The partitioning of the total sediment load of a river into suspended load and bedload

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The partitioning of the total sediment load of a river into suspended load and bedload is an important problem in fluvial geomorphology and sedimentation engineering: Bedload transport rates are notoriously hard to measure and at many sites only suspended load data is available. Often the bedload fraction is estimated with rule-of-thumb methods, which are inadequately field-tested. Here we discuss the partitioning of sediment load for the Pitzbach, an Austrian mountain stream for which high temporal resolution data on both bedload and suspended load is available. The available data shows large scatter on all scales. The fraction of the total load transported in suspension may vary between zero and one at the Pitzbach, while the average fraction decreases with rising discharge (i.e. bedload transport is more important during floods). We review existing data on short- and long-term partitioning and suggest an empirical equation to estimate bedload transport rates from measured suspended load transport rates. The partitioning averaged over a flood can vary strongly from event to event. Similar variations may occur in the year-to-year averages. Long-term average partitioning could be a function of the fraction of the catchment covered by glaciers and the extent of forest, but the available data is insufficient to draw final conclusions. The long-term minimal fraction of the total load transported in suspension increases with increasing drainage area and with decreasing rock strength for gravel bed rivers, whereby in large catchments the bedload fraction is insignificant at ĩ%. For sand bed rivers, the bedload may be substantial (30-50%) even for large catchments.