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# Monthly Rainfall Erosivity Assessment for Switzerland

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Water erosion is crucially controlled by rainfall erosivity, which is quantified out of the kinetic energy of raindrop impact and associated surface runoff. Rainfall erosivity is often expressed as the R-factor in soil erosion risk models like the Universal Soil Loss Equation (USLE) and its revised version (RUSLE). Just like precipitation, the rainfall erosivity of Switzerland has a characteristic seasonal dynamic throughout the year. This inter-annual variability is to be assessed by a monthly and seasonal modelling approach. We used a network of 86 precipitation gauging stations with a 10-minute temporal resolution to calculate long-term average monthly R-factors. Stepwise regression and Monte Carlo Cross Validation (MCCV) was used to select spatial covariates to explain the spatial pattern of R-factor for each month across Switzerland. The regionalized monthly R-factor is mapped by its individual regression equation and the ordinary kriging interpolation of its residuals (Regression-Kriging). As covariates, a variety of precipitation indicator data has been included like snow height, a combination of hourly gauging measurements and radar observations (CombiPrecip), mean monthly alpine precipitation (EURO4M-APGD) and monthly precipitation sums (Rhires). Topographic parameters were also significant explanatory variables for single months. The comparison of all 12 monthly rainfall erosivity maps showed seasonality with highest rainfall erosivity in summer (June, July, and August) and lowest rainfall erosivity in winter months. Besides the inter-annual temporal regime, a seasonal spatial variability was detectable. Spatial maps of monthly rainfall erosivity are presented for the first time for Switzerland. The assessment of the spatial and temporal dynamic behaviour of the R-factor is valuable for the identification of more susceptible seasons and regions as well as for the application of selective erosion control measures. A combination with monthly vegetation cover (C-factor) maps would enable the assessment of seasonal dynamics of erosion processes in Switzerland.