



Regionalisation of precipitation data with a web-based raster climate tool for the Free State of Saxony, Germany

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Models, e.g. rainfall-runoff-models, need areal climate data, particularly precipitation, as input. Precipitation is known for its temporal and spatial variability, but is an important variable in meteorology and hydrology. A web-based regionalisation (upscaling) tool of climate data and its application to precipitation data is presented. The tool interpolates locally measured values of climate and precipitation stations, as well as data of regional climate projection scenarios (SRES scenarios) into raster climate data for the Free State of Saxony, Germany. This raster climate data tool (RaKliDa) serves for Internet inquiry, generation and request of regionalised climate data. RaKliDa is an open web page which generates raster grids in a GIS readable format (ASCII-grid) for different temporal (starting with daily values) and spatial (500 m², 1000 m²) resolutions. The following climate elements are available as raster data: e.g. air temperature [°C], precipitation (uncorrected and corrected for wind losses) [mm], wind speed in 10 m and 2 m above ground [m/s], global radiation with an altitude correction concerning the atmosphere turbidity in [J/cm²] and [kWh/m²], an adapted potential evaporation after Wendling [mm] as well as the climatic water balance [mm]. RaKliDa includes different regionalisation methods based on a digital elevation model: regression to height a.s.l., an inverse distance weighting (IDW), kriging and combinations. Additionally, a background field method is integrated, which represents a weighted combination of the elevation model based method (in gliding 10 year periods or gliding years) and either IDW or kriging for each given time step. The background field considers the systematic error during the interpolation process, serves for higher homogeneity over all time steps and the output is better suited e.g. for water balance models.

Normally, variogram estimation is done half-automatic during a kriging process, but RaKliDa adjusts the given linear or exponential variogram model by itself. Furthermore, a correcting of negative weights is done during kriging to avoid kriging estimates outside the range of input data. Daily precipitation data are interpolated with a combination of point kriging and indicator kriging. Indicator kriging is done to separate cells with precipitation from no rain areas, which can be a problem with simple regionalisation methods.

The application of the web-based regionalisation tool is shown for two types of precipitation with different rainfall distributions. For daily values RaKliDa shows a clear separation of precipitation areas from areas with no precipitation.

The RaKliDa-tool serves as web-based client/server application, the regionalisation is done completely automatically and the tool is acting independently and can handle large data sets. RaKliDa was developed in charge of the Saxon State Ministry of Environment and Agriculture represented by the Saxon State Office for Environment, Agriculture and Geology (LfULG).