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Characteristics of the acoustic blanking zone in the Holocene mud deposit in the continental shelf on the southeastern coast of Korea

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Geophysical survey and geological study of shallow gas in the continental shelf on the southeastern coast of Korea, were carried out by the Korea Institute of Geoscience and Mineral Resources (KIGAM) in 2011. A total of 448 km of high-resolution seismic reflection lines and eleven piston cores 5.78 to 7.95 m long, and dissolved methane data collected at four sites were analyzed for this study. The Holocene mud deposit of the study area can be classified as acoustic blanking zone, gas-free zone and gas-seepage zone based on their configuration. Acoustic blanking zone within the thick Holocene mud deposit was well observed in the study area. The width of this acoustic blanking zone decreased northwards from 10000 m to 700 m. The cores collected in and out of the acoustic blanking zone showed no obvious differences of total organic carbon (TOC) contents (1.1–2.1%). However, cores collected in the acoustic blanking zones showed greater headspace methane concentrations up to 26899 ppm. Significant high dissolved methane concentration (21.87 ppm) was also detected in the water column above the acoustic blanking and gas seepage zones. This concentration was about 15 times higher than that above the gas-free zone. The carbon isotope ratios indicate that the methane in the core sediments is primarily biogenic. TOC/TN (total nitrogen) ratios of core sediments are from 3 to 5 indicating that the organic matter originated from a marine source. The spatial distribution of the acoustic blanking zone may be affected by the East Korean Warm Current and Coastal Cold Eddy, and the water depth. The gas seepage may be caused by the lower pressure in shallow water without effect of the fault system.