



Assessing the sediment load in overland flow based on the stremppower concept

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The most determining parameters in equations or models for assessing sediment load in overland flow are: the critical momentum flux, the mean runoff velocity, the unit stream power or the critical shear strength. Some of those the parameters as critical momentum flux and critical shear strength are difficult to measure and good relationships with soil physical parameters are lacking. Moreover it is shown that the Manning equation is not suitable to calculate the velocity of overland flow during the interrill erosion process, and hence it is preferred to apply relationships using the overland flow discharges measured at stream (or rill) outlets, instead of the velocity parameters.

For assessing sediment load (concentration) in interrill overland flow, the stremppower concept can be used in the transport function based on the slope and on the discharge per unit width of the flow.

Laboratory rainfall simulation tests were performed on a large number of inclined soil pans packed with sandy, loamy and silty soils of loess origin and subjected to different rainfall intensities. This resulted in several hundreds of observations of discharge (runoff) and sediment (soil loss) in the runoff water. It was found that the stremppower ω (g s^{-3}) was the best predictor of the unit sediment load q_s ($\text{g s}^{-1} \text{cm}^{-1}$). A power function fitted the data best. The relationship was also function of the clay content. The higher the clay content, the lower the unit sediment load (concentration) in the overland flow.

Keywords: stremppower, sediment load, rainfall simulation, loess soils, overland flow, unit discharge