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Paleoenvironmental change during the late Holocene in the southeastern llow Sea, Korea

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We investigated the sediment provenance and paleoenvironmental changes of the southeastern Yellow Sea by examining clay mineral changes in sample cores obtained from the Korean Institute of Geoscience and Mineral Resources (KIGAM) borehole [cores HMB-102 (core depth: 20.35 m) and HMB-103 (core depth: 20.85 m)] in 2012. We prepared preferred-oriented specimens of 169 samples and then conducted semi-quantitative analyses for four important clay minerals using X-ray diffraction. Our results indicate that clay-sized terrigenous sediment deposited in the southeastern Yellow Sea is mainly from several Korean rivers and the Huanghe River in China. Down-core variations in the values of these clay minerals suggest a distinct change in in the provenance of fine-grained sediment of the Heuksan mud belt (HMB): the lower part of the deposit mostly comprised Korean river- or Huanghe-derived sediments, whereas the upper part, including the surface layer, has been under the influence of the Korean and Huanghe sediments. Before 13 ka ago, sediment was mostly derived from the Korean rivers. From 13 to 11 ka ago, contributions from the Huanghe became the main source, probably due to the inflow of the Korea Coastal Current (KCC) and Yellow Sea Coastal Current (YSCC) to the HMB. From 11 to 6 ka ago, the Korean rivers were the main contributors, with minor contributions from the Huanghe. For the past 6 ka, when the sea level was high and the shoreline was near the Korean Peninsula, materials may generally came from the Korean rivers. Thus, the relative contributions of the two sources have varied greatly in time and space since the Last Glacial Maximum (LGM). This result suggests that the movement of fine-grained sediments and associated changes in the circulation patterns of surface currents occurred due to an increase in water depth due to climate change and a rise in sea level following the LGM.

