

Luminescence dating of the late Quaternary terrestrial-marine interaction sedimentary history of the north Jiangsu coastal plain and the Yangtze River delta in China

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Abstract: Coastal deposits are ideal archives to decipher the history of interactions between the atmosphere, oceans and solid earth in view of exchanges of mass and energy, climate-induced sea-level changes and coastal sedimentary evolutions. Chronostratigraphy is one of the key clues to understand the links between them. However, robust age controls over glacial-interglacial timescales in Chinese coastal zones remain so scarce. Here, we apply luminescence dating methods, including single-aliquot-regenerative (SAR) quartz optically-stimulated luminescence (OSL) and feldspar/polymineral post-infrared infrared-stimulated (pIRIR) dating, to sediments from the north Jiangsu coastal plain (JSP) and the Yangtze River delta in China to ascertain their chronologies. In combination of sedimentology and microfossil analysis, the late Quaternary sedimentary environments are re-examined based on our newly refined chronostratigraphy. In the north JSP, the obtained chronostratigraphy of a investigated core (EGWY02) revealed that terrestrial deposition occurred in marine isotope stage (MIS) 6, MIS 4-2 and the latest part of MIS 1, whereas marine-influenced sedimentation at MIS 5e, 5c, 5a and the majority of MIS 1. Specially, two sets of marine stratigraphic units (T1, T2) dated back to ~7 ka and 130-80 ka, respectively, were recognized, but no obvious MIS 3 transgression recorded in this core. In addition, the sedimentation rates (SR) resulted from Bayesian age-depth model show that two distinct high SR stages at 130-70 ka and 2-7 ka, corresponding to the global highstands of sea level and also strengthened East Asian summer monsoon (EASM); in contrast, much slower SR occurred through the last glacial as well as the late Holocene, when sea level was lower and the EASM intensity was weakened. However, in the Yangtze River delta, the chronostratigraphic comparison of our studying core (YZ07) with the adjacent cores along a south-north transection, suggested the tidal flat to delta deposits dated to the MIS3 at the basal part, which was erosionally overlain by terrigenous unconformity surface and fluvial deposit of the last glacial. This terrigenous unit is then overlain by the postglacial transgressive to regressive succession of tidal river, tidal sand bar, and delta front to tidal flat after ~13 ka. Both records in the north JSP and Yangtze River delta show strong links between the regional terrestrial-marine alternation sedimentary history and climate-induced global sea level changes, although the discrepancy in MIS 3 was existed between two regions, which might be due to the differences in distances of coring sites far from the offshore either or their paleotopographic relief.

Keywords: Luminescence dating, Late Quaternary, Coastal deposits, terrestrial-marine interaction sedimentary history