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A comparative study of multi-scaled high-resolution seismic surveys in shallow marine environments: examples from three sites, offshore Korea

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In marine seismic surveys, various acquisition systems are used depending on the survey purpose, target depth, survey environment, and conditions. A 3D survey of oil and/or gas exploration, for instance, require large-capacity air-gun arrays and six or more streamers with a minimum length of 6 km. In contrast, a high-resolution seismic survey for the shallow-water geological research and engineering needs a small capacity source such as air-gun, sparker, and boomer, deployed with a single-channel or multi-channel (24-channel) streamers. The main purpose of our seismic survey was to investigate the Quaternary geology and stratigraphy of offshore, Korea. Because the Quaternary is the most recent geological period, our target depth was very shallow at about 50 m below the sea-bottom. We used a high-frequency seismic source including a sparker of 2,000 J capacity or a 60 in³ mini GI-gun and an eight-channel streamer with a 3.125 m group interval or a single-channel streamer that included 96 elements. To compare the resolution of seismic data according to the seismic source, a boomer or sparker systems were used with the single-channel streamer on a small survey ship. The seismic data processing was performed at the Korea Institute of Geoscience and Mineral Resources (KIGAM) with ProMAX, and the data processing and resolution of each survey were compared based on their acquisition systems.