

Sequence Stratigraphy , Microbiostratigraphy and relation of Lithostratigraphy units of Jahrum and Asmari Formations in Kaftarak Section (Fars Province),Iran

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Abstract

In this research, stratigraphic Section titled as Kaftarak Section related to Jahrum and Asmari Formations have been selected. the thickness of the sediments in this Section is 286m. the age of studied sediments is from upper Paleocene to early Miocene. principally index benthic foraminifers, identified in the studied section ,are listed below: Miscellanea sp., Fallotella alavensis, Lockartia sp., Orbitolites shirazeinsis , Opertorbitolites sp. , Dictyoconus sp., Orbitolites complanatus, Somalina stefaninii, Rhapydionina urensis, Coskinolina liburnica, Alveolina sp., Discocyclina sp., Nummulites cf. aturiscus , Nummulites cf. guettardi, Coskinolina sp., Nummulites fichteli, Nummulites intermedius , Nummulites vascus, Spiroclypeus ranjanae, Rotalia viennoti, Pearhapydionina delicata, Astroterillina howchini, Peneroplis evolutus, Peneroplis thomasi, Archaias krikukensis, Spirolina cylindracea, Triloculina trigonula, Meandropsina iranica, Dendirtina rangi, Meandropsina anahensis. Also considering microbiostratigraphic studies seven biozones have been recognized for identified foraminifers in the studied section. Actually, based on the sequence stratigraphy study, the sediments of Jahrum Formation include a 3rd-order sediment sequence. this sequence with sequence lithostratigraphic limit of SB2 type is placed on Sachun Formation. upper limit of the aforementioned sequence is of SB1 type which is placed under Asmari Formation and is distinctive with an erosional surface disconformity. the mentioned sequence encompasses HST and TST facies sets. Also the sediments of Asmari Formation include two 3rd-order sediments sequence with sequence lithostratigraphic limit of SB1 type is placed on Asmari Formation. upper limit of the aforementioned sequence is of SB1 type which is placed under Razak Formation. In order to lithostratigraphy, Jahrum Formation deposits compose of limestone and dolomitic limestone, the Asmari Formation the deposits composed of medium and thin-bedded limestone. the lower limit Jahrum Formation deposits is conformably with Sachun Formation deposits and the upper limit this Formation is conformity with Asmari Formation deposits is conformably with Razak Formation deposits.

Keywords: Sequence stratigraphy, Microbiostratigraphic, Lithostratigraphy, Asmari, Jahrum.

1. Introduction

Jahrum and Asmari Formations outcrops are mainly distributed in Fars province. At first, it has been studied by James and Wynd (1965). The type section of Jahrum Formation is chosen in the kuh-e-Jahrum which is located near the Jahrum town in the South of Shiraz. The type section of Asmari Formation is chosen in the Tang-e-goltorsh. At first, it has been studied by Richardson (1924). the lower lithostratigraphic limit of the Jahrum Formation overlays the Sachun Formation and it underlays in Asmari Formation succession, with a erosional disconformity. However, based on James and Wynd (1965) studies the age of the Jahrum

Formation is Late Paleocene to Middle Eocene. the upper limit Asmari Formation is conformably with Razak Formation. Also many of the large foraminifers are identified in the Jahrum and Asmari Formations. (Rahaghi 1978 p.32-160, 1983).

2. Geographical situation of the studied stratigraphic Section

The studied stratigraphic section are situated in the folded zone of Zagros and their geographical limits are as follow: This section is located in 36-km South east of Shiraz city, Fars province (Iran) and we can approach it through the main road of Shiraz-kharama. the geographic coordinates of This section is $x:29^{\circ}45'00''$ $y:52^{\circ}45'00''$.

3. Kaftarak stratigraphy Section

In order to lithostratigraphy studies, Jahrum Formation deposits compose of limestone and dolomitic limestone, the Asmari Formation the deposits composed of thin to medium - bedded and thick-bedded limestone. Based on the existence of foraminifers (Rahaghi 1978, Loeblich & Tappan 1989) of this section such as: *Miscellanea* sp., *Fallotella alavensis*, *Lockartia* sp., *Orbitolites shirazeinsis*, *Opertorbitolites* sp., *Dictyoconus* sp., *Orbitolites complanatus*, *Somalina stefaninii*, *Rhapydionina urensis*, *Coskinolina liburnica*, *Alveolina* sp., *Discocyclina* sp., *Nummulites* cf. *aturiscus*, *Nummulites* cf. *guettardi*, *Coskinolina* sp., *Nummulites fichteli*, *Nummulites intermedius*, *Nummulites vascus*, *Spiroclypeus ranjanae*, *Rotalia viennoti*, *Pearhapydionina delicata*, *Astroterillina howchini*, *Peneroplis evolutus*, *Peneroplis thomasi*, *Archaias krikukensis*, *Spirolina cylindracea*, *Triloculina trigonula*, *Meandropsina iranica*, *Dendertina rangi*, *Meandropsina anahensis*. The age of this section is from late Paleocene to Early Miocene. the total measured thickness is 286m. in Lithostratigraphy point of view, Jahrum Formation is divided into three parts as follow:

A: the lower part is 52m. Dolomitic limestone from Buff thin-bedded. considering the existence of foraminifers such as: *Fallotella alavensis*, *Nummulites* sp., *Lockartia* sp., *Orbitolites shirazeinsis* is the age of this part has been determined from Late Paleocene.

B: the Middle part is 48m. Dolomitic limestone from light grey medium-bedded. considering the existence of foraminifers such as: *Opertorbitolites* sp. the age of this part has been determined from Early to Middle Eocene.

C: the Upper part is 80m. Limestone and Dolomitic limestone from light brown and grey thin to thick-bedded. considering the existence of foraminifers such as: *Somalina stefaninii*, *Rhapydionina urensis*, *Coskinolina liburnica*, *Discocyclina* sp., *Nummulites* cf. *aturiscus*, *Nummulites* cf. *guettardi*. the age of this part has been determined from Middle Eocene.

in Lithostratigraphy point of view, Asmari Formation is divided into three parts as follow:

A: the lower part is 44m. Nummulitic limestone from grey and light grey thin to thick-bedded. considering the existence of foraminifers such as: *Heterostegina* sp., *Spiroclypeus ranjanae*, *Rotalia viennoti*, *Pearhapydionina delicata*. the age of this part has been determined from Middle to late Oligocene.

B: the Middle part is 32m. limestone from grey medium - bedded. considering the existence of foraminifers such as: *Peneroplis thomasi*, *Archaias* sp., *Archaias krikukensis*, *Velvulinid* sp., *Spirolina cylindracea*, *Triloculina trigonula*. the age of this part has been determined from Aquitanian.

C: the Upper part is 30m. Limestone from light grey thick-bedded. considering the existence of foraminifers such as: *Dendritina rangi* , *Triloculina trigonula* , *Peneroplis sp.* , *Rotalia viennoti* , *Astroterillina sp.* , *Meandropsina anahensis* the age of this part has been determined from Burdigalian.(Fig.1).

4. Introducing Biozonation of the studied stratigraphic sections:

Actually, in the studied stratigraphic section, seven biozones have been determined for benthic foraminifers in the sediments of Late Paleocene to Middle Eocene (Alegret & Thomas 2001, Gibson et al. 1993, khosrotehrani et al. 2005, Loeblich & Tappan 1989, Rahaghi 1983) which are as follow:

1. Biozone No.1-Miscellanea – Kathina(Assemblage-zone):The thickness of this biozone in Kaftarak Section is 50 m. and its microfossils includes: *Fallotella alavensis* , *Nummulites sp.* , *Lockartia sp.* , *Orbitolites shirazeinsis* . Which indicates the age of Late Paleocene.

2. Biozone No.2- Opertorbitolites (Acro-zone):This biozone includes the sediments of Early Eocene related to studied stratigraphic section of Kaftarak and determines the limit of appearance and evanishing of Opertorbitolites type. the thickness of this biozone Kaftarak section is 48 m. and its organic constituents includes: *Lituonella ruberti*, *Alveolina sp.* and *Gomalveolina sp.*

3. Biozone No.3 -Nummulites-Alveolina(assemblage-zone): This biozone includes the all sediments of Middle Eocene in the studied stratigraphic section of Kaftarak. the thickness of this biozone in Kaftarak section is 34 m. and its microfossils includes : *Discocyclina sp.*, *Nummulites cf. aturiscus* , *Nummulites cf. guettardi* , *Coskinolina sp.*

4. Biozone No.4 - Dictyoconus-Coskinolina-Orbitolites complanatus (assemblage-subzone): This biozone includes the all sediments of Middle Eocene in the studied stratigraphic section of Kaftarak. the thickness of this biozone in Kaftarak section is 48 m. and its microfossils includes: *Somalina stefaninii* , *Nummulites sp.* , *Rhapydionina urensis* , *Coskinolina liburnica*.

5. Biozone No.5-Nummulites fichteli – Nummulites intermedius – Nummulites vascus (assemblage-zone):The thickness of this biozone in Kaftarak Section is 44 m. and its microfossils includes: *Heterostegina sp.*, *Spiroclypeus ranjanae* , *Rotalia viennoti* , *Pearhapydionina delicate* . Which indicates the age of Middle to late Oligocene.

6. Biozone No.6 - Astroterillina howchini – Peneroplis evolutus (assemblage – zone): This biozone includes the all sediments of Aquitanian in the studied stratigraphic section of Kaftarak. the thickness of this biozone in Kaftarak section is 34 m. and its microfossils includes: *Peneroplis thomasi* , *Archaias krikukensis* , *Spirolina cylindracea* , *Triloculina trigonula*.

7. Biozone No.7 - Borelis melo group – Meandropsina iranica (assemblage – zone): This biozone includes the all sediments of Burdigalian in the studied stratigraphic section of Kaftarak. the thickness of this biozone in Kaftarak section is 28 m. and its microfossils includes: *Dendritina rangi*, *Triloculina trigonula*, *Rotalia viennotti* , *Astroterillina sp.*, *Meandropsina anahensis*.(Fig.2).

5. Description of Sequence Stratigraphy of Jahrum and Asmari Formations in the studied Stratigraphic section

Actually, based on the sequence stratigraphic studies, the sediments of Jahrum Formation include a 3rd order sediment sequence. This sequence with sequence boundary of SB2 type is placed on Sachun Formation and the upper lithostratigraphic limit of the mentioned sequence is of SB1 sequence lithostratigraphic limit type which is placed under Asmari Formation and is distinctive with an erosional surface disconformities as a result of a Pyrenean Orogenic phase activity. Most forwarding surface (mfs) is observed in the studied section of medium to thin-bedded limestone with Wackestone facies. The mentioned sequence encompasses HST and TST facies set. Actually, TST facies in the Jahrum Formation are of Late Paleocene to Early Eocene and HST facies is of Middle Eocene. Also the sediments of Asmari Formation include a two 3rd order sediment sequence (Sequence No.1 & No.2). This sequence with sequence boundary of SB1 type is placed on Jahrum Formation and the upper lithostratigraphic limit of the mentioned sequence is of SB1 sequence lithostratigraphic limit type which is placed under Razak Formation. Most forwarding surface (mfs) is observed in the studied section of medium to thin-bedded limestone with Grainstone facies (Adams & Mackenzi 1984 p.45-53, Mial 1997 p.125-200, Emery & Myers 2005 p.153-173). The mentioned sequence encompasses HST and TST facies set. Actually, TST & HST facies (Sequence No-1) the Asmari Formation are of Middle to Late Oligocene and TST & HST facies (Sequence No-2) is of Aquitanian to Burdigalian. (Fig.3).

6. Conclusions

a) Based on the investigation of foraminifers of the studied section, there are seven biozones that have been identified which includes:

1. Biozone No.1 - Miscellaneous – Kathina (Assemblage-zone) of the age of Late Paleocene.
2. Biozone No.2 - Opertorbitolites (Acro-zone) of the age of Early Eocene.
3. Biozone No.3 - Nummulites-Alveolina (assemblage-zone) of the age of Middle Eocene.
4. Biozone No.4 - Dictyoconus-Coskinolina-Orbitolites complanatus (assemblage-subzone) of the age of Middle Eocene.
5. Biozone No.5 - Nummulites fichteli – Nummulites intermedius – Nummulites vascus (assemblage-zone) of the age of Middle to Late Oligocene.
6. Biozone No.6 - Astroterillina howchini – Peneroplis evolutus (assemblage – zone) of the age of Aquitanian.
7. Biozone No.7 - Borelis melo group – Meandropsina iranica (assemblage – zone) of the age of Burdigalian.

b) In order to lithostratigraphy, Jahrum Formation deposits compose of limestone and dolomitic limestone, the Asmari Formation the deposits composed of medium and thin-bedded limestone. The lower limit Jahrum Formation deposits is conformably with Sachun Formation deposits and the upper limit this Formation is conformity with Asmari Formation deposits is conformably with Razak Formation deposits.

c) Actually, sediments of Jahrum Formation include a 3rd-order sediment sequence. This sequence with sequence lithostratigraphic limit of SB2 type is placed on Sachun Formation. Upper limit of the aforementioned sequence is of SB1 type which is placed under Asmari Formation and is distinctive with an erosional surface disconformity. The mentioned sequence

encompasses HST and TST facies sets. Also the sediments of Asmari Formation include two 3rd-order sediments sequence with sequence lithostratigraphic limit of SB1 type is placed on Asmari Formation. upper limit of the aforementioned sequence is of SB1 type which is placed under Razak Formation.

d) The upper border of the studied sequence (SB1) has been distinctive with an erosional surface disconformity as the result of pyrenean Orogenic phase activity.

7. References

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Fig.1. Lithostratigraphic column of Kaftarak section



Fig.2. Stratigraphic Range chart and Biozonation of Kaftarak section

