

### Quaternary carbonate sedimentation in the Western Sardinian shelf

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The presence on the sea bottom of reliefs of tabular form was detected at depths varying from about -40 to -130 meters along the continental shelf of western Sardinia by means of S.B.P. (3.5 KHz) and Sparker (0.5 + 1 KJ) recordings. These morphological structures are especially extensive in the sector facing the Sinis Peninsula (Mesa de Maluentu) as well as in the sector facing Alghero in the north and the Sulcis Archipelago in the south.

The Mesa de Maluentu (LECCA, 1982; LECCA *et al.*, 1983), following the study grabbed, core and dredged samples, was found to be a strictly carbonate bioconstructed and bioclastic shelf area (CARBONI *et al.*, 1989). The structure of Maluentu, at depths from about -40 to about -75 meters, is characterized by the presence of grooves and extends towards the greater depths (75 + 135 meters) over steps and spurs, usually terminating in sharp drops. Moreover minor structures are found to a depth of about -120 + -135 meters. A non-systematic sampling of the summits and slopes of these structures produced not recent Lithophyllum bindstones and recent coralline crusts; in the grooves, recent, almost exclusively bioclastic-algal sediments were found.

The non-recent *Lithophyllum* bindstones present polyphase micritic fillings with Brachiopods and Foraminifers and have a framework porosity. This lithotype constitutes a buildup, now partially eroded, that developed over an undetermined period of time in the Quaternary, without excluding a Pliocene age.

Recent products overlying the limestones mentioned above are also prevalently made up of encrusting red Algae (*Lithophyllum*, *Lithothamnium* and other crustose Coralline Algae. ADEY & MACINTYRE, 1973) both *in situ* and in the detritus. The presence of *Halimeda tuna* was also observed, but this does not contribute in this context to the coarse bioclastic fractions, perhaps because of the low degree of calcification.

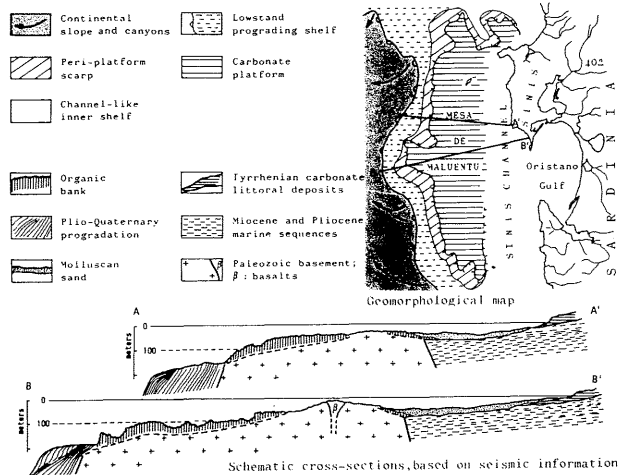
Landwards, the Mesa de Maluentu delimits a canal-like depression down to about -50 meters, where the algal bioclastic feeds with Mollusks now accumulate together with lesser amounts of inland terrigenous contributions.

The shelf-slope transition on the seaward side of the Mesa is formed by a narrow complex oblique-parallel-sigmoid progradation which grew lately during the Quaternary regressive phases, with contribution from the Mesa as well as from the innermost parts of the shelf, and to a lesser degree during the transgressive phases with a draping of carbonate mud and bioclastic contribution from the Mesa seaward scarps.

The dredging, southwards of the Mesa, to a depth of about -120 + -140 meters of Vermetidae limestones and quartzose bioclastic beach sandstones referring to the last Würmian lowstand bears witness to the importance of the boundstone and bioclastic carbonate facies even during the Quaternary regression phases.

On the other hand, the outcropping along the present-day coastline of various bioclastic carbonate facies bearing Mollusks and red Algae, which can be referred to the Tyrrhenian sea level, demonstrates the high carbonate organogenic production that took place in the phases of greatest Quaternary transgression.

The whole of the depositional systems with a high carbonate component found in this shelf segment, in the Western Mediterranean Sea, is an example of a medium latitude carbonate platform that functioned at the variable glacio-eustatic sea levels of the Quaternary, with also variable carbonate facies productivity. The carbonate character of this shelf is enhanced by a tectonic high, made-up of Paleozoic basement and Tertiary overburden and basalts, situated longitudinally on the present-day medium shelf on which the carbonate framework of the Mesa de Maluentu formed. Another favorable factor is given by the poor contribution of terrigenous sediments along the Sinis coasts; these sediments are deviated into adjacent areas by the special tectonic configuration of western part of central Sardinia.



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### Sedimentological characters of the area North of Eratosthenes seamount (Cyprus sector of the Eastern Mediterranean Sea)

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Three small basins occur in the sector North of Eratosthenes Seamount and South of Cyprus Island in the Eastern Mediterranean Sea (Fig. 1). The largest one is the Eratosthenes basin which is characterized by compressive and extensional tectonics on its northern and southern flanks respectively (FINETTI and MORELLI, 1973; CATANI *et al.*, 1983; ANASTASAKIS and KELLING, 1991). From a seismo-stratigraphic point of view, high resolution Sparker and 3.5 kHz S.B.P. surveys point out the existence of Messinian evaporitic substratum, dipping northward beneath the south-verging Cyprus Arc thrust system. The overlying Plio-Quaternary sediments transgress on the Messinian substratum with a contact of onlap type. Their attitude is almost everywhere undisturbed, except for the northern part of the basin where they are involved in the compressional tectonics of the most external and youngest part of Cyprus Arc. As for the provenance of the Plio-Quaternary sediments, both core samples and seismic profiles (sparker and S.B.P.) demonstrate that they mainly slid down from the flanks of the Eratosthenes Seamount, by means of prevailing slump and mass-flow mechanisms, these phenomena being clearly recorded by sedimentological data. The remaining terrigenous materials coming from Cyprus are trapped by a morphological high, acting as a barrier; in the western sector of the examined area the sediments sliding down along the slope are trapped in a narrow small and deep basin (near cores 8 and 9 in Fig. 1). Organic fraction emphasizes the existence of two sedimentary domains in this sector. In fact, reworked material, with high interspecific differentiation, characterizes the northern area; conversely, in the South the number of species is low and with very high intraspecific abundance. Grain size analyses also confirm the existence of these two domains; the surficial sediments are fine and homogeneous in the whole area, while the deeper sediments of each core prove that terrigenous input prevails in the cores near Cyprus, while pelagic sedimentation dominates in the southern cores and in the GAN 17 core (Fig. 2). Due to the low contents of smectite, the mineralogical study of clay fraction demonstrates the limited influence of the nilotic sediments in this area, while the high values found for illite and chlorite would mean that the eolian transports played an important role (Fig. 2). Based on the ash layers analysis on ME 4 core, sedimentation rate is very high (24 cm/1000 yrs) South of Cyprus, from 18,000 up to 8,000 years B.P., while it abruptly diminishes to 5 cm/1000 yrs in the last 8,000 years. Such a difference seems related to the sea-level lowstand that occurred during the 20,000-10,000 yrs B.P. interval (STANLEY and MALDONADO, 1979), with a consequent increasing of terrigenous contributes from Cyprus. These data are confirmed by the study of Y-2 and W-3 ash layers recorded in the GAN 17 core. They display a constant low rate of sedimentation (4.1 cm/1000 yrs, from 120,000 to 100,000 yrs B.P.), being far from the mainland and characterized only by pelagic sedimentation. This situation seems well confirmed by heavy mineral composition (epidotes, amphiboles, clinopyroxenes and orthopyroxenes). In fact, it can be observed that a gradual decrease of epidotes (typical mineral of Cyprus suite) occurs from the bottom to the top of the cores, which should be a direct consequence of a similar reduction of the clastic input from Cyprus. Moreover, in the eastern cores an increase of amphiboles and clinopyroxenes and a decrease of epidotes confirm the more important provenance of the sediments from Eratosthenes Seamount. In conclusion, the recent sedimentation study of this sector of the Levantine Sea allowed the identification of three areas with a peculiar prevailing sedimentation mechanism of different material supply: the first, along the southern Cyprus continental slope, is influenced by Cyprus terrigenous input, the second, placed North of Eratosthenes Seamount, is mostly characterized by gravity flows, and lastly, a western area, steadily dominated by pelagic sedimentation. In all the examined areas, nilotic contributes are rather reduced, while the eolian transport influences the northern sector.

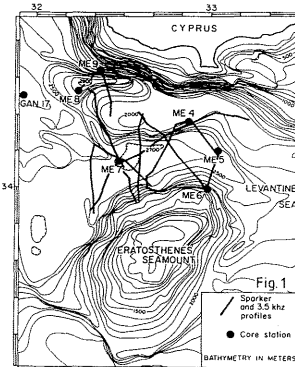
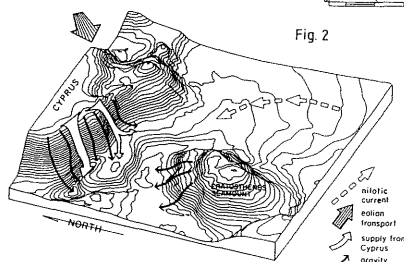


Fig. 2



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