



A physical modeling study for the suppression of water reverberations by multi-depth streamers technique

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Abstract

Ghost reflections and water reverberations are the major and inevitable seismic noises in marine seismic exploration. However, new streamer technology for deployment of multi-depth streamers can extend the bandwidths of seismic waves and that results in elimination of ghost reflections. Therefore using the same deploy technique to suppress reverberations is studied by physical modeling in this paper. Study results show that a seismic exploration under a shallow water environment, the offsets between source and receivers and distance between the multi-depth streamers are much small than the propagation distance of the primary reflections, the depth-arrival time relationship of the primary reflections in the common-source vertical-array gather is linear. In addition, the slopes of depth-arrival times of the primary reflections are the same for different offset common-source vertical-array gathers but the slopes of reverberations increase with offsets. Therefore, only a vertically static correction is needed for the primary reflections in different depth common-source vertical-array gathers to correct to a particular water depth. Thus, after vertically static correction and stacking the primary reflections for the common-source vertical-array gathers, the reverberations could be suppressed. Experimental results under a maliciously contaminated by reverberations show that a factor of 74.3% of the theoretical value of the improvement can be achieved, thus the multi-depth streamers technique to suppress reverberations is recommended.