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Comparison of the rainfall kinetic energy measured by different distrometers

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Rainfall kinetic energy (KE) is a parameter that is used in description and prediction of the soil erosion. Historically the KE was derived from the established relationships between rainfall energy and rainfall intensity. Nowadays the Laser and Video Distrometers are being utilized for direct measurement of the rainfall characteristics, such as spectrum of drop sizes and fall velocities. Within the ongoing project on rainfall kinetic energy and soil particles detachment we measure KE and splash erosion at several locations in Central Europe and New Zealand (see EGU2018-1845 and EGU2018-4353). As each site is equipped with a different distrometer, we conducted rainfall simulation experiments using all distrometers to approve the performance and comparability of the individual devices for the splash erosion research. The tested distrometers are: (i) Laser Precipitation Monitor 5.4110 (Thies Klima , Germany); (ii) OTT Parsivel (OTT Hydromet, Germany); (iii) Present Weather Sensor PWS100 (Campbell Sci., UK), and (iv) 2D Video Distrometer (Johanneum Research, Austria). The distrometers were placed under a rainfall simulator on specific positions with various rainfall intensity (ranging from 10 mm/h to 80 mm/h). The rainfall intensity at each position was measured by tipping bucket rain gauge and a rainfall totalizer. All monitoring devices were repeatedly rotated among the positions to obtain a set of KE and rainfall intensities for each distrometer. The main results are: (i) KE and rainfall intensity measured with different devices at the same position show rather high variability; (ii) KE-I relationship obtained by the individual distrometers show linear trends; (iii) distrometers cannot be used for measuring simulated intensive rainfall (approximately above 60 mm/h) because of the data recording failures due to specific software of some devices. Results from more than 20 individual experiments will be presented. The research has been carried out within the framework of projects GA17-33751L and FWF I 3049-N29.