



Tracing sedimentary mobilization from debris flows in the Peyronnelle sub-catchment of the Guil River (Queyras, Southern French Alps)

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The Guil River is subject to high magnitude/low frequency, flash-flood events. The upper Guil catchment (Queyras – 317 km²) is characterized by a lithology composed of 90-95% of shales, supplying a high, fine and coarse sediment load to the river-bed. Most of the sediment load in the main channel of the Guil River comes from small torrential tributaries, such as the Peynin catchment, and its sub-catchments such as the Peyronnelle. During the June 2000, 30-year RI flood event, one of Guil's major tributaries, the Peynin (15 km²), supplied up to 22,500 m³ of material displaced by debris flows, out of which 12,000 m³ aggraded on the Peyronnelle fan. In order to highlight the sediment dynamics on small torrential channels and its connection with gravel-bed streams, we set up 320 PIT tags equipped pebbles and boulders in the Peyronnelle channel. The distances and trajectories of tracers have been monitored since 2013 during summer periods. On August 9, 2015, a stormy rainfall (14 mm in 3 h) occurred in the Peynin catchment and triggered debris flows in the most active sub-catchments (Roche Rousse, Peyronnelle, Trois Arbres). This event has mobilized 90% of the PIT tags equipped pebbles and boulders installed in the Peyronnelle catchment. On the basis of a 32% return rate, our results indicate a >700 m maximum distance transfer and the mobilization of 36% of PIT tags equipped pebbles and boulders out of the catchment. Deposited volumes on the torrential fans have been estimated as 9,000 m³ in the Peynin catchment. Our results highlight the pulsating character of sediment fluxes associated with high magnitude and low frequency events; they indicate the strongest functionality of debris-flow dominated channels in the Peynin catchment.