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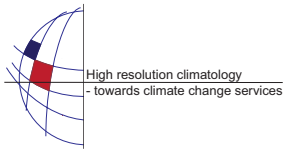

Gridded monthly temperatures over Italy

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Temperature data represent a relevant source of information for environmental modelling, which usually relies on the availability of regularly distributed datasets. The CRU and the E-OBS archives are two examples of large-scale gridded products available for temperature. In order to fill the gap of having such a dataset freely available at national level, a high resolution (1 km) dataset for the whole Italian territory has been realized, made up of gridded monthly mean temperatures over Italy from 1961 to 2008. Available temperature data are provided by several national and regional networks and are consequently rather discontinuous in time and inhomogeneous in space. For this reason, our approach is based on the use of all data available for each month; this choice limits the consistency of gridded temperatures as time series but guarantees the best possible spatial estimate for each time period. The space interpolation was implemented by means of regression-kriging, a well-known geostatistical approach. Regression kriging is a variant of kriging interpolation which allows to exploit the auxiliary information provided by external variables. In this work, altitude and latitude of the input weather stations were found to be strongly correlated with temperature data and used as independent variables in the regression model. Ordinary kriging was then applied to describe the spatial correlation structure of the regression residuals. For each map, the most appropriate variogram function was estimated by means of an objective algorithm. In order to evaluate the quality of each interpolated surface, a cross validation analysis was performed, whose results were evaluated in terms of root mean square error, mean absolute error and mean squared deviation ratio. RMSE ranges between 1.0 and 1.5 °C, and improves, as expected, over the last years when a greater number of stations are available. The RMSE as function of the season was investigated as well. The monthly maps were used to generate two secondary products: annual mean temperature maps and mean temperature maps for the normal periods 1961-1990 and 1971-2000. As an example of time aggregation of temperature maps, mean temperature surfaces for four decades (1968-1977, 1978-1987, 1988-1997 and 1998-2007) were generated and compared.