



## **Pulsed-photon portable OSL (PPSL) profile signatures of multi-layer archaeological sites**

Joel Roskin (1), Oren Ackermann (2), Gloria I. López (3), Naomi Porat (4), and Yotam Asscher (5)

(1) Geomorphology and Portable Luminescence Laboratory, The Leon Recanati Institute for Maritime Studies, University of Haifa, Haifa, Israel (yoelr@bgu.ac.il), (2) Israel Heritage Dept., Ariel University, Samaria, Israel, (3) Luminescence Dating Laboratory, CENIEH, Burgos, Spain, (4) Geological Survey of Israel, Givat Ram, Jerusalem, Israel, (5) Excavations, Survey and Research Dept., Israel Antiquities Authority, Jerusalem, Israel

Rapid assessment of luminescence signals of untreated or preliminary treated clastic sediments that contain feldspar or quartz by a pulsed-photon portable OSL (PPSL) reader is known to be useful for interpreting sedimentary sections during fieldwork, can assist with targeted field sampling for later full OSL dating, and prioritize laboratory work. This study presents high-resolution (10-25 cm intervals) PPSL profiling for investigating depositional processes and discriminating between natural to human-intervened sedimentation within multi-layer archaeological sites. Studies were conducted at prehistoric, protohistoric, Biblical and classical sites in southern and central Israel in sand, loess and clay dominated sediments. The samples were studied by pXRF and FTIR spectroscopy to characterize the relative mineralogical and chemical properties along the profiles, for estimating their possible influence on the luminescence signals.

Several characteristic PPSL profile 'signatures' were identified: (1) A 'normal' depositional profile signature where PPSL counts increase (linearly or in jumps per stratigraphic breaks) with depth. In this case, relative sedimentation rates of units can be extracted (2) An inverse profile signature where PPSL counts decrease with depth, sometimes in a linear fashion. (3) A uniform signature where PPSL counts remain similar let alone for the upper (soil/near-surface) samples (4) Zigzag profiles comprised of different combinations of the above three patterns. Each PPSL profile signature represents different relations between natural sediments, and deposits affected by human activity. Interpretation of the above PPSL profile signatures help deciding if OSL dating is feasible and necessary and if so, for what samples. Altogether, the study demonstrates the potential and some of the complexities involved in a rapid field-oriented approach combining PPSL and FTIR analyses of multi-layer archaeological sites.