Spatial interpolation of monthly mean air temperature data for Latvia

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Temperature data with high spatial resolution are essential for appropriate and qualitative local characteristics analysis. Nowadays the surface observation station network in Latvia consists of 22 stations recording daily air temperature, thus in order to analyze very specific and local features in the spatial distribution of temperature values in the whole Latvia, a high quality spatial interpolation method is required. Until now inverse distance weighted interpolation was used for the interpolation of air temperature data at the meteorological and climatological service of the Latvian Environment, Geology and Meteorology Centre, and no additional topographical information was taken into account. This method made it almost impossible to reasonably assess the actual temperature gradient and distribution between the observation points.

During this project a new interpolation method was applied and tested, considering auxiliary explanatory parameters. In order to spatially interpolate monthly mean temperature values, kriging with external drift was used over a grid of 1 km resolution, which contains parameters such as 5 km mean elevation, continentality, distance from the Gulf of Riga and the Baltic Sea, biggest lakes and rivers, population density. As the most appropriate of these parameters, based on a complex situation analysis, mean elevation and continentality was chosen. In order to validate interpolation results, several statistical indicators of the differences between predicted values and the values actually observed were used. Overall, the introduced model visually and statistically outperforms the previous interpolation method and provides a meteorologically reasonable result, taking into account factors that influence the spatial distribution of the monthly mean temperature.