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High-resolution bathymetry and acoustic geophysical data from Santa Maria di Leuca Cold Water Coral province (Northern Ionian Sea—Apulian continental slope)

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ABSTRACT

A total of 800 km^2 of multibeam echo-sounder coverage, roughly 800 km of chirp-sonar data and 18 km of side-scan sonar profiles (100/500 kHz) were acquired a few km offshore Santa Maria di Leuca (south-eastern Italy), from 200 m to 1300 m water depth. The explored area belongs to the upper slope of the gently south-eastward dipping Apulian continental margin (northern Ionian Sea). Acoustic datasets were collected, by three different oceanographic expeditions, where evidence of living cold-water coral (CWC) colonies were documented by previous surveys and samples.

High-resolution multibeam bathymetry indicated an extensive rough seafloor with an irregular faulted upper surface to the west (reflecting large-scale tectonic control on the margin) and a highly disrupted upper slope formed by prominent downslope mass-movements to the north. A broad area in the east was influenced by mass-transport deposition, which resulted in a very complex hummocky seafloor, mainly shaped by detached block-like features and failure-related bedforms (i.e. low scarps, downslope lineations and compressional ridges). From the shallow seismic-stratigraphic data, failure events appeared to be multiple and recurrent and chaotic reflectors, both buried and exposed at the seafloor, affected most of the investigated area. Drift sedimentation was also recognised along a central large ridge, resulting in an interplay between contour currents and downslope turbidity currents.

The spatial distribution of the CWC reefs was inferred from the acoustic facies interpretation based on video images and ground-truthed by sediment samples. It appeared that: (1) within the investigated area, living coral frameworks were located along large topographic highs facing the main flow of the bottom currents, where hard and firm substrata and/or failure-related sediment bedforms occurred; (2) CWC mainly settled on clustered (and isolated) mound-like features, tens to a few hundreds of metres long and no more than 25 m high and were located between 600 and 900 m water depth, within the broad area affected by downslope mass-transport deposits. Such mound-like morphologies could thus be interpreted as a result of sediment accreted by coral growth, with the consequent sediment trapping on small-scale positive seafloor irregularities; formed by different types of Pleistocene-exposed mass-transport deposits, their burial prevented by bottom currents.

1. Introduction

The southern Apulian margin (northern Ionian Sea—Fig. 1) recently gained interest with the discovery in 2000 of a healthy, living, Cold Water Coral (CWC) province, a few miles off Santa Maria di Leuca (SML) (Tursi et al., 2004). The SML CWC province has since become a focus of significant research efforts: several national and international oceanographic expeditions from different research programs and activities (e.g. the 2002 CNR COR2 project, the 2003–2005 Italian APLABES project, and cooperation between the Euromargins/Eurocore 'Moundforce' ESF program and the EU 'Hermes' provided by the CNR CORSARO cruise in 2006) were initiated after the province's discovery. Following a first attempt to locate and sample SML coral frameworks during the COR2 cruise, aboard CNR R/V *Urania* (Taviani et al., 2005a), a large-scale multidisciplinary investigation of the SML CWC province, performed during three different cruises of the Italian R/V *Universitatis* within the Italian program APLABES, provided a comprehensive geophysical survey. The main dataset, which is presented and discussed, included multibeam bathymetric data, a dense network of chirp-sonar profiles, and side-scan sonar mosaics on selected areas.

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