

Facies, Depositional environment and sequence stratigraphy of the Gadvan and Dariyan Formations in North of Dezful Embayment (Mangasht Anticline) in Izeh Zone – Zagros Basin.

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Abstract

The Gadvan and Dariyan Formations (Bareman-Aptian) are source rock and reservoir rock in southwest of Iran. Assessment of rock deposits of Gadvan and Dariyan lead to recognizing four facies belts including open marine (A), barrier(B), lagoon(C) and tidal flat (D) facies belts. Based on the Walter law, comparison with modern and ancient environments and vertical and lateral facies changes indicate that studied area have been formed in a ramp platform. Based on sequence stratigraphy, in the study area the Gadvan and Dariyan Formations have two sequences (3 rd cycles). The first sequence consists of the lower Gadvan Formation and Khalij member (Bareman) and the second sequence consists of the upper Gadvan and Dariyan Formations (Aptian). The lower contact of sequence 1 and the upper contact of sequence 2 are type 1 unconformity (SB₁) and the contact between two sequences is type two unconformity (SB₂).

Keywords: *Depositional Environment, Sequence Stratigraphy, Ramp, Gadvan Formation, Dariyan Formation*

Introduction

Gadvan Formation (Bareman- Aptian) is source rock (shaley part) and reservoir rock (limy part) and Dariyan Formation is reservoir rock in southwest of Iran. Gadvan Formation in Mangasht section consists chickpea coloured to gray limestone 45 meters in thick and the most of Dariyan Formation includes brown coloured-gray orbitolina limestone with intercalation of dolomite, and the total thickness is 299 meters. The lower contact of the Gadvan Formation with the Fahliyan Formation is unconformable, but its upper contact with the Dariyan Formation is gradational, the Kazhdumi Formation unconformably overlies the Dariyan Formation.

The Gadvan and Dariyan Formations in north of Dezful Embayment and south of Fars area has been formed mainly of carbonates. Thickness of Gadvan Formation in the mentioned zone increases toward Khoramshahr and Basreh area. Dariyan Formation in the south west of Iran (except south-southwest of Lurestan) is equivalent of the Shoayba Formation in the Arabic country (Motiei, 1372). In the last years Gadvan and Dariyan Formations studied mainly from the paleontology and stratigraphy point of view (e.g: James and Wynd, 1965; Kheradpir, 1975 and Motiei, 1372) but in the recent years, the facies, sedimentary environment and sequence stratigraphy of these Formations, have been analysed (e.g: Lasemi and Siahi, 1384; Barzegar

Zandi et al., 1385; Lasemi and Ahmadi, 1385). Therefore, the aim of this research is the sequence stratigraphy of the Gadvan and Dariyan Formations in the Mangasht section.

Method of study

Facies, sedimentary environment and sequence stratigraphy of Gadvan and Dariyan Formations in Mangasht section have been known basically on the microscopic and field study. The facies have been named by the classification of Dunham, 1962. Sedimentary model and sequence stratigraphy are based on Lasemi, 1379; Emery & Meyers, 1996; Mial, 1997, 2000; Buchem et al., 2002.

Micofacies and Sedimentary Environment

Assessment of rock deposits of Gadvan and Dariyan led to recognizing four facies belts including open marine(A), barrier(B), lagoon(C) and tidal flat (D) in surface section of Mangasht(Fig.1). open marine facies belt (A) in Gadvan Formation consists of A1 (bioclast lime mudstone/ shale), A2 (bioclast wackestone / packstone) and in the Dariyan Formation includes, A1, A2 and A3 (rudist bioclast wackestone / packstone). main ingredient skeleton allochems of this microfacieses are echinoderm, sponge spicule, pelsypoda, green algae, rudist, bentic forams and non-skeletal grains are peloid and intraclasts. barrier facies belt (B) consists of B1 (orbitolina grainstone), B2 (peloid bioclast grainstone) microfacies. This microfacies includes skeletal grains such as rudist, echinoderm, green algae, pelsy poda, bentic forams (a lot of orbitolina) and non-skeletal grains include peloids. This facies just has been known in Dariyan Formation.

Lagoon facies belt (C) in Gadvan Formation consists of C1 (bioclast lime-mudstone), C2 (miliolid bioclast wackestone) and in Dariyan Formation consists of C1, C2 and C3 (orbitolina bioclast wackestone / packstone), C4 (bioclast peloid wackestone / packstone) and C5 (peloid wackestone / packstone). Main ingredient skeletal allochems of this microfacies are gastropod, green algae, pelsypoda, bentic forams (orbitolina, miliolid), rudist and non-skeletal grains are peloid and intraclasts. Tidal flat facies belt (D) consists of D1 (stromatolite boundstone), D2 (ooid algal grainstone), D3 (peloid bioclast grainstone). main ingredient skeletal allochems of this microfacies are green algae, gastropod, pelsypoda, benthic forams and non-skeletal grains are peloids, ooids and intraclasts. This facies belt just has been known in Dariyan Formation. Based on facies analysis, vertical and lateral facies changes and comparison with ancient and modern environments, deposition environment of Gadvan and Dariyan Formations in the study area is carbonate ramp platform (Fig.2).

Sequence Stratigraphy

Vertical facies variation of the Gadvan and Dariyan Formations indicate the presence of two 3rd order depositional sequences in the study area (Fig.3). The first sequence consists of the lower Gadvan Formation and Khalij member (Bareman) is 38 meters thick and includes open marine and lagoon facies and the second sequence consists of the upper Gadvan and Dariyan Formations(Aptian) is 306 meters thick that includes open marine, lagoon, barrier and tidal flat facies belts. The lower contact of sequence 1 and the upper contact of sequence 2 are type I unconformity (SB1) and the contact between of these sequences is type II unconformity (SB2).

Transgressive system tracts (TST) of first sequence is 34 meter thick that includes shale/ bioclast lime mudstone/ bioclast wackestone / packstone related to open marine environment. Maximum flooding surface (mfs) has been known with bioclast lime-mudstone from open marine environment (A1). Highstand system tract (HST) of this sequence is 4 meter thick that consists of peloid wackestone/packstone related to lagoon environment.

Transgressive system tract (HST) of second sequence is 31m thick that includes bioclast mudstone/packstone of open marine environment. Maximum flooding surface (mfs) has been known with orbitolina bioclast mudstone / wackestone of open marine environment. Highstand system tract (HST) consists of bioclast mudstone / packstone, Peloid / Orbitolina / rudist bioclast packstone, Stromatolite boundstone, Peloid/ooid bioclast grainstone related to lagoon and tidal flat environment.

Conclusion

Assessment of rock deposits of Gadvan and Dariyan Formations led to recognizing four facies belts include open marine(A)Barrier(B), Lagoon(C) and Tidal flat (D) in Mangesht surface section. Facies analysis and comparison with modern and ancient environments and vertical and lateral facies changes indicate that sediments of these formations in the studied area have been formed in a ramp platform. Based on sequence stratigraphy, two 3rd order sequences with the age of baremian-aptian have been recognized in the Gadvan and Dariyan Formations of the study area.

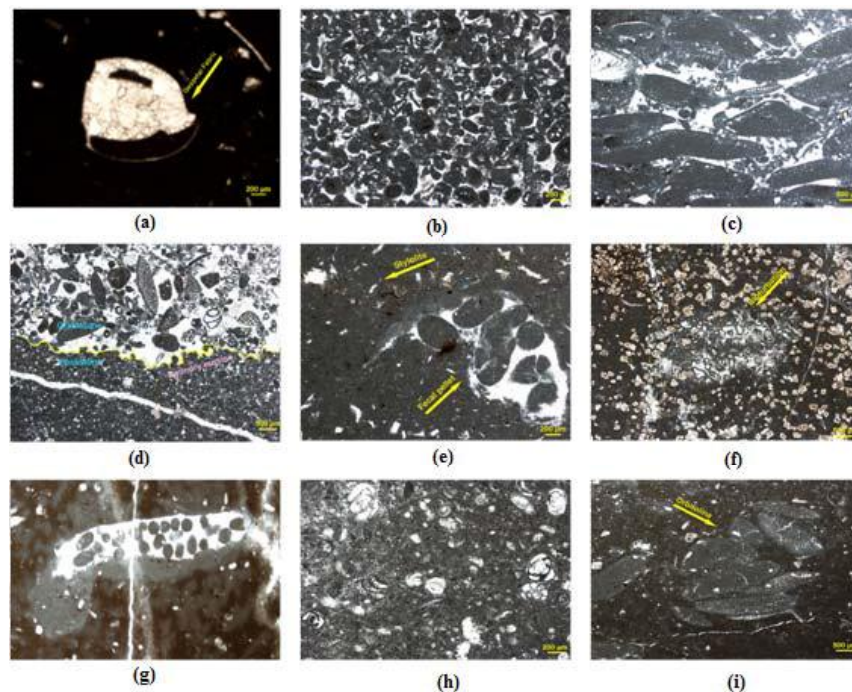


Figure1.Type of microfacies in Mangasht section: (a) geopetal fabric in lime mudstone facies . (b) peloid bioclast grainstone. (c) orbitolina grainstone. (d) peloid bioclast grainston with change facies. (e) fecal pllate & stylolite in bioclast mudstone facies. (f) bioturbition & dolomitization in bioclast mudstone facies. (g) boring in lime mudstone.(h) miliolida bioclast wackestone . (i) orbitolina bioclast packstone.

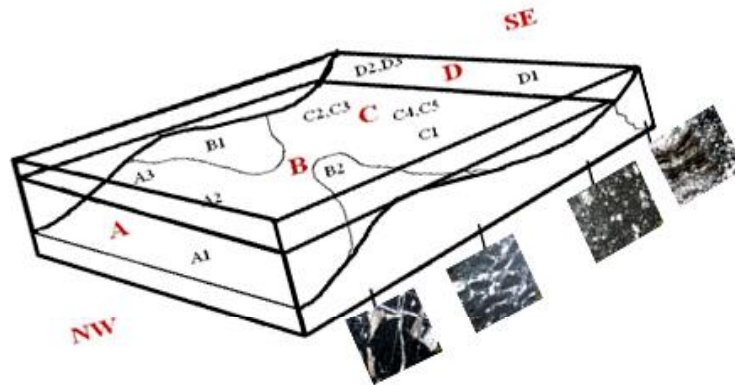


Fig.2: Sedimentary models Gadvan and Dariyan Formations in surfaces section Mangasht. Sequence stratigraphy of Mangasht section

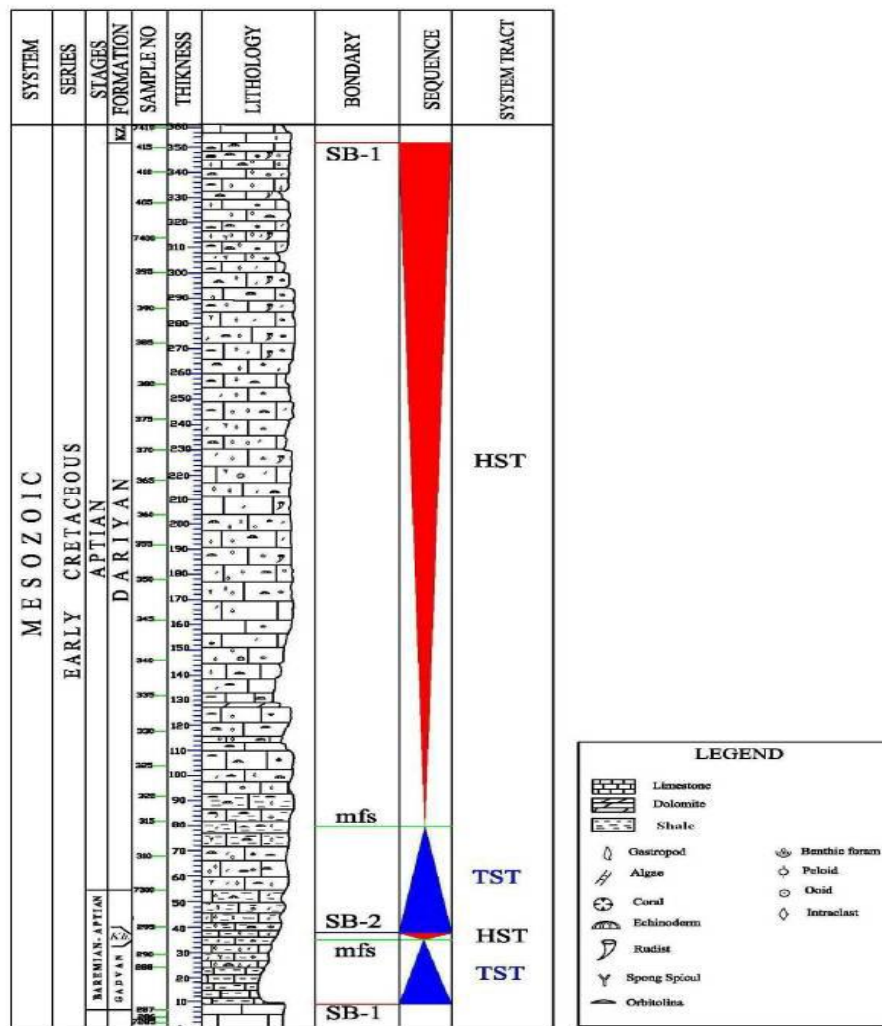


Fig.3: Column sequence stratigraphy of Gadvan and Dariyan Formations in Mangasht section.

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