Cretaceous Research 57 (2016) 257–288

Contents lists available at ScienceDirect

Cretaceous Research

journal homepage: www.elsevier.com/locate/CretRes

Berriasian-Aptian shallow water carbonates in the Zagros fold-thrust belt, SW Iran: Integrated Sr-isotope dating and biostratigraphy

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ARTICLE INFO

Article history:
Received 27 May 2015
Received in revised form
11 August 2015
Accepted in revised form 6 September 2015
Available online 19 September 2015

Keywords:
Berriasian
Aptian
Biostratigraphy
Sr-isotope
Shallow platform
Zagros
Iran

ABSTRACT

A combined biostratigraphic model comprising 12 biozones is proposed for the Berriasian–Bedoulian (lower Aptian) shallow-platform deposits of the newly defined Fahliyan, Sar Bisheh, Ghari, Gadvan and Chahoo formations in the Zagros fold-thrust belt. Six biozones are established for the benthic foraminifers, four plus one subzone (taxon-range zone) for the dasycladalean algae and three for the tintinnids. The top and base of these biozones are calibrated with Sr-isotope numerical dating. The dataset is founded on outcrops and subsurface data in the Khuzestan, Fars and Bandar Abbas areas. High resolution biostratigraphic studies reveal that a sedimentary break corresponding to an exposure is present at the base of the Berriasian across the platform, and becomes younger from west toward the east. Another diachronous regional hiatus is detected on top of the Sar Bisheh Formation. Dated late Valanginian pro parte, it is the largest hiatus occurring in the Fars area. This study demonstrates that the boundary between the Sar Bisheh Formation and the Ghari/Chahoo formations, respectively covering the former Lower Fahliyan and Upper Fahliyan/Gadvan-Dariyan formations, is Hauterivian, not Barremian as stated by previous authors. It also shows that the Gadvan Formation does not reach the Aptian, contrary to previous statements. Sr-isotope stratigraphy offers a comparable resolution to that achieved by biostratigraphy. Combining the two methods results in a better resolution, enabling to estimate the depositional rates and importance of missing intervals.

1. Introduction, previous investigations

In the Zagros region, the first biozonation of the Lower Cretaceous deposits was introduced by Wynd (1965), with one biozone (*Pseudocyclammina lituus-Trocholina* assemblage zone # 14) for the Lower Fahliyan Formation, and another biozone covering both the Upper Fahliyan and Gadvan formations (*Choffatella-Cyclammina* assemblage zone # 15). As for the deeper water facies of the Fahliyan Formation (sensu James & Wynd, 1965), another biozone, *Calpionella* zone # 11a, was put forward by Wynd (1965).

Later on, the microfossil content of the Khami Group, including the Surmeh, Fahliyan, Gadvan and Dariyan formations was studied by Gollestaneh (1965, 1974, 1979), who proposed two biozones for the Fahliyan Formation (sensu James & Wynd, 1965): *Tintinnid* zone # III and *P. lituus-Pseudochrysalidina arabica-Algal* zone # II. This author suggested another biozone for both the Gadvan and Dariyan formations: *Orbitolina-Choffatella-Salpingoporella dinarica* zone # I.

In recent years, an algal biozonation scheme was introduced for the Fahliyan Formation by Parvaneh Nejad Shirazi and Mosadegh (2009), including: (1) *Salpingoporella* spp. assemblage zone (*Salpingoporella annulata, Salpingoporella steinhauseri, Clypeina* cf. *marteli*, *Boueina* sp., *Actinoporella podolica* and *Coptocampylodon fontis*) and (2) *Salpingoporella muehlbergi* assemblage zone with *S. dinarica, Lithocodium aggregatum, Permocalculus ampulacea* and *P. inopinatus*, suggesting an Early Cretaceous age.

A few other authors have presented either the microfossil content (benthic foraminifers and algal associations), or the sediment facies and sequence stratigraphy of the Fahliyan and Gadvan formations, in particular areas of the Zagros Basin (e.g. Adabi, Salehi, &

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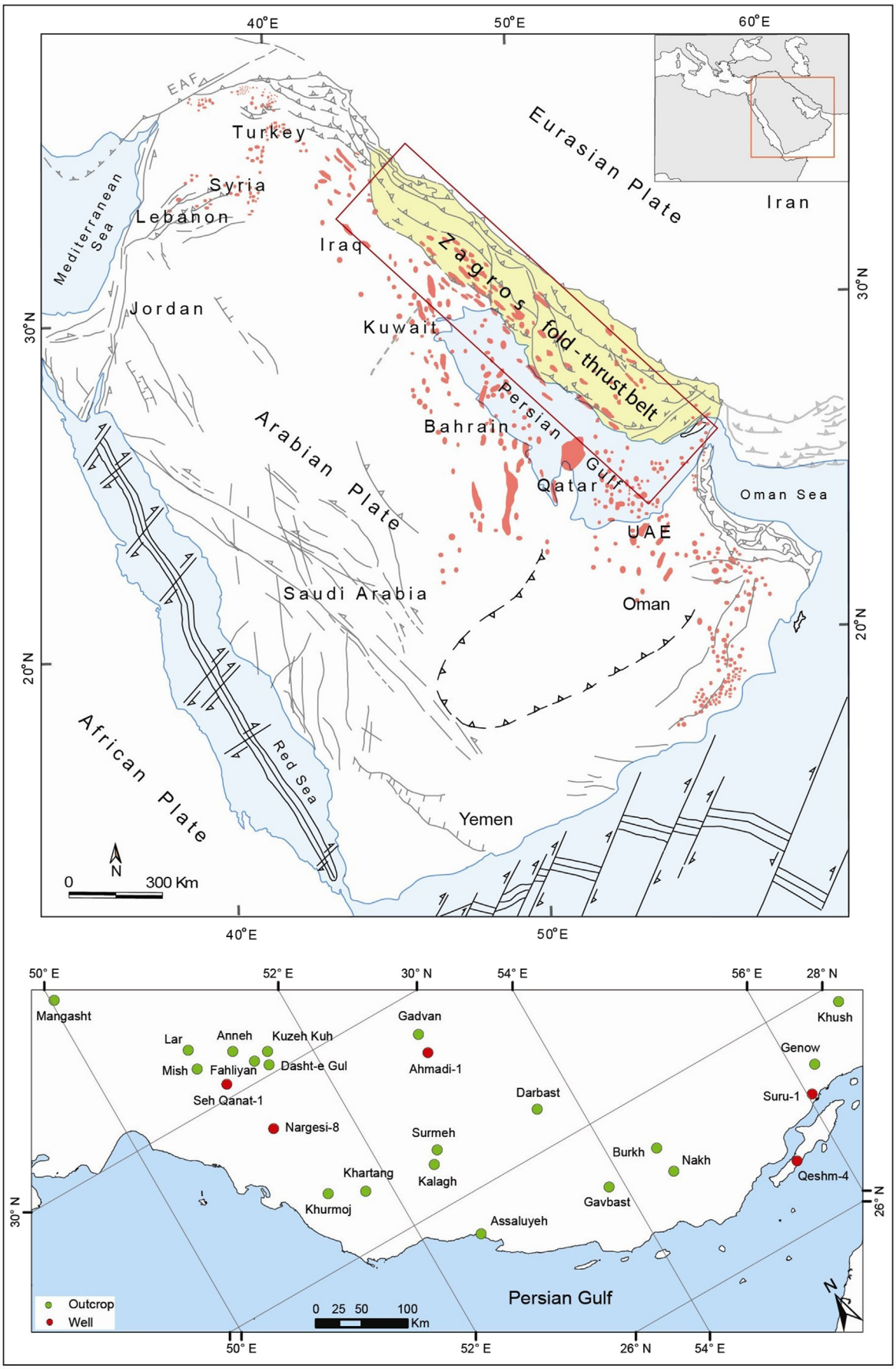
http://dx.doi.org/10.1016/j.cretres.2015.09.007
0195-6671/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50°E
60°E
30°N
20°N
EAF
Turkey
Syria
Lebanon
Iraq
Jordan
Kuwait
Bahrain
Qatar
UAE
Oman
Saudi Arabia
Yemen
Iran
Eurasian Plate
Arabian Plate
African Plate
Mediterranean Sea
Red Sea
Persian Gulf
Oman Sea
Zagros fold-thrust belt
0 300 Km
N
50° E
52° E
30° N
54° E
56° E
28° N
26° N
Mangasht
Lar
Anneh
Kuzeh Kuh
Mish
Fahliyan
Dasht-e Gul
Seh Qanat-1
Nargesi-8
Gadvan
Ahmadi-1
Surmeh
Kalagh
Khartang
Khurmoj
Assaluyeh
Darbast
Gavbast
Burkh
Nakh
Qeshm-4
Suru-1
Genow
Khush
Outcrop
Well
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