

Optically stimulated luminescence dating of marine sediments: a review

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Optically stimulated luminescence (OSL) dating determines the time that has elapsed since sediments were last exposed to sunlight; the technique is widely applicable to late Quaternary sediments. An OSL age is calculated by dividing the radiation dose that has been absorbed by mineral grains during burial by the rate of energy absorption from ionizing radiation during burial (dose rate). The dose is measured using luminescence techniques and the dose rate is calculated from a knowledge of the concentration of natural radionuclides (U- and Th-series and ⁴⁰K) in the sediment matrix. A prerequisite for obtaining an accurate luminescence age is that all grains have been exposed to sufficient sunlight to empty the prior trapped charge prior to burial.

In contrast to studies on land, the application of OSL dating to marine sediments has been limited. The main reasons appear to be difficulties during sample collection (ensuring light shielded condition), the usually fine-grained nature of the material and the evaluation of the life-time burial water content. Here we give an overview of luminescence dating applied to marine cores, discuss the recent methodological advances and the upper and lower age limits. Finally, we show the potential of OSL dating of marine cores when high sampling depth resolution is available.

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