SEDIMENTOLOGICAL ASPECTS OF THE CRETAN SEA

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The Cretan Sea (South Aegean Sea) is bound by the Aegean volcanic arc (Is. of Santorini, Milos, etc.) to the North, by the Peloponnesus-Crete and Crete-Rhodes ridges to the South; it includes four main basins, with axes trending roughly parallel to the ridges; their depths increase eastwards up to 2500m West of Karpathos Is. The slopes are variable, greater values occur in the eastern zone (to 8°) than in the western one (to 5°). Moreover the basin flanks are steeper toward the ridges (sometimes 8-9°) than the volcanic arc (Fig.1).

The 3.5 kHz echograms show that the IB (Damuth&Hayes, 1977) is the most common acoustic type of the area. The IIIA type is less abundant than IB; it is recognized more in the eastern part, offshore from Kasos and Karpathos Is. The IIIB type is present especially near Crete and to the East of Kithira and Andikithira Is. The 3.5 kHz survey allowed the recognition in the superficial layers of many normal faults, sometimes stepwise, already detected, from sparker profiles, by Jongsma et alii (1977) and Brambati et alii (1982). These faults, roughly parallel to the ridges, are present mostly in the central-western Cretan Sea.

Twentyseven gravity cores, up to 6m in length, collected between 500 and 2500m depth were examined (Fig.1). The main sediment types are the following (Fig.2): a) Organic mud, is the dominant type; the greatest thicknesses are found in the western zone cores; composed of clay and silty clay with organic material, it is generally homogeneous and plastic, sometimes more compact because an increase in the silty component; its colour is from light-brown to grey; in the upper layers (20-30cm) is almost always yellowish brown; b) Coarser grained terrigenous and organic material, its distribution is greater in the southern zones and particularly offshore from eastern Crete; fine sand size generally predominates; it is composed essentially of quartz, in the terrigenous fraction, and of planktonic foraminifera and broken shell fragments, in biogenic fraction; c) Volcanic ashes, they are present in many cores, mostly from central and eastern zones, are absent offshore from South-East Peloponnesus; prevalent grain size is coarse silt and fine sand; generally they occur in a dispersed state in the sediment, sometimes are gathered in often graded layers; the ashes are composed of glass shards and pumice fragments; d) Sapropels, these layers occur in about 50% of the cores, essentially located in the South-West zones; generally one sapropelitic layer is present at variable core depth, between 8 and 74cm; two other sapropelitic layers also are detected in three cores only, at the core depth 2.5-3m and about 3-4m; the thickness is usually from 7-12cm up to 24cm; the colour is dark grey to black; now ^{14}C dating is underway in these layers, however through general characteristics (colour, texture) and stratigraphic position in relation to Minoan volcanic ash, it can be assumed that the first layer detected corresponds to the S_1 sapropelitic layer (Stanley & Maldonado, 1977; Stanley

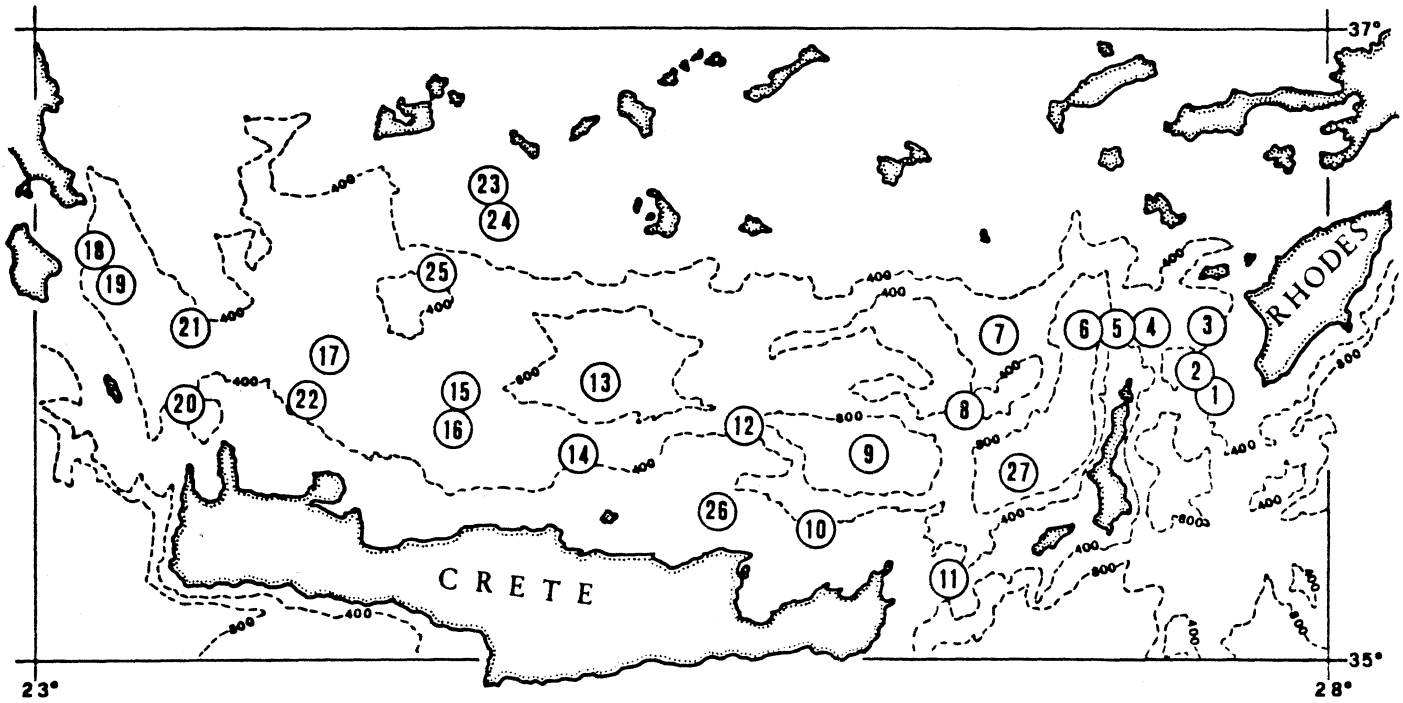

Fig. 1. - Core location map. Bathymetry in fathoms.

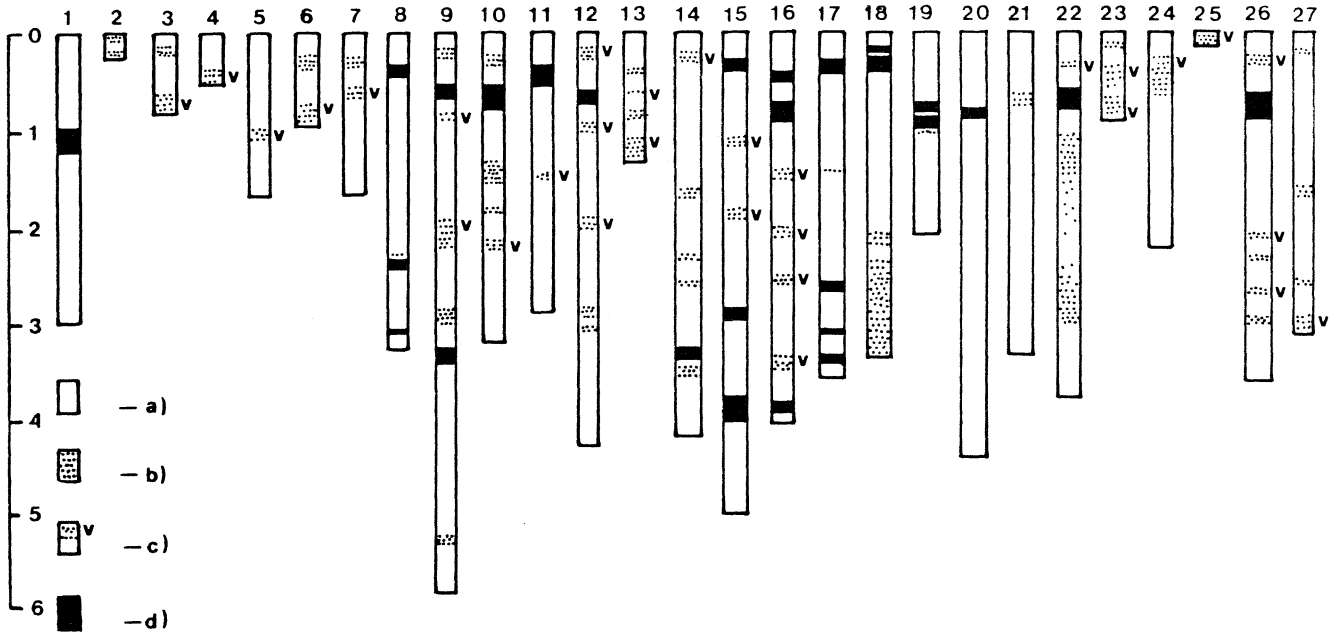

Fig. 2. - Lithologic logs of the cores : a) organic muds; b) coarser terrigenous and organic material; c) volcanic ashes; d) sapropel.

et alii, 1978); at the present it can only be hypothesized that the sedimentation rates in the Cretan Sea over the past 7000-9000 years are generally low and rather uniform (on average 6cm/1000years with maximum values of 10cm/1000years).

The most evident structures are recognized in the coarsest sediments: the most common is the graded bedding; sometimes laminations are also present, generally parallel, seldom wavy or crossed. Many cores are characterized by irregular admixtures of sediment, with the clasts mostly sandy or silty, sometimes clayey or sapropelitic, always unconsolidated, in a clay matrix.

The paleontological study at the present limited to faunistic assemblages (Foraminifera, Ostracods and Mollusks) of the upper surface layer (1cm), allowed the following remarks to be attained: a) a mostly planktonic fauna is characterized by 22 species of Foraminifera, 34 of Mollusks and by the presence of Radiolarians; of these, 6 species of Foraminifera (Globigerina bulloides, G.calida, G.falconensis, Globigerinoides ruber, G.trilobus, Orbulina universa) and 6 of Gastropoda (Limacina inflata, L.trochiformis, Creseis acicula, C.virgula, Hyalocylis striata, Gleba sp.) are considered ubiquitarian throughout the area; b) the benthic autochthonous fauna, rarely well represented, are characterized by 25 species of deep-water Ostracods, 8 of which ubiquitarian (Polycope inflata, P.ovalis, P.reticulata, P.vasfiensis, Polycopsis quadridentata, Bairdia conformis, Bythocypris lucida, Argilloecia acuminata) and by one species of Gastropod (Cyclostrema solutum) well diffused in the whole area; c) the number of deep-water ostracod species is less abundant in the Cretan Sea than in other Mediterranean western basins; d) a diffused shallower benthic fauna was recognized overlapping the deep-water faunas; in fact between the Ostracods some infralittoral species pertaining to Leptocythere, Callistocythere, Semicytherura, Loxoconcha, etc. and some phytal species of the genera Paradoxostoma and Xestoleberis are found; between the benthic Foraminifera there is a very reduced number of infralittoral and circalittoral species pertaining to Ammolagena, Spiroloculina, Pyrgo, Uvigerina, Gyroidina, etc.; e) the presence of fossil specimens,autochthonous and allochthonous, is more evident in the south-western and eastern regions of the Cretan Sea.

In conclusion it results that: 1) The Cretan Sea is characterized by mainly fine sediments of terrigenous and organic origin; in the central-eastern parts volcanic ashes are also present; 2) The sedimentation rates, in the last 7000-9000 years, are rather uniform and generally low; 3) The sedimentation appears to be conditioned by morphology, but even more tectonics, as shown by frequent material deposited by gravity processes in areas without steep slopes, but affected by intense neotectonic activity; 4) Gravity translation deposits,shown through the analysis of the 3.5 kHz echocharacters of the sea-bottom and through the study of the sedimentological structures of the cores , are also proved by the paleontological study of the upper layer, which shows a wide overlapping of fossil and infralittoral-circalittoral specimens on the deep autochthonous benthic faunas.

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