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Spatially Resolved IR-RF: Deciphering Middle Pleistocene Transport Processes on a Single Grain Level?

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Luminescence dating techniques have gained considerable attention in Quaternary Sciences. Their event-based (e.g., sunlight exposure) character enables tracking of geomorphological processes using natural mineral grains (e.g., quartz or feldspar) to provide unique insights into the recent Earth's (geological) history. Our contribution evaluates the potential of a particular luminescence dating method, called infrared-radiofluorescence (IR-RF) to track Middle Pleistocene transport processes. IR-RF is applied to potassium feldspar and was already proposed by Trautmann et al. (1999) [1] two decades ago. IR-RF is believed to significantly enhance the temporal range (back to the Middle Pleistocene) of luminescence dating techniques. However, due to a lack of commercially available measurement equipment and doubts raised on its overall reliability, IR-RF based chronologies are scarce (e.g., [2,3,4])

We present work in progress applying spatially resolved IR-RF on multi-grain aliquots, to extract dates and rates information on a single-grain level to investigate the potential to track Middle Pleistocene transport processes. The samples used for our study have been previously subject to another IR-RF dating study [3] on coastal dynamics in the Médoc region (South-West of France). While the previous results show the potential of IR-RF, differences between age results, obtained with other trapped charge dating methods (ESR, OSL) and believed resulting from a complex sedimentation process, could not be fully resolved. Our study compares age results from 'conventional' IR-RF dating, with age results from the spatially resolved measurements. Our contribution will outline the potential and the limits of the different approaches and discuss the implications for quantifying the palaeoenvironmental history.

References

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