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The assessment of influence of rainfall characteristics in soil erosion by water in Chwalimski Brook catchment, NW Poland

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Soil erosion by water is one of the most important factors affecting contemporary landscape changes within the lowland geoecosystems in Central Europe. Soil erosion mainly depends on: rainfalls (especially its intensity and erosivity), length of slope and its inclination, type of cultivation and usage of land, anti-erosion treatments and susceptibility of soils to erosion. The main goal of the research was related to evaluate rainfall impact on soil erosion processes. The research was conveyed by stationery observation and quantitative researches that have been conducting within the Chwalimski Brook catchment (NW Poland) since the early 90s and by computation rainfall characteristics: intensity, kinetic energy and erosivity (rainfall erosivity index EI30).
Presented results contains data of runoff, soil loss and rainfall collected at testing plot in a 16-years period (2001-2016 hydrological years). The slope with the test area is located within the 1st order catchment being a subsystem of the Młyński Brook catchment and then followed by the upper Parsęta catchment. The slope is covered with gleyic retisols and maintained with no vegetation as a black fallow. Its average inclination is about 4 degrees with its south-east exposure. The measuring system of soil erosion covers a testing plot (42 meters long, 4 meters width).
The annual rainfall erosivity changed from 144.7 to 782.1 MJmm/ha/h, precipitation sums from 524.9 to 919.7 and soil loss varied from 0.074 to 4.471 kg/m2. The greatest rates of soil loss were established in the most rainy years. However some significant annual soil loss (e.g. in 2013 and 2014) occurred in below average rainfall totals. Therefore, the achieved results show that annual soil erosion primarily depends on individual rainfall and erosive events. Hence, magnitude of soil erosion cannot be estimated only on the basis of rainfall totals, but it is also necessary to consider intensity and erosivity of single rainfall events.