## Science

Mapping benthic habitat in regions of gradational substrata: An automated approach utilising geophysical, geological, and biological relationships.

Brown, C.J. and Collier, J.S. 2008.

Estuarine, Coastal and Shelf Science, 78: 203-214.

Marine scientists have recently turned to the use of acoustic systems, such as sidescan sonar, to assist in understanding and mapping the spatial extent of seabed habitats. The overall aim of this work was to investigate the potential of sidescan for automatic discrimination of benthic habitat and to assess what level of biological prediction is achievable.

The relationship between acoustic backscatter, sediment characteristics and benthic habitat is examined using high-resolution sidescan sonar data collected at the Loch Linnhe artificial reef site on the west coast of Scotland. A sidescan sonar mosaic was produced and classified according to derived backscatter parameters (mean, median and standard deviation of the backscatter values) using an unsupervised classification procedure. The accuracy of the final classified map was assessed by comparison with a ground-truthing survey in which the biological habitat was derived from underwater video footage and by comparing the results with grab sampling. The relative success of the two approaches highlights the problems associated with habitat identification and the ability of different methods to resolve habitat traits. Video has only a limited power to discriminate habitat based on conspicuous biota and sediment characteristics, although this is often sufficient for the production of broad-scale habitat maps adequate for many marine management applications. Finer scale differences, such as differences in infaunal community structure or particle grain size distribution provided by grab sampling, can sometimes confuse broad-scale habitat patterns. At this level of observation, variability in community structure is often high and can change with subtle variations in sediment composition, depth or other hydrographic parameters. Compared with underwater video, the sidescan correctly predicted seabed surface characteristics of observed biological habitat with 78% accuracy. Compared to the grab sampling, there was a low to moderate but significant correlation between the multivariate patterns of acoustic backscatter, benthic assemblage structure and particle size distribution.

Coastal and estuarine habitat mapping, using LIDAR height and intensity and multi-spectral imagery.

Chust, G., Galparsoro, I., Borja, Á., Franco, J. and Uriarte, A. 2008. Estuarine, Coastal and Shelf Science, 78: 633–643.

Airborne laser scanning, LIDAR, provides high-resolution Digital Terrain Models that have been applied to characterise and monitor coastal environments. This paper assesses the contribution of high-resolution LIDAR data (both altimetric and intensity components) and four-band multi-spectral imagery to map coastal habitats, using the Bidasoa estuary and its adjacent coast (Basque Country, northern Spain) as a case study. Supplementary topographic features, such as slope and aspect which are indicators of wave action exposure, have been calculated to be tested as potential contributors to intertidal community discrimination. The results of this study have shown that LIDAR information is valuable in mapping coastal habitats. Synergy between LIDAR data sources and visible and near-infrared spectral bands make it possible to discriminate specific intertidal communities. This technology holds significant potential for improving the monitoring of habitat change and in proposing littoral management plans to mitigate the impact of predicted sea-level rise.

**Development of a high-speed, megapixel benthic imaging system for coastal fisheries research in Alaska.** Rosenkranz, G.E., Gallager, S.M., Shepard, R.W. and Blakeslee, M., 2008. Fisheries Research , 92: 340–344.

Video technology can provide direct observations of benthic organisms. Before camera surveys can provide a reasonable alternative to scallop dredge surveys, standard methods have to be improved. This paper presents a detailed technical description of a new high-speed megapixel benthic imaging system developed by the Alaska Department of Fish and Game with design assistance from the HabCam project of Woods Hole Oceanographic Institution.

The towed, bottom-tending camera sled features a GigE Vision (TM) camera with a  $1360 \times 1024$  pixel sensor that streams 16 MB/s of image data to the tow vessel over commercial off-the-shelf Gigabit Ethernet hardware and an armoured fibre optic tow cable. The camera images a  $1.1 \times 0.83$  m area of the bottom four times per second under strobe lighting that eliminates blurring in the images (motion artefacts) while towing at a rate of 5–8.5 km/h. The camera sled was developed for scallop stock assessment but appears to be useful for fine-scale habitat mapping, ground-truthing acoustic data, benthic ecology research and also fishing gear effects studies.

## Habitat suitability modelling as a mapping tool for macrobenthic communities: An example from the Belgian part of the North Sea.

Degraer, S., Verfaillie, E., Willems, W., Adriaens, E., Vincx, M. and Van Lancker, V., 2008. Continental Shelf Research , 28: 369–379.

Being ecologically important and well known, the spatial distribution pattern of the macrobenthos is often used to support an ecologically sustainable marine management. This study aimed to demonstrate the usefulness of habitat suitability modelling as a full coverage mapping tool, with high relevance for marine management, by constructing a habitat suitability model for the soft sediment macrobenthic communities in the Belgian part of the North Sea (BPNS). Mathematical analysis objectively selected median grain size, sediment mud content and omitted bathymetry, slope and distance to the coast to represent the most important environmental variables determining the macrobenthic community distribution. Since the habitat suitability is considered far more stable through time compared to the permanently fluctuating macrobenthic communities, information on the habitat suitability of an area is considered highly important for a scientifically sound marine management.

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