

Late Quaternary Evolution of a Tabular Relief in the Sicily Channel through the Study of Foraminifera and Ostracods

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Background

The Malta Plateau is an area of particular interest since it is affected by active gas venting phenomena, which lead to the formation of mud volcanoes. Furthermore, tabular reliefs occur in this area (Fig. 1) and are the objective of this work. Previous studies focused on the morphological description of this feature (Savini *et al.*, 2009) and on its evolution basing upon paleontological, sedimentological and mineralogical analyses (Bracchi *et al.*, 2019).

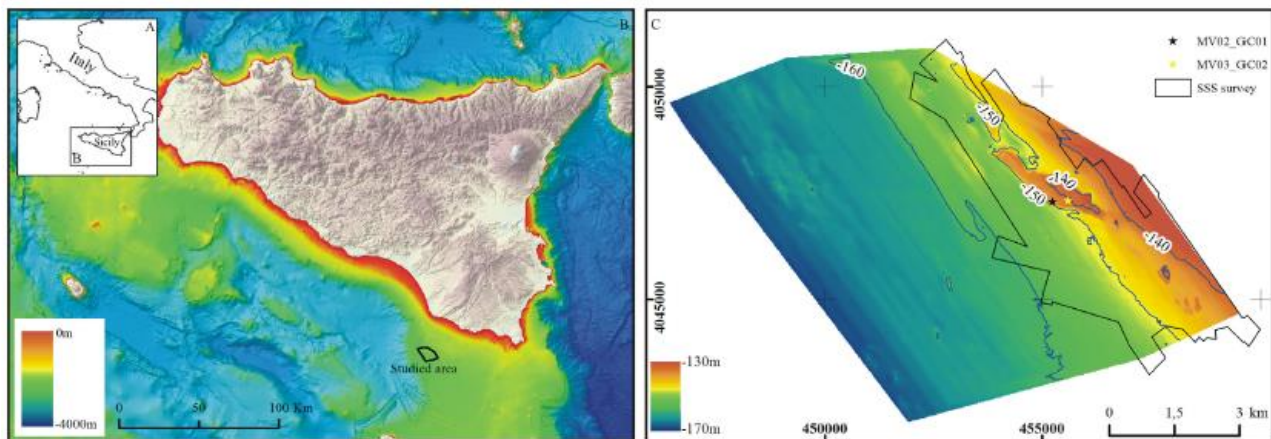


Fig. 1. Location of the investigated tabular relief. Black star indicates the core site (modified from Bracchi *et al.*, 2019).

Objectives

This work proposes a quantitative description of the variation of foraminifera and ostracod assemblages throughout a sedimentary core, in order to detail the paleoenvironmental evolution of this tabular relief.

Methods

Core MV02_GC01 (36°34.2147'N; 14°30.2232'E), 176 cm long, was sampled on the flank of the tabular relief at 141 m depth and divided into two sections: section 1 from cm 0 to cm 76 cm, and section 2 from cm 76 to cm 176. Samples for micropaleontology were collected at 10 cm resolution, with a total of 17 samples from the top to the bottom. For each sample, 3 g of sediment were wet-sieved and splitted. Benthic foraminifera were hand-picked, identified and counted, whereas planktonic foraminifera and ostracods are still under study. Six samples (10-20-40-50-100-160 cm) have been collected and analyzed for nannofossil biostratigraphy.

Results

A total of 7218 benthic foraminifera were identified, belonging to 70 species. According to their habitat requirements, benthic foraminifera were grouped in four ecological categories, whose relative abundance was assessed: transported, lagoonal, marine and epiphytes. The downcore variations of these categories are described below and shown in Fig. 2:

- Transported: group composed by reworked Miliolids, *Ammonia beccarii* and *Elphidium crispum*. These specimens are characterized by an altered coloration and an intense abrasion on their tests. Two or even three cycles of upward-decreasing abundance can be identified. The relative abundance of this category is remarkably large in the lower section of the core, with a maximum value of 37,89% at -160 cm, then it decreases until -80 cm, where there is another peak of 33,04%; finally, it decreases again towards the top, reaching the 0% at -10 cm.
- Lagoonal: group composed by *Haynesina depressula*, *H. germanica*, *Pararotalia* spp., *Ammonia tepida*, *Elphidium granosum* and *E. translucens*; this category has a stable relative abundance of about 10-15% throughout the whole core, with a maximum value of 22,92% at -30 cm.
- Marine: group composed by in situ Miliolids (small and with a white and well-preserved test), *Bolivina* spp., *Cassidulina carinata*, *Globocassidulina subglobosa*, *Bulimina* spp., *Uvigerina* spp., *Valvulineria* spp., *Discorbis* spp., *Cibicides*

refulgens and *Nonion* spp.; the relative abundance of this category has an upward increasing trend, with a maximum value of 70,00% at -20 cm.

- Epiphytes: group composed by *Textularia* spp., *Reussella spinulosa*, *Neoconorbina terquemi*, *Rosalina* spp. and *Asterigerinata mamilla*; this category is directly connected to the marine one regarding the ecological meaning, since most of these identified epiphytes is related, in the Mediterranean, to a fully marine environment with *Posidonia oceanica*; the relative abundance of this category has an upward increasing trend, with a large peak corresponding to 33,02% at -60 cm.

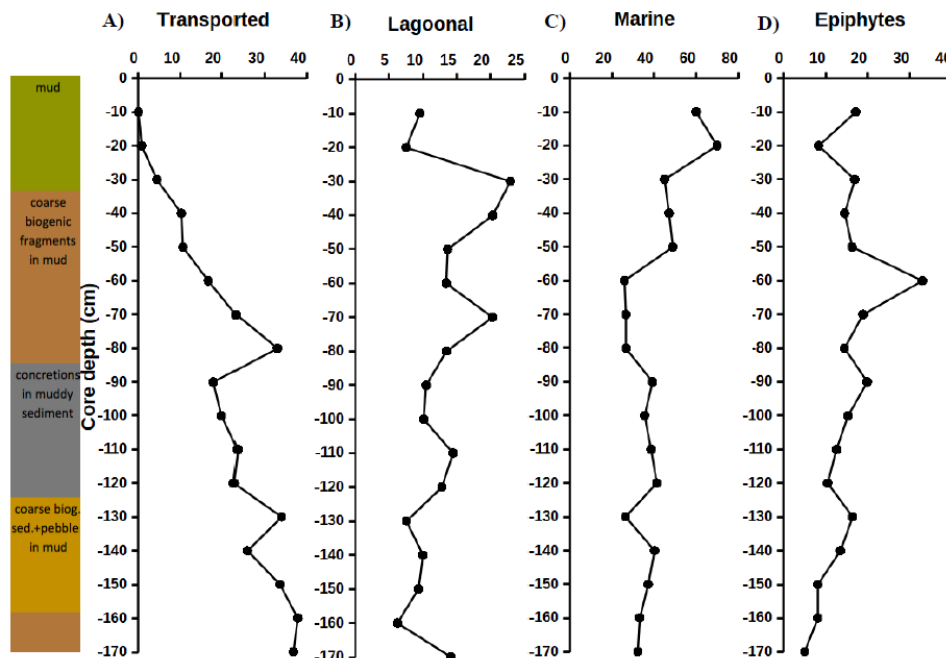


Fig. 2 Plots showing the relative abundance of the four ecological categories (A: transported; B: lagoonal; C: marine; D: epiphytes) along the sedimentary core expressed as percentage (%).

The ratio of planktonic foraminifera vs total foraminifera (%P) corrected for infaunal species, expressed as percentage (van der Zwaan et al., 1990) is notably large in the lower section of the core, with values around 80% from -150 to -90 cm and a maximum of 84,35% at -140 cm, while, starting from -90 cm, this ratio decreases towards the top, with a relevant increase in the last two samples.

Conclusions

The variation in the relative abundance of ecological groups is interpreted as a transgressive cycle from the Last Glacial Maximum or previous glacial phases. The upward decrease in the transported tests is coupled with an increase in the percentage of marine and epiphytes: this suggests an upward deepening trend. Such results well agree with the data of Bracchi et al. (2019), although the analysis of planktonic foraminifera and ^{14}C dating will allow a better constrain of the evolution of the tabular relief. High values of %P in the lower section of the core are still debated. They could result from: an intense erosional activity during glacial phases, vertical migration of older material in correspondence of mud volcanoes or peculiar paleoecological conditions.

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