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Palaeoenvironmental Interpretation Based on Taphonomic Indices of Pleistocene Ostracods

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Introduction

This work involves the paleoecological study of Pleistocene deposits from Magoula (northwestern Peloponnesus, Greece, Fig. 1), based on the analysis of microfaunal elements (basically ostracods). The study area has been chosen not only as a site of significant palaeontological interest where plant fossils, mammal bones and a wide range of different kinds of invertebrate and microfossils occur, but mainly because it belongs to the tectonically interesting Rio –Antirio basin, which is part of the Corinth rift. Rio basin is an asymmetric graben with a NW-SE trending, located between the mainland of Greece and NW Peloponnesus (Kontopoulos & Zelilidis 1997). The basin formed during the Upper Pliocene to Lower Pleistocene, due to WNW normal faults and NNE transfer faults (Doutsos et al. 1988, Parcharidis et al. 2009).

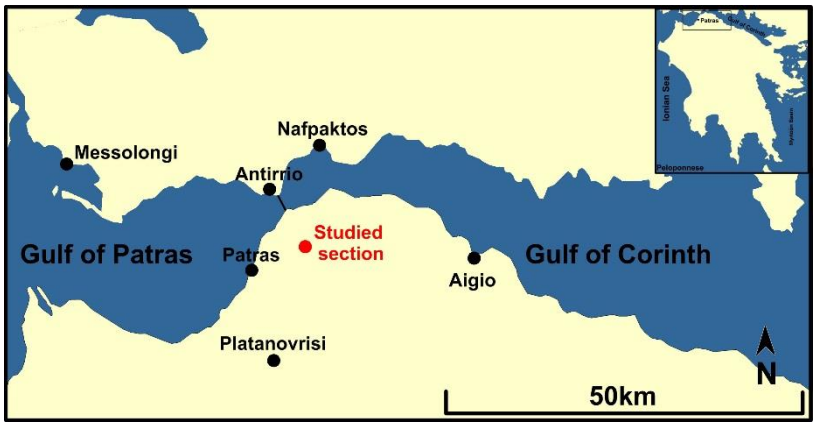

Figure 1. Map illustrating the position of the studied section.

Material & Methodology

Microfaunal analyses were carried out on 133 samples collected every 20-40cm from a natural section in the area of Magoula (2.5 kilometers SE of University of Patras) with a total thickness of 31.30 meters. Sediment samples were washed through 500 and 63 μm mesh sieves. Microfossils were collected and studied under the stereoscope. Species determined based on previous studies of Mediterranean benthic taxa. The collected data were analyzed, relative abundance diagrams were prepared for each species. Furthermore, taphonomic indices (Right/Left valve ratio, Sex ratio, Adult/Juvenile ratio and Carapace/Disarticulated Valves ratio) were calculated for the most abundant species.

Results and Discussion

Out of the 133 sediment samples, 75 contained sufficient numbers of tests and valves (>10%) for quantitative analyses, 53 were barren and 6 contained scarce specimens. According to the microfaunal analysis, 6 ostracod taxa (*Cyprideis torosa* (both un-noded and noded morphotypes), *Candona neglecta*, *Ilyocypris spp.*, *Tyrrhenocythere amnicola*, *Aurila convexa and Cypridopsis vidua*) were recorded in the studied samples. The most abundant were *Cyprideis torosa* and *Candona neglecta*. Two benthic foraminifera taxa (*Ammonia tepida* and *Haynesina depressula*), as well as some charophyte gyrogonites, freshwater gastropods, gastropod opercula and fragments were identified as well. Generally, a lagoonal environment with several variations in the salinity and the mean depth occurred. Based on the relative abundance diagrams and the taphonomic indices three main units can be distinguished (Fig. 2). Unit 1 (0-14.60 m) is mainly characterised by the presence of *C. torosa* and the minor contribution of *C. neglecta* and *Ilyocypris spp*. Based on the taphonomic indices of *C. neglecta*, Unit 1 is characterized by the locally focused deposition of more easily transported juvenile valves (A/J ratio < 1:25 & R/L ratio > 1), thus representing hydrodynamic transport, whereas the taphonomic indices of *C. torosa* (Fig. 2) may represent an in situ death assemblage, with reduced taphonomic removal of juveniles which therefore can be characterized as a life assemblage (A/J ratio 1:12-1:4 & R/L ratio ≈1). At 5.30 m the presence of *Ilyocypris spp*. and the A/J ratio (0.5) of *C. torosa* indicate a freshwater influx. Unit 2 (14.61-23.50 m) consists of barren coarse grained sediments (Fig. 2), while Unit 3 (23.51-31.30 m) is represented mainly by *C. torosa*, *C. neglecta* and small numbers of *Ilyocypris spp*. valves (Fig. 2). Based on the taphonomic indices of *C. neglecta* (A/J ratio < 1:25, R/L ratio ≈1 & C/D ratio >0), Unit 3 may reflect not only low-energy conditions, but also potential mass kill events associated with increased sedimentation rates (smothering via settling of fine-grained sediment from river flood discharge). On the other hand, based on the taphonomic indices of *C. torosa* (A/J ratio 1:10-1:2, R/L ratio ≈1 & C/D ratio >0 at 24.30 m) an in situ death assemblage can be considered, where possibly the taphonomic removal of most juveniles occurred (Fig. 2). Also in this unit at 25.7 m, the presence of *Ilyocypris spp*. and the C/V ratio (0.1) of *C. neglecta* and at 29.90 m, the presence of

Ilyocypris spp. and the A/J ratio (0.56) of *C. torosa* indicate a freshwater influx. Unit 1 can be characterized as a lagoon environment with freshwater influxes. Unit 2 represents river mouth deposits from a river outflowing in the lagoon. Unit 3 can be characterized as a lagoon environment with strong freshwater influxes and the appearance of a possible flood event (24.10-24.30 m).

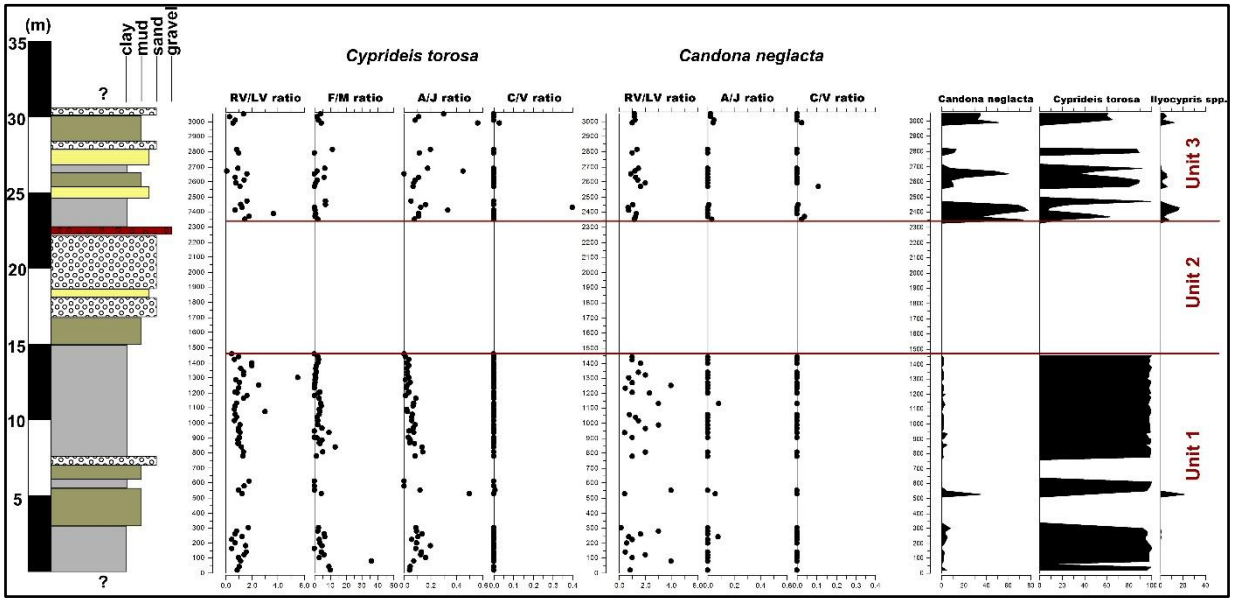

Figure 2. Stratigraphic column of the study section, taphonomic indices and relative abundance diagrams of selected species.

Conclusions

According to micropalaeontological and taphonomic analysis palaeonvironmental changes occurred due to eustatism. Initially a lagoon system, turned gradually into a lagoonal river mouth environment (barren layers) due to sea level drop and finally when sea level rose became again a lagoonal environment influenced by a river system with strong freshwater influxes. Moreover, the relative abundance diagrams and the taphonomic indices in combination with the stratigraphic column characterize a possible flood event at 24.10-24.30 meters.

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