

High resolution OSL dating in the Sea of Okhotsk

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Optically stimulated luminescence (OSL) dating is now widely accepted as a chronometer for terrestrial sediment. More recently, it has been suggested that OSL may also be useful in the dating of deep-sea marine sediments. In this paper, we test the usefulness of high resolution quartz OSL dating in application to a 19 m marine core (MR0604-PC04A) taken from the southwestern Sea of Okhotsk, immediately to the north of Hokkaido, Japan.

Fine-grained quartz (4 to 11 μm) was chosen as the dosimeter, and a single-aliquot regenerative-dose protocol was used for the determination of equivalent dose (D_e), with stimulation by both infrared and blue light. The suitability of the measurement procedure was confirmed using dose recovery tests.

A high resolution record (~ 2 OSL ages/m) of sedimentation rate changes down the core was developed. The OSL ages are significantly dependent on the water content model chosen; two alternative interpretations are discussed, and the geologically preferred model identified. However, ages resulting from the non-modelled water content lie closest to the available radiocarbon ages (in the range up to 25 ka).

Our OSL ages confirm the high sedimentation rates in this locality, and for the first time demonstrate clear differences in sedimentation rate before, during and after the Last Glacial Maximum. While our core-section-averaged data and each grouped data show that OSL dating can be a powerful method for establishing high resolution marine chronologies, especially in sediments with little biogenic carbonate, there remain details of single-sample-age accuracy that require further study.