Spatio-temporal interpolation of sub-daily (6-hour) precipitation over Romania for the period 1975-2010

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The realisation of gridded datasets by means of interpolation techniques of local data allows to determine the climatological characteristics for locations and areas where measurements are not available. Gridded precipitation data are essential for evaluating the performance of regional climate models, for downscaling, or as input for spatially-distributed agrometeorological and hydrological models.

Here, a two-step interpolation framework is proposed for computing sub-daily (6-hour) precipitation maps over Romania, over 36 years (1975-2010), using meteorological and ancillary data. In the first step, the monthly climatology maps were constructed. Here, the auxiliary predictors were quantified with the help of multi-variate geostatistical model (Regression Kriging). In the second step – the interpolation of the six-hour anomaly maps of precipitation –, three methods were compared: Multiquadratic, Ordinary Kriging and 3d Kriging. Due to the good results in interpolating precipitation anomalies (and to the fewer steps required for producing the maps) the Multiquadratic method was chosen to construct the six-hour precipitation ratios maps for the period 1975-2010. By comparing the new gridded dataset to similar sets of data, and by using precipitation data from five independent stations, it was proven that the proposed methodology was suitable for accurately estimating in space and time the 6-hour precipitation values. The final outcome of this work is a gridded precipitation dataset, at a six-hour time step, available in high spatial resolution