



## **Long-term monitoring and long profile analysis in two small alpine catchments with different sediment transport processes.**

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Sediment transport in steep, small ( $<10 \text{ km}^2$ ) mountain catchments of the Alps is often represented by both newtonian (floods with suspended and bedload transport) and non-newtonian (debris and mud flows) behaviour, passing through hyper-concentrated flood events, characterized by intermediate characteristics. Despite a significant diversity as to their transport mechanics, the monitoring activity of such low-frequency, impulsive, high-energy processes in remote areas poses problems that are similarly complex. We examine the results obtained from experimental stations located in two streams of the Eastern Italian Alps: the Rio Cordon ( $5.0 \text{ km}^2$ ) and the Moscardo Torrent ( $4.1 \text{ km}^2$ ). The former hosts a measuring station for water and sediment (both suspended and bedload) transport rates operating since 1986, whereas the latter was set up in 1989 to monitor debris-flow events. Differences in sediment dynamics between the two basins are quantitatively investigated by using a magnitude-frequency analysis that highlights the relatively low sediment supply of the bedload-prone Rio Cordon and the unlimited sediment availability in the debris flow-prone Moscardo Torrent. The downstream spatial organization of channel forms have been examined in both study sites by a slope-area analysis in order to define the dominating geomorphic processes domain. The Rio Cordon exhibits a lower average slope than the Moscardo Torrent and displays an alternation of high-gradient and low-gradient reaches. This rugged profile allows partial sediment deposition, so that debris flows may happen (fro high/magnitude-low/recurrent events) only in some stretches of the channel. By contrast, the high channel gradient and regular longitudinal profile of the Moscardo Torrent, make it possible for most debris flows to reach the alluvial fan. As a con-

sequence of the dissimilar sediment dynamics between the two basins, the two main channels feature a different degree of bed structuring. In fact, the Rio Cordon displays well-developed step-pool sequences that are typical of supply-limited systems. Conversely, the Moscardo Torrent is characterized by a poorly-structured bed profile, indicating the frequent disturbances induced by the passage of debris flows.