

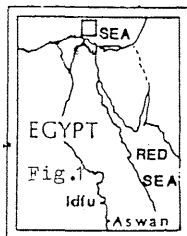
Relationship between clay mineralogy and thermal maturity of Neogene-Quaternary shales in Ras El-Barr well No. 1, off shore Nile Delta, Egypt

Ramadan Abu EL-ALLA

Sciences and Mathematical Department, Faculty of Petroleum, Suez Canal University, Suez (Egypt)

The Nile Delta basin contains a thick section of Neogene-Quaternary strata that have a different values of thermal maturity as determined by vitrinite reflectance. The studied area in the Esatern part of the off shore Nile Delta basin is represented by the Ras El-Barr well No. 1. Clay mineralogy, the half-width of 10 Å illite and chlorite peaks, and the A/H (Area under peak/peak height) are systematically related to thermal maturity. Fig. 1, see GUTHRIE *et al.*, 1986 and HEROUX *et al.*, 1979.

The most important changes in clay minerals with increased depth of burial are: (a) the regular reduction of expandable layers; (b) the gradual increase in the crystallinity of illite and chlorite (decrease of the half width value) with depth. Table 1.



0 200 Km

Table 1. Summary of clay mineral data and the mean values of the level of organic metamorphism (LOM) (hood  $\bar{R}_o$ , 1975), the vitrinite reflectance  $R_o$ , and  $T_{max}$ , the maximum bottom hole temperature of each formation.

Age	Formation	Label	Depth cm	Nonglycolated			Glycolated			Clay minerals Identified	Smectite dominates	$T_{max}$ °C	$R_o$	LOM
				A/H	Half-width	C	A/H	Half-width	C					
Pleistocene	Mit Ghamr	B <sub>1</sub>	599	2.64	0.89		0.89							
			903	2.17	1.43		1.43							
			990	1.68	1.45		0.72	0.71					49	4.6
Upper Pliocene	El-Wastani	B <sub>2</sub>	1060	1.28	1.32	0.40	0.80	0.40	0.48	(I), mixed layer clay, (C)		57	0.21	5.0
			1212	1.05	0.62	0.35	1.06	0.60	0.51	(I), (C), minor mixed layer clay				
Middle & Lower Pliocene	Rafr. El-Sheikh	B <sub>3</sub>	1351	0.91	0.56	0.36	0.88	0.52	0.40	(I), (C), minor mixed layer clay				
			1569	0.56	0.42	0.26	0.60	0.43	0.28	"				
			1656	0.72	0.55	0.33	0.88	0.62	0.36	"				
			1856	0.80	0.56	0.33	0.88	0.66	0.26	"				
			1989	0.72	0.47	0.29	0.64	0.42	0.38	"				
			2550	0.57	0.39	0.44	0.55	0.38	0.40	"				
Lower Pliocene	Abu Madi	B <sub>4</sub>	2670	0.54	0.38	0.28	0.53	0.38	0.26	"		95.1	0.31	6.7
			2799	0.49	0.38	0.35	0.46	0.32	0.35	"		102	0.46	7.0
Miocene	Sidi Salem	B <sub>6</sub>	2820	0.57	0.36	0.35	0.39	0.28						
			2998	0.56	0.35	0.37	0.38	0.28				140	0.57	9.6

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Mineralogical and Chemical Diagenesis of the coastal sediment in the area from Sidi Abd El-Rahman to Mersa Matruh (Egypt)

Mohamed A. SHATA

National Institute of Oceanography and Fisheries, Kayet Bay, Elanfoshy, Alexandria (Egypt)

The area of study extends from sidi Abd El-Rahma to Mersa Martruh for about 150 Km. It can be divided according its morphology into two parts ; namely Gulf of Kanayis and Abu Hashaifa Bay (Fig.1).

Two types of sediments were collected those of bottom samples and the other collected from three succive ridge extending parallel to the North Western coast of Egypt. The aim of study is to follow up the mineralogical and chemical change during the course of the carbonate diagenesis.

### A.- Emphasizes arised from the mineralogical investigations

1.- The first stage of diagenesis proceeds through the transformation of aragonit into low Mg-calcite in the Gulf of Kanayis.

2.-In Abu Hashaifa Bay the transformation of Mg-calcite into the more stable of carbonate minerals is not clear.

3.- The samples of the first ridge reveal that the transformation of aragonit into calcite become more obvious than that into Mg-calcite. Actually these comprises the middle stage of the diagenetic process.

4.- The last stage is accounted for the second ridge, where aragonit and Mg-calcite are converted into calcite, the transformation of aragonite into Mg-calcite is ceased.

The correlation between the different forms of the carbonate minerals indicates that :

a.- The transformation of aragonit into Mg-calcite decreases landward.

b.- The transformation of aragonit into calcite increases in the same previous direction.

c.-The last stage of diagenesis proceeds particularly in the second ridge.

Comparable study between the present work and that of (LYNN *et al.*, 1979) leads to conclusion that the diagenetic changes occur in a different from rather than that in both of the Mediterranean Coast of Israel (GAVISH & FRIEDMAN, 1969) and in Bermuda Island (RISTVIT, 1971), in which the early loss of Mg-calcite through the course of long term regional diagenesis had been achieved. For the short term local diagenesis the transformation of Aragonit into Mg-calcite is observed in the study area. These diagenetic processes have not signs in the sediments off Alexandria (EL-SAYED, 1974, STOFFER *et al.*, 1980) and the adjacent sediments of Arabs Bay (ANWAR *et al.*, 1981).

### B.- Emphasizes arised from the chemical investigations

1.- The substitution of Ca for Mg is strong in the Gulf of Kanayis where the aragonit dominates. In the other studied area the substitution becomes lower. The reason for such chemical behaviour thought to be the increase of the other forms i.e. Mg-calcite and calcite on the expense of aragonit.

2.- Generally Mg-content reflects two important processes.

a.- Mg-calcite secretion from organisms, where there is positive correlation between Mg-content and Mg-calcite i.e. Mg increases in the area wich covers with Mg-calcite secreting organisms.

b.-The diagenetic process by which Aragonit transformed into Mg-calcite.

3.- The Sr content of the study area shows that the higher content of Sr are linked with the higher values of the aragonit. It becomes lower under the influence of the transformation of the aragonite into the other forms of the carbonate minerals. Generally Mn increases in the Existence of calcite owing to its incorporation in the crystal lattice of the calcite (ICHIKUNI, 1983).

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