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Soil particle size distribution in surface runoff under artificial rainfall

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Soil erosion by water is commonly mentioned worldwide environmental problem. During a rainfall soil surface is disturbed by rain drops and surface runoff, the soil particles get mobilized and washed out of the surface. In this work the particle size distribution of eroded material collected in surface runoff was investigated and the dependency to the slope and the condition of the plot (rills, surface changes, soil moisture) was analyzed. Experiments were performed in four steps (i) on the plot with prepared smooth surface under soil dry conditions, (ii) after antecedent rainfall with a short interruption (15 min) under fully saturated soil conditions, (iii) after natural drying (approx. fourteen days) on the plots with rills from previous experiment, (iv) again under fully saturated conditions. During every experiment two samples of surface runoff were collected (one in the middle and second at the end of the experiment), air dried and then used for the particle size distribution analyses. Laser diffractometer „Mastersizer 3000“ by Malvern was used for the particle size distribution measurement. Only small amount of material is needed and measurements are done in short time period. Particles were measured in 5 replications in natural conditions (aggregates), and after the aggregates destruction (soil particles)
For this research two types of experiments with different rainfall simulators were used. (i) Three plots with stable medium scale field rainfall simulator (nozzles Spraying system WSQ40, intensity of 60 mm/h) with a plot size 4*2 m in fixed slopes with inclinations of 22°, 27°, and 34°. (ii) Medium scale laboratory simulator with plot of 4*1m with variable slope and with two types of nozzles (Spraying system WSQ40 and Veejet 800100) with different rainfall intensity. The particle size analyzis from approximately 70 samples (700 PSD curves) will be presented.
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