

Identifying marine seabed habitats around the Bréhat Archipelago (Brittany coast) using complementary acoustic sensors and different vessels for investigating the coastal and nearshore seafloor.

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About 165 km² area around the Bréhat archipelago, located off the North Brittany coast, was surveyed acoustically using different bathymetric and backscatter sensors in 2006 and 2008, to provide baseline geological maps for use in proposed biological habitat studies. The Bréhat archipelago is comprising 96 islands in total of varying sizes. The survey conditions varied quite a bit, as tides in this part of the world have some of the widest ranges between high and low tide, over 7 meters (23.5 feet) due to strong tidal currents. This area corresponds both to a sector of the Rebent and Natura 2000 networks. It was selected for its physical and biological characteristics reflecting the sedimentary heterogeneity and biological diversity of Brittany's coastal seafloors. This paper presents the preliminary results obtained last spring using a new vessel (R/V Haliotis), which is transportable by road and is adapted for geophysical studies in very shallow waters (depths ranging from 15 m (LAT) to about 1 m).

The aim of the Rebent network (www.rebent.org) is to define a reference state and to provide regular monitoring of the French marine coastal fauna and flora from the intertidal area to water depths of about 60 metres. Rebent carries out increasingly frequent monitoring, with an increasing coverage, on three different spatial zones, in order to detect changes in specific habitats. In April 2006, from depths of about 60 m to 10 m (LAT), 900 km of acoustic profile were collected simultaneously using a towed EdgeTech DF1000 sidescan sonar and a Simrad EM1000 multibeam echosounder below the RV Thalia. In May 2008, a new 10 m speedboat (RV Haliotis) equipped with a hull-mounted GeoAcoustic GeoSwath interferometric sidescan sonar-based system, was used for the first time, to complement the collection of nearshore acoustic data. RoxAnn ground discrimination system (AGDS) and subbottom profiler were used in parallel. The average surface area fully covered by Haliotis is about 3 km² per day compared to 13 km² for the Thalia offshore vessel. Preliminary backscatter mosaicing on board provides the best sites for ground-truthing and calibrate acoustic signatures (biological and sedimentological).

Raw acoustic data was processed (backscatter mosaicing, bathymetric DTM, merge offshore and nearshore information...) using different software (Caribes, Geotexture, Fledermaus) and pixel resolution. All the data and products are displayed on a GIS (Geographical Information System), and are subsequently combined with data sets which include grab-sample description (sedimentological and biological samples) and underwater video interpretation. The topography of the coast associated to strong hydrodynamic conditions induces considerable variations in the backscatter responses in relation to high densities of macrobenthic species (maerl, crepidule). There is a wide variety of substratum types present within a relatively small area and a large range and concentrated bedforms (sand banner banks, dunes, comet marks, sand ribbons...) generally built on the outer shelf. Bedform sequences are very complex in response to both transversal and longitudinal instabilities in the near-bottom flow.