

MIDDLE MIOCENE - LATE PLIOCENE EVOLUTION OF THE SOUTHERN AEGEAN
BACK-ARC BASIN

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The sedimentary record of the Neogene of the Southern Aegean area reflects a complex interrelation between major tectonic events, paleogeographic configurations and sedimentation patterns. This is most clearly expressed in the Neogene sequence of Crete, which displays ample evidence for ten successive paleogeographic configurations in the Middle Miocene - Late Pliocene time-span.

In Middle Miocene time Crete formed part of the Southern Aegean landmass (Meulenkamp, 1971), which extended north and east of the island as it is today. Differential, vertical movements during the Late Serravallian and the Early Tortonian caused the transformation of the area into a mosaic of horsts and grabens (Drooger and Meulenkamp, 1973). These processes are thought to have resulted in the most dramatic change of the paleogeographic configuration of the Southern Aegean area in Neogene time, between about 12 and 10 m.y. ago. They resulted in the subsidence of the Southern Aegean landmass and the interruption of the connection between Crete and the European mainland. The high tectonic instability at the transition from the Middle to the Late Miocene can also be inferred from the seismic data (Jongsma et al., 1977) of the Southern Aegean Sea and from the sedimentary record of the island of Kythira (Meulenkamp, Theodoropoulos and Tsapralis, in press).

An overall submergence, related to some type of "restabilisation" of the Southern Aegean area seems to have taken place at the transition from the Tortonian to the Messinian. Calcareous successions (bioclastic limestones and marls) were deposited on Crete and on Milos. On Milos (Cyclades) these sediments unconformably overlie preneogene, metamorphic rocks (Meulenkamp, in press). Also in the Southern Aegean the Messinian salinity crisis was connected with the local deposition of evaporites (Crete, Milos, D.S.D.P. site 378). An intra-Messinian tectonic event caused a removal of part of the older Neogene sedimentary cover and the local accumulation of coarse-clastic sequences on Crete.

Possibly also Kythira was affected by processes of uplift, tilting and erosion at that time.

The Early Pliocene flooding can clearly be recognized in the sedimentary record all over the area. In the course of the Early Pliocene, however, an overall regression, caused by uplift and tilting to the north, started to affect Crete. This resulted in the emergence of Crete in the course of the Middle Pliocene. These processes were approximately contemporaneous to subsidence or even submergence on Kythira, Karpathos and Rhodos (Meulenkamp, Theodoropoulos and Tsapralis, in press, Meulenkamp, de Mulder and van der Weerd, 1972), which suggests a fundamental change of the paleogeographic configuration ("reversal of the megarelief") and sedimentation patterns in the Southern Aegean between the Early and the Late Pliocene.

More information is needed on the Neogene of the Cyclades area, but the conclusions drawn from the Neogene successions on Milos suggest that the uplift and subsequent erosion of kilometers of sediments from the Cyclades mass and the "mise-en-place" of allochthonous units must have occurred before the Messinian, i.e. before about 6.5 m.y. ago.

References:

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