

Upper Quaternary seismic stratigraphy and sequence development in an ever evolving marginal basin: The North Evoikos Gulf, east-central Aegean Sea

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The North Evoikos Gulf is a deep (460 m) semi enclosed, elongate marginal basin connected to the Aegean Sea via a 45m sill to the north. It is an active extensional basin with high seismic activity and a small Upper Quaternary shoshonitic volcanic center (Likades islands) developed to the north.

A dense grid of high to medium resolution seismic reflection profiles has been used to establish the overall Upper Quaternary seismic stratigraphy of the sedimentary infill and 10 cores were investigated in order to elucidate the most recent sedimentary sequences. Detailed seismic facies analysis allowed defining a series of sedimentary features that can be used as indicators of past sea or lake levels. Notably: 1) buried erosional surfaces forming terraces, 2) delta offlap breaks and coastal or delta clinoform wedges, 3) unconformities and their transition to conformable sequence boundaries, 4) alternation of marine and lacustrine facies.

Along the northern shelf we trace a vertically stacked series of coastal clinoform wedges, that form from 165 to 225 m bsl. These we attribute to MIS 2-MIS 16 low sea level stands. The fact that they are arranged in aggradational manner makes us postulate greater magnitude sea level drops to 165-180 m bpsl during globally synchronous low sea level stands and normal subsidence rates locally. Further upslope, coarse fan delta progradation is observed offshore the Xerias torrent at 75-130m bsl and above the numerous vertically stacked clinoform wedges the fine grained Loggos fan is developed. An extensive abrasion platform is observed in between 75 and 105m bsl and locally form small clinoform wedges at similar depths. Along the southern slope of the gulf the abrasion-erosive unconformity extends deeper and the low stand wedges are not so well developed, due to active sediment gravity flows and tectonic deformation. A small basin is forming behind a structural height at the south quarter of the gulf. Within this basin marine-lacustrine cycles can be differentiated on high resolution records.

Sedimentary lithofacies recovered in cores include small scale sequences that comprise of alternations- a few decimeters to meters thick- of mostly chemical carbonates (60-95%) and more marly sediments (around 30-40% CaCO₃) richer in siliciclastic clays.

In North Evoikos Gulf we present univocal evidence that during major Upper Quaternary low sea levels the sea dropped over 165 m suggesting that during glacial intervals evaporation exceeded precipitation and runoff to varying degrees. This scenario persisted through MIS 4&3 and the MIS 2 erosional unconformity has eroded, to varying degree MIS 3 mostly chemical carbonate rich sediments.

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ABSTRACTS

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