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Rain erosivity distribution in the Czech Republic

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Soil erosion on agricultural fields and sediment transport from agricultural land into rivers and reservoirs remains problem within the Czech Republic. During the collectivization period (around 1955) the landscape pattern was destroyed and intensive agricultural production started in many regions. Erosion problems were largely escalated and in many reservoirs water quality is highly affected from then by sediment transport and pollutants of agricultural production. Many silted reservoirs have problems with storage capacity reduction and intensive euthrophication during summer seasons.

Therefore continuous soil erosion assessment is needed for various applications, e.g. land relocation process. USLE (Wischmeier et al., 1978) is commonly used for these purposes as a simple and robust tool. Nowadays it is used also for regional studies as a GIS application. R, K and C USLE factors are commonly accepted from official catalogues recommended by Research Institute of Ameliorations and Soil Conservation Prague (Janecek et al., 2002). But these are not up to date so there was uncertainty about actual rain erosivity values in the Czech Republic. New research was undertaken at CTU Prague in cooperation with Czech Hydrometeorological Institute to update these values.

The research begun in 2002 but no actual values of continuous rainfalls measurements were accessible at that time, so several alternate methods were used for the first attempts. First 4 continuous 40 years measurements in 4 meteorological stations were obtained and analyzed. Storm energies, intensities and erosivities in between 1962-2002 were calculated. Then 87 stations with monthly rainfall amounts for the same period (1962-2001) were analyzed. Since direct Wischmeier's methodology could not be applied here, Modified Fournier Index MFI (Gabriels et al., 2003) and summer pe-

riod R index according Rogler and Schwertmann (Van der Knijff et al., 2000) were used. Comparing the regionalization with 4 previous stations and adapting to altitude regions resulted in first serious rainfall erosivity map of the Czech Republic (Dostal et al., 2004).

But monthly rainfalls cannot be considered as a meaningful rain erosivity indicator, so further research was undertaken. In 2006 new 37 digital meteorological stations with continual measurements were analyzed, so high quality data from 2000-2005 were obtained. From these data rainfall distributions for all erosive storms could be identified and statistical methods were applied for comparing the resulting values and previous attempts. Then GIS spatial statistics was employed to prepare new rain erosivity map for the Czech Republic. Still there were problems that had to be solved. First – several huge regional floods occurred in the Czech Republic during the 2000-2005 period, therefore much longer data source than 6 years is necessary to straighten out these extremes. Second – lack of data in several regions lead to uncertainties, so gathering more data is an important future aim. For these and other reasons, also the map of uncertainties was produced – so that the user of the rain erosivity map is aware of these problematic regions.

Recent map of rain erosivities in the Czech Republic for last 6 years (and the map of the uncertainties) is an important source for estimating regional differences in soil erosion and sediment delivery. Another important output is the database of erosivities and storm characteristics in included stations for any period during 2000-2006. Nevertheless longer term estimations are needed for local studies and soil protection measures designing. Also previous rain erosivity regionalizations and other sources have to be used.

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