New methods for the detection of old munition in the sea

Barradas José Felipe, Mestdagh Thomas and Missiaen Tine

Flanders Marine Institute (VLIZ), InnovOcean site, Wandelaarkaai 7, 8400 Oostende, Belgium
E-mail: jose.barradas@vliz.be

The detection of munition at sea is a time-consuming task. Within the BASTA project we seek to advance ultra-high-resolution 2D and 3D acoustic imaging using multi-transducer parametric echosounder data, and through correlation with multibeam data and magnetic/gradiometric mapping allow a better identification. First results from a munition dumpsite area in the Baltic Sea ("Kolberger Heide") are very promising. Munition detection is often based on one single method. Each method will provide certain information, but has its restrictions. For instance, multibeam (MB) data give information about objects lying on the seabed, but not when they are completely buried. Magnetic sensors allow to detect iron-containing objects, buried or not, but give little information on the exact burial depth and their precision is reduced in areas with a high object density. Sub-bottom profiling (SBP) data allow to detect buried and non-buried objects and pinpoint their depth with high accuracy, but do not distinguish between ferrous and non-ferrous objects. To improve the detection efficiency, multi-sensor integration is therefore crucial. Certain patterns in the interpretation of munition targets in the SBP data were found through the correlation with multibeam and magnetic data showing munition on the seabed or partially buried. A large number of targets were picked to feed the artificial intelligence (AI) algorithm for the automated identification of potential munition targets. Faster and improved generation of targets for AI-input will be done by automating and normalizing the target image extraction. Important steps were also taken with regard to ultra-high-resolution 3-dimensional sub-bottom imaging. In former years, this technique has been applied with success for buried archeological features. Advanced processing was now done on existing test data from Raversijde, which resulted in the identification of extremely small (≤30 cm horizontal resolution) buried objects. Similar processing will be carried out on data from munition dumpsites in the Baltic Sea to model small buried munition targets. This will further help to continue the AI training and improve the workflows.

Keywords: Sea-dumped munition; Parametric echosounder; Ultra-high-resolution visualization; Artificial intelligence (AI)