SEAFLOOR MAPPING AND ACOUSTIC GEOPHYSICAL DATA OF A SHALLOW LIKELY MUD-VOLCANOES PROVINCE OFFSHORE SICILY (EASTERN SICILY CHANNEL - HYBLEAN- MALTA PLATEAU)

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Abstract

A detailed acoustic geophysical survey has been performed on R/V Universitatis, covering a part of the Hyblean-Malta plateau few miles offshore south-eastern Sicily, during the first cruise within the framework of the National Prin project MESC (Mud volcanoes Ecosystem study - Sicily Channel). The survey was carried out to map several shallow seafloor features with acoustical proprieties such that they could be interpreted to be Mud Volcanoes (MVs). Their morphologies, peculiar arrangement on the seafloor and geological setting are here presented.

Keywords : Acoustics, Mud Volcanoes, Continental Shelf.

MVs are the morphological expression of a process initiated deep in the sedimentary succession and resulting in the emission of gas, water and sediment on the earth's surface or the seafloor [1, 2]. Research on MVs in Mediterranean sea had focused mainly along the Mediterranean Ridge accretionary complex in deep sea water [3, 4], while our study investigates a relative flat area at shallower depth (between -140m and -170m) hosting numerous recently discovered [5] high backscattering seafloor features settled on the Hyblean-Malta plateau. The survey track lines were performed by different types of geophysical devices (100-500 kHz side-scan-sonar, 50 kHz multibeam echosounder, 2-9 kHz chirp sonar, 27-200 kHz echosounder and a multi-tip sparker) providing a detailed topography and a wide range of acoustical proprieties of the explored area.

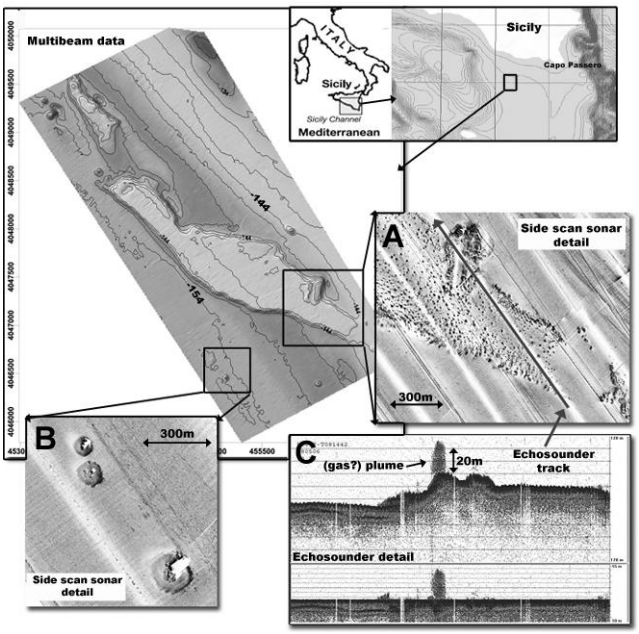

Fig. 1. Multibeam map of a part of the study area, with some details from side scan sonar (A, B) and echosounder data (C) showing the backscattering proprieties and the different morphologies of the investigated seafloor features.

The investigated seafloor features revealed different morphologies, in particular they are few meter high (no more than 10m) and are arranged on the seafloor in two main different styles: 1) several conical features of 50 - 200m in diameter, preferentially aligned along the isobaths 2) numerous close-set small cones up to 10m in diameter, settled within well defined, flat, elongated areas (the largest one reaches 2000m in its long axis and 500m in its short axis) rising up to 10m form the seafloor. Furthermore, their raw acoustic reflection data (mainly from the singlebeam echosounder) show evidence of (gas?) plumes rising into the water column. Their morphologies, their strong acoustic scattering and their possible gas plumes are foremost distinctive proprieties that liken them to MVs.

Their easy accessibility, in comparison with deep-sea MVs, makes them an excellent natural laboratory to study in detail the ecosystem response to such geological phenomena. Their detailed acoustic mapping allows the planning of a focused future sampling, aimed to the collection of valuable geochemical, sedimentological and biological data.

References

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