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Fine-scale predictive mapping of Cold Water Coral species in the Cap de Creus Canyon (NW Mediterranean): first insights

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Cold-water corals (CWC) are azooxanthellate species which develop in a complex environment ruled out by a delicate interplay between geological, biological and oceanographic conditions.High impact deep-sea bottom trawling activities are seriously compromising the health and state of conservation of CWC habitats. It has been recently discovered that submarine canyons can act as hosting areas for benthic communities dominated by CWCs. Favorable environmental conditions along the canyons coupled with the rough seafloor morphology can foster their development and facilitate their preservation from the trawling threat. The aim of this study is to statistically predict the distribution of three CWC species (*Madrepora oculata*, *Lophelia pertusa*, *Dendrophyllia cornigera*) in the Cap de Creus Canyon (NW Mediterranean) based on high-resolution swath-bathymetry data (pixel resolution: 5m) and video observations from the submersible JAGO (IFM-GEOMAR). Species distribution models have been constructed with a Maximum Entropy approach (MaxEnt model) using the presence data from video imagery and layers derived from multibeam bathymetry such as slope, geomorphologic category, rugosity, aspect (orientation of the pixel respect to the North) and backscatter. For the three species the predictive model performance is outstanding, with the area under the curve (AUC) from the sensitivity-specificity approach of 0.98 for *M. oculata* and *D. cornigera* and of 0.99 for *L. pertusa*. The most relevant variables responsible for the CWC distribution are the slope and aspect for *M. oculata* and *L. pertusa,* and rugosity and aspect for *D. cornigera.* According to the models, CWC species are most likely to be found on the medium to steep rough walls of the southern flank of the Cap de Creus Canyon and almost exclusively along the regions facing the North and the North-West, from where strong organic sediment-rich currents flow. Results are coherent with previous observations and quantitative studies performed in the area. Insights coming out from the application of geo-spatial statistical models could represent the basis for the development of a scientifically-based approach in the planning and management of Marine Protected Areas.