quantiles of the temperature probability density function on a monthly base (quantile matching, QM , Trewin et al., 2012) . QM has shown to be better approach in terms of indices and trends the chosen benchmark (manually homogenized) series. In a second iteration the results of this procedure have been used as input and reference set for a further iteration of the same process, taking advantage of the higher signal-to-noise ration and of the better quality of the series themselves after the first iteration.

The homogenized series have then been blended when belonging to same or nearby station, in order to produce longer series. After this step a new homogenization procedure has been performed to avoid step-like changes due to the blending "joints". The new homogenized data-set has then been compared with the original one, looking at changes in extremes, trends and climate indices.

This process has been analyzed and checked on some critical points such as: limitation of possible self induced signals during the second iteration, role of geographical distribution of the reference series and validation of the homogenized series comparing them with manually homogenized series provided by national meteorological services and universities which are partners of ECA&D.