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Using the portable luminescence reader to assess the historical lateral mobility of river channels: preliminary promising results

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Obtaining robust chronological data on landforms and their related deposits together with constraining rates of earth surface processes have constantly represented a major challenge in Quaternary science. In the fluvial context, Optically Stimulated Luminescence (OSL) is particularly well-established but still faces several limitations. It notably requires expensive and time-consuming sample processing and measurement, frequently resulting in a poor spatial and stratigraphical distribution of sampling which may negatively impact the chronological information. To overcome this main limitation, a Portable OSL reader (POSL) has been recently developed (Sanderson & Murphy, 2010). It consists in directly capturing a luminescence signal (counts per seconds) on unprepared sediment samples. This technique is quick and affordable but, unlike conventional OSL, is not able to yield numerical age estimates.

This contribution explores POSL capacities to provide useful relative age information on alluvial sediments from the last centuries. We study and compare 42 samples collected from three alluvial profiles located in the floodplain of a gravelly-sandy mid-sized river: the Bruche (i.e. a sub-tributary of the Upper Rhine, France). POSL stimulations, including both blue and infra-red signals, are performed in combination with grain size analysis. We observe (i) an overall increase of signal intensity with increasing depth, (ii) a very good match between blue and IR signals and (iii) no systematic correlation between signal intensity and grain size. Whilst this last point must still be confirmed (i.e. signal intensity does not primarily depend on grain size), our preliminary results positively suggest that POSL is a promising tool to provide a relative chronology for very young alluvial sediments. Furthermore, it may also provide information on geomorphic processes. These results will be combined soon to numerical dating (OSL and ^{14}C) and compared to outcomes of a planimetric analysis to thoroughly reconstruct the historical lateral mobility of the Bruche river.