

ACCUMULATING MECHANISMS OF METALS IN SURFACE SEDIMENTS
OF A COASTAL BAY ON THE NORTH AFRICAN COASTS

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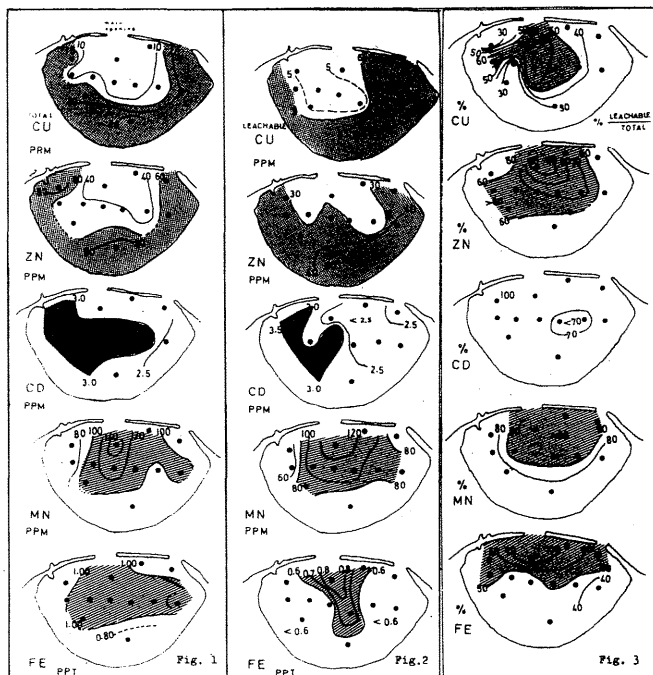
The accumulating site/s of the metals Cu, Zn, Cd, Fe and Mn in the surface sediments of the Eastern Harbour of Alexandria, Egypt, a semicircular bay, on the North African coast is the scope of the present work. For approaching this, surface sediment samples were collected and analyzed for their totals and leachable non-detrital fractions of those metals. The results Figs. 1 and 2 show that, Cu and Zn are concentrated in the sand sediments that covers the shallower sides of the harbour. Fe and Mn are concentrated in the deeper sediments at the middle and north ward towards the main opening - 300 m in width - of the harbour. These are the ones that stand for the open sea action and are formed of sandy-gravel. Cd, is concentrated in the sediments of the western side of the harbour.

Study of the proportion of the leachable fraction to the total of the studied metals Fig. 3, reveals that the easily leachable sediments are the coarser and deeper ones. Referring to that these sediments are recently recovered and consequently are less aged relative to those reworked sediments accumulated on the shallower sides of the harbour. And Cd, Cu and Zn are related mostly to man's activities; sewage outlets and shipyards, situated on the western side of the harbour. Almost 100% of Cd is of non-lithogenous origin.

During study of interrelationships between the studied leachable metals a significant enrichment for Fe and Mn in the deeper and coarser sediments, is indicated. All the evidences, imply involvement of an authogenic process leads to that enrichment. The authogenic mechanism is the precipitation of soluble Fe (II) and Mn (II) from the interstitial waters of a subsurface sediments as solids Fe (III) and Mn (IV) oxides, after exposure under the effect of the erosion process.

References :

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- Distribution of total (Fig.1), leachable non-detrital (Fig.2) metal and their proportion (Fig.3) in the sediments of the Eastern Harbour of Alexandria, Egypt.

EVROS DELTA : EVOLUTION OF CONTINENTAL SHELF SEDIMENTS

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ABSTRACT

For the study of the Evros river-delta continental shelf sediments 40 bottom samples and 3 short piston cores are examined concurrently with current measurements, aerial photographs and physical oceanographic parameters. Sedimentological processes seem to be related with the suspended load discharged from Evros river and near bottom currents field rather than the bathymetry of the area.

For the study of distribution, morphology, origin of sedimentation and physical properties of sediments, forty surface samples were investigated as well as three short cores from the widest area of the Evros delta.

The area belongs to Rhila-Rhodope cristalline massif, and the surrounding area of the Evros delta consists mainly of quaternary terrigenous and deltaic, as well as neogene and paleogene sediments.

The Evros river, one of the biggest rivers of the N. Aegean area, discharges about 3250×10^6 m³ of water per year, through a 15 Km wide delta at the eastern side of the area. In comparison with other great rivers of the North Greece area, this discharge corresponds to about 170.000 tons, as carried material both in suspension and bottom load.

The sediments are distributed mainly along zones oriented SE-NW. From both sides of a central muddy zone, which begins from the river's estuary to NW, sediments are sorted gradually to coarse-grained fractions up to sand fraction at the exterior zones. The carbonate (CaCO₃) fraction at surface sediments increases from 3% at the central muddy zone to 50% at seaward and to 15% at landward sandy zones, while the predominant minerals (quartz, mica, feldspars, calcite) varies from the central to the exterior zones.

The fine-grained central zones -mud, sandy mud, sandy silt- appear to be related with higher proportions of: suspended material, mica in the sand fraction (>50%), porosity, water content, shear strength, as well as with lower proportions of carbonates (<10%), and bulk densities. On the contrary the coarse-grained exterior zones -sand, clayey sand, muddy sand- appear to be associated with lower proportions of: suspended material, mica in the sand fraction, water content, vane shear strength as well as with higher: bulk densities, water content, carbonate content (15-50%) and percentage of quartz in sand fraction.

The Mean size - 7-9 phi at the central zone, 2-5 phi at the exterior zones - the Inclusive Graphic Standard Deviation -almost all of the studied samples are "very poorly sorted" - the Inclusive Graphic Skewness -symmetrical or nearly symmetrical values along the central zone, extreme values at the exterior zones- the distribution of the sediments texture as well as the conditions of the sedimentation, appear more to be related with the quantity and the composition of the material discharged by Evros river in relation to the predominated conditions of energy and layer mixing near the river's estuary than with the bathymetry and topography of the bottom.

Using as indicators of the conditions of energy in the area, the distribution of statistical parameters (mean size, sorting etc.), the distribution of mica in the sand fraction, the low textural maturity of the sediments, the wave action, in situ current measurements, it was ascertained that the proportion of energy (currents and wave action) seems to be relatively high while the sedimentation in the area is extremely high because of the high material offering from Evros river and the neighbouring coasts, and the favourable conditions of energy.

It is believed that the main quantity of the suspended material, as results from the study of previous factors and arial - photographs, moves in the surface layer N.W. while there is a near bottom current which retrogrades either NW-SE or WSW-ENE. Under these conditions of movements, mixing of layers is created and the fine-grained material is trapped, flocculated and settled. At the same time material originated from the neighbouring coasts, is transported, mixed with the river's discharged material and settled seaward creating the landward fine-grained zones between the central muddy zone and the coast. Finally the seaward "sand" zone seems to be related with low quantities of fine-grained material and high energy conditions of the area.

Fig. 1. Map of the Evros river delta shelf, showing the area of study, the bathymetry and the locations of bottom samples. Depth contours are in meters.

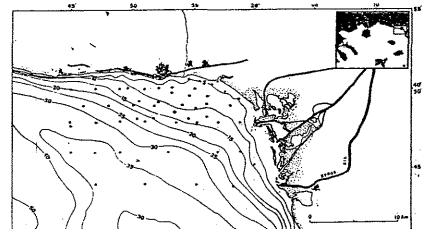
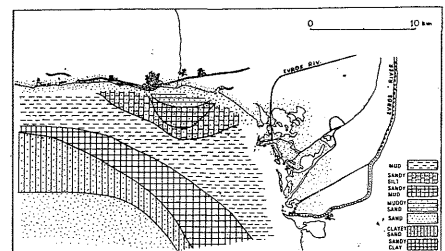


Fig. 2. Distribution of surface sediments.



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