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Geological and Structural Evaluation on Temsah Gas Field, NE-offshore Nile Delta, Egypt

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Abstract

The Nile Delta basin and its facing offshore Mediterranean area represents hydrocarbon–rich province that has hydrocarbon generated from clastic reservoirs ranging in age from Plio–Pleistocene to Early Cretaceous. Morover, the new gas discoveries in the Levantine basin at the eastern Mediterranean (Zohr gas field) open new horizon for further explortation activities. Temsah field is located North-northwest of port said. This study focused on stratigraphic sequences and structural elements that cause facies changes. Series of subsurface isopach maps for the studied formations beside palaeorelief profiles and cross sections were constructed. Structural maps were generated using 2D seismic data. The structure is dissected by strike–slip faults trending NW–SE (Temsah trend) with a downthrow less than 50 m. These faults resulted in a horst, graben and step fault structures within the field area which controls the hydrocarbon accumulations. Paleorelief profiles were incorporated in order to better under stand the paleoevents that control the stratigraphic, geolgical and structural phenomenas in the area.

Keywords: *Temsah field, Mediterranean, Levantine basin, hydrocarbon exploration, paleorelief.*

1. Introduction

The Nile Delta offshore Mediterranean is the most active exploration and development province in Egypt. The proven huge reserves of the Pliocene gas discoveries made in the last decade firmly established the Pliocene sequence as a primary hydrocarbon potential target for the Exploration activities in the offshore Mediterranean region (Rio et al., 1990, Abdel Aal et al., 1994, Barsome et al., 1998, Abdel Aal et al., 2000, Dolson et al., 2001, Elewa et al., 2002, Lottaroli et al., 2002, Ewida and Darwesh,2010, Cozzi et al., 2017 and Nabawy et al., 2018). The study area (offshore Temsah Field) is located at about 65 km north-northwest of Port Said city. (Fig.1).

Geologically the Nile Delta includes the continental shelf about 80 km west of Alexandria to North Sinai at the east, the continental slope and the Nile submarine fan. The Nile Delta as a petroliferous province is bordered from the south by latitude 30ºN, the Rosetta branch to the west, and the isobath of approximately 50 meters to the north and the Damietta branch to the east (Hamouda and Abdel Salam, 2010).

Kamel et al. (1998), Kamel and Sarhan (2002), Hemdan et al. (2002) and Said et al., (2004), revealed that, the structural development of the Nile Delta is largely contemporaneous with the break–up of the African plate margin consequent to the opening of the Red Sea and the northward transition of the Arabian Peninsula. Four main alignments seem to have a major control over the evolution of the Nile Delta; the overall northwest trending Marmarica, Bardawil lines, the northeast–southwest trending Qattara–Eratosthenes (or Rossetta fault) and Pelusium lines. The two northwest trending lines played an important role starting from Jurassic time as possible spreading lines of the southern Neo–Tethys ocean, whose remnant constitutes the present eastern Mediterranean (Sarhan et al., 1996 and Hamouda, 2010 b).

The Pelusium line is believed to have acted in several episodes since Pre–Cambrian times as a left–lateral mega shear while the hinge line marks the southern limit of the strongly rifted continental margin of the northern Egypt and divided the Nile Delta into two sub–provinces, the south Nile Delta Block and the north Nile Delta basin (Mosconi et al., 1996 and Hemdan et al., 2002) (Fig. 2).

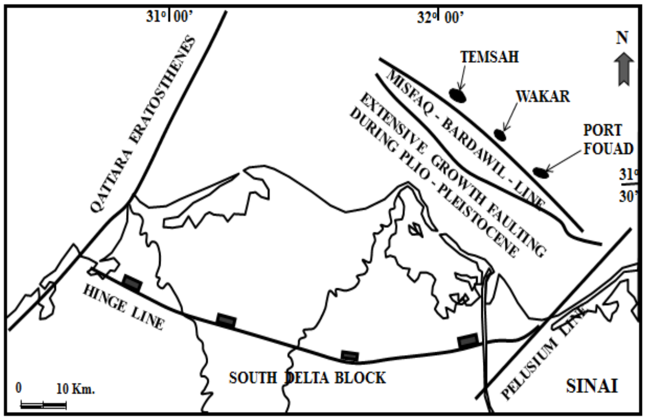

Fig. 1. Location and regional structural setting, north Nile Delta (after Hemdan et al., 2002).

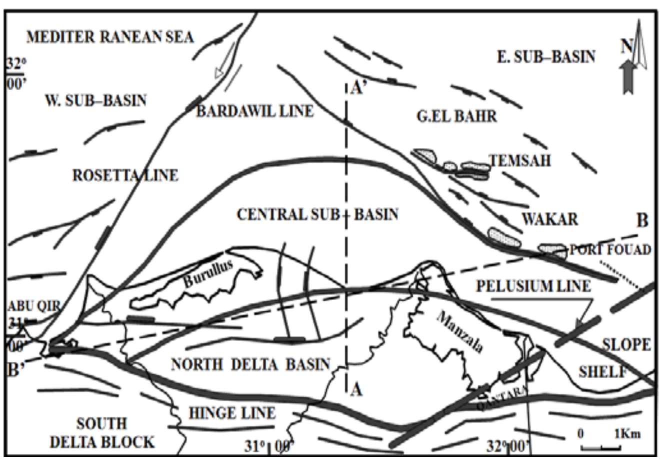

Fig.2. The Nile Delta tectonic setting and structural outlines (after Abdel Aael et al., 1994).

This Hinge Zone is parallel to the old east–west trend, which dissects Sinai Peninsula. It identifies the steeply faulted continental slope along the northern coast of Egypt, and represents the southern limit of the strongly rifted continental margin of northern Egypt. This zone is not only considered as the first structural element but also can be considered as facies boundary between the developed carbonate platform to the south and basin sediments (shale and sandstone) to the north towards the Mediterranean Sea (Hamouda et al., 2014). It subdivides the Nile Delta into two areas with different tectonic settings, the Northern area and the Southern area (Abdel Aal et al., 1994, Kamel et al., 1998 and Hemdan et al., 2002).

The northern part of the Nile Delta is characterized by a series of major tectonic features with different orientation (Hamouda, 2010 a). Some of them are active during the deposition of Tertiary section, the other flatten with depth and become horizontal and lies on top of the Rosetta Formation affecting only through the Kafr El Sheikh Formation.

The depositional evolution of the Nile Delta has been discussed by Rizzini et al. (1978), Bertello et al. (1996) and Kamel et al. (1998) as follows (Fig. 3):

- The Mesozoic carbonates or marls of the shelf environment are penetrated only south of the hinge line. Also, many unconformities are recorded as a result of eustatic variation and tectonic phases during that time.

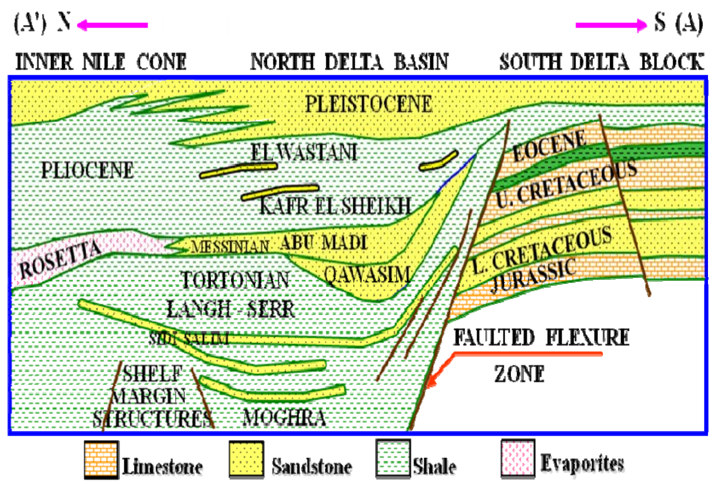

Fig.3. Schematic diagram A-A' showing the stratigraphic and facies relation between south Delta and North Delta basin (after Rizzini et al., 1978).

- A wide spread marine transgression accompanied the Syrian arc tectonic phase took place in the Late Cretaceous to Eocene.
- Active subsidence took place during the Late Eocene–Early Oligocene time to match the uplift of Sinai and Eastern Desert as well as beginning of Suez rifting and Aqaba–Jordan shear where deep marine shales grading upward to marl were deposited

- At the end of Late Oligocene time, a wide spread uplift took place resulting in a regional unconformity and NW–SE faulting and basaltic extrusions. The hinge line was probably active at that time, as seen in the facies and subsidence contrast between the North Delta basin (north of the hinge line which is characterized by deep marine sediments with few sandy fine–grained turbidities) and the South Delta block (south of the hinge line).
- In the Early Miocene time a wide marine transgression took place all over the Nile Delta reaching the Gulf of Suez area. A thick sequence of basin marls and shales with subordinate coarse terrigenous sediments is well developed north of the hinge line, where strong subsidence took place.
- In the Early- Middle Miocene (Burdigalian to Langhian time) the Arabia / Eurasia events caused strong erosion of the exposed formations and the closure between the Mediterranean and the Gulf of Suez. After these events, the Late Langhian and Serravallian are characterized by deposition of a thick terrigenous sequence due to a high subsidence rate and a large sediment supply. At the end of Serravallian a strong erosive event led to the development of the Serravallian–Tortonian unconformity.
- The Tortonian interval is represented by a shelf northward prograding system with turbiditic complex.
- At the beginning of the Messinian time, a major drop in the sea level coupled with widespread erosion of the exposed formations, with subaereal incision of deep canyons. During the early Messinian, evaporites were developed in the depression where seawater remained isolated from the fluvial drainage. A sequence of fluvio-deltaic sediments was also deposited, with some sediments of lagoon and/or restricted marine episodes. A major transgression took place at the beginning of Pliocene time. From then to the present time a thick sequence of marine sediments was deposited. Helmy and Fouad (1994), Sarhan and Hemdan (1994), El Barkoky and Helal (2002) and Abu–Shadi and Adel (2004) studied the geology of the Nile Delta. According to them, the old fault systems, which were rejuvenated in Late Oligocene and younger ages, controlled the distribution of Miocene and younger sequences. This led also to the formation of three main Miocene Sub–basins namely, the Western, Central and Eastern, respectively (Fig.4). The two paleo-highs that separate the three sub–basins are the western and eastern highs:

The Eastern Sub–basin in which the study area is located was controlled and isolated from the Centeral Sub–basin by Temsah fault trend. It includes Happy, Akhen, Temsah, Wakar and Port Fouad gas fields which are producing hydrocarbons from Miocene reservoirs. The stratigraphy of this Sub–basin is represented by Wakar Formation which is unconformably underlained by Sidi Salem Formation and underlies Rosetta evaporite. Wakar and Rosetta evaporites are equivalent to Qawasim and Abu Madi formations, respectively in the central basin.

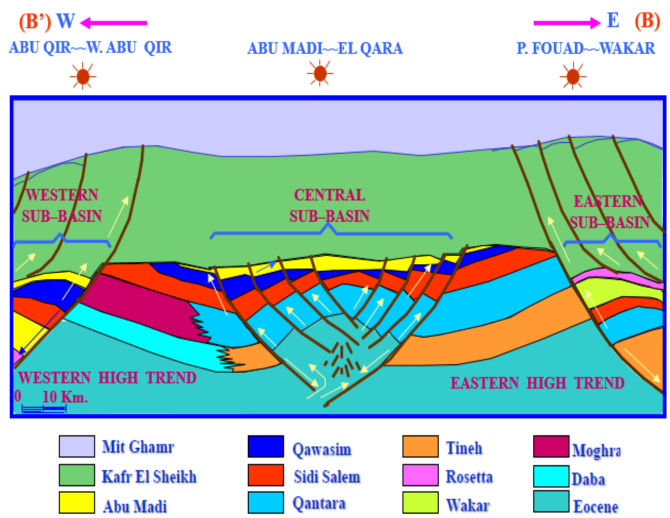

Fig.4. Schematic regional geological section B-B' of North Nile Delta showing different subbasins (after Kamel et al., 1998).

Wakar Formation of Late Miocene age is composed mainly of shales and sandstones of marine environment and is overlained by Rossetta evaporites.

Rosetta Formation also of Late Miocene age reaches a thickness of only tens of meters and consists of thick anhydrite interbedded with mudstones. This formation overlies the Qawasim and Sidi Salem formations and occurs mainly in the northern part of the Delta and offshore areas. The Rosetta anhydrite was accumulated during the Messinian when water salinity was very high and sediment influx very low.

Moreover, Qantara, Sidi Salem, Qawasim and Abu Madi formations (from bottom to top) are among the formations in this sub-basin with the same clastic lithologic facies.

2. Methodology

lithologic logs, electric logs, seismic maps, geologic subsurface maps and cross–sections were incorporated in this study. This data is extracted from 14 wells distributed from the northwestern to the southeastern sides of Temsah field, table (1). A series of thickness maps for the studied formations (Sidi Salim, Wakar, Kafr El-Sheikh and El-Wastani formations) as well as palaeorelief profiles and cross sections were constructed to show the stratigraphic sequence, structural elements. 2D Seismic data were used to generate a structrual map of top Qantara and Sidi Salem formations.

3. Results and Discusions

3. 1. Sidi Salem Formation (Middle Miocene)

Sidi Salem Formation is of Middle Miocene (Serravalian) age, its upper boundary unconformably underlies the sandy or shaly facies of Wakar Formation while its lower boundary unconformably overlies the marly facies of the Qantara Formation.

Sidi Salem Formation had been deposited under marine conditions (paralic to shelf and slope) and consists of brownish to grey shale with streaks of fine to course–grained, friable to moderately hard sandstone with calcareous cement. This Serravalian sandstone represents the main reservoir in Temsah field and named Sequence–1.

Sidi Salem Formation extends widely allover the area, where it is encoutered in many wells. Its thickness ranges from 360 to 760 m. in Temsah Field. This formation reached by most wells in Temsah area. The isopach map (Fig. 5) shows that sediments of Sidi Salem Formation is distributed taking the lens–form (lobe) which extendes NW–SE at Temsah and Temsah NW areas where the thickness ranges from 300 to 700 m. This lens form (lobe) reflects channel and/or fan depositional system which affected the marine conditions during deposition of Sidi Salem sediments. The channel system seems to be acting and providing sand at Temsah area. On the other hand, going to the NE direction these channel sediments change to shelf sediments with prograding thickness increase up to 900 m. in the deeper areas.

Table 1: The drilled well data of the different lithostratigraphic units in the study area (all values measured in meters).

Formation	El Wastani			Kafr El Sheikh			Wakar			Sidi Salem		
Well	Top	Bottom	Thick	Top	Bottom	Thick	Top	Bottom	Thick	Top	Bottom	Thick
TE–1	802	1293	491	1293	3143	1850	3153	3602	449	3602	3966	364
T–1	877	1308	431	1308	3014	1706	3044	3573	529	3573	4040	467
T–2	988	1338	350	1338	3090	1752	3105	3549	444	3549	3980	431
T–3	1079	1440	361	1440	3082	1642	3327	3562	235	3562	4021	459
T–5D	811	1270	459	1270	2932	1662	3147	3478	331	3478	3984	506
T–7D	755	1367	612	1367	2988	1621	3038	3461	423	3461	3957	496
TNW–1	672	1223	551	1223	3099	1876	3110	3420	310	3420	3917	497
TNW–2	526	1140	614	1140	3135	1995	3137	3624	487	3624	4154	530
TNW–3	777	1197	420	1197	3143	1946	3218	3473	255	3473	4233	760
TNW–4	758	1196	438	1196	3101	1905	3141	3400	259	3400	3905	505
TNW–6	698	1228	530	1228	3251	2023	3252	3434	182	3434	3878	444
TNW–7	765	1229	464	1229	3131	1902	3270	3510	240	3510	3890	380
TNW–8	726	1188	462	1188	3104	1916	3191	3394	203	3394	3895	501
TNW–9	739	1229	490	1229	3239	2010	3265	3501	236	3501	3979	478

Based on penetrated sections of Sidi Salem Formation in the area the direction of increasing thickness is suggested to be from southeast to the northeastern area at Temsah and furthermore increase is expected at the extreme northern part at well TNW-3 where deep marine conditions were prevailed.

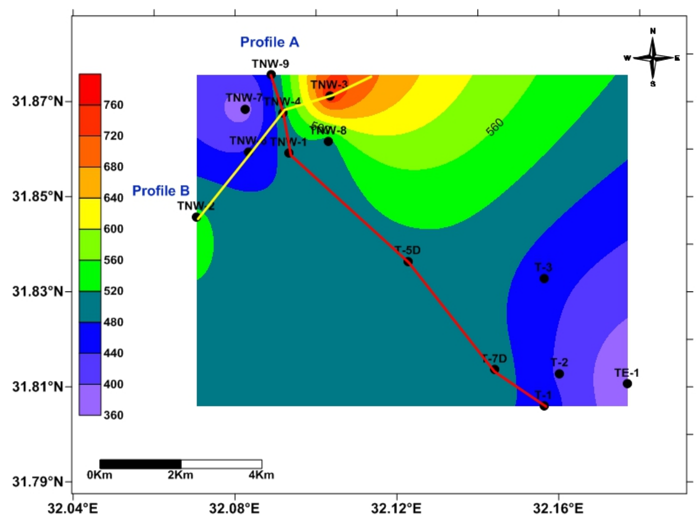

Fig.5. Isopach map of Sidi Salem Formation

where the thickness of Sidi Salem Formation reaches about 800 m. in well TNW–3. Accordingly the thickness variation pattern of Sidi Salem Formation is most likely, due to the deposition in different environmental parts on the sea floor and the effect of the channel system during deposition.

Harms and Wary (1990) reported erosional period at the boundary between Serravalian and Tortonian due to tectonic event, which led to dropping of the sea level giving rise to the extensive erosion and unconformity surface. This erosional period also gave rise to the thickness variation of Sidi Salem Formation. Said (1990) also mentioned the effect of rotated fault blocks on the thickness of the Middle Miocene sediments and erosion of the higher parts of the fault blocks during the development of the broad Late middle Miocene unconformity.

Said et al., 2004 had divided the Serravallian and Tortonian into three depositional sequences bounded by unconformity surface. These sequences are known as sequence–1 (Serravalline), sequence–2 and sequence–3 (Tortonian). Each depositional sequence belongs to a deposition cycle due to sea level fluctuation.

SQ–1 of Serravallian age is represented by Sidi Salem Formation and developed mainly in Temsah Field (Fig. 6). This sequence is divided into two parts as follows:

- The upper part consists mainly of shale.
- The thick lower part consists of sandstone with few intercalations of sandy shale. These sandstone layers correspond to the reservoir levels and are called lobes 1, 2 and 3 which are found as gas bearing in Temsah Field.

3.2. Wakar Formation (Late Miocene)

Wakar Formation is missing in some places due to a major unconformity events which had occurred near the Late Middle to Early Late Miocene. Wakar Formation is Late Miocene (Tortonian) in age, its upper boundary unconformably underlies the evaporitic facies of the Rosetta Formation while its lower boundary unconformably overlies the shally facies of the Sidi Salem Formation.

The entire section of Wakar Formation is penetrated by many wells in the studied area. Hence, an isopach map is constructed showing the thickness variation. Thickness of Wakar Formation in Temsah field ranges between 529 m in T1 to 182 m in TNW6 at Temsah.

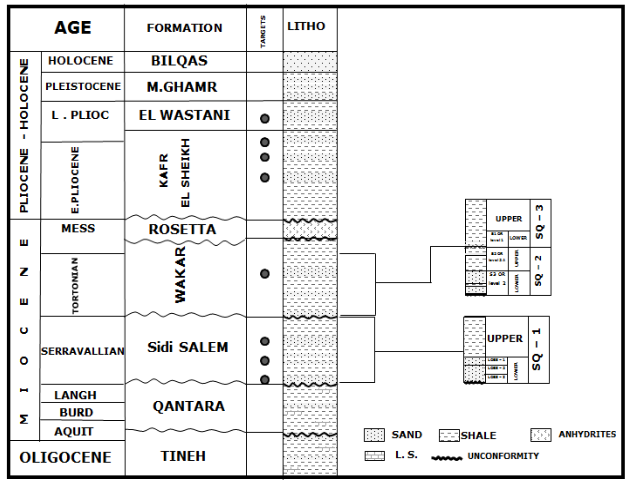

Fig.6. Schematic subsurface stratigraphic succession of Temsah, Wakar and Port Fouad Fields, in the eastern sub-basin, Offshore North Nile Delta, Egypt (After Said et al., 2004).

Figure (7) shows the isopach map of Wakar Formation at Temsah area which do not exhibit the lens–form, a shallow to deep marine environment was prevailing during deposition of Wakar sediments especially at the northwestern part where the sediments are composed of shale. In the southeastern part of Temsah Field, the depositional environment was affected by the channel conditions which led to appearance of sand layers in the lower part of Wakar Formation. A gradual increase in thickness is noticed toward the south eastern direction (Fig. 7).

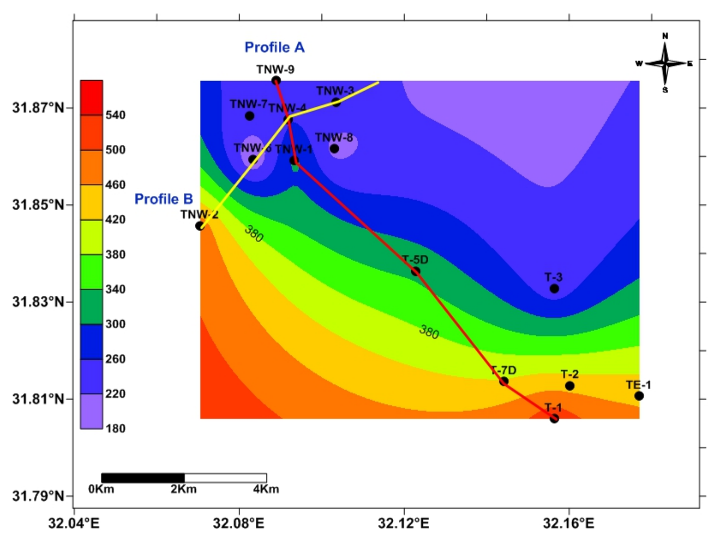

Fig.7. Isopach map of Wakar Formation.

It is worth to mention, that variation in lithology between Sidi Salem and Wakar formation concerning

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sand interbeds is attributed most probably to the change of deposition (meandering) of the linear channel system carrying sands to the basin. The sand interbeds increase in Sidi Salem Formation at the northwest of Temsah area. This means that the main channel was at the area of Temsah during deposition of Sidi Salem Formation while the main channel during deposition of Wakar Formation was at the areas south of Temsah field; this may be attributed to the Messinian EoNile phase (Said, 1981).

In addition the variation of thickness of Wakar sediments could be also attributed to the local uplifting development by tectonic activity during Tortonian time giving rise to partial erosion of Wakar rocks in some areas.

According to Said (1990), the Late Miocene time span, there was an overall progradation that caused paralic and shelf facies to advance from the mid–delta to the northeast delta area.

In general, Wakar Formation represents a shelf prograding shale facies that is widely extended allover the area. It is composed of brownish to gray shale with fine to coarse–grained sandstone. This sandstone in Temsah field is not developed and represents a secondary reservoir, but disappearing at the northwesernt part of Temsah field. Wakar formation belongs to Sequence–2. Sequence–3 that has been found in Temsah Field is characterized mainly by shale with minor streaks of sandstone and limestone. One or more sandstone layers are located in the lowest part.

3.3. Rosetta Formation (Late Miocene)

According to Hsu et al. (1978) at the end of the Messinian interval, global sea level fell significantly, and the isolated Mediterranean was drastically lowered by the Messinian salinity crisis. As a result, The Miocene succession terminated with the sequence of Rosetta Formation. Rosetta Formation is Late Miocene (Messinian) in age. Its upper boundary unconformably underlies the Pliocene shaley facies of the Kafr El Sheikh Formation and represents the transation from the shale of the Kafr El Sheikh Formation (Pliocene) to the Messinian evaporitic complex of the Rosetta Formation so, it is the best acoustic marker on a regional scale. The lower boundary of Rosetta Formation also unconformably overlies the shaley facies of Wakar Formation.

Rosetta Formation is composed of evaporitic facies anhydrite and salt with limestone and shale interbeds representing lagoonal facies. Rosetta Formation represents the time of closing the mediterranean sea, while in the onshore area the same time is represented by channel fill sediments of Abu Madi/Qawasim formations which are composed of sandstone and shale.

Rosetta Formation is widely extended allover the study area and its thickness is variable due to Tortonian tectonics and the pre–existing topographic surface of the Wakar Formation. The thickness of Rosetta Formation ranges from 11 m. to 245 m. in the study area.

3.4. Kafr El Sheikh Formation (Early to Late Pliocene)

Kafr El Sheikh Formation is the thickest formation in the sedimentary sequence of the study area. It consists mainly of marine shales with local turbiditic sand. The base of Kafr El Sheikh Formation shows a significant unconformity marking the widespread transgression, which terminates the Messinian crisis (El Heiny and Enani, 1996). The top of Kafr El Sheikh Formation can be easily identified by the appearance of the large sand layers of El Wastani Formation (Rizzini et al., 1978). Gas shows were reported in the sands of Kafr El Sheikh Formation in some wells.

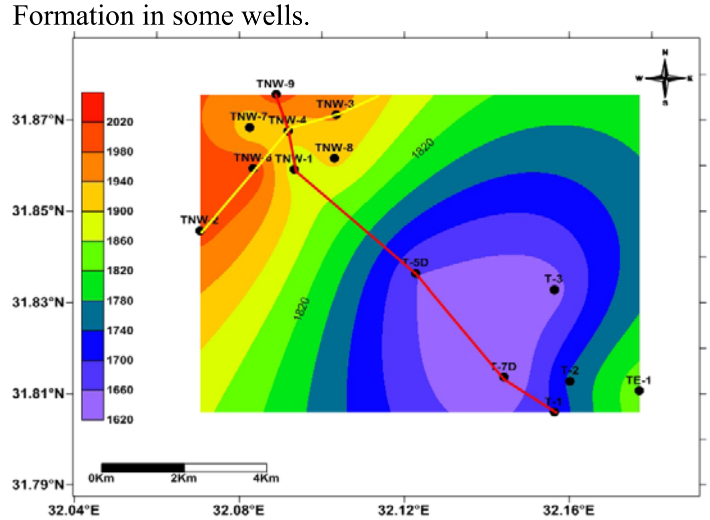

Fig.8. Isopach map of Kafr El-Sheikh Formation

Figure (8) shows the isopach map Kafr El Sheikh Formation in Temsah area the thickness of Kafr El

Sheikh Formation ranges from 1621 to m 2023 m in wells T-7D and TNW-6, resectively. The thickness increases to the northwest direction towards the deep marine. One channel lobe is recorded in Temsah area where thickness measures about 1900 m.. This lobe is unified to the northeast direction in the deep shelf and slope bottom features of the sea. This indicates that Kafr El Sheikh Formation was deposited under channel depositional conditions with lobe at the down stream end of the channels as the turbidity flow spread.

This conclusion could interpret the depletion of reservoir pressure in the different parts of Temsah due to the possible communication attained between channels either laterally or vertically through lateral/vertical stacking and incission by younger channels.

3.5. El Wastani Formation (Late Pliocene)

El Wastani Formation represents a transitional facies between the channel and shelf facies of Kafr El Sheikh Formation and that of coastal and continental sands of the overlying Mit Ghamr Formation (Rizzini et al., 1978). However, this formation consists of intercalations of sand and thin clay beds, which become thinner toward the top of the formation.

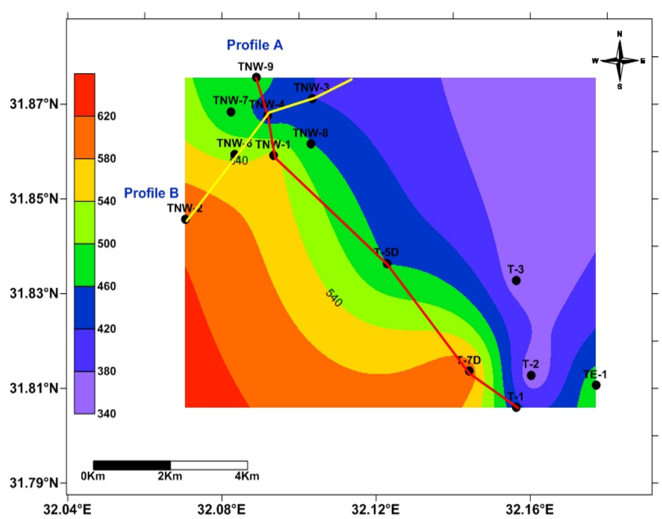

Fig. 9. Isopach map of El-Wastani Formation

In general, the thickness of the penetrated section ranges from about 200 to 600 m. Isopach map of this formation in Temsah area shows that, thickness increases to the southwest direction and decrease to the northeast direction giving a reverse trend in comparison with trends of the older formation especially Kafr El Sheikh Formation (Fig. 9). This could be attributed to the regression of the channel belt in the Temsah area and shifting of the depositional lobes towards the southwest direction with low deposition rate at the deep marine areas to the northeast.

3.6. Structure of Temsah field

According to Kamel and Sarhan (2002) the Nile Delta offshore eastern area which includes Akhen, Temsah, Wakar, Kersh and Port Fouad fields, is located along the Bardawil (Temsah Fault trend) alignment (Figs. 10 and 11). These fields are characterized by antiform structures which involve Miocene and Pre–Miocene formations. On a vertical section these structures appear to have a flower–like shape, which, as such, indicates a past history of strike-slip movements. The alignment is actually not perfect, there being some little offset or slight obliquity of the single structures. Going from southeast to northwest the depth of which the top of these antiform structures is found deeper, in accordance with the increasing depth of the basinal area (Leila and Moscariello, 2018).

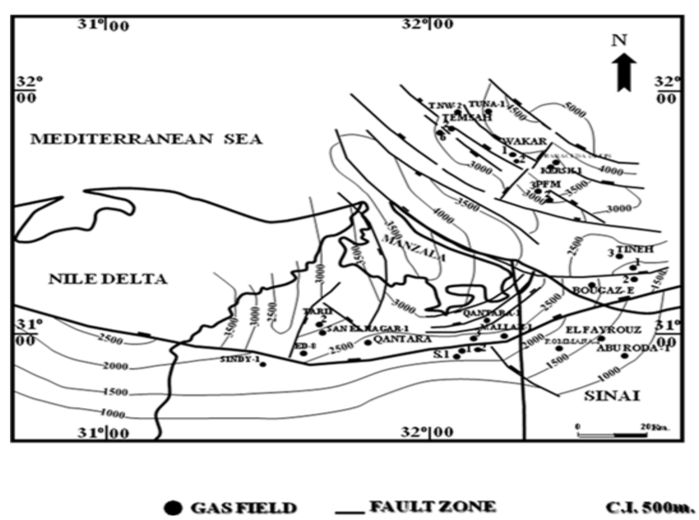

Fig. 10: Tentative regional structure contour map of top Qantara Formation, northeastern Nile Delta, Egypt (after Kamel and Sarhan, 2002).

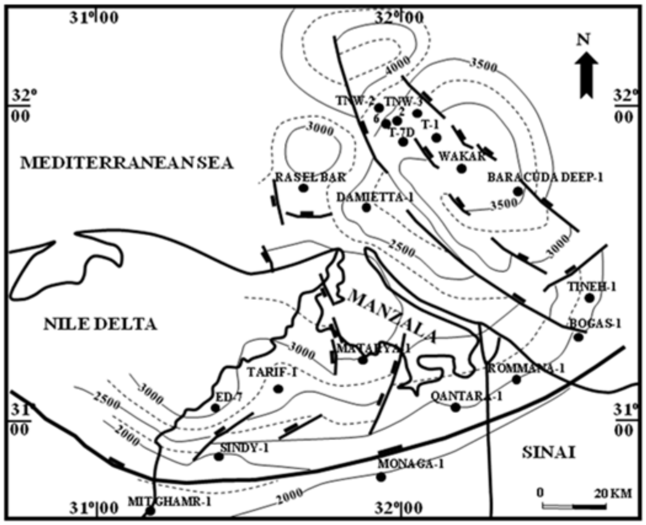

Fig. 11. Tentative regional structure contour map of top Sidi Salem Formation, northeastern Nile Delta, Egypt (after Kamel and Sarhan, 2002).

Origin and timing of these structures are a subject of discussion as they are not yet well understood. In general, during Middle Miocene the Bardawil line (Temsah trend) was subjected to shear displacements possibly produced by movements occurred along the major Qattara–Eratosthenes and Pelusium lines. This shear will have led to the creation, along the line, of en echelon faulted folds. The final compressional phase has occurred during the Messinian to Early Pliocene(Keshta et al., 2012).

The Temsah and Temsah northwest fields are located in a NW–SE trending antiform structure which involves Miocene and pre–Miocene Formation. The two fields are located at the upthrownside of the main fault trend named Temsah trend (Bardawil alignment) taking the direction northwest–southeast (Fig. 12and 13). They aligned with Osiris and Akhen structures to the northeast and with wakar and Port Fouad structures to the northeast. All these structures are antiforms of the same type. Temsah and Temsah northwest structures are represented by a NW–SE closure delineated by a subsea contour line of 4200 m. The crested area of each structure are delineated by 4000 m. subsea contour line. Temsah structure is separated from NW Temsah by a NE–SW fault zone which affects the area between wells T–5 and TNW–5 where two faults are suggested with a small throw (less than 50 m.) to the NW. Figure(12) shows the structural map as deduced from seismic data interpretation for Qantara Formation, while figure (13) shows the structural map of Sidi Salim Formation.

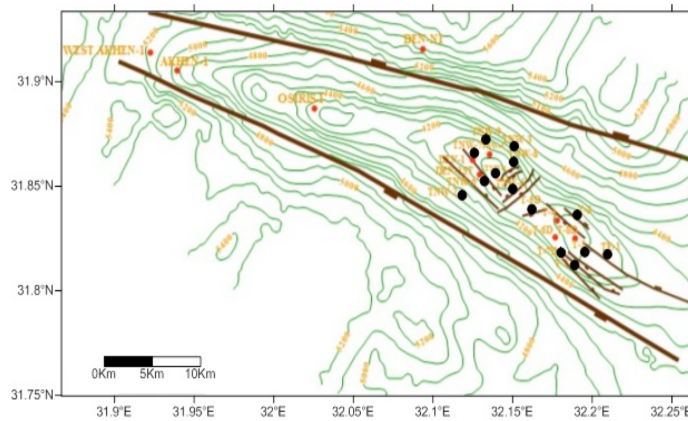

Fig.12. Structrual map of Qantara Formation in Temsah and NW-Temsah fields (After Petropel, 2003)

Temsah structure is represented by faulted anticline with oriented axis northwest–southeast direction (Fig. 13). The structure is dissected by strike–slip faults trending NW–SE (Temsah trend) with a downthrow less than 50 m.

These faults resulted in a horst, graben and step fault structures within the field area which controls the hydrocarbon accumulations.

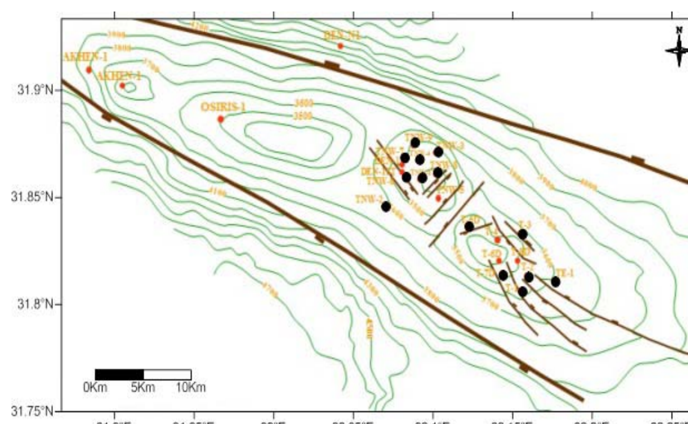

Fig. 13. Structrual map of Sidi Salim Formation in Temsah and NW-Temsah fields (After Petropel, 2003)

3.7. Paleorelief evaluation

In this sudy we review the main, long- and short-term geological and geotectonic processes that have controlled the development of Miocene- Pliocene landscapes in the region above and below the fluctuating sea level. Two crossing profiles (A and B) were constructed using the thickness of each formation . The trend of the first profile (A) extends SE-NW passing through six wells (TNW-9, TNW-4, TNW-1, T-5D, T-7D and T-1). The second profile (B) extends SW-NE direction passing through four wells (TNW-2, TNW-6, TNW-4 and TNW-3) ,figures 14 and 15 represent these profiles.

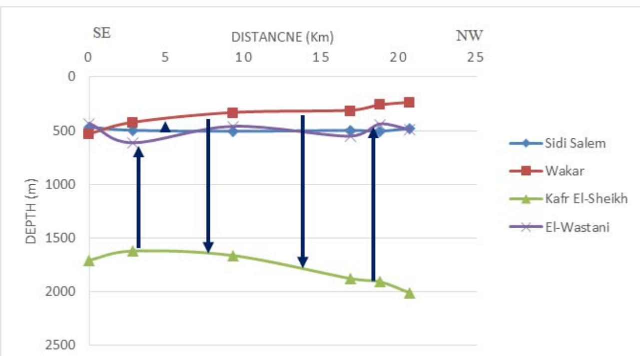

Figure (14): SE-NW Palaeorelief Profile extending from Temsah to North Temsah fields

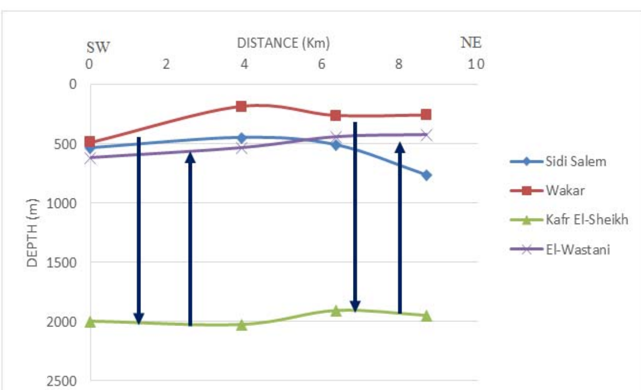

Fig. 15. SW-NE Palaeorelief Profile extending from Temsah to North Temsah fields

The paleorelief profiles gives an idea about geological, tectonic and morphological processes that had been occurred in the study area. as Sidi salem formation was the older we use it as the basin background and we compared the rest of formations to it. From the profiles (A and B) we found that Wakar layer was high in thickness this indicates that there was an uplift that had been occurred during the formation of this formation. Followed by a sever subsidence that affects Kafr El-Sheikh formation resulting a very high thickness layer of Kafr El-Sheikh. Then, there was a cycle of deposition of deltatic sediments of shale and sand forming El-Wastani deposites. Despite the heavy loads of deposited sediments, El-Wastani appers as a low thickness layer. This is attributed to the compaction of the shale deposites that decreases the thickness of the layer (Figs. 14 and 15).

Two subsurface geologic cross section for the same palaeorelief trends are constructed to follow any variations in the subsurface geologic conditions. Figures (16 and 17) represent the constructed sections. Inspection of these profiles indicates relative calm sedimentation conditions.

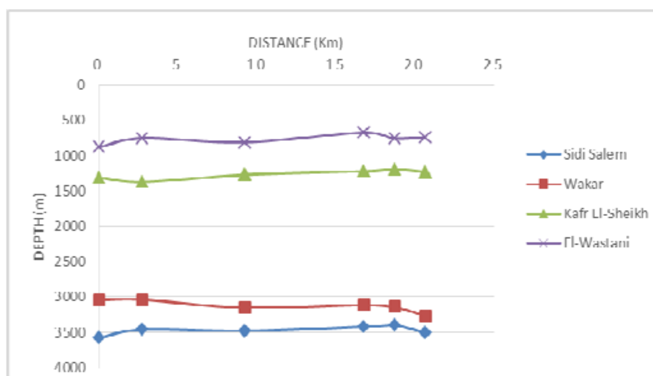

Fig. 16. SE-NW Subsurface Geologic Section extending from Temsah to North Temsah fields.

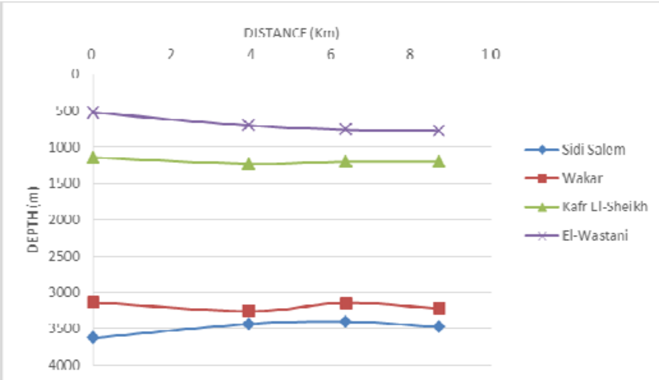

Fig. 17. SW- NE Subsurface Geologic Section extending from Temsah to North Temsah fields.

4. Conclusions

Interest in the Eastern Mediterranean as a natural gas resource base has been growing since 2009. A series of large natural gas discoveries in the Levant Basin have altered the dynamics of the Eastern Mediterranean region. Egypt has found new gas deposits in the Mediterranean (Zohr) in 2015. So significant focused studies on this area become a must. This study introduced a geological and geophysical over view on Temsah field in the eastern Nile Delta (west of levantin basin). This area is located to the south of the massive Zohr gas field that has been recently explored. The main formations in the study area reflect its potential for oil and gas especialy both Sidi salem and Kafr El-Sheikh formations. The isopach maps for different layers illustrates the thickness and extension of each layer. The main faults in Temsah area trend NE to SE and is accompanied with faulted anticlines, horst and grabens insid the fields. These structures seem to control the oil and gas trapping and accumulation. Apparently, this area was subjected to different tectonic activities accompanied with erosional truncations . The tectonic history of the studied interval beginning from Sidi Salem Formation of the Middle Miocene to El-Wastani Formation of Lower Pliocene is described as follows: After the deposition of Sidi Salem Farmation an uplift event has occurred accompanied by erosional epoch , and then deposition of Wakar Formation took place. After the deposition of Wakar Formation a great subsidence took place causing formation of great thickness of Kafr – Elsheikh Formation which followed again by an uplift causing formation of El-Wastani Formation. This sequence of uplifting and subsidence events dominates allover the Nile Delta and its facing off-shore areas. Based on the reccent studies carried out in Levantin Basin deeper targets under the Messinian should be explored.

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