

Review of the sedimentary environment Lower Cretaceous carbonates in Northwest of Tabriz

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Abstract

This study is on Lower Cretaceous deposits in Northwest of Tabriz. Lower Cretaceous carbonates in the studied area with a thickness of 76.5 meters consist mainly of limestones and sandy limestones. The lower as well as the upper boundary is disconformable. Petrographic studies led to recognition of 12 microfacies that were deposited in four facies belts including tidal flat, lagoon, bar and open marine. The observed facies patterns of these deposits indicated a Rimmed carbonate platform depositional environment. Interpretation of the lower Cretaceous deposits and renovated paleogeography area at the time can complete knowledge on basic history of geology of Northwest Iran to help.

Introduction

The eastern part of Azerbaijan had came out in Late Jurassic and Lower Cretaceous and constituted the mountains. Terrigenous deposition of Lower Cretaceous in Alborz was provided by erosion and transport of these mountains. In Lower Cretaceous, sea progressive was occurred and sediments comprised Orbitolina limestones deposited in the most area of Azerbaijan. These Orbitolina limestones are like similar to Tizkoh Formation which are observed in Soofian area and Goshchi mountains (Nabavi, 1976).

In Lower Cretaceous -Aptian-Albian- series, particularly in Moro mountains, starts by light red terrigenous depositional with a thickness of 30 meters and gray orderly fossiliferous (Bivalves and Orbitolina) limestones with a thickness of 45 meters. Late Triassic orogeny was effect on this basin which occurred marine regression. As result there is not any carbonaceous series of Upper Triassic-Jurassic and very limited Cretaceous deposits is seen (aghanabati, 2006). Cretaceous climate were warm and soft and it was forming sedimentary and diagenetic environments in marine and shore and restricted lagoons.

The purpose of this study is to review Lower Cretaceous facies and interpretation the sedimentary environment of Lower Cretaceous carbonates which is a model of deposit in Northwest of Tabriz.

This section is located in 30km Northwest of Tabriz, in the north slopes of the Moro mountains, in Kalankesh (Soofian part) (fig. 1).

Lithostratigraphy

The study area is located in central Iran zone which is similar to carbonate units of Tizkoh Formation in type section, but their thickness is different.

Lower Cretaceous carbonates in the study area with a thickness of 76.5 meters consist mainly massive to thick-bedded limestones and sandy limestones. The lower boundary as well as the upper one is disconformable (Fig. 2). Upper Cretaceous Flysch deposits was covered this section. Lower unite of this area is basal Conglomerate and Sandstones that basal Conglomerate units were not seen obviously (fig. 3).

Microfacies Descriptions

The analysis of skeletal and non-skeletal allochemes assemblages using the above methodology and the sedimentary features observed in thin sections allowed 12 carbonate facies and 2 terrigenous facies to be defined. These were labeled A through E.

Open marine microfacies

It includes facies: A₁ (Radiolaria peloidal wackestone – packstone) (plate 1: figs. 1, 2) and A₂ (Ooidal packstone) (plate 1: figs. 3, 4). Benthic foraminifera, Bivalves, Brachiopods and Miliolides are other allochemes. In this facies Calcitic veins with iron oxides is observed.

Bar microfacies

It includes Facies: B₁ (Ooidal grainstone) (plate 1: fig. 5), B₂ (Boundstone- framestone) (plate 1: fig. 6) and B₃ (Intraclastic packstone) (plate 1: figs. 7, 8). In this facies Graptolite, Terrigenous Quartz, coated micrite Bivalves, Brachiopods, Rudists, Red algae, Echinoderms, Orbitolina, Gastropods are observing.

Lagoon microfacies

It includes facies: C₁ (Bioclastic packstone) (plate 2: Figs. 1, 2), C₂ (Intraclastic peloidal wackestone) (plate 2: fig. 3), C₃ (Intraclastic wackestone) (plate 2: fig. 4). Ancoids, Bivalves coated micrite, Brachiopods, Echinoderms, Orbitolina are other allochemes.

Tidal flat microfacies

This facies including: D₁ (Pelletic packstone) (plate 2: fig. 5), D₂ (Pelletic packstone-grainstone) (plate 2: fig. 6), D₃ (Pelletic wackestone) (plate 2: fig. 7) and D₄ (Mudstone) (plate 2: figs. 8, 9). Gastropods, Geopetal structures, Fenestral fabric, Sandy textures, Hematitic Stylolites, Terrigenous Quartz, Evaporitic minerals sodomorph, Dolomite romboedr and Bioturbation .

Terrigenous facies including

-E₁ (Calcarenite): Rock Fragments(50%), Quartz(20%), Feldspar and carbonate allochemes are former components this facies . Graines are sub-angular and have moderatly sorted and them textural maturity is sub mature.

-E₂ (Litharenite): Quartz (40-50 %), Rock Fragments (20%) and Altered Feldspar are former components this facies. Graines are sub-angular and have poorly sorted and them textural maturity is sub mature.

Sedimentary environments

Regarding the features of the above mentioned facies as well as the percentage of the allochems existing in each facies and facies sequence and energy of environment, a sedimentary environment consisting of tidal flat, lagoon, bar and open marine sub environments are proposed for of Tizkoh Formation in Northwest of Tabriz (fig. 4).

and Texture Open marine facies deposited in medium to high energy environments.

skeletal grains size point to deposition in low depth unites of open marine. Radiolaria in microfacies A₁ is a sign of partly deep environment (Flügel, 2004). Basic component in A₂ facies was corals in short distance and always belonging to Bioclastic bar. Bioclastic fragments related to open marine term and low depth (Flügel, 2004).

Bar sub environment has the highest amount of energy among the studying facies. compare of sparry calcitic, value of micrite was decreased in bar facies. Bar environment is composed of open marine and lagoon organisms that is located between open marine and lagoon. Assemblage of bioclastic allochems and Ooids indicate high energy conditions (Folk, 1962). Existing of skeletal reefs and broken rudist is one of the important observation in this facies. Lagoon sub environment has lower energy and lower water circulation for presence of bioclastic bars, so restricted fauna was seen (Tucker, 2001). This sub environment consist of C₁, C₂, C₃ facies that is composed of mostly echinoderms fragments and red algae in parts face to marine and ancoid and graptolite in parts face to shore. Variety of lagoon facies indicate a shallow marine in the carbonate platform.

D₁, D₂, D₃, D₄ facies is showing depositional conditions in tidal flat sub environments. High Frequency micrite and no skeletal allochems shows rhythm of low energy (Flügel, 2004). Carbonates tidal flat consists of mudstone and grainstone. Variety of fauna is restricted in this area and often bioclastic fragments is seen. This sub environment divided to some parts such as Supratidal, Lower Intertidal, Upper Intertidal and Subtidal.

Presence of some thin-bedded sandstones between carbonate facies shows they sometimes cause increasing meteoric falling and ining flood and thus entering sand conveying to keep of carbonate sediments.

Study of microfacies and sequence sedimentary of Lower Cretaceous in the Northwest of Tabriz indicated a Rimmed carbonate shelves depositional environment (fig. 5) such as Bahamas and Florida (Reading, 1996).

According to the facies and samples rocks the real thickness of Microfacies Column study section in the Northwest of Tabriz was designed (fig. 6).

In Microfacies Column any of ingredients was about for a special microfacies. They can present special sedimentation sub environment.

In order to this study, vertical respective changing of facies, conditions changing, sedimentation sub environments and respective changing of depth in the sedimentations time can be characterized.

According to the results of the study of Tizkoh Formation Microfacies Column in Northwest of Tabriz, 5 sequences sedimentary could be recognized which their thickness is 2-15 meters and could be change until several meters. Sequences are gradual regressive.

Conclusions

Lower cretaceous carbonate deposits have outcrop in Northwest of Tabriz. 1.

2. In selected section, the thickness of deposits is 76.5 meters.
3. Cretaceous carbonate series consists of gray – dark gray and reddish gray medium-bedded, thick-bedded and mainly massive limestones and sandy limestones.
4. Cretaceous carbonate series in Northwest of Tabriz can know equivalent Tizkoh Formation.
5. Petrographic studies led to recognition of 12 microfacies of carbonate facies and 2 terrigenous facies by Dunham method.
6. Limestones with micrite texture and intraclasts and extraclasts suggest in stability sedimentary environment conditions and fluctuation of sedimentary basin.

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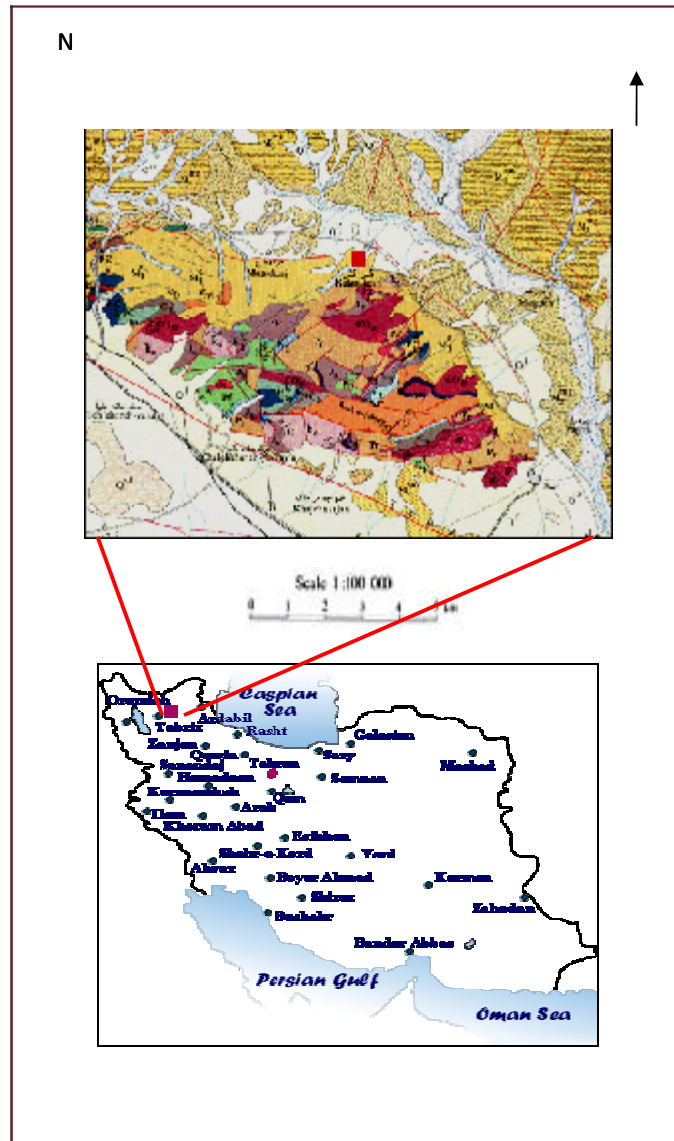


Figure1. Geology map and location of study area

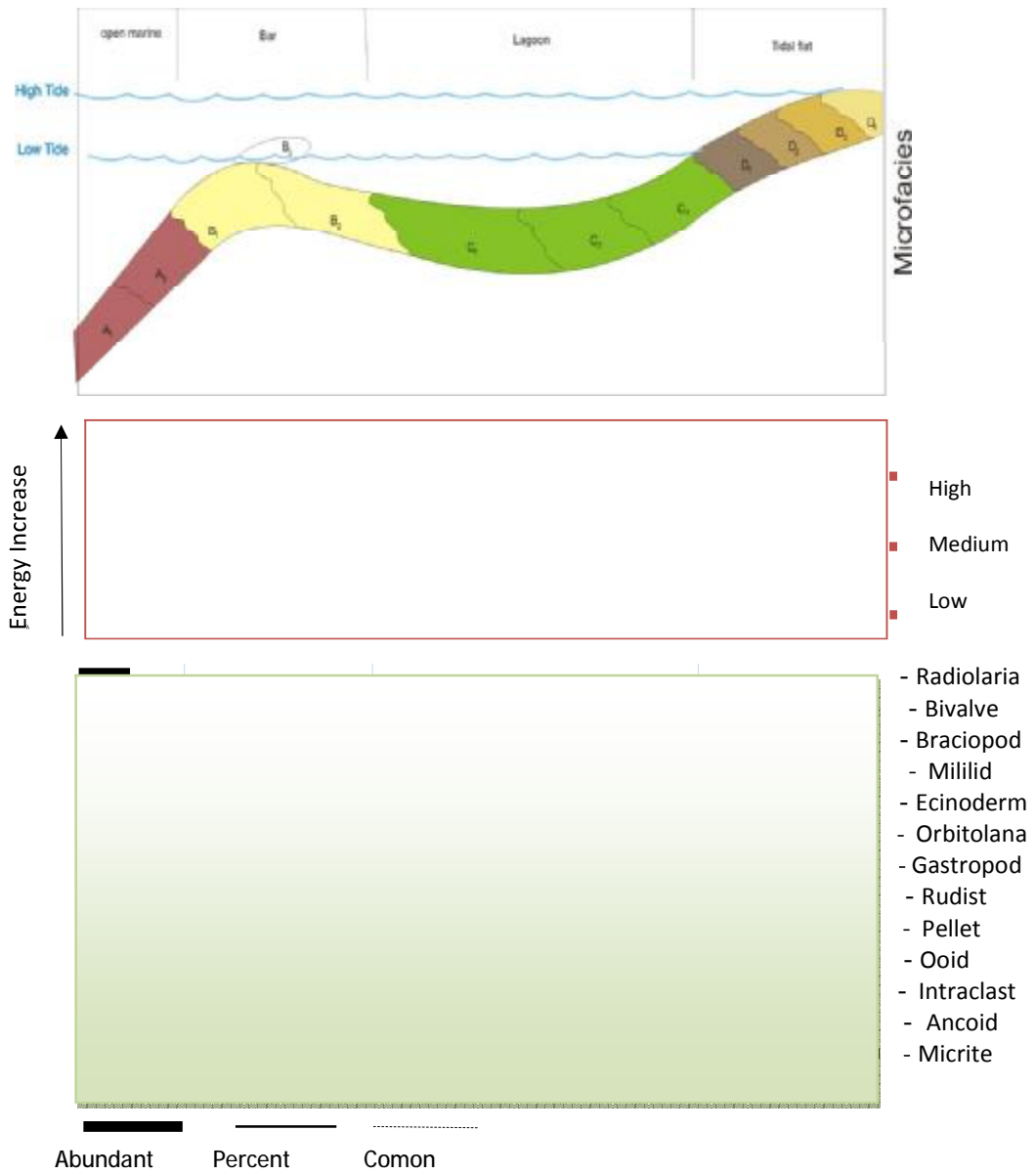


Figure 4. The percentage of the allochems existing in each facies and facies sequence and energy of sub environments