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# Rill erosion in cohesive soils - Part II

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During an erosion event soil is translocated by splash, sheet as well as rill or gully erosion. Rill erosion, as the initial stage of gully erosion, is the dominant process of sediment mobilisation and translocation. This research work focuses on the development of rills in cohesive soils. A soil filled experimental flume (2m x 0,1m) was used to simulate rill erosion. The experimental setup allowed variations in slope, discharge and soil bulk density. The soil we used is a silt loam (FAO, 1990). The soil bulk density averaged 1.3 g/cm$^3$. The discharge ranged from 0.06 to 0.3 l/s. The slope was adjusted to 2%.

Increasing discharges provoked higher flow velocities at the beginning of an experimental run. As soon as headcuts had developed the average flow velocity ($\sim$ 0,39 m/s) did not significantly change for different discharges. The discharge was correlated to the number of headcuts ($R^2$=0.6). The headcut velocity was not correlated to discharge ($R^2$=0.01). There was also no correlation between number of headcuts and headcut velocity ($R^2$=0.06).

Sediment concentrations were correlated to discharge ($R^2$=0.64) but not to headcut velocity ($R^2$=0.16). Sediment concentrations were weakly correlated to the number of headcuts ($R^2$=0.3).

To simulate erosion processes at a lower part of a slope we used sediment laden overflow. Initial sediment concentrations did not significantly change density and kinematic viscosity of the flow.

The average Froude numbers is 2. Shear stress values range from 0,5 to 1,5 N/m$^2$.

First results with consolidated soil (bulk density $\sim$ 1.46 g/cm$^3$) indicate that the number of headcuts decrease whereas the headcut velocity seems to increase. The flow velocity before headcuts had developed on consolidated soil exceeds flow velocities of unconsolidated soil. After the development of headcuts average flow velocity corresponds to flow velocities on unconsolidated soil ($\sim$ 0.4 m/s).