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Empirical relations between large wood transport and catchment characteristics

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The transport of vast amounts of large wood (LW) in water courses can considerably aggravate hazardous situations during flood events, and often strongly affects resulting flood damage. Large wood recruitment and transport are controlled by various factors which are difficult to assess and the prediction of transported LW volumes is difficult. Such information are, however, important for engineers and river managers to adequately dimension retention structures or to identify critical stream cross-sections. In this context, empirical formulas have been developed to estimate the volume of transported LW during a flood event (Rickenmann, 1997; Steeb et al., 2017). The data base of existing empirical wood load equations is, however, limited. The objective of the present study is to test and refine existing empirical equations, and to derive new relationships to reveal trends in wood loading. Data have been collected for flood events with LW occurrence in Swiss catchments of various sizes. This extended data set allows us to derive statistically more significant results. LW volumes were found to be related to catchment and transport characteristics, such as catchment size, forested area, forested stream length, water discharge, sediment load, or Melton ratio. Both the potential wood load and the fraction that is effectively mobilized during a flood event (effective wood load) are estimated. The difference of potential and effective wood load allows us to derive typical reduction coefficients that can be used to refine spatially explicit GIS models for potential LW recruitment.