



Effects of scale on sediment transfer from agricultural land

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The limitations of current monitoring techniques mean that it is necessary to select particular spatial scales at which to measure and study soil erosion processes. This study uses event-based runoff and suspended sediment data collected at three spatial scales (1.9 ha, 2.5 ha and 3.7 ha) integrated within a small (30.6 ha) agricultural catchment, to demonstrate that the scale which we measure influences the data we can collect, and hence the inferences we make about soil erosion through monitoring experiments. Seventeen rainfall events were monitored in the Jubilee catchment, Herefordshire, UK, in one hydrological year, however, responses to all rainfall events did not occur at all scales. Only ten event responses occurred at all scales monitored, and the number of event responses observed increased with scale of observation. Six event discharge and suspended sediment characteristics were used to describe the event response at different scales. Temporal variability between events was high, but variance between the scales was greater than variance within scales for two characteristics, peak discharge, and peak suspended sediment concentration, where values varied significantly between scales. Peak discharge showed a significant increasing trend with increasing scale ($r^2 = 0.61$), while peak suspended sediment concentration showed a significant decreasing trend with increasing scale ($r^2=0.62$). There was no significant difference in either discharge yields or suspended sediment yields between these scales, or in the timing of the discharge or suspended sediment peak. A number of event rainfall, soil moisture and runoff characteristics were used to explore relationships between discharge and suspended characteristics at each scale, and so determine dominant factors which may influence the discharge and suspended sediment response at each scale. The results highlight the importance of scale-appropriate monitoring, and the need for more consideration of the observation scale when undertaking field monitoring or using field data to understand and predict soil erosion.