Homogenisation of temperature in Sweden; comparison to regional reanalysis data

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The current societal debate about climate change highlights the need to describe, with the best possible accuracy, its observed variability across spatial and temporal scales. In this regard, the MORA database of meteorological records across Sweden (maintained by SMHI) represents a unique collection of sub-Arctic climate observations, with dense daily measurements since 1960. While the quality of reported measurements has been checked during digitalisation, other phenomenon can introduce variations which are not related to climate: the meteorological station might have been relocated (e.g. in pace with increasing urbanisation), or measurement methods might have evolved over time. It is therefore necessary to perform an homogenisation of the dataset, in order to isolate the "pure" climate variability.

The present study focuses on the homogenisation of daily temperature (minimum, mean and maximum) over the following subset of the MORA database: 50 stations representing a national climate network over Sweden, over the 1961-1990 period. We use the "climatol" package (developed by José A. Guijarro, version 3.1.1, <https://CRAN.R-project.org/package=climatol>), testing the sensitivity of the homogenisation to critical parameters (e.g. SNHT threshold, outlier tolerance).

In order to further investigate the sensitivity of the homogenisation method, as well as assessing the added value of the homogenised temperature compared to the raw dataset, temperature observations in the MORA database are compared to a Copernicus regional high-resolution re-analysis for Europe (<https://climate.copernicus.eu/regional-reanalysis-europe>, led by SMHI as part of the Copernicus Climate Change Services C3S). For consistency purposes, the re-analysis output is treated as pseudo-stations, undergoing the same homogenisation with "climatol" as described above.