High resolution climatology
- towards climate change services

Spatial interpolation of biologically effective UV radiation over Poland

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The ultraviolet(UV) radiation plays an important role in the Earth-Atmosphere System. It has a positive influence on both human health and natural environment but it may also be very harmful if UV exposure exceeds "safe" limits. For that reason knowledge about spatial distribution of biologically effective UV doses seems to be crucial in minimization or complete elimination of the negative UV effects.

The main purpose of this study is to find the most appropriate interpolation method in order to create reliable maps of the biologically effective UV radiation over Poland. As the broadband UV measurement network in Poland is very sparse, erythemaly weighted UV radiation data reconstructed from homogeneous global solar radiation records were used. UV reconstruction model was developed in Centre of Aerology (Institute of Meteorology and Water Management) within COST Action 726 – 'Long term changes and climatology of UV radiation over Europe'. The model made it possible to reconstruct daily erythemal UV doses for 21 solar radiation measurement stations in the period 1985 – 2008.

Mapping methodology included the following processing steps: exploratory spatial data analysis, verification of additional variables, selection and parameterization of interpolation model, accuracy assessment and cartographic visualization. Several different stochastic and deterministic interpolation methods along with various empirical semivariogram models were tested. Multiple regression analysis was performed in order to examine statistical relationship between UV radiation and additional environmental variables such as: elevation, latitude, stratospheric ozone content and cloud cover. The data were integrated, processed and visualized within GIS environment.