CHARACTERIZATION OF AN ARTIFICIALLY GENERATED RAINFALL USED FOR A SOIL EROSION RESEARCH

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A rainfall simulator is a common laboratory tool for soil erosion research. Typical objective of the rainfall experiments is the evaluation of various factors on soil erosion processes, such as the effect of rainfall intensity, rainfall duration, soil characteristics, soil management, crop residues on the soil surface, plot's slope and length. The results of the experiments are then upscaled to estimate the erosion processes in the landscape or they serve as the calibration data for the simulation models. Due to the fact that the soil erosion is initiated by the rainfall, it is crucial to keep the simulated rainfall characteristics as close as possible to the natural rainfall. Rainfall intensity is usually easy to control, but the rainfall kinetic energy is the driving force of the initial stage of the erosion. The aim of this study is to evaluate the simulated rainfall characteristics, incl. its drop size distribution and kinetic energy, and compare the simulated rainfall to the natural rainfall. Within a study we also compared three common disdrometers and we show limitation of the disdrometers to monitor the artificially generated rainfall.

The experiments were done with a use of nozzle type rainfall simulator. The rainfall characteristics were monitored by disdrometers LPM (Thies Clima), Parsivel (OTT) and PWS100 (Campbell Sci.), standard raingauge was used as a reference measurement for the intensity monitoring. The intensity, recorded with the disdrometers, was very similar to the rain gauge. In the average it measured 106% (LPM), 79% (Parsivel) and 116% (PWS100) of rain gauge value. There was a large difference between the disdrometers in the measured kinetic energy values. LPM significantly underestimated the kinetic energy compared to the other disdrometers it measured 83% of Parsivel value and 59% of PWS100 value. The highest values were measured with the PWS100. The key conclusion is, that a simulated rainfall with the intensity above 20 $mm.h^{-1}$, has significantly lower kinetic energy, compared to a natural rainfall with same intensity.