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Estimation of increasing sediment transport rates along watercourses in the upper Soca river valley after recent strong earthquakes and large landslides

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The paper analyses the influence of recent strong earthquakes and larger landslides on sediment transport rates in river channels in the Upper Soca River basin. Specific annual average sediment production in the headwaters of this typical alpine valley in western Slovenia is estimated at > 1000 m3/km2/year or given as denudation rate > 1 mm/year. Landsliding not only changes morphology of the terrain but quite often produces sediments that reach the fluvial network. In last years, two large landslides (Stoze, Strug) were triggered in this river basin, both of them having a volume of the order of 1 million m3, and being different regarding the sediment delivery ratio to the fluvial network The Stoze Landslide with a volume of around 1,5 million m3 turned into a wet debris flow, which immediately delivered more than 1 million m3 of coarse debris to the fluvial system. The deposited material is now actively eroded by the Koritnica River and brought to the Soca River, where it is dredged and used for construction purposes. In the paper, the results of the sediment budget analysis after this event will be presented together with the volumetric data on dredged sediments. The Strug Landslide as a complex landslide initiated by a rock slide amounts to nearly 1 million m3 in total, contributed to the fluvial system by releasing several rainfall-induced debris flows of the order of some 100 m3 a year. In mountainous terrain, during stronger earthquakes normally numerous slope failures occur. After the earthquake on April 12, 1998 (magnitude M = 5.6, estimated intensity after EMS between VII and VIII), in the Upper Soca River valley more than 100 such cases were regis-

tered. After the earthquake on July 12, 2004 (magnitude M = 4.9, estimated intensity after EMS between VI and VII), in the same region again around 50 slope instabilities were registered. The majority of these events were rock falls, which were mapped in the field and will be shown. After the 1998 earthquake, 52 rock falls, and after the 2004 earthquake 44 rock falls were registered. In the first case, much larger failures occurred as in the latter, when the majority of events were rather superficial. Numerous rock falls that were triggered along vertical slopes in carbonate rocks, released large amounts of coarse debris, an important part of which gravitates into torrential channels. Some rock falls were triggered just above the channels, so that the released rocky materials fell directly into it. Other rock falls were situated quite differently with regard to the channel network. Only with some rock falls the rock fall debris accumulated on slopes, where there is rather low connectivity with channels. With the majority of rock falls, the accumulated rock fall debris is slower or faster eroded to the main channels. After a slope failure also soil erosion on this slope accelerates. After the 1998 earthquake, hyperconcentrated flows were observed during floods on the Lepenica Torrent and the Tolminka River. On the latter a sediment retention basin was built and thus, volumetric data on dredged sediments will be presented. As shown in the case of the Upper Soca River valley, recent strong earthquakes and large landslides were an important erosive factor.