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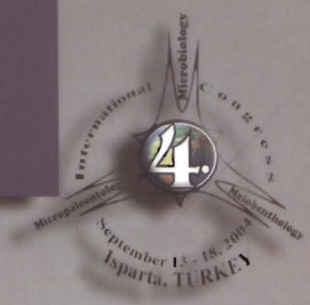

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Foraminiferal biofacies on the Bo shelf, Gavdos Island, Eastern Mediterranean: paleoenvironmental implications

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Gavdos island has been the focus of many paleoenvironmental studies dealing with relatively deep water assemblages representative of outer shelf and bathyal environments. The result is that the shallow shelf and littoral faunas of this area remain relatively undocumented and little known despite their importance in reconstructing the depositional, tectonic and paleoceanographic history of the Eastern Mediterranean Basin.

This study presents the first detailed analysis of foraminifera from surface exposures of Miocene neritic and littoral deposits of Gavdos island.

Miocene marine sediments are well exposed in the western part of Gavdos island (Bo Section) and contain usually well preserved and diverse benthic foraminiferal assemblages. These foraminiferal faunas are discussed in relation to the depositional history of the associated sediments in order to determine correlations between abundances of the benthic foraminifera and variations in individual physical and chemical properties of the water.

Samples were prepared using standard processing techniques. The analysis of the benthic foraminiferal fauna was carried out on the size fraction of >125 mm. Diversities were determined following the Shannon-Wiener information equation (Buzas & Gibson, 1969). Faunal assemblages were calculated by R-mode principal component analysis (PCA). Rare species that only occurred in one sample or never exceeded abundances of 2% were summarized in the category "rare species".

Faunas, particularly those in the plankton, are numerically quite high throughout the succession in which there is a planktic/benthic ratio as high as 60% with an abrupt decrease at 16,6 m (25%).

Paleobathymetry was calculated for each sample by introducing P/B ratios based on epifaunal species, in the equation of v. d. Zwaan et al. (1990). Based on water depth zonation of Bremer et al. (1980) and van Morkhoven et al. (1986), the depositional depth of the Section varies from around 127 to 630 m indicating an environment in the lower neritic to upper bathyal zone.

An R-mode factor analysis of the samples in the data set required two principle axes in order to explain 59% of the variability contained in the matrix. The first axis which explains 41% has a bipolar character indicating two assemblages. Species loading this axis positively are *Uvigerina* spp. Species loading the axis negatively are *C. lobatulus* and *C. kullenbergi.* The second axis which explains 18% is loaded positively by *Cancris oblongus.*

Bottom sediments rich in organic carbon are particularly suitable for the predominance of the *Uvigerina* spp. assemblage (van Morkhoven et al., 1986) especially since a higher organic carbon content helps create a low-oxygen environment (Poag, 1984).

In contrast, *C. lobatulus* and *C. kullenbergi* which prevail in the upper part of the section, are shallow neritic species associated with fine-grained substrates and a high sedimentation rate

(Murray 1973; Poag 1984). *Cancris oblongus* assemblage predominates in the middle part of the studied succession indicating low-oxygen environmental conditions (van der Zwaan, 1982; Jonkers, 1984).

A warm, mesotrophic to nearly oligotrophic environment is inferred by the epifauna dominated fauna. Moreover, a lower infauna supports this conclusion.

A slightly different situation might exist on the adjacent Potamos shelf. The comparison between Potamos and Bo sections encourage us to conclude that an Island may have acted as a barrier to the distribution of foraminifera. Perhaps its role was more significant during the times of sea-lever fall. It separates the shelf water regime into Bo and Potamos sectors. The Bo shelf water is warmer and nearly oligotrophic, whereas the Potamos shelf is bathed mainly in cooler, mesotrophic shelf waters, with local upwelling occurring from time to time. *Ammonia beccarii* dominated the fauna on the inner part of the Potamos shelf. We attribute the origin of the *Ammonia*-dominated fauna to the existence of a river which ruptured this brackish-water species. At a time of a low sea level, when the surface topographical gradient was higher, discharge from the river may have intensified, resulting in a benthic fauna dominated by *A. beccarii.* The barrier acted as a biogeographic barrier, because there was not passage between the Bo shelf and the Potamos shelf when sea level dropped.

Therefore, the difference between the Bo and Potamos shelves is due to the blocking effect of an island which acts as an oceanographic and biogeographic barrier.

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