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Temporal variability of sediment load in a highly erodible Mediterranean mountainous catchment (The River Isabena, Southern Pyrenees)

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Reservoir siltation is accelerated in areas where runoff occurs over highly erodible unconsolidated sediments on bare slopes (i.e. badlands) under severe climatic conditions, such as the Mediterranean mountains, with long dry periods and storms of high rainfall intensity. There, most sediment is detached and eroded during short high magnitude rainfall events. Under such circumstances erosion rates are very high, creating high-density flows in the river network that reach the lowlands. Despite the enormous interest of those mountainous areas for water management, there are yet not many studies aiming at understanding sediment load dynamics and temporal distribution at the large catchment scale, which can support hydrological modelling and inform engineering mitigation actions. This is the case of the River Isabena, a 445 km^2 drainage basin located in the Southern Central Pyrenees, whose suspended sediment yield threatens water storage capacity of the downstream Barasona Reservoir. The dam was built in the 1930s and regrowth in the 1970s; several million tones of sediment were sluiced down in the 1990s to alleviate siltation and to ensure water supply to 70,000 hectares of irrigated land. We have monitored the suspended sediment transport at the basin outlet during the period 2005-2007 by means of manual and automatic sampling, and continuous turbidity measurements. Mean sediment concentration is 0.45 g/l, with maximum values attaining 300 g/l. Sediment yield ranges from almost 50×10^3 tones (110 t/$km^2\times$year) during the dry 2005-06 year to 185×10^3 tones (415 t/$km^2\times$year) reached the average 2006-07 year. Mean sediment yield in the

Isabena ranks as moderate to high in relation to other Mediterranean catchments. A rainfall-dependent sediment transport has been observed, with the highest values of sediment export occurring during seasons in which elevated precipitation typically occur i.e. late summer and autumn (2005-06); if rainfall does not occur sufficiently during that period, sediment load is then dominated by snowmelt (i.e. spring 2007). Temporarily sediment storage in the channel ensures high suspended sediment concentrations, even during baseflows ($>$1 g/l).