On the evolution of the Cycladic-Attica S. Euboean (C-A-SE) area since Miocene

by

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Sea and land. 1. — Of the C-A-SE massif (thickness of the crust there : 27-31 km) submerged in great part by the sea, the highest parts are emerging now as islands (Cyclades) or peninsulas (Attica, S. Euboea). Researches on the distribution of land and sea since Miocene are attesting followings :

The uplift. 2. — As a crystalline massif, the C-A-SE resisted strongly to the Alpine orogeny in the climax phase which had given rise to the Hellenic Chains. Intensely pressed from W, it was moderately uplifted. Vestiges of ancien (Miocene) erosion surfaces are found at alt. till 1000 m, while on the Hellenic Chain at 1800-2100.

Distraction. 3. — The Aegean area testify giant distraction processes in Neogene. In L. Miocene probably, by important fault lines were traced the superficial limits of the massif toward E and W where, neighbouring blocks were very remarkably displaced downward (basins of Central Aegean and Myrtoon) as also to S where the there block (of the Sub-Pelagonian zone?) little only subsided.

4. — Toward N the C-A-SE is strong attached with the neighbouring area of the Sub-Pelagonian zone, which is uplifted little higher (ancient surfaces till c.1300 m). Limits are traced by a line NE-SW of little faults and overthrusts. The C-A-SE presents a light inclination from NE to SW (ancient surfaces higher in N and E, lower in W).

5. — In the interior, tectonic basins were formed in Miocene only, probably, in the north part (chiefly in Attica). The lowlands are to be attributed mostly to the erosion.

The Mesogean sea branch. 6. — It is from S-SE that Mesogean penetrated toward the interior of the C-A-SE and formed an important branch. Miocene marine deposits are known only in Paros and Naxos.

The Pontian extended land. 7. — During Miocene and Pontian erosion greatly enlarged the basins, while sedimentation covered with continental formations the deeper parts of them (chiefly in Attica).

8. — It is in the north part that, during Pontian, conditions were more favourable for the Pikermi fauna. Fossile are found in S. Euboea (Almyropotamos), and in extreme abundance in Attica (Pikermi etc).

The Upper Pliocene penetration of the sea in the interior. 9. — Intense tectonic derangments in Pliocene permited to the Mediterranean (which succeded the Mesogean) to approach c.middle Pliocene the C-A-SE. The greater deepening of basins and valleys in its western half and, probably, also subsidences favoured the sea penetration largely into the interior of the area during the Upper Pliocene. From W, sea penetrated in the central part of it. A branch advanced notably toward N between E. Attica (Astian marine sediments near Raphina) and S. Euboea. From SW sea penetrated also notably in the interior (Pliocene marine deposits arc known in Antiparos).

Withdrawal of the sea during Lower Pleistocene. 10. — At the end of Pliocene deposits in brackish waters succeed the marine deposits; later begin continental formations. Sea is retiring little by little because probably of a slow uplift, but with alternances of regressions and transgressions attributed chiefly to sea level eustatic fluctuations. Marine deposits considered as Calabrian are known on the eastern coast of Attica as also not far from C-A-SE in the Corinthian Isthmus and in Thera.

Rapp. Comm. int. Mer Médit., **23**, 4a, pp. 175-179, 2 figs., (1975).

The Middle Pleistocene extended land. 11. — During a great part of the Middle Pleistocene Mediterranean is presenting low levels, attributed to an interruption of communication with the Ocean. The C-A-SE became thus again an extended land convenable for living of abundant great animals. But, owing to the recent subsidence, the then lowlands are covered by the sea. Fossils known are rare.

The penetration of the sea in Tyrrhenian. 12. — It is with the Tyrrhenian transgression that sea penetrates again in the western Aegean. Sure Tyrrhenian I deposits are not known, but Eutyrrhenian are abundant W of the C-A-SE. The more neighbouring are those in the Saronian islands Angistri and Metopi and in the Corinthian Isthmus. In C-A-SE are probably covered by the sea, because of the recent subsidence.

Sea level eustatic fluctuations. 13. — It is in Uppermost Pleistocene that sea penetrated very largely into the C-A-SE area, but with alternances of transgressions and regressions due to eustatic fluctuations of the sea level. Abundant geomorphological evidences in the coastal zone, but few on the sea bottom (according at least marine maps) are giving an idea of shoreline displacements during Würm and Holocene.

Some conclusions. 14. — The C-A-SE area is an excellent field for researches on the evolution of the Aegean area. It is one of the more proper to explain if in recent tectonic history is independent or no of plate tectonics, if a second shear horizon must be assumed within the crust to explain the distraction phenomena near the surface, and many other problems.

15. — In the present paper are exposed only results based upon the study of the not abundant stratigraphic data and the geomorphological evidences. These are testifying a prevailing influence of the erosion in the formation and evolution of the lowlands, strong vertical movements, and a tectonic origin of basins only in the north part. They give also an idea of shoreline displacements since the middle of Pliocene.

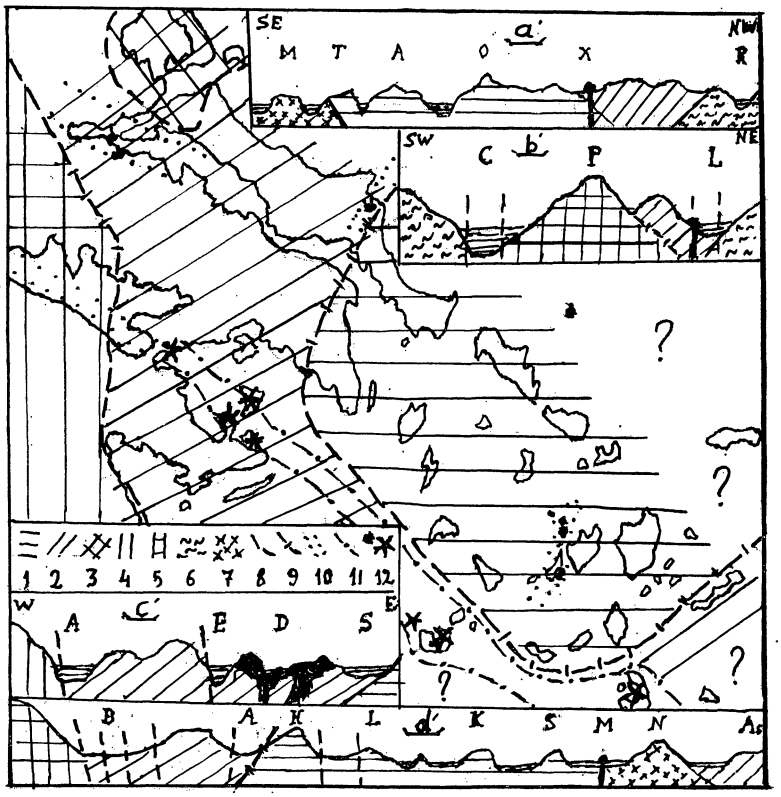

FIG. I.

Structural units

1 = Cycladic-Attic-S.Euboean (C-A-SE) massif
2 = East Thessalian massif
3 = Eastern Middle Greece-NE Peloponnesus (GMO-NEP) area
4 = Hellenic (continental) Chain
5 = Parnassus tectonic zone (High karstic plateaux)
6 = Metamorphic rocks
7 = Core of the C-A-SE massif

Tectonics and Volcanism

8 = Fault line (important)
9 = Line of little faults and overthrusts
10 = Ancient faults and volcanic fractures
11 = New volcanic zone in South Aegean
12 = Volcano (older, recent)

Diagrams

a' Across Mt Ziria (Kyllene)-Corinthian gulf-Eastern Parnassus-Lichadian Channel-northernmost Euboea (dir. c. SW-NE).
b' Across islands Mykonos-Tinos-Andros- and Euboea (dir. SE-NW).
c' Across Hellenic Chain-Argolic gulf-Argolic peninsula-Epidauros Trench-Methana-Aegina-Saronic gulf-to southernmost Attica (dir. W-E).
d' Across S. Parnassus-Bœtian basins-N. Attica karstic basin-basin of Athens-Mt Hymettus-basin of Mesogœa-SE Attica-islands Syros-Paros-Naxos-to Amorgos (dir. NW-SE).

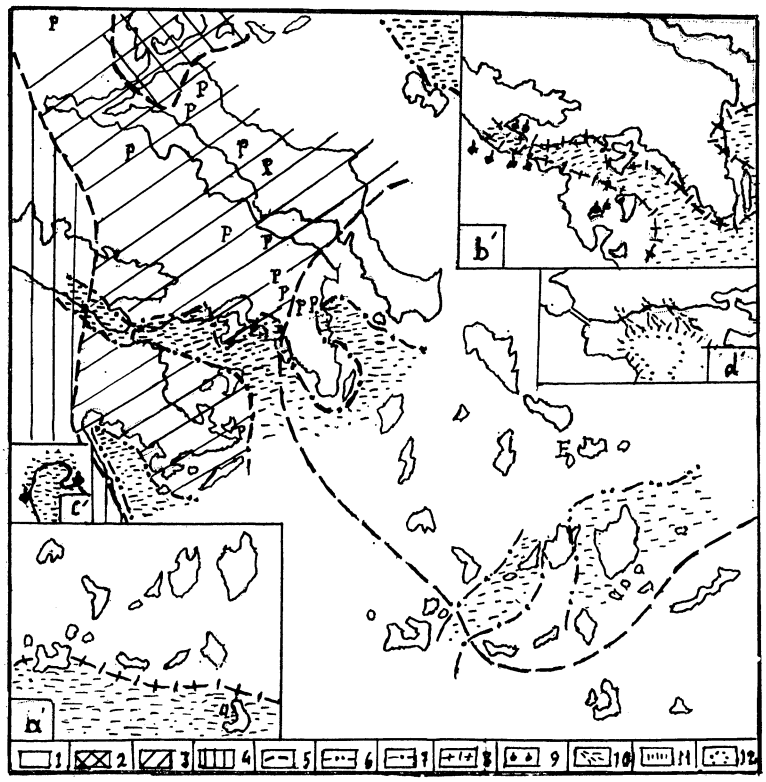

FIG. II.

1 - 4 (*see figure I.*)
5 = Limits of units-areas.
6 = Probable limits of Mesogean Miocene sea branches.
7 = Probable limits of Mediterranean Upper Pliocene sea branches.
8 = Probable limits of Mediterranean Lower Pleistocene sea branches.
9 = Tyrrhenian marine deposits.
10 = Dilluvial fans partly submerged by the sea.
11 = Isobath of 200 m.

F = Fossils of Pikermi fauna (Pontian) E = Middle Pleistocene fossils.

a' *South Cyclades.* Probable limits of the Calabrian sea.
b' *Attica-Corinthia-Argolis.* Probable limits of the Calabrian sea and sites of Tyrrhenian marine deposits.
c' *Northern part of the Argolic gulf.* Sites of Tyrrhenian marine deposits and probable limits of the sea then branch.
d' *NW Saronic gulf area.* Dilluvial fans advanced during the low sea levels of Würm till shorelines now at depths of 80-90 m standing. The then shoreline.

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