Geophysical Research Abstracts
Vol. 13, EGU2011-680, 2011
EGU General Assembly 2011

Evaluation in the laboratory of the influence of storm movement on the hydrologic response of small areas.

Jorge Isidoro (1,3) and João de Lima (2,3)

(1) University of Algarve, Civil Engineering Department, Faro, Portugal (jisidoro@ualg.pt), (2) University of Coimbra, Civil Engineering Department, Coimbra, Portugal (plima@dec.uc.pt), (3) IMAR – Marine and Environmental Research Centre – IMAR-CMA, Portugal

Moving storms are natural phenomena which affect the rainfall-runoff process. Ignoring the storm movement can lead to considerable over- or under-estimation of runoff volumes and peaks. The rainfall runoff process has to be understood for a variety of engineering studies, such as the design of urban drainage systems, the analysis of pollutant and soil transport, water resources management, and flood defence and flood management systems. Most methods used in hydrologic studies assume a constant rate of rainfall whereas natural rainfall is highly variable in both time and space. Thus the effect on the runoff response to the movement of storms across the drainage area is not taken into account.

The aim of this study is to quantify the hydrologic response of drainage systems in terms of discharges and soil loss caused by both non-moving and moving rainstorms. Laboratory experiments were conducted in the last few years, employing different set-ups to gain insight into this issue.

The experiments used several soil flumes, a physical scale model (1:100 scale) representing an impermeable downtown urban area with high rise buildings and a movable sprinkling-type (full cone nozzle) rainfall simulator. Moving rainstorms were simultaed by moving the rainfall simulator upstream and downstream over the soil surface and the physical scale model at different speeds and from different directions. Overland flow and sediment transport were monitorized over time, during the runoff events.

The laboratory soil flumes and physical scale-model experiments both showed that the direction of the storm movement significantly affected the runoff and the water erosion process at different scales, especially for very high intensity rainfall events. The differences observed between static and moving rainstorms should be taken into consideration for small drainage basins, which means that design procedures need careful evaluation.