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Sediment transport in steep forested catchments: the role of disturbance and scale

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Sediment loads (both bedload and suspended sediment) are difficult to measure due to the time and equipment needed. However such data is needed to understand overall sediment transport rates, landscape evolution, effect of human disturbance as well as patterns and temporal response. There is a dearth of such data sets globally let along for Australia. Here we present the findings from 8 steep slope forested catchments dominated by headwater streams (size range 15-100 hectares) in south-eastern Australia where both bedload and suspended load have been measured over multiple years. The results demonstrate that suspended load is the dominant component. There appears to be no consistent suspended to bedload ratio for the catchments. The suspended sediment to bedload ratio appears to be catchment specific. There was no relationship between total load (or bedload/suspended load) and average catchment slope, stream length, shape or any geomorphic descriptor. Again this appears to be catchment specific. However catchment total load was found to be significantly related to catchment area and demonstrates strong log-log linear behaviour. Comparing these total loads with total load data from a nearby larger catchments (100km2 to 1000km2) demonstrates that there is a significant scaling relationship across all catchment sizes in this region. The scaling relationships found here are similar to those found globally and provide a unique insight into an understudied system. The data also provides the ability to assess sediment transport models and their reliability across different scales.