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Sunshine Duration Mapping

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Climatological and meteorological observations are preformed in more or less dense observational points. To present a spatial distribution of meteorological variables, besides the measurements in limited number of points we need to build a model, that describes physical processes and relations to the topography. Our aim was to calculate spatial distribution of sunshine duration and prepare a climatological maps.

Four maps were prepared to represent spatial distribution of sunshine duration for winter, spring, summer and autumn. The values on all four maps are 30-years mean seasonal sunshine duration, calculated from measurements on 45 meteorological stations in the reference time-period 1971-2000. The seasonal presentation was chosen due to high interseasonal variability in spatial distribution of sunshine duration, which would not be obvious in spatial distribution of yearly accumulation of sunshine duration. The values on the maps are calculated for mathematical horizon, to avoid the influence of geographical, urban and vegetational obstacles, in order to present the spatial variability of sunshine duration due to weather influence.

The spatial distribution of average seasonal sunshine duration was calculated using objective interpolation methods. The interpolation model was a combination of multivariate regression model, residual kriging and simple mathematical models. Geographical variables (altitude, latitude and longitude) were used in models to explain the spatial variability of sunshine duration. For each season, regionalisation was preformed, based on sunshine duration data, geographical data and radiosaunding data. While sunshine duration is very much dependent on cloudiness, for every region and season the average cloud base was estimated out of radiosounding measurements and

it was used in the interpolation model. The interpolation models were developed separately for every region and afterwards the calculated layers were merged using GIS techniques.

The values of seasonal sunshine duration were calculated in 100 m resolution mash grid in order to consider high spatial variability of terrain variables. In the final step the values were averaged in 1 km resolution grid, which is appropriate resolution considering spatial density of measurements and model output errors.