Discussion

Comments on “Facies modeling of synchronous successions – A case study from the mid-cretaceous of NW Zagros, Iran” by Shoghi et al., J. Afr. Earth Sci., 162 (2020) 103696

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A B S T R A C T

A number of micropalaeontological identifications and biostratigraphic interpretations made in a recent paper on mid-Cretaceous of the Iranian Zagros are questionable, and in many cases, can be shown to be erroneous. This in turn casts doubt on correlations and sequence stratigraphic interpretations presented in that paper, as the basis for these is undermined.

1. Discussion

Shoghi et al. (2020) present an intriguing study of the economically important mid-Cretaceous succession in the Lurestan region of the Iranian Zagros. In this region, the platform carbonates of the Sarvak Formation pass into, and interfere with, the deeper-water facies of the Garau Formation. As emphasised by Shoghi et al. (2020), demonstrating the synchronous nature of different facies is always challenging and requires precise and accurate biostratigraphic calibration and correlation, or the use of other chronostratigraphic proxies. Unfortunately, the intentions of Shoghi et al. (2020) are undermined by unsubstantiated and erroneous micropalaeontological and biostratigraphic observations and interpretations. Examples of these are as follows:

Figure 4 of Shoghi et al. (2020) purports to illustrate calcispheres that suggest an open marine facies. These are identified to species level (i.e. Pithonella ovalis, Calcisphaerula innominata, and Stomiosphaera sphaerica). Unfortunately, the quality of the images presented does not allow for the recognition of calcispheres in general, let alone the species mentioned. Calcispheres (also termed oligosteginids) are well known from the mid-Cretaceous of the Zagros region (e.g. James and Wynd, 1965; Adams et al., 1967; Afghah and Fadaei, 2015; Assadi et al., 2016) where they typify outer platform – upper slope facies. If correctly identified they can offer a degree of stratigraphic precision (e.g. Dias-Brito, 2000). However, even if present, the species mentioned do not confirm the Cenomanian age suggested by Shoghi et al. (2020). As the authors themselves mention in a later part of their text, such taxa can be Turonian in age (Dias-Brito, 2000; Aguilera-Franco, 2003).

Figure 5 of Shoghi et al. (2020) purports to illustrate various planktonic foraminifera, including several species that are regarded as stratigraphically important. Globigerinelloides algeriana is regarded as an important index fossil by Shoghi et al. (2020), indicating in their view, an Albian age. G. algeriana is widely regarded as an index fossil with a very restricted range within the Late Aptian (e.g. Premoli Silva and Verga, 2004; Luber et al., 2019) not the Albian. The G. algeriana biozone is of short duration within the Late Aptian (Moullade, 1966) and is defined by the total range of the nominate fossil. In any case, the illustration of G. algeriana by Shoghi et al. (2020) (Figure 5A) is unconvincing. It is a pyritised grain that has a vaguely planispiral shape, which could be a pyritised foraminifera, but shows none of the features needed for a species identification (e.g. number of chambers). Similarly, illustrations of Biglobigerinella barri (Figure 5B) and Rotalipora appenininica (Figure 5C) are likewise uncertain. Both images are probably planktonic foraminifera, but show too few features to be identified beyond this general level (see Postuma, 1971; Sitter, 1989; Premoli Silva and Verga, 2004 for good examples of these taxa in thin-section).

If anything, Figure 5C resembles a Late Cretaceous Marginotruncana or Globotruncana, perhaps caved from an overlying unit. If indeed present, Biglobigerinella barri (= Globigerinelloides barri) does not indicate an Albian age as suggested by Shoghi et al. (2020). This species is a Late Aptian or older fossil (Premoli Silva and Verga, 2004; Luber et al., 2019). Similarly, R. appenininica, if present, does not necessarily indicate an Albian age as suggested by Shoghi et al. (2020) in the caption of their Figure 5. This species is well known as also occurring in the Cenomanian (e.g. Leckie, 1984; Premoli Silva and Verga, 2004).

Shoghi et al. (2020) make a curious statement in their section 3.2.3.2.1: “Index fossils of the lower part of the Sarvak Formation from 1540 to 1440 m SSTVD depth include Lufutia sp [presumably a misspelling of Lufutia sp.], Orbitoides madia [presumably a misspelling of Orbitoides media], O. orientalis, Neumannites granulata, Oligosteginids, all..."
of which related to a Cenomanian age...". These are not Cenomanian taxa. Instead, they indicate a Maastrichtian age (Rahaghi, 1976; Hottinger and Caus, 2007; Smith et al., 1995; Meric and Gürmez, 2001; Abdelghany, 2006) and are well known from the Tarbur Formation of the Zagros (e.g. Sampo, 1969; Kalantari, 1976; Schlagintweit et al., 2016), not the Sarvak Formation. If present at the depths indicated, either the lithostratigraphy interpretation of Shoghi et al. (2020) needs revision or, probably more likely, these fossils are caved from higher in the well (if the samples are cuttings samples, which is not clear).

In section 3.2.3.3.1 of Shoghi et al. (2020) the authors state “The presence of Turonian was also revealed by index fossils such as Clavi-
hedbergella simplex, Gavelinella ballica and Rotalipora cushmani”. C. simplex is a long ranging taxon, found in Albian – Coniacian strata (Premoli Silva and Verga, 2004), whilst R. cushmani is an important late Cenomanian index fossil (Premoli Silva and Verga, 2004; Falzoni et al., 2016). It does not occur in the Turonian. As noted by Shoghi et al. (2020) earlier in their text, G. ballica can also be Cenomanian (see also Hradecká, 1996).

In summary, many of the fossil identifications and age interpretations suggested by Shoghi et al. (2020) cannot be substantiated, which in turn casts doubts on their facies correlations (e.g. their Figure 8) and recognition of the Arabian Plate sequence stratigraphy of Sharland et al. (2001) (e.g. their Figure 7). This in turn, emphasises the need for rigorous micropalaeontology in such studies, supported by definitive illustrations and reference to key literature.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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References