



## High-resolution Spatial Interpolation of Hourly Temperature in Norway

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This work describes the development of a spatial interpolation method for hourly temperature observations from automatic weather stations. The high-resolution gridded dataset, updated on a daily basis, will be used in climatology, hydrology and meteorology.

Currently, Norway has a network of about 500 automatic weather stations measuring two-meter instantaneous temperature with hourly frequency. The observations are available at MET Norway in the Climate Database, although the many sub-networks constituting the overall network are managed by different public institutions, such as: MET Norway, the Norwegian Water Resources and Energy Directorate, the Norwegian Public Roads Administration. In general, the station network is adequate to describe atmospheric processes down to the meso-beta scales. The grid resolution of 1Km is chosen to take into account the complex topography of Norway.

The spatial interpolation is performed through a statistical interpolation method, which is based on a scale-separation concept. First, the focus is on the reconstruction of larger meteorological scales affecting a significant number of neighboring stations by means of a non-linear detrending procedure. The resulting vertical temperature profile allows for ground-based inversions and it may change at every time step depending on actual atmospheric conditions. Second, the inclusion of local scale effects affecting few neighboring stations is based on an Optimal Interpolation procedure. The larger scale background is modified on a local basis in order to achieve the best-linear unbiased estimate of the unknown true atmospheric state. Different de-correlation length scales are used for the vertical and the horizontal directions in the error covariance matrices definition.

To deal with the presence of gross measurement errors in the observations, a spatial consistency test is included in the statistical interpolation.

The spatial interpolation method has been evaluated both using average skill measures and considering significant case studies.