

Vertical and horizontal detrending for the optimal interpolation of temperature observations from a high resolution meteorological network

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The present work describes an optimal interpolation algorithm implemented for 2m temperature observations from Lombardia's high resolution meteorological network.

Local meteorological services manage high density networks which measure, with high temporal resolution, most surface meteorological parameters, often over a complex topography. On the other hand, an independent first guess, such as an operational model field, is not always available with temporal and spatial resolution as high as the observational network. To overcome this problem, a de-trending procedure is realized by estimating, at each observation time, the main vertical and horizontal temperature dependence. This dependence is then used to compute a background field that also accounts for the possible occurrence of thermal inversions. Covariances are estimated by three dimensional analytical correlation functions.

In this work the algorithm is described, the implementation choices are justified, and the theoretical and operational performance of temperature interpolation is presented. A detailed description is given of the algorithm behavior in two cases where strong temperature gradients were observed, a foehn case and persistent fog case.

Work is in progress to extend the interpolation procedure to other variables and to account for covariance anisotropies caused by topographic features.