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Identification of Stratigraphic Units of Iraqi Zagros and Coincidence of Them with Carbonated Formations of Iranian Zagros Basin

Key Words: Zagros, Iran, Iraq, Stratigraphy, Carbonated Formations

1. Introduction

Very closely geological studies are occurred in north of Iraq (Kurdistan) according to political and other problems. This paper tries to compare carbonated formations in Zagros between Iranian and Iraqi units.

These studies show that the formations that are extended from south of Iran to north of Iraq, keep their lithostratigraphic characterizations.

2. Geological Setting

The area under study is from west of Iran to the northeastern mountainous region of Iraq and also have been correlated from the viewpoint of lithostratigraphic classification. This location is also located in an area between two main Phanerozoic units of Middle East, i.e. between the eastern part of the African plate and the Asian part of the Alpine geosynclines. African-Arabian plate has approached Eurasia because of subduction of Neotethys oceanic crust under the central Iran and has collided across Zagros fracture. The location of this clash has been considered as the current line of Zagros major reversed fault. The subject under consideration has been located between the two mentioned borders (Figure 1).

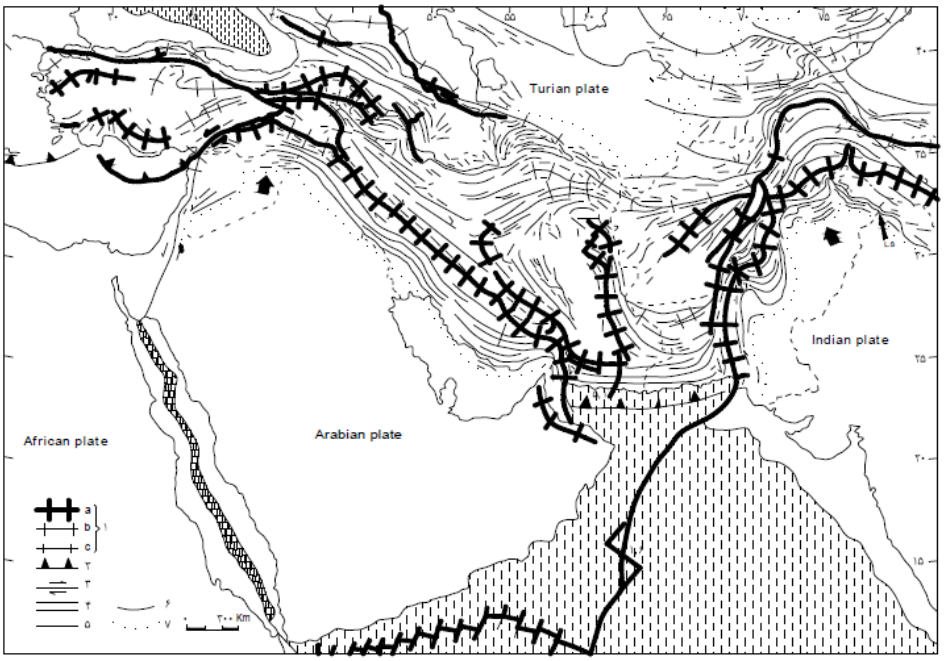

Figure1. Simplified map of Iran-Himalaya earth structure, 1: Clash between continental plates, a: Alpine, b: Trias and Hercynian, c: Caledonian, 2: Subduction area, 3: Strike-slip faults and trades, 4: Rift zone, 5: Main fault or seismic fault, 6: Axis of folds, 7: Edge of folded belts upper alpine thrust and neogenic foreland basin, Quaternary. The arrows show the relative movements of the plates in terms of centimeter per year. The hatched area contains oceanic crust, (M. Berberian, 1981)

3. Stratigraphy of Zagros in Iranian Part

1.1. Pabdeh Formation (Paleocene to Early Miocene)

The formation is named after Kuh-e Pabdeh in the Khuzestan Province, where James and Wynd (1965) and Setudehnia (1972) described the type section at Tang-e Pabdeh, 32'25' N, 49'16'22" E. The formation is known in outcrop and in subsurface in the provinces of Khuzestan, Fars and Lurestan of Iran. The section, northeast of the Lali Oil Field, has a thickness of about 870 m and is divided into the following five units, in ascending order:

Units: 459 m of thin-bedded, argillaceous limestone interbedded with shale

Unit 4: 823 m of dark shale with rare, thin limestone in the lower part

Unit 3: about 42.6 m of thin-bedded, argillaceous limestone with chat nodules (assumed to be the deep-water facies equivalent to the Taleh Zang Member of Lurestan)

Unit 2: about 74.7 m of gray shale with bands of argillaceous limestone

Unit1: 140 m of blue and purple shale marl with thin, interbedded, argillaceous limestone

The fauna contained in the beds of the Pabdeh Formation indicates that the age of the formation may extend beyond the commonly assigned Paleocene-Oligocene age range into the Neogene (Lower Miocene), at least in the Khuzestan Province, thus providing evidence of the continuity of sedimentation from the Paleogene (James and Wynd, 1965). However, the location of the boundary requires more complete faunal information, particularly because in the extreme northwestern and southeastern parts of the basin, there is a lateral facies transition into carbonates of the Jahrum Formation.

The Pabdeh Formation everywhere overlies beds of the Gurpi Formation. In the type section, the contact is conformable, but a disconformity is found in the Fars Province where the purple shale (unit 1) is missing. Here, the contact is placed at the base of a bed of cherty limestone, which contains shark teeth, glauconite and an occasional pebble conglomerate (Setudehnia, 1972) indicating a disconformity. The top contact of the Pabdeh Formation with the Oligocene (? early Miocene) Asmari Formation is conformable (Setudehnia, 1972).

1.2. Guri Formation (Santonian-Paleocene)

Locally for the Guri Formation is Kuh-e- Guri in the Lurestan Province. The formation has a thickness of 320 m and consists mainly of soft, weathering, bluish-gray marl and shale with subordinate, argillaceous limestone bands (Setudehnia, 1972). It overlies the Illam Formation with minor disconformity, and underlies the Tertiary (Pabdeh Formation) with the contact placed at the base of sandy, silty, purly shale forming the lowermost Pabdeh. In the Lurestan Province, tow prominent limestone units are included in the Lopha Limestone member. The Emam Hasan Limestone Member (Maastrichtian) may reach a thickness of as much as 114 m of fine-grained, argillaceous, thinly bedded limestone altenating with blocky, gray marl and limestone. The member can be identified in the Lurestan Province and parts of the Khuzestan Province. The Lopha Limestone Member (Campanian), about 206 m, is present only in the Lurestan Province, where it is a shallow-water, shelly limestone with abundant megafauna and is named after the most commonly occurring species.

The Gurpi Formation is found throughout most of southwestern Iran, but the age range of the formation is variable; it extends from the Santonian to Maastrichtian the Fars Province and parts of the Khuzestan Province and from the Campanian to Paleocene in the Lurestan Province. This period of time was marked by considerable basin differentiation, with the development of facies variants that may be of considerable thickness, but of restricted extent. The presence within the Gurpi Formation of the two limestone members is one example; two

others are thick and have beers accorded formational status: the Tarbur and Amiran formations. The lower is a predominantly limestone unit (late Campanian to Maastrichtian in age); the other is a predominantly clastic unit of siltstone; and sandstone is younger in age (Maastrichtian to Paleocene).

1.3. Ilam Formation (Upper Cretaceous)

Ilam formation contains of argillaceous, fine grained, and gray to bright gray, well bedded limestone with some interbedded shale. The age of this formation is upper cretaceous.

Typical section of this formation is selected in the Tang- garab which is located south west edge of Sourgah Mountain in the North West planch of Kabirkouh Mountain. This formation is determined with its 190 meter thickness of light gray clay limestone which has became white in effect of weathering, its regular bedding surfaces and some thin shale layers between the limestones. In the typical section of this formation, its lower border is indicated with sandy limestones, silty limestones and hematitic nodules that show discontinuity between this formation and Sourgah formation, and its upper border is isocline with Gourpi formation.

4. Stratigraphy of Zagros in Iraqi Part (Based on Geology Study of Azmar Tunnel Site)

The stratigraphy of Azmar is affected by Iraq and Middle East tectonic structural. The oldest rocks in this area are Cretaceous limestone layers and in anticline core probably upper Jurassic formations. Stratigraphic column of the area can be described as in figure 2.

Carbonated rocks, which exist in the area, have layered structure. according to microscopic investigation on thin sections, and also based on the similarities of the properties of bedded rocks obtained from field studies and with respect to what Buday (1980) described, Carbonated rocks, which form the Azmar mountain, are mostly composed of Balambo, Kometan and Shiranish formations. In Anticline core there is probably upper Jurassic Formation.

3.1. Shiranish formation

Rock layers of this unit are dark grey Marl-Limestone. It is relatively weak against geological hammer comparing with Kometan-Unit. Near the western south of hillside, relatively thick layers can be found which their thickness is about one meter (Figure 3).

3.2. Kometan formation

Rock layers of this unit are relatively rough and strong against geological hammer hits in comparison to the other units. The material of interbeds is clayey silt with Fe_2O_3.

Their thickness is low and its range is up to two centimeter. The thickness of the materials between joints and faults is less than those of the layers. The surface of these plates has dogteeth pattern, which is a result of crystallization of carbonate materials.

Their color is mostly dark to light grey. Dark color of some parts of these rocks is related to organic materials within the rocks. These rocks are namely referred to as light carboniferous limestone. Apparent thickness of Kometan-unit starts from Azmar road in the southwest of Azmar Mountain to TV antenna track road which is about 550 meter.

The thickness of layers in this unit is 10 to 8 cm and they are formed in thin layers. This range is called medium layers, based on BGD classification. Outcrops of these rocks appear in some parts of the Mountain.

The surface color of these rocks is light grey inclined to blue. The thickness of Kometan unit in northeast side in geological profile, reaches to 600 meter due to exist of a few small anticline and syncline in that area.

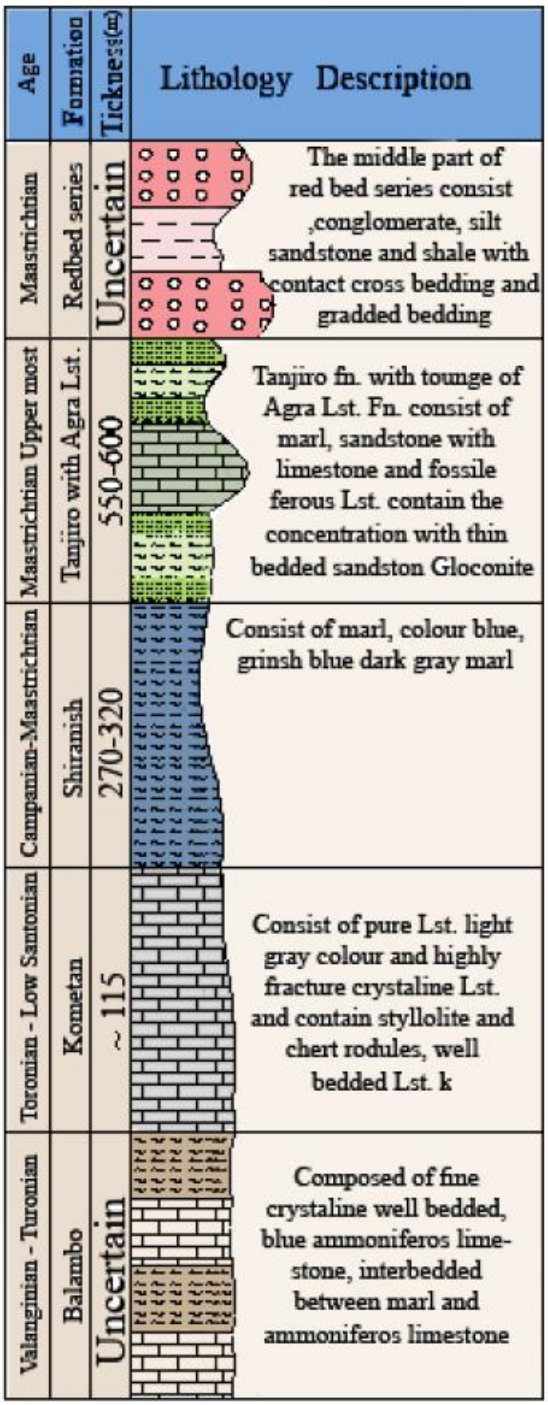

Figure 2: Stratigraphic column of the area (Buday 1980).

Figure 3: Relatively thick bedded carbonated rocks of Shiranish-Unit, Azmar Mountain.

3.3. Balambo formation

In high folded zone, the stratigraphy starts with lower Balambo formation. The Balambo formation includes thick sediments, which are deposited in North and Eastern North of Iraq miogeosyncline. Bellen et al., (1959), discussed this formation in Sirvan Canyon nearby the Halabche for the first time. Balambo formation is divided to two units from the viewpoint of lithology, which are upper and lower units. Lower Balambo consists of thin amonitic limestone inclined to blue with layers of olive green marls and dark blue shale (Bellen et al, 1959). The formation thickness reaches to about 280 meter in typical areas and its thickness varies in other locations. This formation has been settled in a geosyncline, which is always subsiding (Bolton, 1958d). The age of the lower Balambo is Valanginian Albian. Buday believes that defining formation borders and their exact lithological combination requires multidimensional considerations. The Balambo unit is rested on Kometan unit concordantly.
The thickness of this unit reaches up to 300 meter, whit a sequence of strong carbonic rocks, soft shale, and fine grain material within layers (Figure 4).
The colors of limestone and the shale layers are light grey inclined to blue dark olive, respectively.
In some areas surrounding Azmar Mountain, rocks similar to Balambo-unit can also be observed.

Figure 4: Sequence of Carbonated layers (10 to 50 cm), light grey inclined to blue and dark olive green shale within layers up to 50cm (B). The white color in the picture is the winter snow, 2006.

5. Conclusion

According to the passage, it can be concluded Pabdeh Formation (Paleocene to early Miocene), Guri Formation (Santonian-Paleocene) and Ilam Formation (Upper Cretaceous) in Iran can coincident with Balambo formation, Kometan formation and Shiranish formation in Iraq. Also existence of some oil spots in those formation which is located in Iraq is predicated, Because of these oil presence evidences have be reported in Pabdeh Formation, Guri Formation and Ilam Formation in Iran. Also amount of these hydrocarbonaceous tanks has be seen in the oil exploration projects in west of Iran in the Zagros zone which those Iranian carbonated formation is located, so the proofs can be a clue of next oil exploration in these zones in Iraq.

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