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# Analysis of passive seabed imaging techniques

Thomas Siderius
HLS Research Inc., 3366 N. Torrey Pines Ct, Suite 310, La Jolla, CA 92037, USA

Recently, a passive technique has been developed to image seabed layering. The method exploits naturally occurring acoustic noise generated on the sea-surface, primarily from breaking waves. The processing exploits the noise coherence through cross-correlations between sensors to recover travel times to significant seabed reflectors. To make this a practical tool, beamforming is used with a vertical array of hydrophones and this greatly reduces the required averaging times. Several data sets using moored arrays have shown stable returns from the seabed. Imaging seabed layering over extended areas requires the array to move which has been accomplished by allowing the array to drift. This, however, introduces a number of complications. If the array moves too rapidly, there is potential for the ensonified seabed (in the beam) to change within the averaging time. Another potential problem could be caused by vertical motion of the array (e.g. by surface coupling). In this case, Doppler shifts may cause degradation in the cross-correlation peaks. In some cases, these degrading factors may be reduced through signal processing. In this presentation potential mechanisms that degrade passive seabed imaging will be described with possible mitigating signal processing. Numerical modeling and measured data sets will be analyzed.