

EFFECTS OF SEDIMENT PULSES ON CHANNEL MORPHOLOGY AND SEDIMENT TRANSPORT IN A GRAVEL-BED RIVER

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Sediment delivery to stream channels in mountainous basins is strongly episodic with large inputs of sediment typically delivered by infrequent landslides and debris flows. Identifying the role of large but rare sediment delivery events in the evolution of channel morphologies and fluvial sediment transport is crucial to an understanding of the development of mountain basins. In July of 2001, intense rainfall triggered numerous debris flows in the severely burnt Sleeping Child watershed, Sapphire Mountains, Montana. Ten large debris flow fans were deposited on the valley floor. Investigations focused on the channel response

to the large input of sediment. The channel has aggraded immediately upstream of the fans, and braided in reaches immediately downstream. Channel incisement through the fans has created sets of coarse-grained terraces. The deposition upstream of the pulses consists almost exclusively of fine material resulting in a median bed material size (D50) 1-2 orders of magnitude lower than the ambient channel material. The volume of sand being transported is so great that these aggrading reaches can extend hundreds of meters upstream of the pulses with 1-2 meters of sand deposited across the entire valley floor. In a 10-km study reach with 10 debris flow fans, cross section surveys, longitudinal profiles, and pebble counts chronicle channel response to a major increase in sediment supply and provide insight on the processes of sediment wave dispersal.