

The investigation of sedimental facies and sedimental environment of Tirgan Formation, Zavin section, NE of Iran

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The age of Tirgan Formation is early cretaceous (Barremian-Aptian) and is one of the calcareous formations in Kopt-dagh sedimentary basin which is ranged with E-W strike in the area (Afshar-e-Harb, 1994).

This formation is mainly composed of Orbitoline-Oolithic limestones which is overlain on the Shurijeh Formation and is underlain by Sarcheshmeh Formation. The studied area is located near to Zavin township in 80 Km(s) of Kalat-e-Naderi township. The thickness of mentioned formation is about 188 m in this area. The aim of this study is interpretation of Tirgan Formation sedimentary basin (Barremian-Aptian) in south east of Kalat-e-Naderi.

Explanation of microfacies

Microscopic Investigation of Tirgan Formation samples in the studied section led to identifying variant microfacies which are related to open marine environmental belt (A), bar (B), lagoon (C) and tidal flats (D).

Four facies complexes (A, B, C, D) in this facies are recognized which for more precisely investigation, each one is divided to several facies. These facies are numbered from deeper part of the sea toward the beach.

Open marine facies complex (A)

Mudstone facies

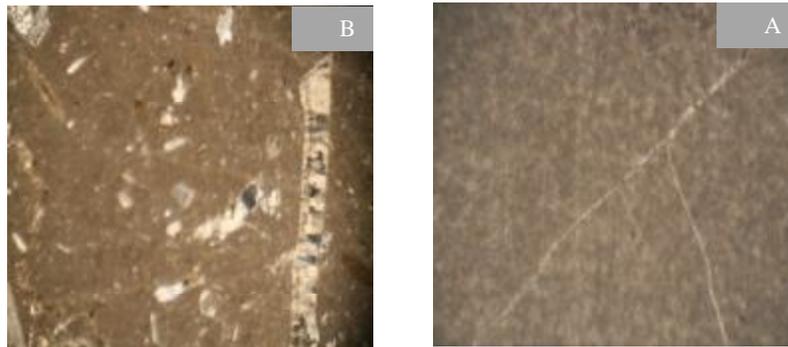
This facies is mainly composed of calcareous mud, less than 4% bioclasts, and bivalves, brachiopods and bryozoans fragments. The fragments and grains are very fine. (Figure A)

Bioclastic Wackstone

This facies is including of skeletal fragments such as brachiopod shells (3-5%), bryozoans (3-4%) and bivalves (3%). (Figure B)

Interpretation

This environment is located in sub tidal and has normal salinity. Because of great depth in this area, waves cant affect the substrate sediments, generally in these sediments, bivalves, brachiopods and bryozoans fragments show sedimentation in parts of the sea with mid depth. Also, skeletal fragments with fine to middle size, existence of micrite in the background and fossils relative to open marine show forming of these facies in open marine environment.



Bar facies complex(B)

Agroгат ooid grain stone facies

This facies is formed from ooid and intraclast. Ooid has abundance about 20-25% which its destruction index is 1.2-0.5 mm. The Intraclast has abundance about 10-15% which its destruction index is 1-4 mm. pelloid is one of the other non skeletal fragments which is very little (2-3%).(Figure C)

Ooid grain stone facies

Ooids are the major forming fragments of this facies. Their abundance in this facies is about 30-35% which their destruction index is about 0.5-1.7. ooids cores are mainly formed of skeletal fragments. Intraclasts are one of the other non skeletal fragments which their abundance is about 7-9%. (Figure D)

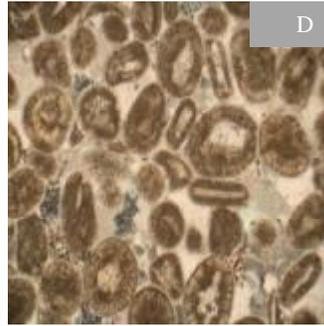
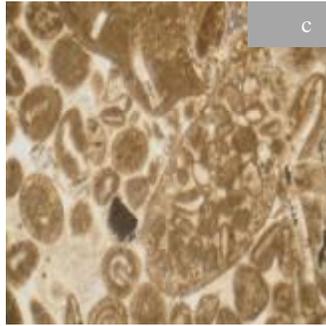
Pelloid ooid grain stone facies

ooids are the major forming fragments of this facies which their abundance is about 20-25% and in some parts, they become micritic which haven't signal structure. Their diameter is about 0.5-1.8 mm. In this facies, pelloids are viewed with the abundance about 10-13%.

Interpretation

High percentage of ooids with tangent fabric and intraclasts with marine skeletal fragments shows high energy at the time of sedimentation in this facies. In addition to ooid, intraclast is also one of the important fragments in this area which the existence of this fragment in ooid grain stone and intraclast ooid grain stone facies confirms the forming of this facies beside the bar toward the lagoon.

High destruction index of intraclasts and ooids confirms their forming in high energy state. Facies belt type B is equal to facies belt number 6 of Wilson model (1975) locates in Y area in Ervin model (1965).



Lagoon facies complex(C)

Algal bioclastic wakstone facies

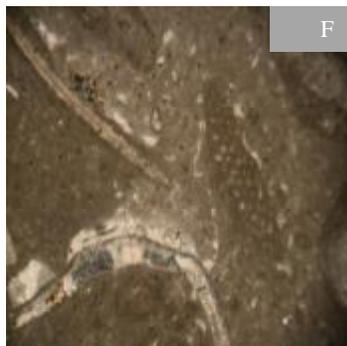
In this facies, various types of skeletal grains are found beside each other which connect together by calcy mud. The main part of the particles is algal, gastropod, bivalve, brachiopod fragments. Studied algs are belonged to family Dacyclades, the genus *Cylindroporella* and *Macroporella*. (Figure E)

bioclastic packstone facies

The percentage of bioclastic fragments which formed this facies is: bivalve 15-20%, brachiopod 7-8%, echinoderm 3-5%, bryozoans 7-9%, green algae 3-5%. (Figure F)

Interpretation

The great abundance of calcy mud with gastropod, algae, bivalve and pelloid fragments shows sedimentation of facies belt type C in a low energy environment. Great abundance of calcy mud shows lack of high energy in the environment (Flogel 2004). The facies belt type C is equal to facies belt number 7 of Wilson model (1975) and is located in Z area in Ervin model (1965).



Tidal flats facies complexes (D)

Intraclastic packstone

The main allochem which forms this facies is intraclast which its abundant is about 20-25%. The destruction index of intraclasts is variable between 1.4-0.5 mm. quartz is one of the terrigenous particles which observed with the abundance of 4-6%.

Intraclastic ooid packstone

This microscopic facies is mainly formed from ooid and intraclast which are 25-30% of allochems in this facies.

The ooid destruction index is 0.3-1.4 mm and the intraclast destruction index is 0.5-4 mm. The skeletal fragments in this facies are bivalve and alga.

Bioclastic Quartz Packstone

This microscopic facies is mainly formed from quartz. The abundance of quartz is about 15-18%. The other types of terrigenous particles are feldspars and opaque minerals which have few percentage. The bioclastic fragments of this facies are bivalves and brachiopods.

Conclusion

The followed conclusions are gained with studying of Tirgan Formation in Kalat area (Zavin): The thickness of Tirgan Formation is about 188m in this area which is located between Shurijeh and Sarcheshmeh Formations. The facies of Tirgan Formation is located in 4 facial belts: open marine environment, bar, lagoon and tidal flat. Regarding to the sequence of Tirgan Formation's facies and its comparison with nowadays environment, we can conclude that the sedimentary model of Tirgan Formation in studied section is carbonate platform, hemoclinal ramp.

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