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A combined study on luminescence and radiocarbon datings of lacustrine sediments from arid northern China

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Arid northern China is an ideal place for the reconstruction of palaeoenvironmental changes, for which the chronology is a key issue. To test the applicability of optically stimulated luminescence (OSL) dating method to lake sediments and to evaluate the reservoir effect of 14C dating in arid northern China, twelve OSL samples and twelve radiocarbon samples were dated. These samples were from an 8 m long lacustrine section (Qingtu Lake, QTL) in Zhuyeze Palaeolake in arid northern China. Tests of luminescence characteristics (preheat temperature, laboratory dose recovery, OSL decay and growth curve, and equivalent doses distribution) confirmed that the OSL signal of silt-sized quartz (38-63 μm) from QTL section was fully reset before burial, and that OSL dating has considerable potential for improving the dating of Holocene lake sediments in the arid land of northern China, especially in those cases where there is a significant 'old carbon' problem. The good agreement between OSL and 14C dating for QTL section suggested that the reservoir effect of 14C samples in the study area is probably negligible, which was also supported by the analysis on two 14C samples using different dating materials for each of the two individual samples (shells which are assumed to be affected by reservoir effect, and peat organic matter which is assumed not to be affected by reservoir effect).