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Resolution analysis of high-resolution marine seismic data acquired off Yeosu, Korea

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High-resolution marine seismic surveys have been conducted for the mineral exploration and engineering purpose survey. To improve the quality of high-resolution seismic data, small-scaled multi-channel seismic techniques are used. In this study, we designed high-resolution marine seismic survey using a small airgun and an 8-channel streamer cable and analyzed the resolution of the seismic data related to acquisition and processing parameters.

The field survey was conducted off Yeosu, Korea where the stratified thin sedimentary layers are deposited. We used a 30 in3 airgun and an 8-channel streamer cable with a 5 m group interval. We shoot the airgun with a 5 m shot interval and recorded digital data with a 0.1 ms sample interval and 1 s record length. The offset between the source and the first channel was 20 m.

We processed the acquired data with simple procedure such as gain recovery, deconvolution, digital filtering, CMP sorting, NMO correction, static correction and stacking. To understand the effect of the acquisition parameters on the vertical and horizontal resolution, we resampled the acquired data using various sample intervals and CMP intervals and produced seismic sections.

The analysis results show that the detailed subsurface structures can be imaged with good resolution and continuity using acquisition parameters with a sample interval shorter than 0.2 ms and a CMP interval shorter than 2.5 m. A high-resolution marine 8-channel airgun seismic survey using appropriate acquisition and processing parameters can be effective in imaging marine subsurface structure with a high resolution.

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