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Seabed biotope mapping using multi-beam backscatter based on reference sites

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A multibeam sonar (MBS) was used to discriminate ecological relevant seabed characteristics based on 62 reference sites spanning depths 50 m to 400 m sampled with georeferenced video, sediment grab and rock dredge. The simple ecologically derived terrain characteristics of soft, hard, smooth and rough were found to have the most predictive power for discrimination of the biota using data from video and physical sampling. The acoustic data were corrected for range and incidence angle effects and analysed based on phenomenological characteristics and inversion of a seabed scattering model. Near normal incidence (<16o) the seabed backscatter showed poor correlation to seabed characteristics (cross validation error 32%) and was sensitive to the estimation of the correct seabed incidence angle. Using the trend in backscatter near normal incidence (<30o) greatly improved (cross validation error 4%) the classification but also increased the spatial scale of classification. The length of biotope scales were derived from the video transects with 50% of patches less than 18 m. Referencing the seabed backscatter to a consistent incidence angle (40o) gave the highest spatial resolution derived metric and minimised range, incident angle and beam compensation errors. Using this simple metric, high probabilities of prediction of fauna functional groups were recorded.