Effect of the movement of storms across drainage areas with different shapes - soil flume experiments

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Most water erosion studies do not take into account the movement of storms across drainage areas, due to the combined effect of wind and rain. However, the importance of storm movement on surficial flows has long been recognised, at scales ranging from headwater scales to larger catchment basins. Laboratory experiments can be used to explore the dynamics of complex processes. The main objective of this study was to investigate, in laboratory conditions, the influence of the storm movement on overland flow and soil loss from sloping areas. To simulate moving rainstorms, a rainfall simulator was moved along different directions over the soil surface of soil flumes. Runoff and sediment deliveries were measured at the outlet of several flumes with different shapes: rectangular, circular, convergent and divergent.

The results of the present study show that storm direction, affecting the spatial and temporal distributions of rainfall, has a marked influence on the runoff and soil loss processes. Soil loss resulting from rainstorms moving in different directions across drainage areas are clearly linked with the characteristics of the corresponding overland flow hydrographs, namely, peak discharge. Storms moving downslope on convergent surfaces are the most potentially hazardous in terms of erosion.