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SEDIMENTARY DYNAMICS OF THE MARETTIMO CONTINENTAL SHELF AND MARETTIMO CHANNEL (EGADI ISLANDS – WESTERN MEDITERRANEAN): ANALYSIS OF DEPOSITIONAL AND EROSIONAL FEATURES.

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Abstract

Sedimentary dynamics of the Marettimo continental shelf and Marettimo Channel (Egadi Island – Western Mediterranean), have been unveiled based on the erosive and depositional features observed at the seafloor.

Different morphologic features were recognized through side scan sonar, multibeam and high-resolution seismics, acquired in the framework of national Research Projects (CARG, GebecSud, MaGIC) carried out by the Department of Earth and Marine Science (former Department of Geology and Geodesy) of the University of Palermo. Sediment samples have been also collected and analyzed.

The Egadi Islands are part of the NW Sicilian offshore, and belong to the mountain chain that connects the Sicilian chain to the Maghrebides one. The Marettimo Island represents an isolated portion of the Egadi continental shelf and is separated from the rest of the archipelago by the Marettimo Channel.

Previous studies allowed to recognize different kind of sedimentary structures along the seafloor. Lo Iacono and Guillén (2008) described extensive field of subaqueous dunes (Ashley, 1990) along the Marettimo inner shelf, forming on gravelly and pebbly sediments and related to strong storm events (H:5.5 m, T: 12 s). Larger dunes have been observed in the north-western sector of the inner shelf with wavelengths ranging from 1 to 2.5 m, heights between 15 cm and 30 cm and extending laterally for hundreds of meters. Moreover in the north-eastern sector of the inner shelf, sorted bedforms have been detected at a depth of 40 m: they are characterized by a width varying between 15 m and 50 m and a length that reaches hundreds of meters.

In the south-eastern sector of the Marettimo outer shelf, Colantoni et al. (1993) map two groups of sedimentary structures. In the same area, Lo Iacono (2004) recognized two-dimensional and three-dimensional subaqueous dunes. 2D dunes are found at depths between 60 and 90 m and show a wavelength variable between 15 and 50 m. 3D dunes, which are found at a depth of 80 m, are characterized by a wavelength of 30 m and a lateral extent of 50 m.

Morphological evidences of a strong hydrodynamic regime come also from the morphobathymetric analysis of the Marettimo Channel, that is a 24 km long submarine valley oriented NNW-SSE, with a depth ranging from a minimum of 180 m to a maximum of 370 m and a width from 2 km to 14 km. Inside the channel, south of its narrowest point, a 180 m deep bathymetric threshold separates two areas, which deepens towards opposite directions: north-west and south. The flanks of the sector that deepens towards the NW are affected by mass-wasting features (Lo Iacono et al., 2007). The western flank of the channel, which delimits the Marettimo continental shelf, is carved by gullies, making the shelf-edge very uneven. Gullies develop to a maximum depth of 280 m and have a length of 250 m and a width of 50 m. At the bottom of the channel a linear incision 20 m deep, 400 m wide and almost 3 km long, is probably generated by erosive bottom currents.

On the whole, the morpho-sedimentary structures here described reveal a strong hydrodynamic regime. The morphological and textural features of the bedforms observed on the Marettimo inner continental shelf suggest the occurrence of sporadic medium to strong storm events coming from western sectors. The morphological characteristics of the Marettimo Channel reveal the occurrence of strong bottom currents probably related to the severe interchange of water masses between the Tyrrhenian Sea and the Sicily Channel.

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Presentation mode

POSTER

Choice of session

1st OPTION R1 - Marine geology: new developments foreseen by geological mapping. The input of the CARG Project

2nd OPTION GEO4 - Geography and geomorphology