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Multiple-sensor fusion approach to seabed classification

Benoit Zerr^a, David Kerneis^b and Basel Solaiman^b

^aDGA/GESMA, BP42, 29240 Brest Armées, France

^bENST Bretagne Dept. ITI, Technopôle Brest-Iroise - CS 83818, 29238 Brest Cedex 3, France

Seabed classification is key issue for civilian and military underwater applications, from offshore exploitation to mine counter measure. Most of the existing automated classification techniques relies on the analysis of the data provided by a single sensor, supposed to unambiguously separate the different classes of seabed. In this paper we present a different approach which considers that, even if a sensor cannot tell the differences between two classes, classification will improve by considering that the seabed belongs to one of these two classes, and, further, that the analysis of the data from another sensor can resolve the ambiguity. For each sensor, the classification is achieved in a conventional way by feature extraction and supervised classification. The fusion of the results implements the theory of evidence through Dempster-Shafer method. After a description of the method, the paper discusses the experimental results from the fusion of information delivered by three sensors : an imaging sidescan sonar, a vertical echo sounder and an interferometric bathymetric sonar. The major part of the experimental data has been acquired by towed or hull mounted sensors. As these sensors are a subset of the payloads operated simultaneously by the new DGA-SHOM DAURADE AUV, preliminary seabed classification results in covert REA missions will also be presented and discussed.