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Evaluating bed load transport in a mountain stream of the Central Spanish Pyrenees

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When studying sediment transport in mountain streams, solutes, suspended sediment and bed load must be considered. However, there is a scarcity on bed load data due to the increasing difficulty of quantifying sediment transport as the size become greater. Some works suggest that bed load transport only represents 5-10 % at a global scale while others have shown that in some specific areas it can represent more than 80% of the sediment yield.

In the Arnás stream (Central Spanish Pyrenees) bed load transport is an important process since the channel is totally armoured with gravel and rocks. Since 1996 discharge, solutes and suspended sediment transport are measured at the outlet of the catchment. Bed load is retained in a 0.7 m^3 trap located before the flume, though during big floods this system is insufficient. In these cases, the trap is overfilled, favouring the accumulation of a bar which behaves as a dam. In September 2003 a 3 m long profilometer with 20 sticks every 15 cm was built. Seven profiles are measured every 60 cm so that the topography of an area of 10 m^2 is modelled from 140 points. The volume of bed load transported during the flood is estimated from this topographic surface. The subsequent removal of the accumulated material facilitates the comparison between events and relationships between bed load volumes (V_{bd}) and other hydrological variables are analysed. Results from one year period validate such methodology. Relationships between V_{bd} and the peak of suspended sediment concentration are statistically significant. V_{bd} is also correlated with the peak flow when considering a logarithmic function, suggesting that peak flow is the main factor that explains bed load transport.