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Suspended sediments from upstream tributaries as the source of downstream river sites

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Understanding the efficiency with which sediment eroded from different sources is transported to the catchment outlet is a key knowledge gap that is critical to our ability to accurately target and prioritise management actions to reduce sediment delivery. Sediment fingerprinting has proven to be an efficient approach to determine the sources of sediment. This study examines the suspended sediment sources from Emu Creek catchment, south eastern Queensland, Australia.
In addition to collect suspended sediments from different sites of the streams after the confluence of tributaries and outlet of the catchment, time integrated suspended samples from upper tributaries were used as the source of sediment, instead of using hillslope and channel bank samples. Totally, 35 time-integrated samplers were used to compute the contribution of suspended sediments from different upstream waterways to the downstream sediment sites.
Three size fractions of materials including fine sand (63-210 μm), silt (10-63 μm) and fine silt and clay (<10 μm) were used to find the effect of particle size on the contribution of upper sediments as the sources of sediment after river confluences. And then samples were analysed by ICP-MS and –OES to find 41 sediment fingerprints.
According to the results of Student's T-distribution mixing model, small creeks in the middle and lower part of the catchment were major source in different size fractions, especially in silt (10-63 μm) samples. Gowrie Creek as covers southern-upstream part of the catchment was a major contributor at the outlet of the catchment in finest size fraction (<10 μm)
Large differences between the contributions of suspended sediments from upper tributaries in different size fractions necessitate the selection of appropriate size fraction on sediment tracing in the catchment and also major effect of particle size on the movement and deposition of sediments.