ENLIGHTENMENT OF LANDSCAPE DYNAMICS USING SG-PIRIR LUMINESCENCE SIGNAL OF FLUVIAL SEDIMENTS (RANGITIKEI RIVER, NZ)

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Feldspar single-grain post-infrared luminescence (SG-pIRIR) signals are increasingly used to date Quaternary deposits. It provides high-resolution equivalent dose (De) distributions, allowing age estimation through appropriate age models. For heterogeneously bleached fluvial deposits, we use the bootstrapped minimum age model [1]. Recent studies have shown that SG-pIRIR can also be used to reconstitute sediment pathways [2-4].

Our aim here was to use information from SG-pIRIR as a geomorphic tool to reconstitute the landscape evolution and better understand the origin of the grains that constitute the river sediment load. Investigations were carried out on the Rangitikei River (RR), New Zealand [4]. We found that RR last aggrading phase (17.4 ±1.9 ka to 11.6 ±1.5 ka) was followed by an incision in several steps. A dataset of 28 SG-pIRIR dates on terrace remnants along the river, indicates that rapid incision related to knickpoint retreat was followed by a phase of slower incision associated with widening of the RR canyon.

We also used the SG-pIRIR De distributions to investigate changes in sediment pathways over time. Towards this, we focused on the proxies provided by the fraction of saturated and well-bleached grains. We show that saturated grains were mostly sourced from bedrock and that their dominance in a sample is associated to high lateral input from valley flanks through landslides and related mass wasting processes during rapid incision and valley widening. In contrast, deposits formed during aggradational and slow incision phases contain a greater fraction of well-bleached grains. The De distributions also provide evidence that that a tributary, the Kawhatau River (KR), provides high sediment fluxes to the modern RR, a phenomenon that likely plays a major role in the widening dynamics on the downstream of the RR. Our results demonstrate that SG-pIRIR is well-suited to date fluvial terraces, reconstruct incision rates and reconstruct sediment sources. This makes is a versatile tool to study past and present river processes.

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