Cyprus Basin: Evolution and Dispertion of Quaternary Sediments

Antonio BRAMBATI and Romana MELIS

Geology and Paleontology Institute, University of TRIESTE **(Italy)**

The Cyprus Basin is the eastern part of the Levantine Basin; in this area, sedimentation is mainly affected by the detrital supply from the Nile river and by the seasonal supply from minor rivers flowing in nearby regions. This transport and depositional pattern has prevailed since the early Pliocene (ROSS and UCHUPI, 1977; COLEMAN *et al.*, 1981). The submarine cone of the Nile, closing the Cyprus Basin southwards, is supplied mainly with terrigenous sediment coming from the Damietta branch, the eastern tributary of the Nile. These sediments are distributed on a large area, due to strong surface currents moving counterclockwise.

A study has been carried out on late Quaternary sediments found in cores drilled in the Cyprus Basin (oceanographic cruise NOE-1984 and two oceanographic cruises organized by the Institute of Geology and Paleontology of Trieste in 1986 and 1987; fig. 1). The predominance of pelagic muds with sporadic layers with a higher sand content, probably deriving from a distal turbidite, and the foraminifers and ostracods association show that sedimentation occurs in a pelagic environment.

The sequences observed clearly reflect physical-oceanographic conditions which led to repeated anoxic phases in the Levantine Basin during the Plio-Quaternary. Evidence of this is the cyclic repetition of the facies studied, with colours gradually fading from beige to light gray and dark gray (sapropel/sapropelitic level), then returning to beige in connection with improved oxygenation of the environment.

A number of sapropel levels were dated in the Beta Analytic Laboratory in Washington, while one layer of volcanic glass was assessed to be a Y-2 layer (18,000 years of age) (VINCI, unpublished data). These foundings revealed greater sedimentation rate in the stages of Pleistocene regression (between 13.3 and 17.2 cm/1000) than during the stage of Holocene transgression (between 1.3 and 3.9 cm/1000), as reported also by MALDONADO and STANLEY (1978 and 1979). A study of the mineralogic and geochemical features was carried out on sample layers of the cores. The geochemical analyses was based on those elements (Al, Cd, Cr, Fe, Hg, Mn, Ni, Pb, Ti and Zn) corresponding to the main mineralogic components of sediments trasported by the Nile (EMELYANOV and SHIMKUS, 1986). These elements, in a solution by means of two different types of extraction (total extraction with an acid mix and partial extraction with HNO_3 8 N) were analyzed by atomic absorption spectrophotometry; furthermore, to characterize the sediment, its structural features and its content in organic and inorganic C were studied.

Trace elements distribution in the levels under study led to determine that the geochemical basis consists in Al, Cr, Fe and Ti, which are all elements showing the prevailing supply of terrigenous material. Other elements, such as Hg, Mn and Zn, have a behaviour which is difficult to define with the variables adopted. All elements bind with preference with the clay fraction of the sediment (< 2 µm.), with the exception of Cd and Pb, which are mainly present in the sandy fraction.

Fine sedimentation in the Cyprus Basin is marked by the presence of clay minerals, whose bounds with smectite and kaolinite prove that the terrigeneous material comes from the northeastern African continent. With their distribution throughout the Basin, they determine diffusion of some trace elements (Al, Fe and Ti), while other elements depend more on the non lithogenic fraction of the sediment and therefore on the conditions of the environment where they deposit, as reported also by MURAT and GOT (1987).

In conclusion, therefore, in an environment where recent sedimentation is determined periodically by particular situations with prolongued anoxic phases, the terrigenous sediments coming from the Nile mouth is the determining supply for the Cyprus Basin; these features lasted during the whole late Quaternary.

We wish to tank Prof. H. Got and Dr. M. Fontugne for providing cores from R.V. ""Marion Dufresne" NOE-1984 cruise.

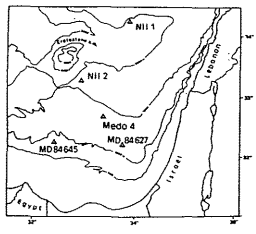

Fig. 1 – cores location in the Cyprus Basin.

REFERENCES

COLEMAN J.M., ROBERTS H.H., MURRAY S.P., SALAMA M., 1981. - Morphology and dynamic sedimentology of the eastern Nile delta shelf. *Mar. Geol.*, 42, 301-326.

EMELYANOV E.M., SHIMKUS K.M., 1986. - Geochemistry and sedimentology of the Mediterranean Sea. Reidel Publish. Comp., Dordrecht, 553 pp.

MALDONADO A., STANLEY D.J., 1978. - Nile Cone depositional processes and patterns in the late Quaternary. In D.J. Stanley and G. Kelling (Eds.) "Sedimentation in submarine canyons, fans and tranches". Dowden, Hutchinson & Ross, Stroudsburg, 239-257.

MALDONADO A., STANLEY D.J., 1979. - Depositional patterns and late Quaternary evolution of two mediterranean submarine fans: a comparison. *Mar. Geol.*, 31, 215-250.

MURAT A., GOT H., 1987. - Middle and late Quaternary depositional sequences and cycles in the eastern Mediterranean. Sedimentology., 34, 885-899.

ROSS D.A., UCHUPI E., 1977. - The structure and sedimentary history of the southeastern Mediterranean Sea-Nile Cone area. Amer. Assoc. Petrol. *Geol. Bull.*, 61, 872-902.