

# **Feldspar single grain luminescence of modern fluvial sediments: a new tool for the study of continental erosion and fluvial transport**

Anne Guyez <sup>\*1</sup>, Stéphane Bonnet <sup>1</sup>, Tony Reimann <sup>2</sup>, Sébastien Carretier <sup>1</sup>,  
Jakob Wallinga <sup>3</sup>

<sup>1</sup> GET, Université de Toulouse, IRD, UPS, CNRS (Toulouse), France

<sup>2</sup> University of Cologne, Geographic Institute, Geomorphology & geochronology, Germany

<sup>3</sup> Netherlands Center for Luminescence Dating & Soil Geography and Landscape group, Wageningen University, Wageningen, the Netherlands

In the recent decades, luminescence has been widely develop for dating Quaternary sedimentary deposits. One of the approaches is the single-grain post-infrared luminescence (SG-pIRIR) protocol, that provides high-resolution equivalent dose ( $D_e$ ) distributions, allowing age estimation through befitting age models. This protocol is particularly adpated to fluvial deposits that often present large heterogeneity in  $D_e$ .

Here we present a SG-pIRIR analysis of 24 samples of modern sediments from rivers in the South Island of New Zealand, with the aim of testing their use as a tool for documenting and quatifying erosion and transport as proposed in some recent publications (McGuire and Rhodes, 2015; Gray et al.,2018). 14 are from the Rakaia and the Waimakariri rivers, braided systems that are output channels for tonnes of sediment eroded annually from the Southern Alps. Those rivers are braided in the Canterbury plain on about 130-150km, except on short sections of 10-20km where they are running into incised gorges. 10 others samples are from catchments on both sides of the main divide of the Southern Alps range for which we also measured  $^{10}\text{Be}$  catchment wide erosion rates.

Our aim is to use information from SG-pIRIR as a geomorphic tool to better understand (1) characteristic transport lenghtscale, remobilization pattern and origin of the grain transported alongstream braided rivers; (2) compare luminescence signal and  $^{10}\text{Be}$  catchment wide erosion rate. To do so, we focused on the fraction of saturated and well-bleached grains from  $D_e$  distributions as proxies for respectively input of grains from bedrock and for transport and transient storage of particles in floodplains. We demonstrate for the first time that these proxies actually depend on catchment-wide erosion rates and show how these signals are modulated during downstream sediment transport in the braided rivers. Our preliminary results also suggest that remobilisation of grains from the floodplain must be taken into account to understand the longitudinal trends in single grain  $D_e$  distributions alongstream.

**Mots-Clés :** Luminescence, fluvial transport, erosion rate, single-grain, braided rivers.