Using Novel Mapping Tools To Predict The Small Scale Spatial Distribution Of Cold-Water Coral In The Mingulay Reef Complex

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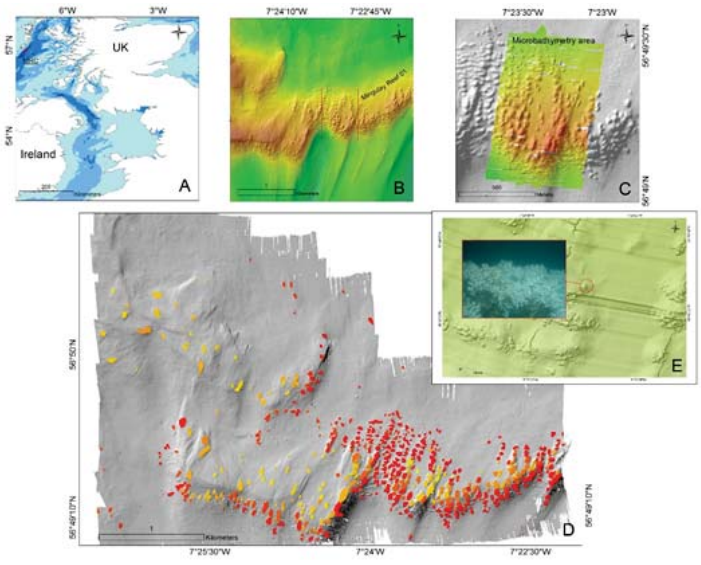

The Mingulay Reef Complex (MRC) located off the West Coast of Scotland, has the ecosystem engineer Lophelia pertusa as its dominant framework forming coral. Predictive models and maps of cold-water coral habitats are useful to understand the factors that control the distribution of these organisms. In this study we predict coral presence at one of five mounds at the MRC, by using the new ArcGIS-based "BGS Seabed Mapping Toolbox", which was developed for this study, together with random forest modelling. By using this toolbox almost 600 carbonate mounds were semi-automatically delineated from bathymetry data of the Mingulay Reef 1, obtained as part of the MINCH project in 2003 with 2 m resolution, and their characteristics were quantified and captured. Coral presence data were derived from HD video and from a microbathymetric grid with a resolution of 35x35cm. This microbathymetry covers the centre of the study area and its high resolution allowed the observation of individual coral colonies. Random forest classification identified 1) Maximum Water Depth, 2) Maximum Rugosity, 3) Bathymetric Positioning Index (BPI), 4) Orientation and 5) Maximum Current Speed as the environmental variables that contributed most to the prediction of live coral presence. A detailed map with the presence of corals on minimounds will be specifically valuable for future sampling and monitoring climate change surveys. This is the first study using an ROV-based microbathymetric grid and the newly developed "BGS Seabed Mapping Toolbox" to explore the environmental variables that control coral growth on minimounds.