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## Observed laterally reflected hydroacoustic signals generated by underwater impulsive sound sources

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The International Monitoring System (IMS) of the CTBTO includes hydroacoustic stations composed of underwater hydrophones placed at the depth of the SOFAR channel. Since the hydroacoustic component of the network is designed to detect underwater nuclear explosions, events of special interest are impulsive underwater explosions. Among these, we studied several underwater explosions detonated close to the coast of Florida in September 2016 and 4 impulsive-like events (likely also underwater sources) from the Kamchatka area recorded in August 2020. In both cases, we observe secondary arrivals on IMS station HA11 for the Kamchatka sources and HA10 for the Florida sources immediately following the direct hydroacoustic arrivals. We assume these secondary arrivals are due to coastal reflections. We identify the potential reflection points for these reflections based on their back azimuths at the recording station and the estimated location of the impulsive sources. To verify this, we used the IDC standard hydroacoustic analysis tool HART and DTK-(G)PMCC, the latter provided to CTBTO authorized users, to estimate back azimuths. Comparisons between sources in the same general area give us an idea of the consistency of these reflections between sources in the same general area.

### Promotional text

From this study of reflected hydroacoustic signals generated by underwater impulsive sources it is evident that the IMS in-water hydroacoustic stations can detect signals of high relevance to CTBTO and also that the IDC processing analyst tools are applicable to define them.

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