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LM-OSL components of quartz as sediment tracers

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This study investigate the first attempt for the use of Linearly Modulated Optically Stimulated Luminescence (LM-OSL), as an alternative to using fallout radionuclides, to determine the dominant erosion process supplying sediment in a water supply catchment in southeast Queensland.
Fifteen surface-soil and five channel bank samples were collected and their LM-OSL signals were compared to those from samples collected from two downstream river sites.The shapes of the LM-OSL signal curve of quartz varied in surface soil samples, with negligible slow components at the tail of curve, and whilst channel bank samples produced signals with more dominant slow components.
Discriminant analysis on the source samples showed that quartz properties can be used to differentiate between channel bank and surface soil sources. Normal distributions for selected quartz components were determined for each of the end members, with these distributions then used to estimate the source contribution to two river bed sediment sites.
The results indicate that channel bank derived sediments dominate the sediment sources at both sites, with 90.1 $\pm$ 3% and 91.9 $\pm$ 1.9% contributions. These results are in agreement with previous studies based on measurements of 137Cs and 210Pbex fallout radionuclides to estimate the relative contribution from these two sources. Consequently, LM-OSL approach may be a useful method to estimate the relative contribution of surface soil and channel erosion to stream sediments.
Keywords: Quartz, OSL signal components, Tracers, Sediment sources