



Sound wave energy emitted by water drop during the splash on the soil surface

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A drop of rain falling on the surface of bare soil not only moisturizes but also can cause splash or compaction, depending on the energy of incident drops and the condition of the surface on which it falls. The splash phenomenon can be characterized by the weight of detached soil material (using splash cups) as well as the number and trajectory of splashed particles (using high-speed cameras).

The study presents a new aspect of the analysis of the splash phenomenon by measurement of the sound pressure level and the sound energy of the wave that propagates in the air. The measurements were carried out in an anechoic chamber. Three soils (Endogleyic Umbrisol, Fluvisol Endogleyic Cambisol, and Haplic Chernozem) with four initial moisture levels (pressure heads: 0.1 kPa, 1 kPa, 3.16 kPa, and 16 kPa) were tested. Drops of 4.2 mm diameter were falling from a height of 1.5m. The sound pressure level was recorded after 10 consecutive water drop impacts using a special set of microphones. In all measuring conditions with 1m distance, the sound pressure level ranged from 27 to 42dB. The impact of water drops on the ground created sound pulses, which were recalculated to the energy emitted in the form of sound waves. For all soil samples, the sound wave energy was within the range of 0.14 μJ to 5.26 μJ , which corresponds to 0.03-1.07% of the energy of the incident drops (Ryżak et al., 2016).

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References

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