A Physical Modeling Study for the Suppression of Water Reverberations by Multi-depth Streamers Technique

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EGU2013-3994

Ghost reflections and water reverberations are the major and inevitable seismic noises in marine seismic exploration. In this study, the data acquired by multi-depth streamers to suppress reverberations is proposed and evaluated by physical modeling.

Figure 1. Schematic diagram of the multi-depth streamers technique.

Figure 2. Physical model, apparatus, and recording geometry used in this study.
Figure 3. The common-source vertical-array gather (CSVA) with a horizontal offset 250 m and 1750 m.

Figure 4. The vertically stacked common-source horizontal-array gather (CSHA; black) and non-stacked one (pink) observed along the water surface. The $S_1$ and $N_1$ represent the maximum positive amplitudes of the primary reflections and reverberations in the non-stacked traces, respectively. And the $S_2$ and $N_2$ are for the vertically stacked seismic traces. The $R_1$ and $R_2$ represent the non-stacked $S_1/N_1$ ratio and vertically stacked $S_2/N_2$ ratio, respectively.

Figure 5. The CDP stacked trace (pink) and the vertical/CDP stacked trace (black).