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Reconstruction of coastal progradation during the Holocene in Kangneung area along the east coast of Korea, based on OSL dating and GPR survey on beach-foredune ridges

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Coastal dunefields along the east coast of Korea were thought to be originated from the beach ridges and to have been prograded seaward during the Holocene without any absolute chronology. The optically stimulated luminescence (OSL) dating method and the ground penetrating radar (GPR) survey were used to reconstruct the history of coastal progradation of a dunefield in Kangneung area along the east coast of Korea. This dunefield was comprised of at least four ridges which were originated from beach-foredune ridges. The GPR profile across the ridges and sedimentological analysis reveal that they are mainly composed of beach deposits that consist of seaward-dipping and planar laminae, but capped by aeolian sands of landward-dipping laminae. The absolute chronology based on luminescence dating and radiocarbon ages of samples from five trench sites show the history of coastal changes in this area. Before the Holocene period, this area was deposited by fluvial sands and rounded cobbles which dated at ca. 33 $\sim$ 20 ka based on the OSL chronology. The 4th sand ridge from the sea was developed at around ca. 7 ka above these Pleistocene deposits, when the transgression rate of the sea was slowed. The shoreline has been prograded seaward since the Mid-Holocene, and as the result, the coastal plains have been developed. Between ca 3.5 and 3.0 ka, this area was eroded by some erosional events and foreshore sediments including granules and pebbles were deposited over the older beach deposits. Subsequently, it was prograded seaward again between ca. 3 $\sim$ 1 ka: the 3rd ridge was developed between ca. 3.0 $\sim$ 2.2 ka, the 2nd ridge was formed between ca. 2.2 $\sim$ 1.6 ka, and finally, the 1st ridge from the sea was developed between ca. 1.6 $\sim$ 1.0 ka. The shoreline advanced 0.14 m/a on the average during this period but it was especially speeded up at 0.5 m/a between ca. 2.2 $\sim$ 2.0 ka. The beach-foredune ridges in Kangneung area are regarded as strong evidence that support the Holocene coastal progradation in the east coast of Korea.