DEEP SEA HABITAT MAPPING AT THE SANT MARIA DI LEUCA COLD WATER CORAL PROVINCE: RESULTS FROM SMALL TO LARGE SCALE SEAFLOOR MAPPING AT ONE REPRESENTATIVE SITE

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Abstract

The present work reports the main results obtained from a number of different acoustic and video investigations carried out at different spatial scales within the Mediterranean Santa Maria di Leuca (SML) Cold-Water Coral (CWC) province (south eastern Italy – northern Ionian Sea). The different scale of data sets here presented and discussed vary from small scale maps that resolve regional geomorphology of the Apulian plateau, to large scale maps provided for one representative site, where video-data, high resolution side scan sonar mosaic and micro-bathymetry well describe micro-scale variations in mound geomorphologic attributes and associated habitats.

Keywords: Geomorphology, Swath Mapping, Mapping, Ionian Sea, Biodiversity

Along the oceanic margin and in particular in the Mediterranean Sea, CWC distribution has been better known during the last decades thanks to the new technologies nowadays available for exploration in deep sea environments. The recent use of acoustic survey techniques and remotely operated vehicles (ROVs) revealed the presence of living CWC at different locations in the Mediterranean sea (i.e.: the Straits of Gibraltar [1], the Alboran Sea [2, 3], the Sicily Channel [4, 5], the Ionian Sea [5, 6, 7], and the Southern Adriatic Sea [5, 8]); although the Ionian Santa Maria di Leuca (SML) CWC province represents the largest occurrence of a living white coral community known in the Mediterranean so far. Several national and international oceanographic expeditions (e.g. the 2002 CNR COR2 cruise, the three cruises of the 2003-2005 Italian aplabes project, the 2006 CNR CORSARO cruise promoted by the cooperation between Euromargins/Eurocore 'Moundforce' ESF program, the 2006 METEOR M70 cruise and the 2007 MEDECO cruise of the EU 'Hermes' project) were initiated after the SML province's discovery, producing a number of different "seafloor mapping data". From these, three different scale of data sets are here presented and discussed: (1) a small scale morphobathymetric map (1/1000000) that resolve the regional geomorphology of the Apulian plateau; (2) a detailed medium scale morphobathymetric map (1/50000) obtained from multibeam data acquisition; (3) a large scale morphobathymetric map of one representative coral mound, where video-data, high resolution side scan sonar mosaic and micro-bathymetry have been collected. Small scale map (coming from the Gebco Digital Atlas) shows that the SML CWC province is located along the upper slope of the gently south-eastward dipping Apulian continental margin, the large-scale morphology of the area is related to a strong tectonic control. The multibeam data set collected between -300m and -1300m of water depth, over more than 900-km2 survey area, provided a detailed medium scale morphobathymetric map, in which several geomorphic processes are recognized, superimposed on the regional large-scale morphology [7]. In particular broad slope erosion, sediment sliding, block tilting and collapse and prominent downslope mass-movements were identified and drift sedimentation is also recognised along a central large ridge [6, 7]. Within this dataset CWCs are found along a depth belt between 500 and 900 m and in different physiographic settings, although they look to be abundant within the broad area affected by downslope mass-transport deposits [7], [9]. Here a detailed ROV-based survey, carried out in the framework of the Hermes project by the use of the VICTOR6000 ROV (MEDECO cruise – R/V Pourquoi Pas?), provided a high resolution mapping survey [10] at one representative seafloor feature identified as a coral colonised positive structure (coral-mound) during previous cruises. The relevant seafloor mapping data here presented, collected at different spatial scales, show how the large-scale mapped coral distribution and the mound morphology are well correlated to the environmental controls under which coral mounds can develop. These results also show how large scale maps can help in provide a proper assessment on CWC distribution along small scale maps and therefore show how such methodologies are essential to support deep-sea habitat mapping purposes, finding a way to extrapolate substrate maps into habitat maps based on acoustic proprieties.

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