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Analysing connectivity through landslide-channel geomorphic coupling in a large drainage system of Southern Romania

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Unlike creep, splash erosion and linear erosion which sometimes are called „continuous" slope processes, since they are perceived as causing relatively continuous erosion on slopes and a rather rapid transport towards river channels, mass movement processes, excepting flows, have a discontinuous behavior, manifesting stochastically on time intervals ranging from one year to tens of years, while the displaced material can remain suspended in different parts of the slope forming sediment stores. It is obviously why estimating the sediment delivered to the river network by landslides becomes a difficult task.

Landslide control on channel dynamics is just one of the several forms of hillslope-channel coupling. Landslide-channel connectivity is relevant for understanding the way landslides are contributing to the sediment flux within catchments and how their study should be integrated in the estimation of sediment budgets.

This paper explores the geomorphic coupling of landslides with river channels based on an extensive landslide inventory. The study area is a large drainage basin (> 2400 km2) in southern Romania encompassing four different geomorphic units (mountains, hills, piedmont and plain). The region is highly affected by a wide range of geomorphic processes which contribute to supplying sediments to the drainage network. The presence of a reservoir at the river outlet emphasizes the importance of estimating sediment budgets, the first stage of which consists in studying sediment sources. High sediment transport is associated to flash floods, a fraction of which is due to the slope failures occurring in response to the undercutting of river channels.

Nominal classification systems as well as quantitative measures available in the connectivity literature are adopted here to describe the landslides-channels contact zones. Characteristics of the geomorphic coupling interfaces are further linked to the resulting geomorphic effects of landslides on the drainage. Observations made are useful in understanding the differences in landslide-channel connectivity characterizing the various geomorphic landscapes present in the study area.