

## **Backscatter Patch Test – inter-comparison of systems using shared reference areas for testing, calibration, and quality assessment**

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The European Union Marine Strategy Framework Directive (“MSFD” Directive 2008/56/EC, Official Journal of the EU, 25.6.2008) requires member states to monitor and assess the health status of their marine habitats. Due to their ability to provide simultaneous bathymetry and backscatter strength (BS) reflecting the seabed nature, multibeam echosounder systems (MBES) are by now the standard technology for doing this legal obligation. However, while IHO standards provide a clear framework for assessing the quality level of the bathymetry, there is no formal quality level scale for the BS and consequently, no level of reliability of the final decibel values, the unit of BS. As highlighted by the document “Backscatter measurements by seafloor-mapping sonars - Guidelines and Recommendations” from the Backscatter Working Group, evaluating the BS quantitative capabilities to monitor the seabed integrity, measuring the level of quality and defining standards for BS quality are current challenges. To move forward on these topics, five European teams, from Belgium, France and United Kingdom, have started a project on the definition and validation of reference areas in order to perform BS “patch tests” (mean and variance estimation of each MBES); relative (and possibly absolute) calibration of different MBES; inter-comparisons between different acoustic measurement systems; and to record long-term time series of reference data. In addition, repeated surveys combining MBES with an Acoustic Doppler Current Profiler are organized. The latter measures currents and backscatter in the water column allowing studying the potential influence of water column conditions on the BS. Vertical profiling of oceanographic parameters is also conducted. Based on this pooling of BS related datasets, BS reliability and stability will be assessed. Key reference areas, proposed by the teams involved in this project, are shown on the map below.



The three shallow-water zones have already been the subject of numerous bathymetric and BS surveys using different acoustic systems with *in situ* control (video and samples) of the seabed nature. The resulting time series already enable a detailed characterization of the bathymetry, morphology and geological characteristics, and are a first step for BS stability assessment. In the framework of GEOHAB 2015, the main purpose of our contribution will be to present a detailed description of the reference areas, illustrated by previous data from sonar surveys (high-frequency MBES) and ground-truthing operations. We will describe the criteria that are ideally needed to establish a reference area for the BS, with focus on this relative calibration approach to characterize in detail the quantitative measurements of BS. The next step of the project is to include a cruise by a single vessel over the three areas, and the building of a shared data library.