

**DISTRIBUTION OF SHELF SEDIMENTS IN THE SOUTHEASTERN
MEDITERRANEAN SEA OFF SINAI.**

M.A. EL-SABROUTI AND A.A. EL-SAMMAK

Oceanography Department, Faculty of Science, Alex. Univ.

ABSTRACT

Shelf sediments off Sinai Peninsula was studied. A patchy distribution of sediments can be observed. Most of the outer and upper slope is covered by mud. Sand occurs in the innershelf off Damietta. Silty sand, sandy silt, and sand patches occur off Tena, Bardawil, and Arish. This could be attributed to the secondary-born deposits coming from northern Sinai. In general, the distribution of sediments in the investigated area is governed by the current regime as well as the source of sediments.

Introduction

Until 1964 the Nile river discharged average some 1480 m³/sec. (Coleman, 1976). The mean size distribution of the suspended load consists of 27% sand, 62% silt and 11% clay (El-Sammak, 1987). This ratio was 25%, 45% and 30% during the flood season (Queleennec and Kruk, 1976). The closing of Aswan High Dam in 1964 essentially eliminated the sediment supply to the coastal area by the Nile river. The Rosetta distributary still receives a small volume of water and fine-grained sediments, but the Damietta branch has been completely sealed and no sediments are delivered to river mouth. El-Askary and Frihy (1986) reviewed most of the studies made on the shelf sediments of the Nile Delta and mentioned that the near-shore facies is restricted to depths shallower than 30 m which is a delta front platform covered with fine to very fine sand and admixture of sand and silt. Further seaward, prodelta mud which is composed of silt and clay extends almost as the shelf edge. Scatter patches of relict medium to coarse sand occur near the middle of the shelf, seaward of this, is a broad muddy zone with a high organic silty clay and clays (mud).

Eastward directed displacement of sand by longshore currents, particularly on the innershelf east of Damietta, has been mapped by Coleman et al. (1981). The eastward directed displacement of sediments, from off the Nile Delta and northwest Sinai toward Levant margin, off Gaza and Palastine to the north, was graphically depicted in a depositional model termed "Nile littoral cell" (Inman and Jenkins, 1984).

However, the continental shelf sediments east of Damietta is not well studied, so the present work try to fill this gap. The present paper aims to get a complete picture about the sediment types as well as the factors responsible for their distribution in the Damietta-Arish area.

MATERIALS AND METHODS

Thirty surface sediment samples were collected by Petterson grab sampler from the area between Damietta and Arish and from depths ranging between 2 and 244 m (Fig. 1). A detailed granulometric analysis was made using standard and pipette methods. The statistical application of the grain size of the present samples was published (El-Sabrouti and El-Sammak, 1990). The sediment types were given here according to Shepard (1954).

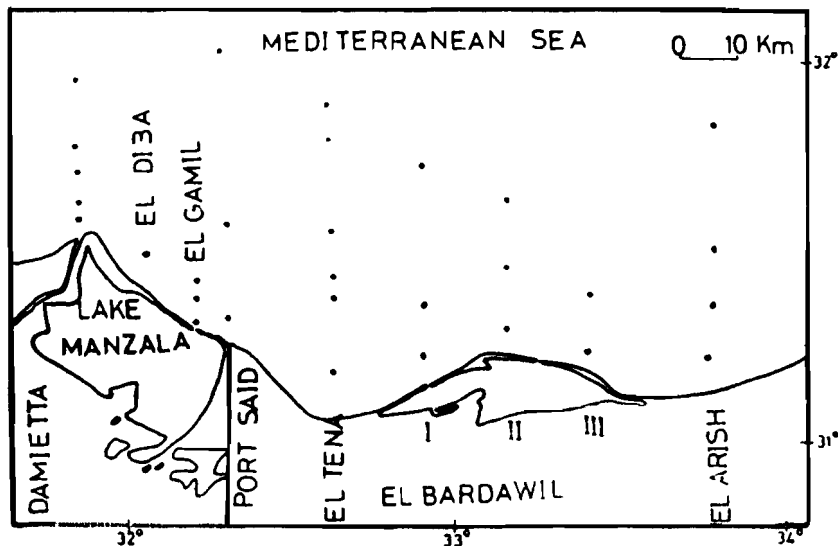


Fig. 1

Area of study and stations sampled.

RESULTS AND DISCUSSION

The distribution of the sediments in the investigated area is governed by the current regime as well as the source of sediments. The study shows a patchy distribution of sediments (Fig. 2). Most of the outer shelf and the upper slope is covered with mud. This may be due to the failure of the innershelf between Damietta and Tena. This area is characterized by receiving the fine-grained materials loaded

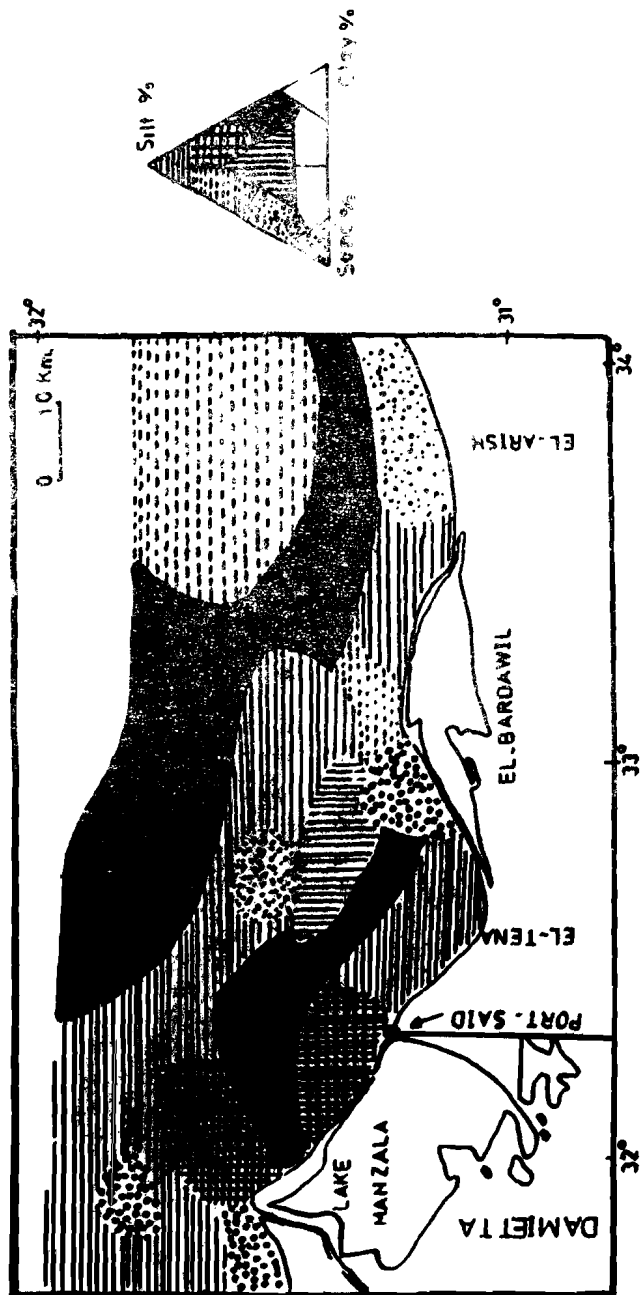


Fig. 2

Areal distribution of sediments in the study area.

by the Nile water and lake water through Rosetta and El
Mansalaha Lake opening respectively. Sand presents in the

inner shelf off Damietta derived mainly through Berullos Lake opening. Coleman et al. (1981) concluded that the sand in the inner shelf off Damietta is actively migrating and probably does not represent a relict deposit. The Damietta distributary causes a large-scale perturbation in the mean easterly drift along the Egyptian coast. Unusually strong currents, capable of transporting and reworking large volumes of sand, are associated with an eddy trapped behind this feature. The directionality of these currents and the curvature of the eddy axis correspond well to the distribution pattern of sand on the inner shelf. Silty sand, sandy silt and sand patches occur off Tena, Bardawil and Arish respectively. This is attributed to the secondary wind-born deposits coming from northern Sinai. The sand patch of middle shelf off Damietta may be related to the older mouths of the Nile.

Mapped distribution patterns of surficial shelf sediments indicate two dispersal trends, one south to north and the other west to east. An example of the former is seaward transport, by nearshore current and dispersal in suspension, of fine-grained sediment from the once-active mouths of the distributary branches (Emslyanov and Shimkus, 1972). Reworking and advection (cf. McGraw, 1985) resulted in northward displacement of silts and clays to and beyond the shelf break. This mud of Nile derivation irregularly blankets large parts of the middle to outer shelf (Summerhayes et al., 1974). Anwar and Mohammed (1978) concluded that east of Damietta, the westward current slows down and follows two directions; SSE with velocity of 6 cm/sec. and another opposite current (off Port Said) with velocity of 4.6 cm/sec. making a sort of wide vortex. However, most of the sediments is distributed primarily along west to east trend largely in response to recent transport processes. Surficial sediment distribution on the inner and middle shelf is largely a response to the wave dominated regime (Coleman et al., 1981) and overall to regional water-mass circulation pattern (Lacombe and Tcherina, 1972).

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