characterized by the absence coralline algal and benthonic and planktonic foraminifera and the dominance of peloids, skeletal bioclasts, and foraminifera.

Each of the carbonate sequences can be further classified into transgressive systems tract (TST) at the base, followed upwards by highstand systems tract (HST) at the top. Trasgressive systems tracts show aggradational and retrogradational stacking patterns and contain gradual carbonate cycles which show gradual emergence upward. The gradual cycle contains three lithofacies, lime-mudstone at the base, foraminiferal algal wackestone in the middle and algal foraminiferal packstone at the top. Such sequence represents gradual upward decrease of water depth passing from deep subtidal, to shallow subtidal and very shallow subtidal at the top. Some of these cycles contain thick lime mudstone at base and thin wackestone and packstone at the top. This can be explained by the following, at the beginning of cycles there was continuous subsidence (increase in accommodation space) and sufficient production of lime-mud. Emergence (decrease in accommodation space) depositing wackestone and packstone at the top follow this. As these cycles were deposited completely under subtidal zone, they named subtidal cycles by Osleger (1991). Subtidal cycles are distinguished by an upper increase in grain size, bed thickness and other high -energy sedimentary structures. Most of which are not capped by shallow subtidal lithofacies, nor do any of the subtidal cycles exhibit exposure features such as microkrast or vadose cementation (Osleger, 1991). The constant submarine erosion and redistribution would tend to inhibit aggradation above the zone of active storm- wave reworking. To keep subtidal carbonate cycles from complete shallowing to sea level, some mechanism may have been active within the subtidal zone to suppress vertical aggradation into the photic zone that was responsible for optimal carbonate production. Reworking and redistribution could suppress net sedimentation rate

The highstand systems tracts that form the upper parts of sequences 2 and 3 include peritidal or non-gradual cycles. Each of which comprises two lithofacies, lime mudstone at the base, capped by dolomicrite at the top (Fig.3.C). Such type of cycles shows progradational stacking pattern. This type of cycles was deposited in two non-gradual subenvironments. The lime mudstone at the base represents deep subtidal zone, followed by dolomicrite that was deposited in interdial to supratidal zones, without shallow subtidal zone in between. The non-gradual cycles prove cyclic sedimentation on the unstable shelf, where there is no regular balance between subsidence and sedimentation rates (Khalifa, 1996). This may unravel the sudden and variability in sea level changes during its regression marking the end of the depositional sequence. Some cycles in the higstand systems tract showed intermittent subaerial exposure as evidenced by the presence of dedolostone (dolomicrite replaced by blocky calcite).

In the middle part of the Um Mahara Formation, there was a sudden decrease of sea level that led to the formation of thick dolomicrite and dedolostone (Fig.4). This helped in classifying the Um Mahara carbonate succession into two depositional sequences. Because the formation of dolomicrites most probably took place at, and near, the mean sea level in the intertidal-supratidal zones that represent the latest phase of highstand systems tract. Moreover, the presence of dedolostones at the topmost of dolomicrites indicates subaerial exposure of dolomicrites, where it was percolated with meteoric water. This process is common in the carbonate platforms (Molina et al., 1999). This process may gave rise to sudden lowering of sea level and sustain for a prolonged period of time during which the fresh water percolated on tops of dolostone leading to their change to blocky calcite. Such process took place under low pressure, near the earth surface (Khalifa, 1981, Khalifa and Abu El Hasan, 1993). This process is closely similar to the formation of paleokarsts on the carbonate platforms on the southern Iberian Paleozoic margin that accompanied with sudden sea level fall due to the rifting (Molina et. al., 1999).

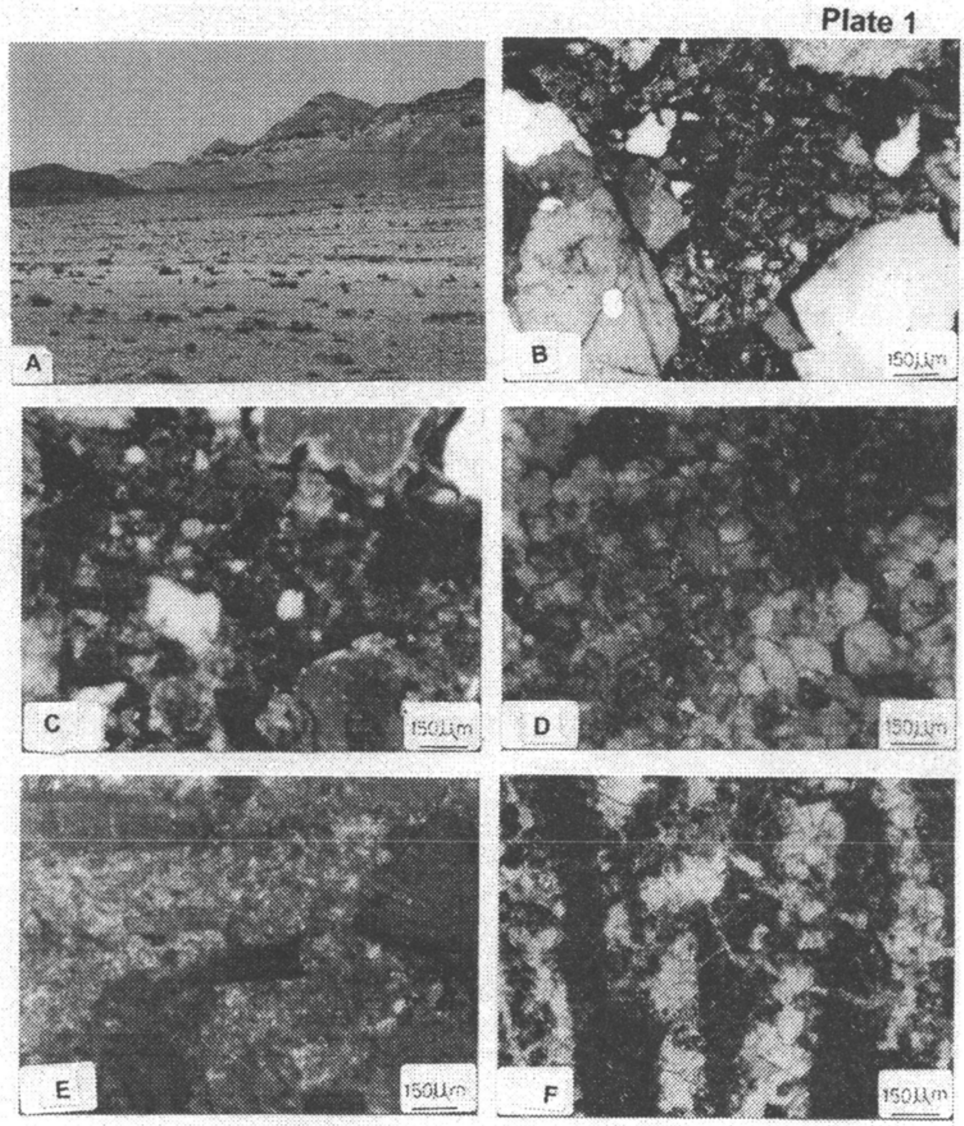

Plate. 1

A-Field photograph showing the contact between the basement rocks and the sedimentary rocks (Abu Ghusun and Um Mahara formations) at Ras Banas peninsula.

B- Polymictic conglomerate consisting of composite quartz grains cemented by detrital matrix

C- Feldspathic litharenite in which poor sorted quartz grains are embedded in a mud matrix.

D- Lime-mudstone showing aggrading neomorphism to microspar .

E-Algal wackestone in which the red algae show parallel orientation and are heavily micritized.

F-Molluscan packstone in which the molluscan particles show preferred orientation and exihibit aggrading neomorphism giving coarse mosaics of pseudospars.

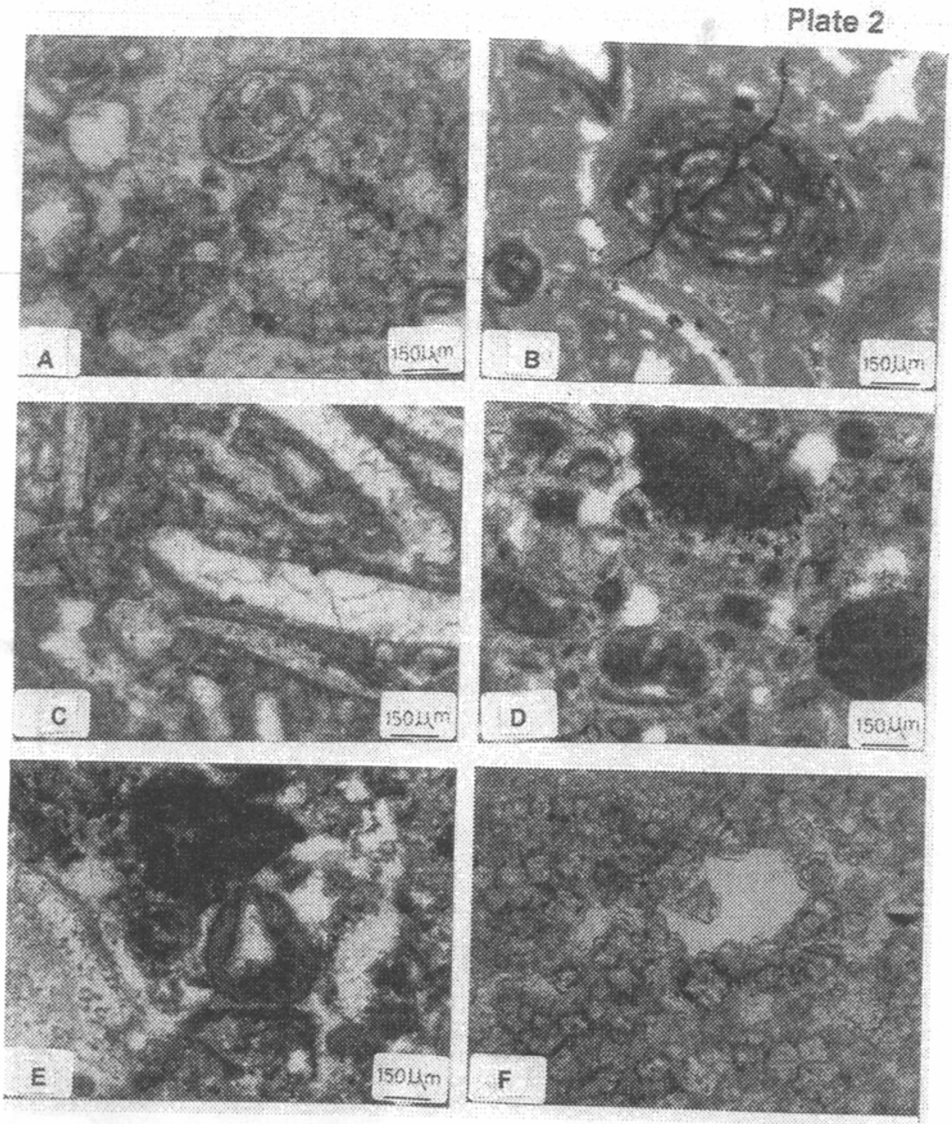

Plate. 2

A-Foraminiferal wackestone consisting of benthonic foraminifera (miliolids) which are heavily micritized.

B-Foraminiferal packstone consisting of benthonic foraminifera (miliolids and operculines) with micrtized mollusks debris.

C- Skeletal bioclastic packstone in which most of the particles recrystallized into sparry calcite and are embedded in a dull micritic matrix.

D-Peloidal packstone in which rounded to subrounded micritic pellets or peloids are randomly distributed with intraclasts of different sizes.

E-Algal foraminiferal packstone consisting of benthonic foraminfera and algal coated grains.

F- Dolomicrite consisting of fine-grained unzoned dolomite rhombs.

The climatic conditions that dominated during the lower sequence were generally warm with restricted phases as evidenced by the presence of corals, algae, with benthonic foraminifera. This may enable these organisms to form reefal facies or patch reefs similar to that found at Wadi Abu Ghusun (Mahran et al., 1999).During the formation of the upper sequence, the climate has temperate to mildly warm, where there was no corals, algae and the common abundance of benthonic foraminifera (operculines,miliolids), peloids, and molluscs that flourished in open marine shelf (Milliman et al., 1972).

In spite of the carbonate sequences of the Um Mahara Formation are close to the sources of clastic facies (basement rocks and older sediments) there was no any influx with detrital sediments. This suggests that conditions were not humid during sedimentation. Instead, the dry, arid and warm conditions dominated during this period of time that enabled the growth of coralline algae, corals and other associated organisms in the photic zone.

.7. CONCLUSIONS

The Oligocene-Lower Middle Miocene rocks exposed at Ras Banas Peninsula on the Red Sea include two rock stratigraphic units, the Abu Ghusun and Um Mahara formations. The Oligo-Miocene Abu Ghusun Formation nonconformably overlies the Precambrian basement rocks and unconformably underlies the Lower Middle Miocene Um Mahara Formation. The Abu Ghusun Formation consists of clastic facies that show submergence or fining upward cycles. Each cycle starts with polymictic conglomerate at the base, capped by litharenite at top. These cycles were probably formed during the initiation of rifting of the Red Sea, and controlled by allocyclic mechanism. The Lower Middle Um Mahara Formation consists entirely of carbonate sequence that subdivided into two depositional sequences. The subdivision of these depositional sequences is based on the presence of thick dolomicrite and some dedolostones at the top of the sequence. Since the dolomicrite is a good indicator for the fall in sea level and the dedolostones indicates intermittent subaerial exposure and percolation with meteoric water. Each sequence includes transgressive systems tract and highstand systems tract. The transgressive systems tracts in both sequences comprise emergence carbonate cycles that were deposited in subtidal environments. These cycles were formed by autocyclic mechanism indicating low frequency sea level fluctuations. The highstand systems tracts in both sequences comprise peritidal emergence carbonate cycles that deposited in shallow subtidal to intertidal-supratidal environments. These latter cycles were mainly controlled by the allocyclic mechanism that proves high frequency sea level fluctuations.

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