

Sea level fluctuations of NW-central Aegean shelf environments, during the past 20,000 years, by means of benthic foraminiferal assemblages

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This research provides an insight into the Upper Pleistocene to Holocene benthic foraminiferal record of two sediment cores (DEH1 and DEH5), collected from the NW-central Aegean Sea and specifically from the South Evoikos Gulf. The study aims to investigate the effects sea level fluctuations have on shelf environments of eastern Mediterranean, during the post-last glacial maximum period to present.

Detailed micropalaeontological analysis allowed the identification of 135 benthic foraminiferal species in the core DEH1 and 151 in the core DEH5. Statistical analysis singled out six benthic foraminiferal assemblages, interpretation of which, along with the calculation of ecological indices, defined an equal number of biofacies. The studied material covers more than 13540 cal yr BP, revealing the paleoceanographic history of the South Evoikos Gulf, from the time it was a landlocked lagoon, when the sea level at Aegean was lower than 60 m b.p.s.l. to the complete re-entry of the sea and the installation of marine conditions, similar to the current ones.

Three evolutionary stages were discriminated:

Stage 1: Pre-Holocene Sea Level Rise.

In this stage, South Evoikos Gulf forms a brackish lagoonal environment, described by three biofacies. The older biofacies IV (>13.21 cal. kyr) is indicative of a strongly stressed landlocked brackish lagoon, around 10m deep, holding a monospecific to oligospecific fauna of euryhaline and tolerant species. At the end of Pleistocene, biofacies V (12.89 to 13.21 cal. kyr BP), presents the early retreat of the stressed conditions and establishment of good oxygenation and adequacy of food. However, the faunal content remains poor. Towards the onset of the Holocene (12.89 to 9.09 cal. kyr BP), biofacies VI, reveals the early "opening" of the gulf and the consequent development of the benthic foraminiferal fauna, still brackish, in the open lagoon of <30 m water depth.

Stage 2: Holocene Sea Level Rise.

In the Middle Holocene, the study area has evolved into an infralittoral to shallow circalittoral biotope, with a mean water depth of 60 m. Two biofacies can be distinguished. From 8.2 to 7.31 cal. kyr BP, biofacies II reflects high organic matter concentration, derived from the increased productivity and continental influx, causing mild eutrophication and moderate oxygenation. Species indicative of well oxygenation have poorly developed. Subsequently, from 7.31 to 4.86 cal. kyr BP, biofacies I was attributed to a possible deltaic progradation into the preceding marine environment. This phenomenon influenced the salinity and brackish conditions were installed.

Stage 3: Holocene High-stand.

Palaeoenvironmental clues, for the period from 9.09 to earlier than 1.21 cal. kyr BP, extracted from biofacies III. The main ecological component of the environment, where the deposition of these sediments took place, is the significant influence of marine currents. The currents have mixed together infralittoral and circalittoral benthic foraminiferal assemblages, making difficult the evaluation of a single water depth. However, the micropalaeontological content clearly shows the transition from the Early-Holocene lagoonal conditions to the Late-Holocene shallow circalittoral ones, followed by even more deeper.