



Towards increasing the spatial resolution of luminescence chronologies – Portable luminescence reader measurements and standardized growth curves applied to the beach-ridge plain of Phra Thong Island, Thailand

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Since optically stimulated luminescence (OSL) dating is time consuming and cost intensive, age information available for individual study sites is usually restricted to significantly less than 100 ages. In particular the interpretation of complex depositional systems with temporally and spatially diverse sedimentation histories may suffer from the effects of a poor spatial resolution or an ineffective distribution of chronological data. In these cases, time and cost efficient approaches that provide reasonable dating accuracy are required to substitute or complement full luminescence dating. For the sandy beach-ridge plain of Phra Thong Island, Thailand, which is chronologically constrained by a set of approximately 50 luminescence ages, we evaluated the potential (i) of luminescence profiling using a portable luminescence reader, and (ii) of standardized growth curves (SGCs) to improve the resolution and sampling strategy of OSL dating in coastal settings. Although SGCs are related to some shortcomings in dating accuracy, and luminescence profiling with even the favorable conditions provided by the homogeneous sandy stratigraphy of the beach-ridge plain does not equal full luminescence dating, both approaches are capable of reproducing some of the main chronostratigraphic features of the island. This includes the differentiation between Holocene and last interglacial ridges, as well as the identification of the general east-west progradation and some (but not all) of several 1500-2000 year hiatuses within the Holocene sediment succession. However, while both approaches can successfully identify relative chronological trends, robust absolute age estimates can only be achieved by considering the highly variable dosimetry, which is the main contributing factor to bulk luminescence signals apart from deposition age on Phra Thong Island. At Phra Thong, portable reader signals as a proxy for palaeodoses combined with sample-specific dose rates proved as the best compromise between rapid data acquisition and adequate dating accuracy.