Geophysical Research Abstracts,
Vol. 11, EGU2009-8868, 2009
EGU General Assembly 2009

Experimental investigations of rill erosion dynamics in Andalusia

S. Wirtz (1), M. Seeger (1,2), and J.B. Ries (1)

(1) Dep. of Physical Geography, Trier University, Germany, (2) Dep. of Land Degradation and Development, Wageningen University, Netherlands

Rills are considered to be effective sediment sources, distributers of large sediment quantities and act as preferred runoff channels for overland flow. They have the potential to develop to irreversible forms (Gullies). Despite of the continuous advances in modelling particularly the modelling of rill erosion remains still difficult. So it is important to produce experimental data from field experiments to increase the process knowledge and for developing more useable models. In the experiments a standardised method should be used to achieve a certain comparability of the results between different test areas. In September 2008 seven rill experiments were accomplished in different natural rills in Andalusia.

Water is induced into the rill with a constant intensity and the flow velocity is measured for each meter at three different terms. At three measuring points four samples are taken following a given time table. After a flow distance of 20m the runoff amount is measured. Slope is measured for each meter. In order to consider the influence of starting soil moisture two runs are accomplished in each rill. So it is possible to discern changes in spatial and temporal process.

In the experiments in Andalusia on a silty-loamy substrate sediment concentrations of more than 400 gl-1 were measured. It can be discerned that the waterfront can only transport the loose material lying in the rill because of the low flow velocity. Erosion starts later when the flow velocity increases. But not only the flow velocity is responsible for sediment delivery. Plungepools have an important influence on the sediment budget: First, they store water and sediment, so the flow velocity and the sediment concentration at the measuring points below is decreased. However, at the time the plunge pool spills over a huge quantity of water and sediment is delivered and flow velocity as well as sediment concentration increase significantly. Collapse events and retreat at knickpoints also increase the sediment concentration. If there are no special events like a collapse or a plunge pool- spill over it is clearly to detect that in rill sections with low slope the flow velocity decreases and material is deposited, in rill sections with higher slope the velocity increases and material is removed as expected. There is no simple transport from the rill start to the rill end. The consequence of this fact is that there is not automatically a constant increase in sediment concentration from the first to the last measuring point. Because of decreasing soil shear forces the sediment concentration increases with time but also this process can be covered by collapse events and retreat.