Microfacies and depositional basin analysis of Cretaceous deposite at Korkouh area

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Abstract

In order to microfacies studies of the Cretaceous deposits, a section called Korkouh was selected in Kerman province in Central Iran area. The Korkouh is on the Bidou Formation with angular unconformity and underlain by paleogene conglomerates with an erosional surface. The studied section basically contains lime and dolomitic limestone with the thickness of 146 meters with new fossils such as foraminifera, bivalves and bryozoans. In general, foraminifera obtained from Korkouh section indicate the existence of sediments in the age of Albian and Cenomanian. Based on microfacies studies on the section three facies belts have been identified in Karkouh section that include intertidal, lagoon and inner ramp. Studying of identified facies and comparing them with the present sedimentary environment showed that Korkouh outcrop facies have been deposited.

Keywords: Cretaceous; Korkouh Section; Microfacies; Biostratigraphy; Foraminifera; Kerman, Intertidal, Lagoon.

1- Introduction

Recognition of facies is very important in stratigraphy layers. Facieses are studied in both microscopic and in macroscopic scales. In this study, microfacies are named based on the microfacies of Flügel's standard (2004), and according to available lithological and paleontological features, we tried each of microfacieses compare the facies belts of Flügel's model as much as possible. In general, lithological and paleontological characteristics of a sedimentary facies have to be specified, so that facies are easily separated from each other. Differences in environmental factors (sedimentology and biological), are the main reasons for the differences in microscopic facies, which in detail including the impact of organisms, water energy, oxygen level, water depth, light intensity, salinity, water temperature, arrival rate of clastic material and substrate type (Flügel, 2004). The studied cross-section in Korkouh is 35 Km South East of kerman (Fig. 1).

2- Materials and Methods

In order to study microbiostratigraphy and depositional environments of the Cretaceous deposits in the South East of Kerman, at first geological map of the study area were identified for selecting the section, then site visits and sampling of this area was carried out. After preparation of the samples were studied. Systematic sampling and sampling intervals at selected section, was used on average, between one and three meters.

A total of 20 samples at harvest field was collected which prepared thin layers of them. Then, in the laboratory were studied by polarizing microscope and then identify foraminifera available, microfacies of each

sample was determined. The microfacies named using Dunham (1962). Sedimentary facies diagnosis and determine the environment in accordance with the model proposed by Flügel (2004) has been made. According to field observations, accurate sampling, laboratory studies, data analysis and final conclusion, the article was written.

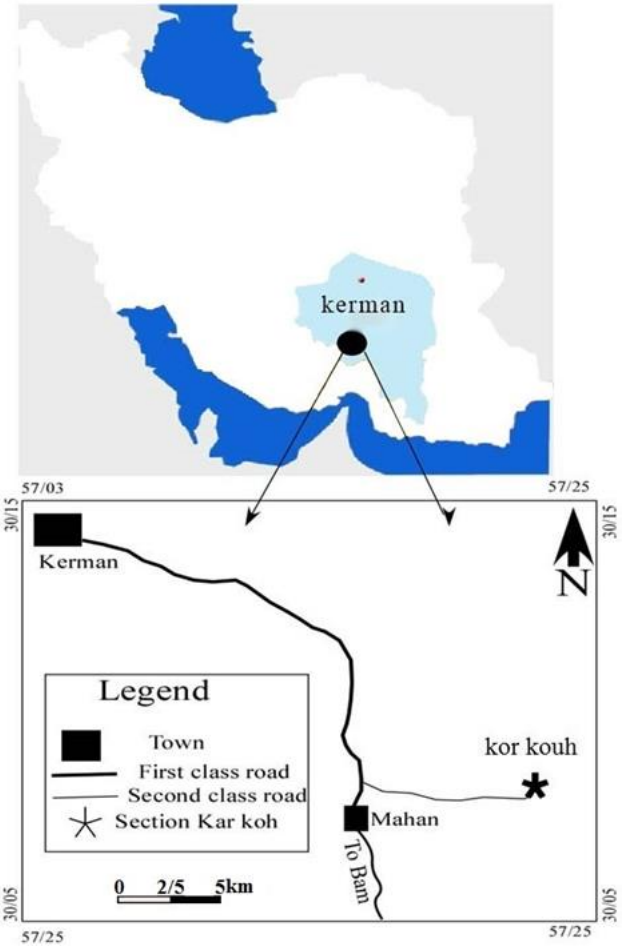

Figure 1) Location map of the study area.

3- Geological setting

The Korkouh section at located in the 35 kilometers SE of Kerman in longitude 57° 25' and latitude 30° 05'. Geologically, the province with about 183,714 Km^2 area situated in the southeastern region of Iran and in the provinces of Hormozgan, Sistan and Baluchestan, Fars, Yazd and Southern Khorasan which encompasses nearly 11% of the total area of the country.

2.1- Stratigraphy

The Cretaceous limestone and dolomitic lime layers have angular unconformity on Willow formation and is covered by an erosional surface and it is in turn is covered by Paleogene conglomerates. The thickness of the harvest section is 146 m. The study of layers aligned along the NW–SE direction. The total of 20 representative samples were collected for biostratigraphy of microfacies studies (Fig. 2).

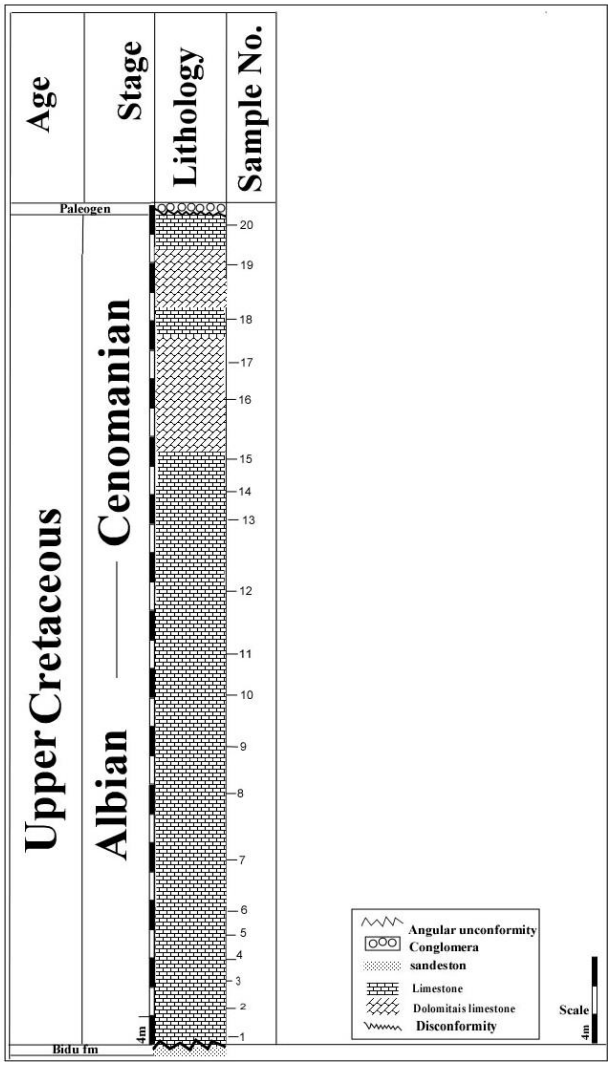

Figure 2) Stratigraphic column studied region.

2.2- Lithology

The limestone and dolomitic limestone in the study area are comprised of following layers:

- The 116.5 m gray limestone containing fossils of Bryozoa, in the bivalve, planktonic and benthic foraminifera and the detrital components (Intraclasts).

- The 29.5 m dolomitic limestone containing fossils of Bryozoa, foraminifera and Intraclasts.

According to microfacies studies, facies have been identified in the Korkouh section Theser microfacies are related to intertidal, lagoon and mid ramp.

Intrataidal facies belt (A):

The 17 samples are collected from this facies belt. One of the characteristics of this facies belts is the existence of dolomitized lime mudstone microfacies that is attributed to intertidal with no allochemical components which is composed of lime mud that locally show bird's eye orthochem. The Secondary dolomitization is one of the diagenetic phenomena happening in such microfacies (Fig. 3).

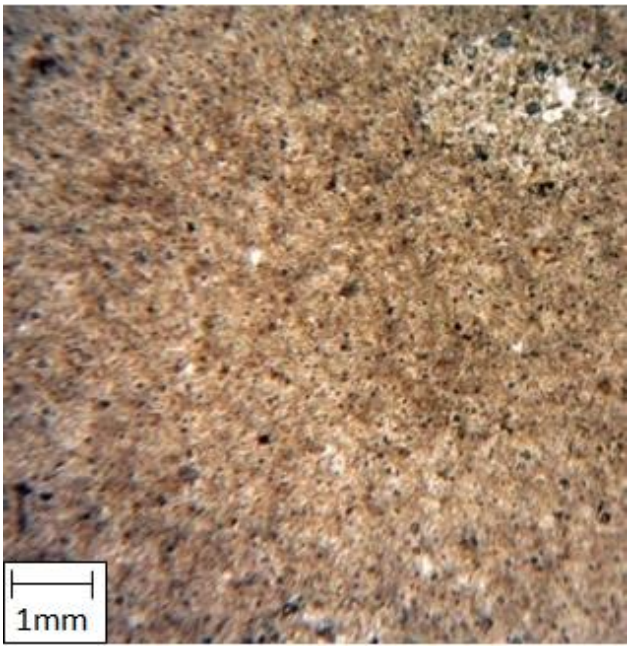

Figure 3) Microphotograph of intertidal dolomitized lime-mudstone facies.

Lagoon (B):

This facies belt includes the following Microfacies:

Bioclast Intraclas twackestone / packstone, bioclast intraclast wackestone, Dolomitized bioclast packstone, bioclast wackestone/ packestone, Bioclast packestone, bioclast wackestone, Dolomitized bioclast Intraclast packstone/wackestone, with thickness of 129.5 m.

Bioclast packestone microfacies (B1):

This microfacies contains 40-50 % of bioclasts including Charentia sp., Cyclammina sp., Praechrysalidina infracretacea, Nezzazata sp., Minouxia lobata is attributed to lagoon zone. It is worth noting that such diagenetic phenomena calcite veins in the desired microfacies (Fig. 4).

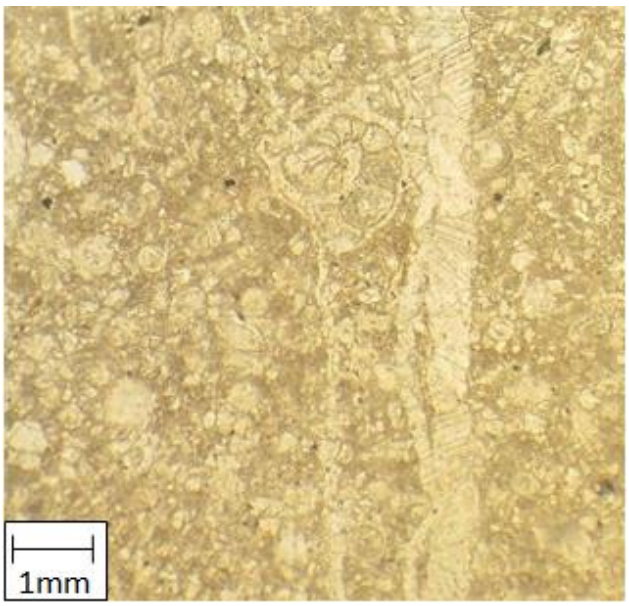

Figure 4) Microphotograph of bioclast packstone facies belt lagoon.

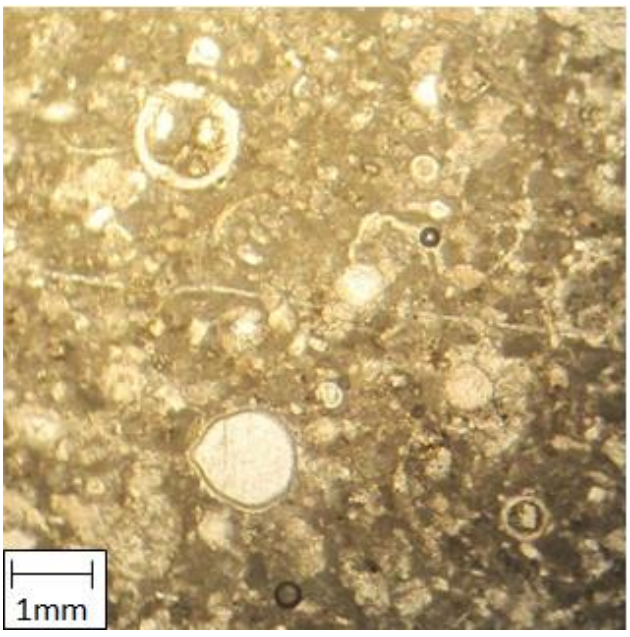

Figure 5) Microphotograph of bioclast wackestone facies belt lagoon.

Bioclast wackestone microfacies (B2):

According to main allochems 40% of Nummofallotia apull, Nezzazatasp., minouxia lobata, Textularia sp., Hemycyclamminasp., Rzehakina sp., Praechrysalidina infracretacea, Pseudolituonella sp., Cuneolinapavonia, Quinqueloculina sp. with traces of bryozoas, echinoderms pieces, ostracoda. Regarding to the mentioned cases, the following microfacies are in the central part with less energy of lagoon environment (Fig. 5).

Bioclast Intraclast wackestone microfacies (B3):

Skeletal components of this microfacies contain 15% benthic foraminiferas such as Nezzazata sp., Pseudocyclammina lituus, Nummofallotia sp., Textularia sp., Praechrysalidina infracretacea with bivalve debris 4%, and non-skeletal components contain 20% intraclast pieces that are not well rounded and sorted due to low energy of environment (Mousavi-Harami, 2000; Fig. 6).

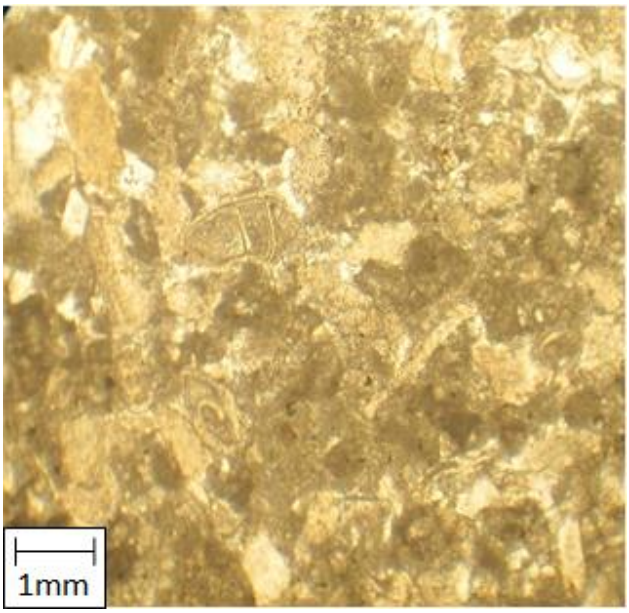

Figure 6) Microphotograph of bioclast intraclast wackestone facies belt lagoon.

Bioclast Intraclast wackestone/ packstone microfacies (B4):

The main components of this microfacies are Minouxia lobata, Textularia sp., Praechrysalidina infracretacea, Nezzazata sp., Charentia cuvillieri, gastropod and Bryozoa, intraclast pieces in calcareous ooze ortochem. Porcelaneous walled foraminifera presence of water is sign of peaceful environment and with limited rotation (Hottinger, 1997; Racey, 2001) (Fig. 7).

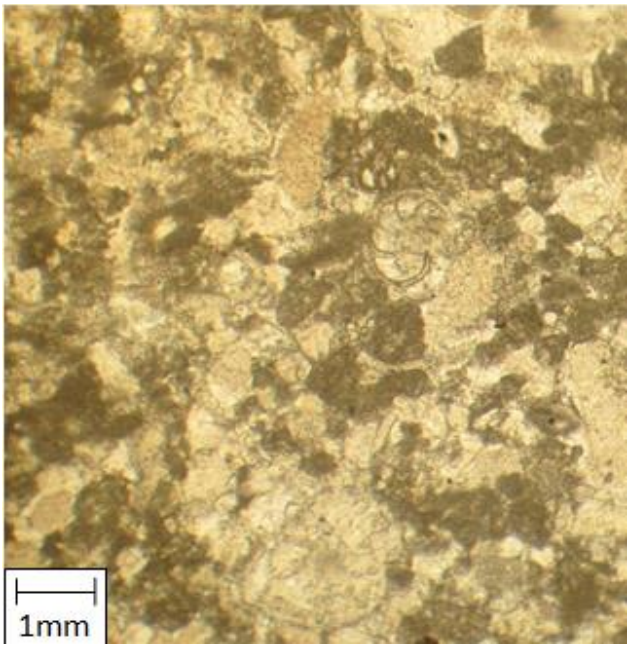

Figure 7) Microphotograph of bioclast intraclast wackestone/ packstone facies belt lagoon.

Bioclast wackestone/packstone microfacies (B5):

This microfacies contains of Nezzazata sp., Cuneolina pavonia, Nummofallotia sp., Charentia sp., Textularia sp., Praechrysalidina infracretacea, Minouxia lobata, Miliolid and of gastropod and Bryozoa in lime ortochem (Fig. 8).

Dolomitized bioclast packstone (B6):

Its main components are Quinqueloculina sp., Rzehakina sp., Miliolid, Cuneolina pavonia, textularia sp., Nummofallotia sp., and Bryozoa in micritic ortochem. Rocks containing Miliolid are attributed to lagoon zone (Geel, 2000). The secondary dolomitization is one of the diagenetic phenomenons that occured in such microfacies (Fig. 9).

Bioclast Intraclast packestone microfacies (B7):

The main components of this microfacies are Nezzazata sp., Rzehakina sp., Minouxia lobata, Quinqueloculina sp., Pseudocyclammina sp., Bryozoa, and intraclast in lime ortochem (Fig. 10).

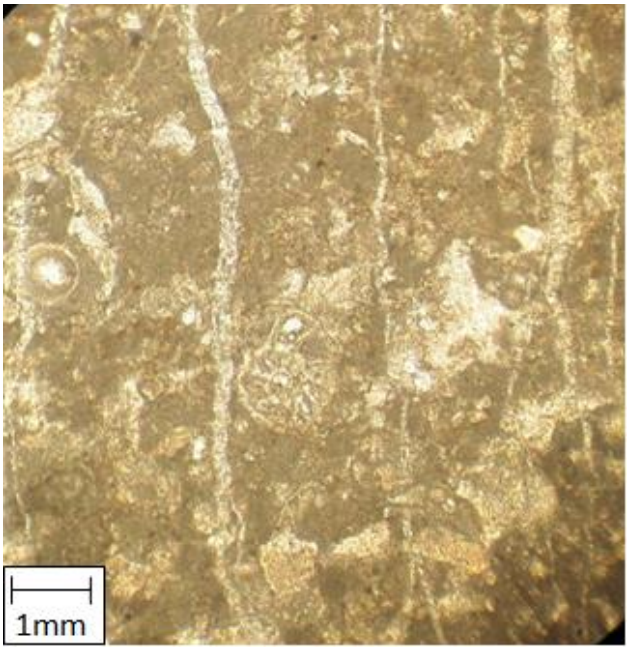

Figure 8) Microphotograph of bioclast wackestone/ packstone facies belt lagoon.

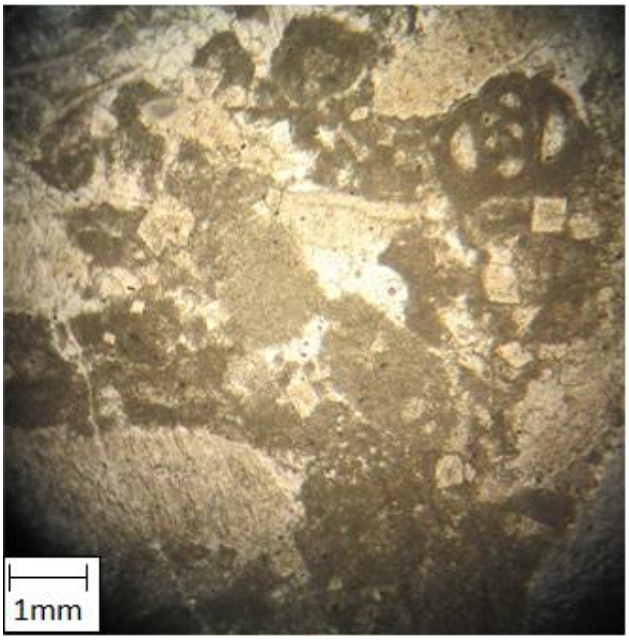

Figure 9) Microphotograph of dolomitized bioclast packstone facies belt lagoon.

Dolomitized bioclast packstone/ wackestone (B8):

This microfacies is composed of Quinqueloculina sp., Miliolid, Cuneolinapavonia and Bryozoa in lime ortochem. Rocks containing Miliolid are attributed to lagoon zone (Geel 2000; Fig. 11).

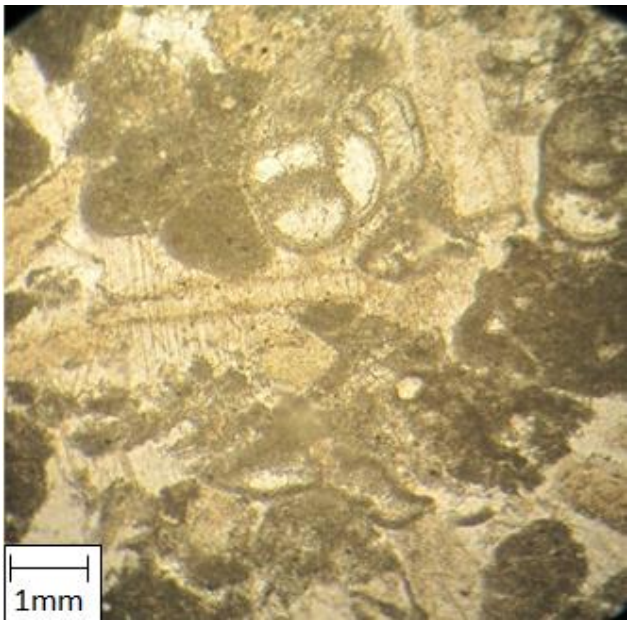

Figure 10) Microphotograph of bioclast intraclast packstone facies belt lagoon.

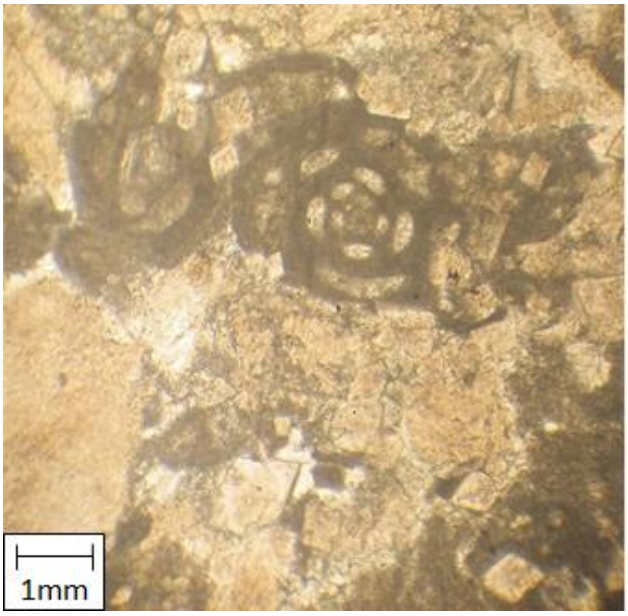

Figure 11) Microphotograph of dolomitized bioclast packstone/wackestone facies belt lagoon.

4- Discussion

The main allochem in microfacies of the lagoon is small benthic order of Miliolina (Miliolides). This is located in the inner ramp of microfacies lagoon. The facies with benthic shells along the lagoon of vans, the producer of the low energy

environment, upper photic zone and sat down the bottom of the shallow lagoon commeg inner ramp section. (Romero et al., 2002) with more close to the barrier and the increase of energy and environment, the value of the wackestone facies of micritic costs and value added sparite packstone facies. Presence of porcelaneous foraminifera implies high salinity characteristics of the environment (Flügel, 2004). Furthermore, the aboundance of Miliolid may be attributed to the lagoon (Penney and Racey, 2004).

Mid ramp facies belt (C):

This facies has thickness of 13.5 m. The existence of bioclast wackestone microfacies is one of the characteristics of this facies. Microfacies in such facies includes benthic foraminifera associated with Planktonic foraminifera which may implies its formation in restricted lagoons in pools to the open sea. It is confirmed by presence of the fauna of both open sea and pool.

Bioclast Wackestone microfacies (C1):

This microfacies contains Benthic foraminifera including Charentia sp., Textularia sp., with Planktonic foraminifera such as Globotruncana cf. helvitica, Globotruncana sp. and Ostracoda (Fig. 12).

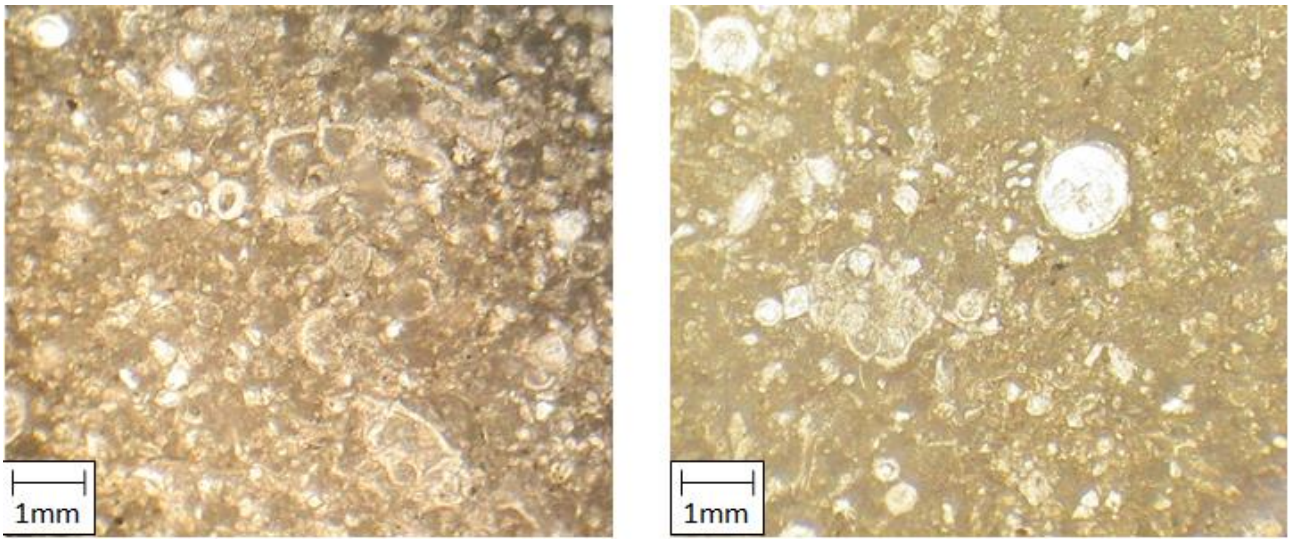

Figure 12) Microphotograph of bioclast wackestone facies belt Mid ramp.

Depositional model:

Since the sequence of carbonate facies result of changes in the environment through time (Tucker and Wright, 1990), it is possible to identify microfacies and their formation conditions and interpret their depositional environment and.

The described facies belts of tidal, lagoon and the open sea for microfacies have been emplaced in the shallow carbonate platform. The observed vertical changes in microfacies represents a lack of re-deposited sediments and symptoms caused by a sudden change, for exsample turbidites represent the slope of the carbonate platform (Burchette and Wright, 1992). The facieses of carbonate sediments in the reef barrier formed a carbonate ramp, because expansion is limited to reef ramp feature (Einsele, 2000).

According to environmental studies on the proposed model can be set up in each of the horizons and facies belts in all positions during section conclude that early cutting (horizons 1 to 7) to constantly advance and recession of the sea(s). Half of the section to the next (horizons 8 to 16), and at the end of a cycle, steadily cutting back the advance and recession encounter sea (Fig. 13).

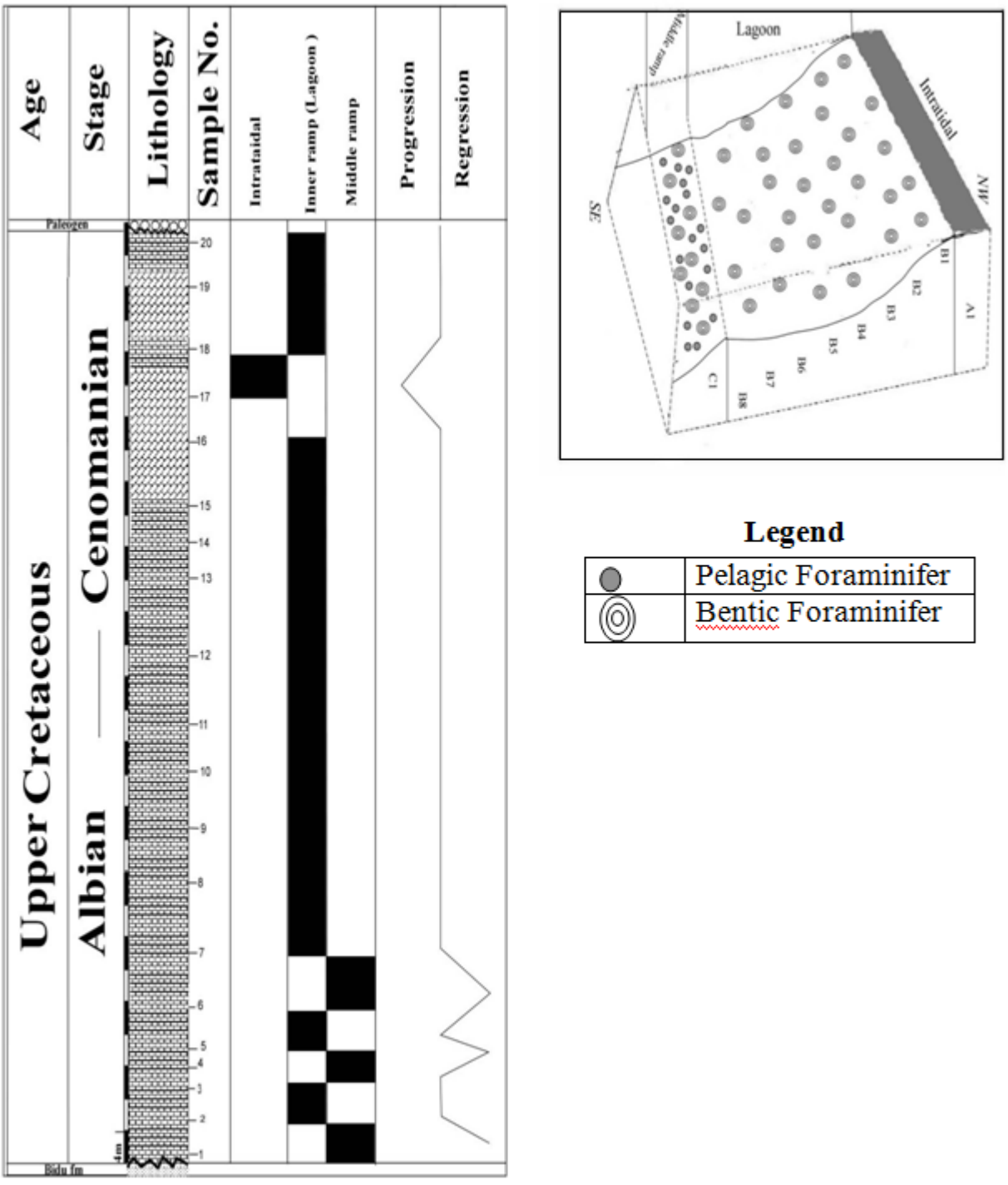

Figure 13) Facies belts distribution and facies models in studied region.

4- Conclusion

1- The 146m Korkouh outcrop (SE Kerman) lithology is mainly limestone and dolomitic. In this study 21 genus and species of foraminifera on the Korkouh outcrop have been identified.

2- According to microfacies studies, facies have been identified in Korkouh section and Theser microfacies are related to intertidal, lagoon and mid ramp in the carbonate platform.

3- The existence of fossil foraminifera genus and species accumulation index and age region of the Albian-Cenomanian show the emergence and spread of Minoxia lobata, Nezzazata conica, Cuneolina pavonia, Pseudocyclamina sp., could be confirmed this age of the study area.

4- Korkouh level with angular unconformity is on the Bidou formation and covered with an erosional surface by paleogen econglomerates.

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