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Sources and suspended solid load in a rural catchment, NW Spain

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A rural drainage catchment of 16 km^2, with low antropic influence focused on non intensive agriculture and small farms, was selected in Galicia (NW Spain) to evaluate sediment export by water. In this region, as a consequence of land partitioning, agricultural production systems are characterized by small size of fields and family oriented. Maize and grassland were the main crops in the catchment. In some cases, fields were left fallow during winter after maize cultivation. Water discharge and suspended solid concentrations were measured during some rainfall events at the catchment outlet since 2004. Regular surveys were conducted within the catchment in order to obtain data on the suspended solids sources.

During the observation period important variations in suspended solids yield were detected, which could be linked with processes occurring within the catchment. In a single event, the sediment peak generally precedes the peak discharge, following a clockwise hysteretic loop. The magnitude of hysteresis loop and the suspended solid load transported during a single event are related with the storm size, soil surface status as well as the development of rills and ephemeral gullies. For example after a series of rainfall events, during the autumn period of 2005, ephemeral gullies were formed in a hillside (after maize recollection) located in the head of the catchment resulting in high sediment export. During these events the suspended solids concentrations reached values of 626 mg/L.

The study of event sequence showed that the suspended solid concentrations associated secondary peaks are lower than those associated with the first ones. Samples collected during the events that occurred in February 2005 and October 2006 showed the progressive exhaustion of sediment.

The load of suspended solids in the river varied with the events. It was observed that

a small number of single rain events can contribute in an important way to the annual suspended solids load.

Runoff from agricultural soil, forestry road and riverbank represent the most important sources of suspended sediment in the catchment.