Daily and sub-daily homogenization of temperature data in Switzerland

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Abstract
Many applications in climate science require high-quality, long-term data at a high temporal resolution. However, such records are often affected by artificial breaks, so-called inhomogeneities, due to, for instance, station relocations or changes in instrumentation. Homogeneous daily data are required for studying extremes and changes thereof, especially since inhomogeneities can alter the whole distribution of a series; both the mean and the tails can be affected. Analysis of daily data has come into focus continuously in the past decades with the growing attention of possibly changing climate extremes in the view of climate change.

The challenging task of homogenizing daily and sub-daily data has only been partially addressed in recent years. Therefore, the number of available datasets providing homogeneous daily and sub-daily series is still small compared to the volume of monthly or annual data. For studying changes in the extremes it is crucial to use homogenous data otherwise wrong conclusions can be made when estimating e.g. trends in extremes. In this paper all daily and sub-daily temperature series from Switzerland are being homogenized. Switzerland is an interesting study site for homogenization purposes because it offers a dense network of stations with rather long series (up to 250 years) but it also has a very complex terrain (Alps).

The correction method used (HOMAD) accounts for the whole distribution of a temperature series. We present cold indices/trends in Switzerland (using minimum and maximum temperatures) from the raw and homogenized series and assess the impact of homogenization on the results.