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Spatial interpolation of relative humidity in Slovenia

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Relative humidity is important information for several end-users from different branches: health, tourism, civil engineering, forestry, energetic... It is also one of the influencing parameters on the energy consumption for cooling. For the purpose of national regulation for energy consumption for heating and cooling, high spatial resolution data of relative humidity were demanded. Since the spatial density of humidity measurements is low, the interpolation in high-resolution grid was necessary.

Interannual variability of relative humidity is high and that was one of the reasons that spatial distribution of long-term humidity averages was calculated on monthly basis. The spatial distribution of average monthly relative humidity 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 relative humidity. For each month, regionalisation was preformed, based on relative humidity data, geographical data and radiosaunding data. While relative humidity is very much dependent on cloudiness and cold air pools formation, for cold season months and every region the average cold air pool height 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 monthly relative humidity 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.