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# Constructing gridded hourly temperature data sets

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Air temperature is the main climatological element, with major impact on the earth-atmosphere energy balance. The characteristics of the surface air temperature in locations without meteorological measurements are obtained using spatio-temporal interpolation techniques. Gridded surface meteorological data are essential for evaluating the performance of regional climate models (RCMs), for applying Statistical Downscaling (SD) methods and as input data for hydrological models.

In this study we proposed a methodolgy for interpolating hourly surface temperatures. Three gridding methods are compared. A two-step multivariate gridding approach was used. First we interpolated the hourly normal maps, considered as multiannual average (1961-2010), of air temperature for each hour (4 meteorological terms) of a standard year (366 days). In this step, the Residual Kriging method was used with potential predictors derived from DEM and Landcover Corinne. For interpolating the residuals of the regression model we tested 3 gridding methods: Multiquadratic (MQ), Ordinary Kriging (OK) and 3D Kriging (using time as a third dimension).

In the second step, we calculated the anomalies of each hour, day, year for the period 1961-2010. The anomalies were interpolated using the same methods applied for gridding regression residuals. The final hourly surface air temperature maps were obtained by summing the maps from first step with the anomlies map.

The main data used in this work were the hourly air temperatures of the 4 observation terms (01, 07, 13, 19), measured between 1961-2010 at the weather stations of the Romanian Meteorological Administration. The predictors were derived from SRTM (Shuttle Radar Topography Mission) DEM and from CORINE Land Cover 2000 product. The gridding was performed in a Romanian National Grid (Stereo 70), at 1 km2 spatial resolution, using R language.

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