



Purposeful scientific research is a basic pillar for the advancement of Iraq



Biostratigraphy and Facies Analysis of Palani Formation in Balad and Kirkuk oilfields

Sawsan Al-hazaa , Yasir Kareem Jasim

Department of Applied Geology, College of Science, Tikrit University, Tikrit, Iraq

Sawsanalhazaa@tu.edu.iq , geo.yasir.k.j@gmail.com

ABSTRACT

The investigation of two selected well from Kirkuk (K.218) and Balad (Ba.9) oil field stratigraphy petrographic and physical properties, which leads to the interpretation of the microfacies and environment for Palani Formations. Palani Formation has six distinct carbonate microfacies (Planktonic foraminiferal mudstone, *Bulimina* mudstone, Planktonic foraminiferal wackestone, Planktonic foraminiferal wackestone – packstone, Planktonic foraminiferal Packstone, Glauconitic, dolomitic foraminiferal packstone), and has one Planktonic foraminiferal zones (*Pseudohastigerina micra* Interval Zone (P19)).

The depositional environment of Palani Formation is deposit in middle ramp - basinal outer ramp depositional environments, according to different types of microfacies described from Palani Formation.

Introduction

The Oligocene period is less well represented than the Eocene. It occupied a small area, mostly within Mesopotamia (1). Oligocene formations are separated from both the underlying Eocene and the overlying Miocene by a break and an unconformity. The Kirkuk group is an Oligocene carbonate sequence composed of 9 formations (Anah, Azkand, Ibrahim, Bajawan, Baba, Tarjil, Shurau, Sheikh Alas, and Palani) that are distributed within the early (Rupelian) and late (Chatian) Oligocene. The carbonate rocks of the Palani Formations are described using the carbonate rocks classification by (2), as modified by (3), and microfacies determination from the Palani Formations based on sedimentological features and skeletal and non-skeletal components.

The natural geographic environment in which sediment accumulates is referred to as the depositional environment. They are differentiated by fossil content, physical, and chemical parameters. The interaction of these parameters production various sediment types or facies that are representative of different environmental conditions. The study of sedimentary facies in the rock record can shed light on the conditions that existed in ancient depositional environments (4). Many parameters define the depositional environment, and their effects on sediment accumulation can be identified. Understanding the environmental processes and products that comprise the sedimentary

sequence is the foundation for environmental reconstruction. Facies models, which are built from real and theoretical studies of both the rock record and the modern environment, are used to understand the depositional environment (4).

Knowledge of modern paleoenvironmental models is the foundation for studying sedimentary rocks and the best place to start when interpreting paleoenvironmental data (5). Certain biological factors, such as the extinction and dominance of certain genera and the environmental niche occupied by certain genera, have changed over time; however, many factors have remained constant. These factors are taken into account in the development of ancient models based on the rock record, which greatly aids in understanding carbonate sedimentology.

The study area Kirkuk oil Field which has length of more than (100 km) and about (4-5km) width which Kirkuk city lies on this Field. To the south west of this field, and to

The northwest of Kirkuk city, while the Ba.9 well section is represents a strip of 10 kilometers wide and 16 kilometers long located between the Samara Field in the north and east Baghdad Field in the south. It lies on the western bank of Tigris and it is about 9 kilometers south of Balad District and 40 kilometers north of north stretches of East Baghdad Field. Fig. (1), Table (1).

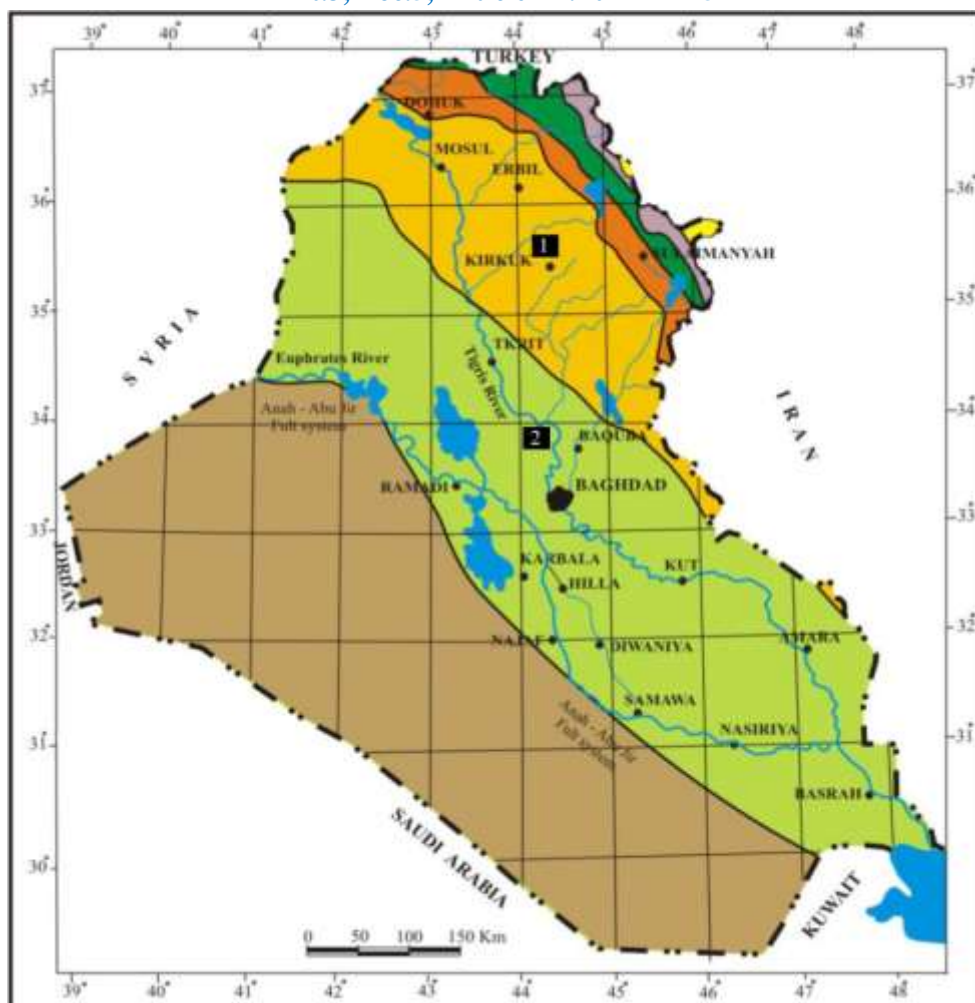


Fig.1: "Location map of study area includes": 1- Kirkuk oilfields (K.218 well) 2- Balad oilfields Ba.9 well, (6).

Table 1: The coordinates of the study sections

no	studied section	Thickness (m)	Formation	Number of sample	coordinates
1	K.218	60 m	Palani	35 Thin section	N 39° 33' 712"
					E 43° 086' 83"
2	Ba.9	33m	Palani	15 Thin section	N 34° 02' 20.7832"
					E 44° 12' 3.8164"

Previous studies

(7) studied the biozones of the Cenozoic microfossils and their fossil assemblages in Iraq. They divided the Oligocene section into three zones: early-middle Oligocene represented by (*Globigerina ampliapertura* zone) of Palani Formation.

(8) generated a palaeofacies map of the Arabian Plate from the Late Permian to the Holocene to reconstruct the depositional history of the Arabian Plate. This also included Oligocene palaeofacies spanning deposition of the Pebdeh-Chilo Formations (Palani Formation in Iraq) and their regional equivalents.

(9) Identified the index species *Cassigerinella chipolensis* in the Palani Formation in the Sinjar section near Sinjar city, where the Formation is represented by a condensed marine interval; however, in this study we did not recognize the species

Cassigerinella chipolensis within the Palani Formation.

(10) studied the stratigraphy and reservoir characterization of the Oligocene succession in Kirkuk area, he recognized paleoenvironments of this succession include basinal environments (Ibrahim, Tarjil and Palani formations).

Practical work

The materials on which this study is carried out include laboratory works, about 50 thin sections are selected and investigated for their microfossils, which are used to reveal the different palaeoenvironments, prevailed during their accumulation. In addition, we describe the biozones, which determine the nature of the Oligocene boundary in the area.

Results and discussion

1-Stratigraphy

Author: The Palani Formation was first identified as a dolomitized globigerina limestone by (11) from well Kirkuk-85, with the upper part made up of dolomitic, Nummulites-rich soft limestone.

Age: According to (12) the Formation could span from the latest Eocene to the early Oligocene.

Arial distribution and thickness: Palani Formation exposed on the surface in Sinjar area (9). Also exposed on the surface in the Qara Chauq structure (13). In the present study, the Palani Formation is reported in the subsurface only at K.218 with thickness 60m and Ba.9 with thickness 33m.

Lithology: In the K.218, the Palani Formation is composed of limestone: grey, grey to light, fine-grained marly, rare vugs, dolomitic, with dolomite rhombs scattered at the top, abundant *globigerina*, rare *Textularia* and rotalid fragments, and abundant shell fragments, wherever *globigerina* is present the Formation's globigerinal limestones were thought to have been deposited in an outer shelf to basinal environment (14), (Fig. 2).

In the Ba.9 Well, the Palani Formation consists of gray-white to light grey limestone, chalky, soft, pyritic, and marly fossiliferous with small planktonic foraminifera, (Fig. 3)..

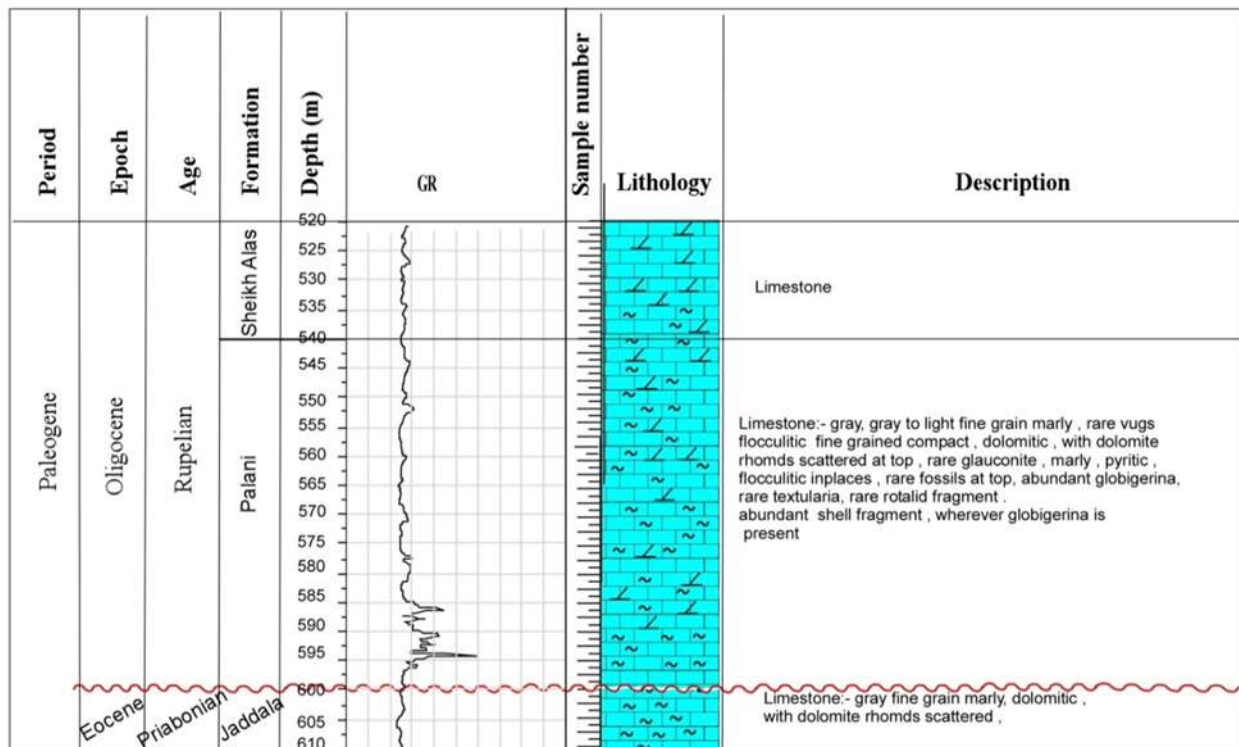


Fig. 2: Stratigraphic column of the K.218well

Stratigraphic boundaries: The lower boundary of the Palani Formation is unconformable with Jaddala Formation (Priabonian age) in both studied wells,

while the upper boundary is conformable with Sheikh Alas Formation in K218 well and Tarjil Formation in Ba.9 well.

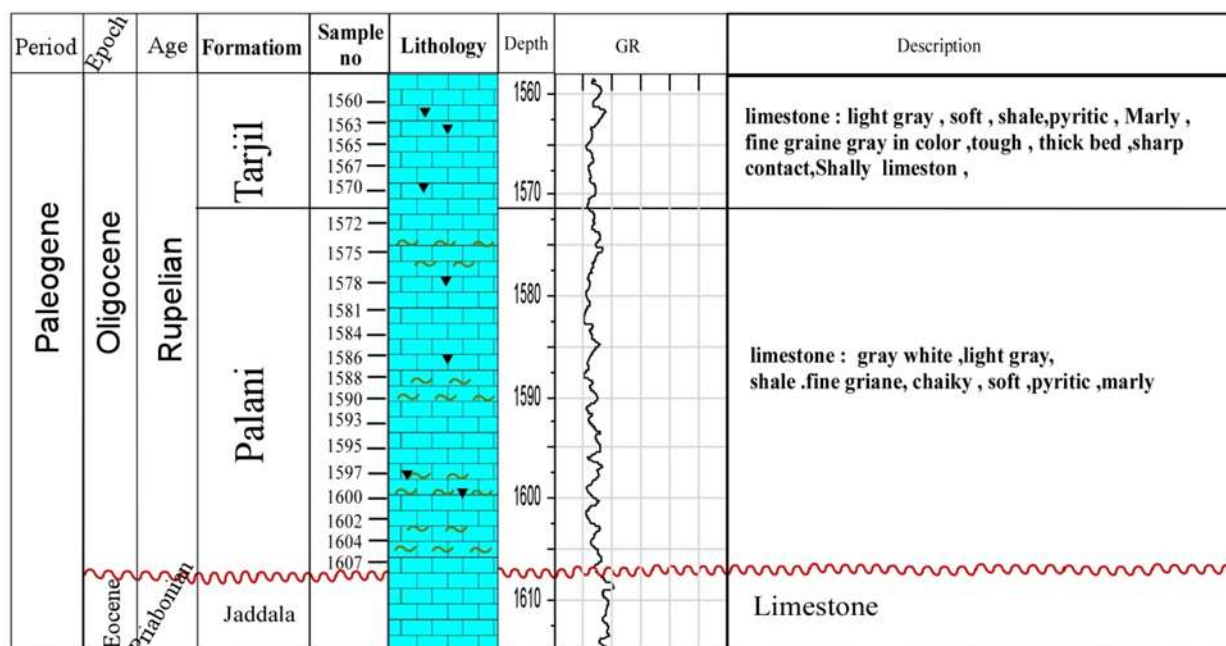


Fig. 3: Stratigraphic column of the Ba.9 well

2-Biostratigraphy

A- *Pseudohastigerina micra* Interval Zone (P19): Early Rupelian

Age: Early Oligocene (Rupelian)

Definition:- This zone covers the interval from the disappearance of Middle Eocene planktonic foraminifera of the Jaddala Formation to the last appearance of *Pseudohastigerina micra* Plate2 (C).

Thickness: This zone is recorded from the Palani Formation and attains 33 m thick at Ba.9 well and 60 m thick at K.218 well (Figs. 4 and 5).

Discussion:- The Zone is home to the following planktonic species and subspecies: *Pseudohastigerina micra*, *Globigerina ampliapertura*, *G. sellii*, *G. ouachitaensis ouachitaensis*, *G. praebulloides praebulloides*, *G. praebulloides leroyi*, *G. euapertura*, *G. tapuriensis*, *G. ciproensis*. The Zone is similar to the *Cassigerinella chipolensis/Pseudohastigerina micra* Zone (15, 16, 17) and the *Globigerina sellii/Pseudohastigerina barbadoensis* Zone (18) P19; (19, 20).

All of these zones date from the late Eocene to Early Oligocene.

Blow (1969) classified the Early Oligocene as having two Biozones: a lower *Globigerina tapuriensis* Zone (P18) and an upper *Globigerina sellii/Pseudohastigerina barbadoensis* Zone (P19). However, (17) proposed that the overlap of *Cassigerinella chipolensis* and *Pseudohastigerinira micra* is the most reliable way to recognize the Lower Oligocene, whereas (21) used the overlapping of *Chiloguembelina cubensis* and all *Pseudohastigerinids* to avoid nomenclature problems. (22) provided a full discussion and illustration of this species. *P. micra* are common in the upper Eocene but it declined dramatically in size and abundance at the Eocene/Oligocene boundary (23, 24, 25, 26, 27). The disappearance of large-sized *P. micra* can be used to correlate the Eocene/Oligocene boundary proper, especially when hantkeninids are rare or absent (26, 27).

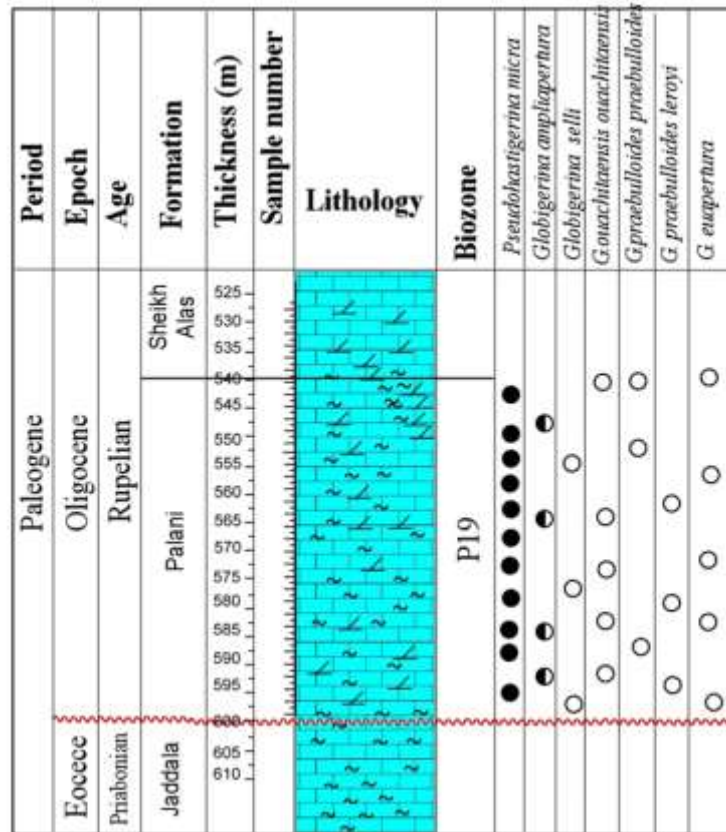


Fig. 4: Distribution of planktonic foraminifera in the K.218 well

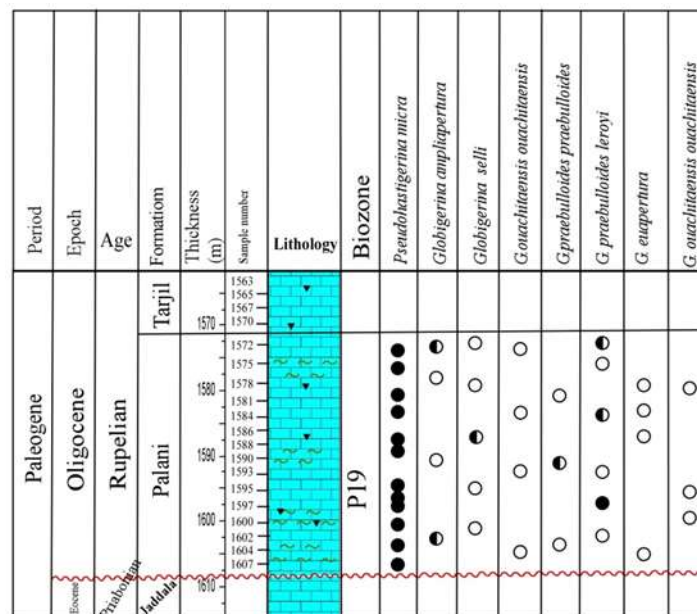


Fig. 5: Distribution of benthic foraminifera in the Ba.9 well

3-Microfacies of Palani Formation

Palani Formation consists basically of six microfacies easily recognizable throughout in the thin section. The microfacies are:

A- Planktonic foraminiferal mudstone microfacies

This facies types is described from the lower part of the Palani Formation in Ba-9 well about 7 m at the depth (1592-1597) (Fig. 7),

Petrographically, the foraminiferal lime-mudstone is composed of small amounts of skeletal particles floating in a dense lime mud matrix. Foraminiferal tests (e.g., *Globigerina* sp., *Globorotalia* sp., and *Bolivina* sp.), plate1 (A, B). Representing the main component of these skeletal particles, are fragmented and medium preserved. These tests are available in both a complete and fragmented format; they come in a variety of sizes, from very fine to medium sand.

Fine glauconitic grains are also recorded randomly disseminating in the lime mud matrix. The matrix is partially recrystallized into pseudospar.

The facies was deposited in an outer shelf basinal environment, depending to (28), upon planktonic foraminifera in micritic matrix with completely absences of other shallower bioclastic, had flourished in the water column off shore and reflect relatively deeper water basinal environment (outer ramp), and low energy.

B- Bulimina mudstone microfacies

This facies types is described from the lower part of the Palani Formation in Ba-9 well about (9 m) at the depth (1597-1606) (Fig. 7).

This microfacies is composed of dense lime mudstones, identifiable components of this facies include *Bulimina*, and the *Bulimina* was live in Fore-reef environment (29), Plate 1(C). This facies was deposited in Fore-reef (middle ramp) environment.

C- Planktonic foraminiferal wackestone microfacies.

This facies types described from the Palani Formation lower part in K-218 well about (20 m) at the depth (580 - 600) (Fig.6), upper and lower part in Ba-9 well about (22, 4m) at the depth (1571-1592),(1605-1609) (Fig.7).

The foraminiferal wackestone is mainly made up of foraminiferal and other fossils tests mainly of Planktonic with some smaller benthonic which form together about 10% - 40% of the rock constituents. The fossils tests are embedded in a dense grey lime mud matrix and present in a complete form and in a fragmented manner. These fossils tests variable in size ranging from very fine to medium sand size .

The main components are reworked Planktonic, the foraminifera are characterized by a relatively diverse assemblage of *Bolivina*, *Globigerina* sp., *Globorotalia* sp, Plate 1(D,E). The combination of micritic matrix and abundance of basinal skeletal fauna are exclusively marine planktonic organisms, they can be found in all current ocean depths and live in open marine environments, with a sharp decline in abundance in deeper waters, the majority of species and individuals are found in the first few hundred meters, (29). Depending to this fauna, that the facies was deposited in basinal (outer ramp) environment.

D- Planktonic foraminiferal wackestone - packstone microfacies

This facies types described from the Palani Formation in upper part of the K-218 well about (15 m) at the depth (565-580) (Fig.6).

A diverse assemblage of poorly to moderately sorted, fragmented and whole fossils in lime mud is characteristic of this microfacies. Composed with Planktonic *Globigerina* sp., *Globorotalia* sp, textures range from wackestone to packstone, Plates 1 (F).

Planktonic foraminifera float in the water column and occupy a range of depths, the species of *Globigerina* are some of the intermediate water species living in 50–100 m depths, the deeper species living below 100 m include *Globorotalia* (30). The occurrence of large number of Planktonic *Globigerina* foraminiferal tests may point to the depositional environment being basinal (outer ramp) environment, (31). Depending to this fauna that the Planktonic foraminiferal wackestone - packstone sub microfacies was deposited in basinal (outer ramp) environment.

E- Planktonic foraminiferal Packstone microfacies.

This facies types described from the Palani Formation in upper part of the K-218 well about (15) at the depth (542-557) (Fig.4.2)

The main characteristic of this microfacies is abundant of Planktonic foraminifera such as *Globigerina* sp., Plates 1(G, H), these planktonic foraminifera which are numerous in the micrite matrix reflect relatively deeper water basinal environment and low energy, had flourished in the water column off shore (30). Depending to this fauna that the P1 was deposited in basinal (outer ramp) environment

F- Glauconitic, dolomitic foraminiferal packstone microfacies.

This facies types is described from the middle part of the Palani Formation in K.218 well about 8 m at the depth (557-565) (Fig. 6), and Ba-9 well about 2 m at the depth (1592-1594), (Fig. 7), Plate 2(A,B).

The term glauconite is commonly used by geologists to refer to a dark green mineral that is found quite commonly in marine sediments. In correct usage the use of this term should be restricted to a potassium rich mica, which has the mineral name glauconite, because this is in fact only one member of a group of potassium and iron-rich phyllosilicate minerals that are closely related (32).

Glauconitic Is most commonly formed in inner shelf environments during times of relatively slow sedimentation, some wave or current activity, and mildly reducing conditions especially during transgressive events (33).

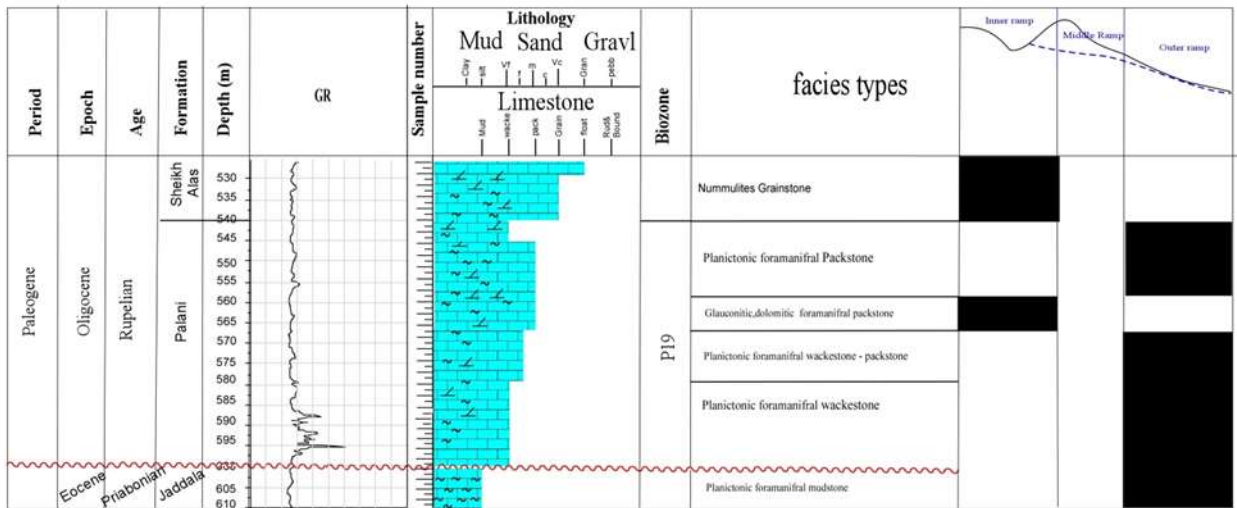


Fig.6: Microfacies and environmental distribution column of the K-218 well

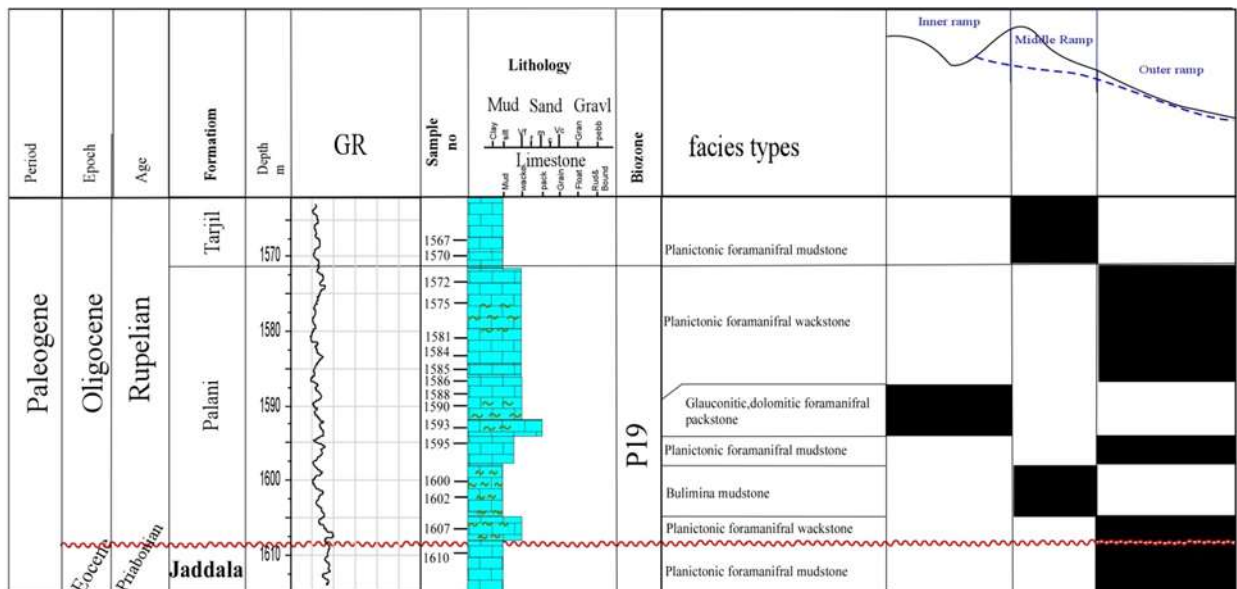


Fig.7: Microfacies and environmental distribution column of the Ba. 9 well.

4-Depositional Environment of Palani Formation

The Palani Formations most dominant microfacies are (Planktonic foraminiferal mudstone, *Bulimina* mudstone, Planktonic foraminiferal wackestone, Planktonic foraminiferal wackestone – packstone, Planktonic foraminiferal Packstone, Glauconitic, dolomitic foraminiferal packstone) the main components of which are Planktonic foraminifera *Globigerina* sp.

This Planktonic foraminifera marine planktonic organisms, they can be found in all current ocean depths and live in open marine environments, with a sharp decline in abundance in deeper waters, the majority of species and individuals are found in the first few hundred meters, (29).

According to the microfacies that described in palani Formation the planktonic globigerinal which are abundant in the micritic matrix are exclusively reflecting relatively deeper water and low energy. The microfacies (Planktonic foraminiferal mudstone, Planktonic foraminiferal wackestone, Planktonic foraminiferal wackestone – packstone, Planktonic foraminiferal Packstone,) was deposits in basinal (outer ramp) environment, while (*Bulimina* mudstone, Glauconitic, dolomitic foraminiferal packstone) was deposits in (inner ramp) environment. The biozones that recorded from the Palani Formation is *Pseudohastigerina micra* Interval Zone (P19), as it indicates a deep (basinal) deposition environment. Overall the Palani Formation deposit in middle ramp - basinal outer ramp environment.

Plates 1

A, B: Planktonic foraminiferal Mudstone sub microfacies with micrite matrix; Palani Formation; Ba-9 well about 7 m at the depth (1592-1597).

C: Bulimina mudstone sub microfacies; Palani Formation; Ba-9 well about (9 m) at the depth (1597-1606).

D, E: Planktonic foraminiferal Wackstone sub microfacies with micrite matrix; K-218 well about (20 m) at the depth (580 - 600); Ba-9 well about (22, 4 m) at the depth (1571-1592), (1605-1609).

F: Globigerinal wackstone - packstone sub microfacies with micrite matrix; bearing *Globigerina*

sp Palani Formation; K-218 well about (15 m) at the depth (565-580).

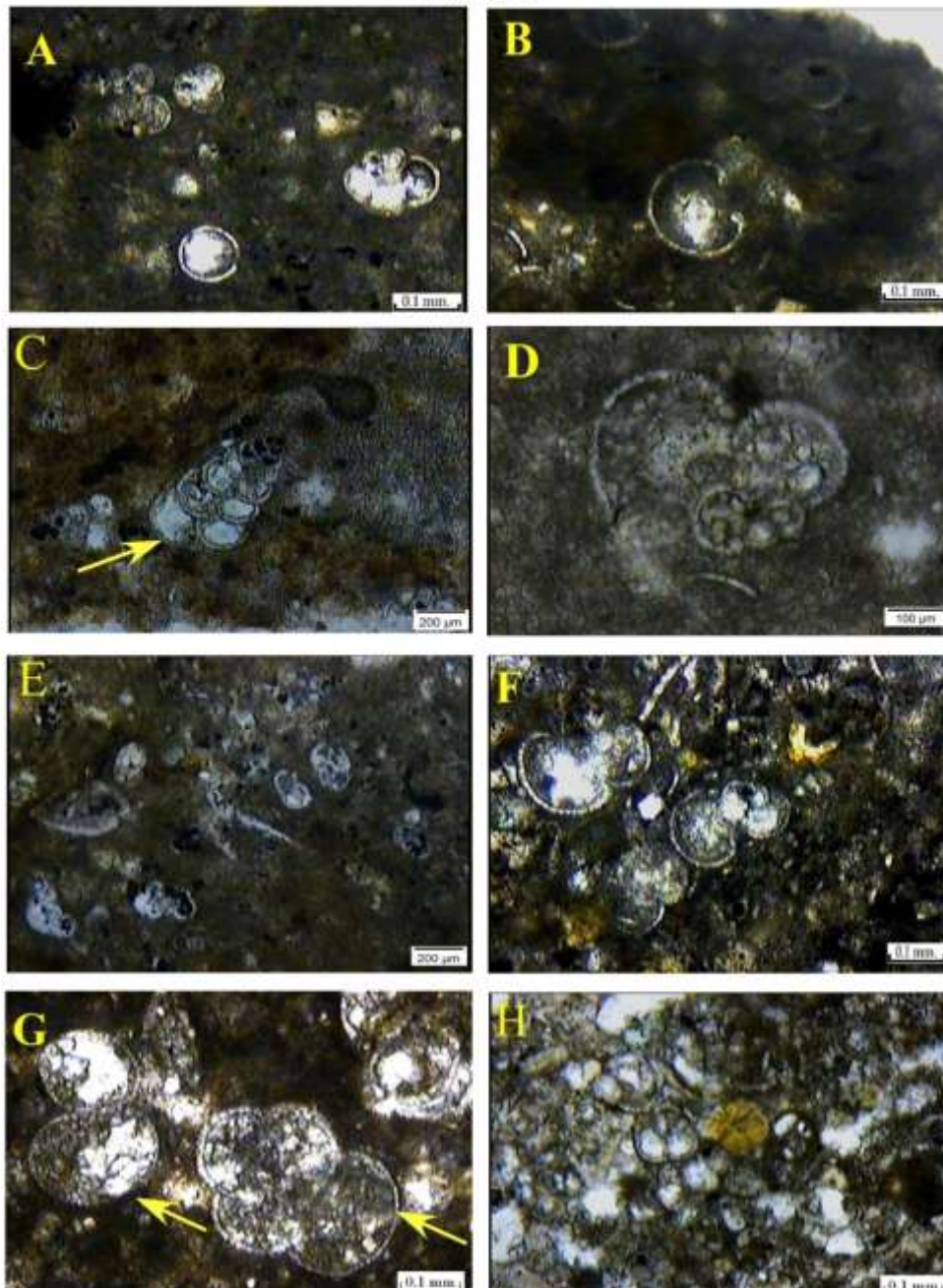
G, H: Globigerinal packstone sub microfacies with micrite matrix; bearing *Globigerina* sp., Palani Formation; K-218 well about (15) at the depth (542-557).

Plate 2

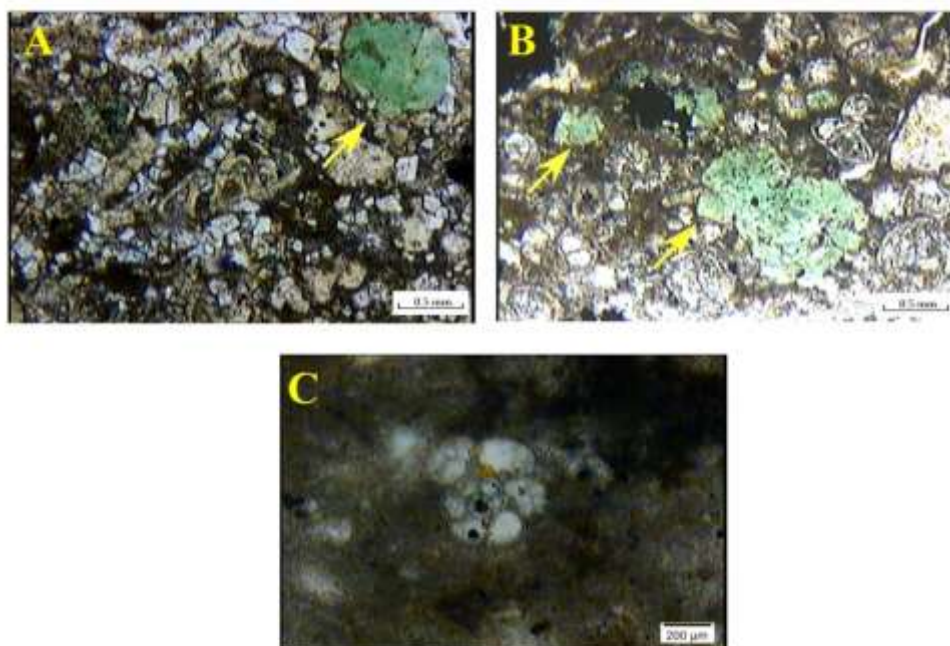
A, B: Glauconitic, dolomitic foraminiferal packstone sub microfacies; Palani Formation ; K.218 well about 8 m at the depth (557-565) ; Ba-9 well about 2 m at the depth (1592-1594).

C: *Pseudohastigerina micra* Interval Zone (P19), recorded from the Palani Formation at Ba. 9 well and K.218.

Plates 1



Plates 2



References

1. Jassim, S. Z., Karim, S. A., Basi, M., Al-Mubarak, M. A., Munir, J., 1984. Final report on the regional geological survey of Iraq, Volume 3, Stratigraphy. Manuscript report, Geological Survey of Iraq.
2. Dunham, R. J., (1962). Classification of carbonate rocks according to depositional texture. In: Ham, W. E., (eds.), Classification of carbonate rocks, AAPG., Mem.1, PP. 108-121.
3. Embry, A.F., and Klovan, E.J., 1972. A Late Devonian reef tract in North Eastern Banks Island. North West Territories. Can Petrol. Geology Bull.vol.19, pp. 730-781 .,
4. Elf-Aquitaine., 1982. Paleocological conditions and morphological variation in monospecific banks of Nummulites: an example. Bulletin des Centres de Recherches Exploration Production Memoire, 6, 557-563.
5. Heckle, P.H., 1983. Diagenetic Models Pennsylvania, Cyclic Cyclo-themes, Jou. of Sed. Pet.V.53, No.3, PP.733-789.
6. Fouad, S.F.A., 2015. Structural Tectonic Map of Iraq, Iraqi Bulletin of Geology and Mining Vol.11, No.1, 2015 p 1- 7.
7. Al Hashimi, H. A. J., Amer, R. M. 1985, Tertiary microfacies of Iraq. Directorate General for Geological Survey and Mineral Investigation.
8. Ziegler, M. A., 2001. Late Permian to Holocene Paleofacies Evolution of the Arabian Plate and its Hydrocarbon Occurrences. *GeoArabia*, 6, 60p.
9. Al-Mutwali, M.M. and N.Y. Al-Banna 2002. Planktonic foraminiferal biostratigraphy of the Oligocene (Palani and Tarjil formations), Sinjar area. Northwestern Iraq. Rafidain Journal of Science, v. 13, no. 4, p. 1-11.
10. Al Tamimi, A., M., 2011, Stratigraphy and Reservoir Characterization of the Oligocene Succession, Kirkuk Area, M.Sc. Thesis, University of Baghdad.
11. Bellen, R. C. V. 1956. The stratigraphy of the Main Limestone of the Kirkuk, Bai Hassan and Qara Chauq Dagh structures in Northern Iraq. *Journal of the Institute of Petroleum*, 42, 233-263.
12. Jassim, S. Z., Goff, J. C., 2006, Geology of Iraq. Published by Dolin, Prague and Moravian Museum, Brno. 341p.
13. Bellen, R. C. V., Dunnington, H., Wetzel, R., Morton, D. 1959. Lexique Stratigraphique, International. *Asie, Iraq*. 333p.
14. Majid, A. H., Veizer, J. A. N., 1986. Deposition and Chemical Diagenesis of Tertiary Carbonates, Kirkuk Oil Field, Iraq. *AAPG Bulletin*, 70, 898-913.
15. Bolli, H.M. 1957. Planktonic foraminifera from the Oligocene-Miocene Cipro and Lengua formations of Trinidad, BWI. Bulletin of United States National Museum 215, p. 97-123.
16. Bolli, H.M. 1966. Zonation of Cretaceous to Pliocene marine sediments based on planktonic foraminifera. Boletin Informativo de la Asociacion Venezolana de Geologia Mineraria y Petroleo, Caracas, v. 9, no. 1, p. 3-32.
17. Bolli, H.M. and J.B. Saunders 1985. Oligocene to Holocene low latitude planktic foraminifera. In, H.M. Bolli, J.B. Saunders and K. Perch-Nielsen (Eds.), Plankton Stratigraphy. Cambridge University Press, p. 155-262.

18. Blow, W.H. 1979. The Cenozoic *Globigerinidae*. A study of the morphology, evolutionary relationships and the stratigraphical distribution of some *Globigerinida* (mainly *Globigerinacea*), v. 1-3, Leiden, E.J. Brill, 1413 p.
19. Bolli H.M. and V.A. Krashennikov 1977. Problems in Paleogene and Neogene correlations based on planktonic foraminifera. *Micropaleontology*, v. 23, no. 4, p. 436-452.
20. Krashennikov, V.A. and V. Pflaumann 1977. Zonal stratigraphy and planktonic foraminifera Paleogene deposits of the Atlantic Ocean to the west of Africa. (Deep Sea Drilling Project, Leg 41). Deep Sea Drilling Project, Initial Report 41, p. 581-611.
21. Berggren, W.A. and K.G. Miller 1988. Paleogene tropical planktonic foraminiferal biostratigraphy and magneto biochronology. *Micropaleontology*, v. 34, no. 4, p. 362-380.
22. Olsson, R.K., Hemleben, Ch., Huber, B.T., and Berggren, W.A., 2006, Taxonomy, biostratigraphy, and phylogeny of Eocene *Globigerina*, *Globoturbotalita*, *Subbotina*, and *Turbotalita*, in Pearson, P.N., Olsson, R.K., Huber, B.T., Hemleben, Ch., Berggren, W.A. (eds.), Atlas of Eocene planktonic foraminifera Cushman Foundation Special Publication, No. 41, p. 111-168.
23. Cordey, W.E., Berggren, W.A., and Olsson, R.K., 1970, Phylogenetic trends in the planktonic foraminiferal genus *Pseudohastigerina* Banner and Blow, 1959: *Micropaleontology*, v. 16, p. 235-242.
24. Keller, G., 1985, Eocene and Oligocene stratigraphy and erosional unconformities in the Gulf of Mexico and Gulf Coast: *Journal of Paleontology*, v. 59, p. 882-903.
25. Nocchi, M., Parisi, G., Monaco, P., Monechi, S., Madile, M., Napoleone, G., Ripepe, M., Orlando, M., Premoli Silva, I., and Bice, D.M., 1986, The Eocene - 34. Oligocene boundary in the Umbrian pelagic sequences, Italy, in Pomerol, C. and Premoli Silva, I. (eds.): Terminal Eocene Events: Developments in Stratigraphy, v. 9, p. 24-40.
26. Wade, B.S. and Pearson, P.N., 2008, Planktonic foraminiferal turnover, diversity fluctuations and geochemical signals across the Eocene/Oligocene boundary in Tanzania: *Marine Micropaleontology*, v. 68, p. 244-255.
27. Miller, K.G., Browning, J.V., Aubry, M.-P., Wade, B.S., Katz, M. E., Kulpecz, A.A., and Wright, J.D., 2008, Eocene-Oligocene global climate and sea-level changes: St. Stephens Quarry, Alabama: Geological Society of America, Bulletin, v. 120, p. 34-53.
28. Sadeghi, R., Vaziri-Moghaddam, H. and Taheri, A. (2010) Microfacies and Sedimentary Environment of the Oligocene Sequence (Asmari Formation) in Fars Sub-Basin, Zagros Mountains, Southwest Iran. *Facies*, 57, 431-446.
29. Boudagher- Fadel, M.K., 2015. Biostratigraphic and Geological Significance of Planktonic Foraminifera (Updated 2nd Edition). London: UCL Press. doi:10.14324/111.9781910634257.
30. Schiebel, R. and Hemleben, Ch, 2017, Planktic foraminifers in the modern Ocean: Springer-Verlag, Berlin, Heidelberg, 333 p.
31. Postuma JA (1971) Manual of planktonic foraminifera. Elsevier, Amsterdam, pp 1-420.
32. Amorosi, A. (2003) Glaucony and verdine. In: Encyclopedia of Sediments and Sedimentary Rocks (Ed. Middleton, G.V.). Kluwer Academic Publishers, Dordrecht; 331-333.
33. Van Houten, F. B., and M. E. Purucker, 1984, Glauconitic peloids and chamositic ooids — favorable factors, constraints, and problems: *Earth-Science Reviews*, v. 20, p. 211-243.

الطباقية الحياتية والتحليل السحني لتكوين بلاني في حقلي بلد وكركوك

ياسر كريم جاسم ، سوسن حميد الهزاع

قسم علوم الأرض التطبيقية ، كلية العلوم ، جامعة تكريت ، تكريت ، العراق

الملخص

شخصت في المقطعين المختارين بئر بلد 9 وبئر كركوك 218، الطباقية والخواص الفيزيائية والبتروغرافية والطباقية الحياتية لصخور تكوين بلاني حيث ان هذا التشخيص ادى الى تفسير السحنات الدقيقة والبيئة الترسيبية لتكوين بلاني، حيث تم تشخيص ستة سحنات دقيقة والتي هي سحنة الحجر الطيني الحاملة للفورامنيفرا الطافية و سحنة الحجر الجيري الطيني الحاملة للبولميلا وسحنة الحجر الجيري الواكي الحاملة للفورامنيفرا الطافية وسحنة الحجر الجيري الواكي - المرصوص الحاملة للفورامنيفرا الطافية وسحنة الحجر الجيري المرصوص الحاملة للفورامنيفرا الطافية وسحنة الحجر الجيري الدولوميتي الكلوكونايي المرصوص الحاملة للفورامنيفرا الطافية.

شخص في تكوين بلاني نطاق حياتي واحد والذي هو

Pseudohastigerina micra Interval Zone (P19) -1

اعتمادا على نتائج السحنات الدقيقة والطباقية الحياتية حيث ان تكوين بلاني ترسب في بيئة المنحدر الاوسط الى الخارجي.