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The development of erosion measurement equipment for elucidating rainfall-induced saltation during shallow-flow conditions on planar surfaces

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Rain-impacted flow occurs on planar or near-level surfaces in areas where inter-rill erosion is the predominant sediment transport process. Since it is responsible for the preferential selectivity of fine-sediment and sediment-associated contaminants, the transfer of such material from terrestrial to aquatic ecosystems may have an appreciable impact on water quality and on the biogeochemical cycle. This presentation describes the main components of a laboratory-based facility that was designed and developed by the Physical Geography and Environmental Change Research Group, University of Basel, Switzerland, for the specific purpose of investigating rain-impacted flow during shallow-flow conditions on planar or near-planar surfaces. The equipment consists of a rainfall simulator suspended over a flume containing an erodible surface and, through the use of a number of distinct water control features, particular emphasis has been given to controlling and measuring the relative influence of key variables associated with shallow-flow characteristics. The equipment incorporates a number of distinct features that permit varying flow characteristics to be closely controlled. This provides a means of isolating their respective effect and provides an opportunity to quantify and precisely measure their relative influence on rain-impacted flow during sheet wash conditions. The main components of the experimental facility are outlined and key properties associated with the control and measurement of precipitation, runoff and erosion conditions during simulated rainfall events are described and some preliminary results are presented and briefly discussed. Data generated thus far highlight the potential of the equipment to replicate similar erosion conditions over multiple rainfall simulations, and also emphasise the need for operators to become conversant with the control features. It is envisaged that data produced by this facility, under the guidance of experienced operators, will be of sufficient quality to contribute to developing and further refining physical-based erosion models.