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The role of intense rainfall events on the land degradation processes in the Slovak and Polish catchments

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Land degradation caused by anthropogenic activities (deforestation, overgrazing, unsuitable land-use and management practices) negatively influence the well-being of people and also accelerates soil erosion processes. The main evidence for a link between soil degradation and water erosion can be seen in the following elements: increasing rainfall intensity, permafrost thawing, biomass production, tillage, cultivation overgrazing, deforestation/ vegetation clearing, vegetation burning, poorly designed roads and paths to a global extent. Therefore, it is significant to investigate degradation processes in order to point out the possible adverse effects of unsuitable management practices of the landscape in the scale of past and future periods. A future prediction of the development of any processes requires long-term investigation and analysis of the phenomenon predetermined to assess future behaviour. On the contrary, analysis of past processes shows us precipitation patterns and reveals their effect on the generation of degradation processes. The study describes the role of rainfall events on a generation of erosion processes, especially soil water erosion in the catchments located in Poland (Zagożdżonka) and Slovakia (Svacenický Jarok). A common characteristic of these catchments is the susceptibility to degradation processes, the predominance of arable land and the dominant agricultural use of catchments. In the case of Zagożdżonka catchment (Poland) the modelling period covers the years 1963-2020 with the real measured rainfall events. On the contrary, in the case of Svacenický jarok the future development of degradation processes was analyzed based on the future prediction of rainfall events covering the period 2020-2100 and generated by CLM model (Climate Land Model). In both cases, the simulations were performed using the physically-based EROSION-3D model and three scenarios were created in order to model different land cover, land use, soil types and crops on agricultural land. The first scenario reflects current catchment conditions, the second reflects the best conditions (more forests, fewer pastures and unprotected land) and the third involves worst-case conditions (no protective measures or changes of inappropriate management practices). The results provide insight into the development of degradation processes, illustrate how changes in rainfall patterns affect soil degradation processes in the past and future and take into account different scenarios of management practices together with an analysis of the impact of rainfall events on these processes.