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Late Quaternary shell concentrations on the continental shelf of southern Korea: bioclastic fabrics and paleoenvironments

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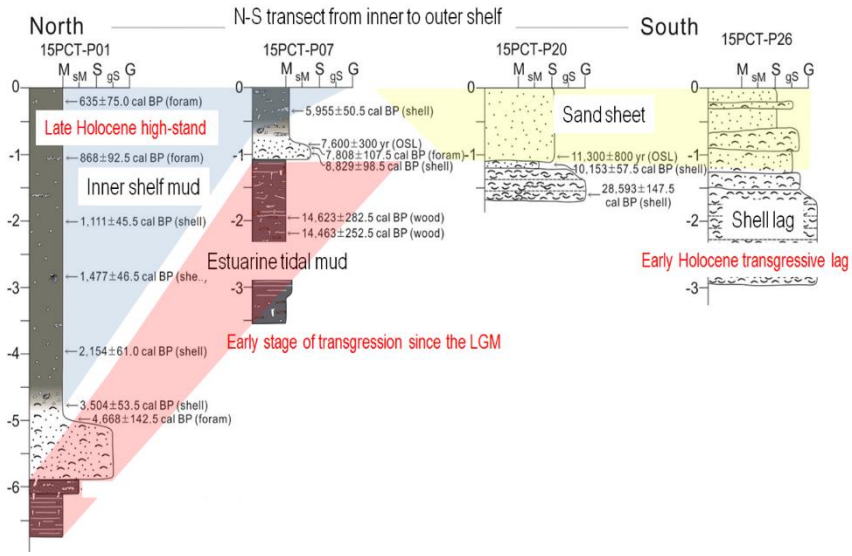
Shell concentrations with bioclasts occur widespread across the continental shelf of southern Korea. A particular feature is the variety in species composition and stratigraphic position. The types of shell concentrations vary in time and space, suggesting that they contain a record of the late Quaternary history of the shelf. Thus, the primary aim of this study was to utilize the shell concentrations to reconstruct the depositional and palaeo-environmental history of the region in association with changes in local sea level. More than thirty piston-cores were analysed for this purpose. In addition, one-thousand kilometres of sparker and chirp seismic profiles were acquired for seismic stratigraphic analysis. Shell bed ages were determined by OSL and radiocarbon AMS dating methods.

Surface sediments are generally distributed in discrete zonal belts between the inner and the outer shelf. Fine-grained sediments (silty clay or clayey silt) prevail along the coast and on the inner shelf up to water depths of about 50 m, representing a thick mud deposit emplaced during the postglacial highstand stage. Towards deeper water, the mud grades through mud-sand/sand-mud mixtures to relict sands containing abundant shell fragments. In the course of core examination, three major types of shell concentration were identified based on the substrates and shell fabric: 1) a mud matrix-supported, 2) a sand matrix-supported, and 3) a shell-supported type. The mud matrix-supported shell concentration occurs largely on the inner shelf, being erosively underlain by estuarine (tidal) muddy sand, and overlain by a late Holocene highstand mud. This suggests gravitational shell concentration along an estuarine channel bed. Shell concentrations in sandy substrates are found mostly on the middle shelf, the shells being normally graded. They are overlain by clean, massive sands. These features suggest bioclastic shell accumulation on the shoreface, representing beds overlying the shoreface ravinement surface. Shell-supported concentrations on the outer shelf are characterized by condensed packing, intense boring and encrustation of shells. Their thickness suggests repeated reworking and deposition during the early stages of transgression.



Stratigraphically, the shell beds on the outer shelf suggest deposition in the form of transgressive lags on a shoreface ravinement surface, whereas the shell concentrations on the inner shelf demarcate the onset of the sea-level highstand after transgression (Figure 1). It is thus evident that the spatio-temporal variety of shell beds

reveals the Holocene history of the shelf.

Figure 1: Correlation of core logs with shell fabrics across the shelf.