



factors controlling overland flow discontinuity in Arid and Semi-arid zones

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In Arid and Semi-arid areas hillslope overland flow is generated by rainfall intensity excess over infiltration rate (Horton overland flow). Through flow does not play direct role in this process and the soil profile is almost dry after overland flow event except for its upper few centimeters.

In studies executed in the Sinai desert, the Negev desert and the Judean desert, it was found that the overland flow is not continuous and in most cases only a relatively narrow belt at the lower part of the hillslopes on both sides of the channel feed the channel flow.

The factors controlling the discontinuity of overland flow are:

1. Rainfall properties:

a. The typical short rain events (rain showers of 5 - 30 minutes) in which overland flow that was generated on the hillslopes at a distance of more than 30m from the near channel has almost no chance to reach the channel and to contribute to the channel flow as it infiltrates into the soil on the hillslope before reaching the channel and therefrom evaporates (Lavee & Yair 1990).

b. The fact that the actual rain amount reaching the ground, and its intensity, are higher near the channel and the adjacent lower part of the hillslopes (Sharon 1980).

2. The spatial distribution of the soil properties which determine infiltration rate:

a. Lateral variations such as the intermittently existence of gullies and interfluves on the lower part of scree slopes. The gullies are characterized by big blocks that have rolled down from upslope and are partly buried in a matrix of fine particles whereas the interfluves are composed of loose smaller blocks with a very high void ratio and small amounts of fines. Overland flow is generated only in the gullies (Yair & Lavee 1974).

b. Vertical variations such as the existence of colluvium at the lower part of the hillslope, in which infiltration rate is usually higher than in the upper part of the hillslope (Yair, Sharon & Lavee 1978).

c. Spatial distribution of different types of patches such as bare soil covered by mechanical crust or big stones, especially when partly embedded in the topsoil (Lavee & poesen 1991), that function as source areas of overland flow, and shrubs, mosses or small stones that lie on the soil surface that function as sinks for the direct rainfall and for the overland flow from adjacent source patches (Lavee, Imeson & Sarah 1998).