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Considering Changes in Thickness of Hambast Formation Deposits in Different Section of Central Iran

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Abstract: Lithostratigraphy studies on Hambast Formation deposits in Shorjestan section indicate that in this section, Hambast Formation with 23 m thickness has 2 units (6 and 7). The 6th unit includes 6.5 m marly limestone and red, green and gray shale layers and the 7th unit includes 16.5 m red to purple limestone besides red and gray shale. A comparison between under studied section with 4 other sections in Abadeh and Shahreza indicates that regarding probable reasons such as different procedures of tectonic activities in floor of sedimentary basin, differentiation in sedimentation rate and different depths in sedimentary basin, thickness and lithology of these deposits are different with each other in a way that in Esfeh section in Shahreza region, deposits of Shahreza informal formation have more thickness and different lithology in comparison with Abadeh and Shorjestan sections.

Key words: Hambast, late permian, lithostratigraphy, sedimentary basin, Shorjestan

INTRODUCTION

Hambast Formation depostis that is as old as Upper Dzhulfian-Dorashamian (Liu *et al*., 2013), is located expansively in Irans central parts (Baghbani, 1996; Stampfli and Borel, 2002) and according the important stratigraphic position of these deposits it has been studied by many researchers (Bando, 1979; Iranian-Japanese Research Group, 1981; Baud *et al*., 1989; Baghbani, 1996; Sweet and Mei, 1999; Heydari *et al*., 2000, 2001, 2003; Partoazar, 2002; Yazdi and Shirani, 2002; Kozur, 2004, 2005, 2007; Korte *et al*., 2004, 2010; Richoz, 2006; Richoz *et al*., 2010; Shen and Mei, 2010). The Permian sequence of Abadeh region was subdivided into seven lithologic units (Unit 1-7). Hambast formation has 2 units (6 and 7) in type section which totally has 36.5 m thickness and the dominate lithology are argillaceous limestone, dark red and green shales and red limestone (Taraz, 1969, 1971, 1973, 1974). The significant tip about Hambast formation deposits is that the lithology and thickness of these deposits have significant different in different regions and even in some regions the informal formation of Shahreza was suggested because of great amount of changes in these deposits lithology (Partoazar, 2010). In present study, lithostratigraphy comparison was done between understudied section and Shahreza and Abadeh sections.

MATERIALS AND MEHODS

Geographical position and methods: The Abadeh region was situated in the western margin of Paleotethys during the Late Permian (Ziegler *et al*., 1997; Golonka and Bocharova, 2000; Stampfli and Borel, 2002). Understudied section in Shorjestan was located in 30 km to Abadeh in central Iran in geographical coordinates of 52°32° East longitude and 31°24° North latitude (Fig. 1). The method in this study is in a way that after considering lithostratigraphical features and separation of Hambast formation units, this sequence is compared with adjacent sections from lithology features and thickness aspects and then the reasons of thickness and lithology changes in Hambast formation's deposits were considered.

Lithostragraphy of Hambast formation in Shorjestan section: Hambast formation in Shorjestan section has 23 m thickness that lower boundary of these deposits with Abadeh formation and their upper boundary with Elika formation equivalent deposits that are as old as early Triassic are continues and gradual (Fig. 2 and 3). In under studied, section 6th unit includes 6.5 m marly limestone and layers of red, green and gray shales that some foraminifera are found, such as *Nodosaria* sp. and *Geinitzina* sp. in this unit. The 7th unit includes 16.5 red to purple limestone besides red and gray shales that some

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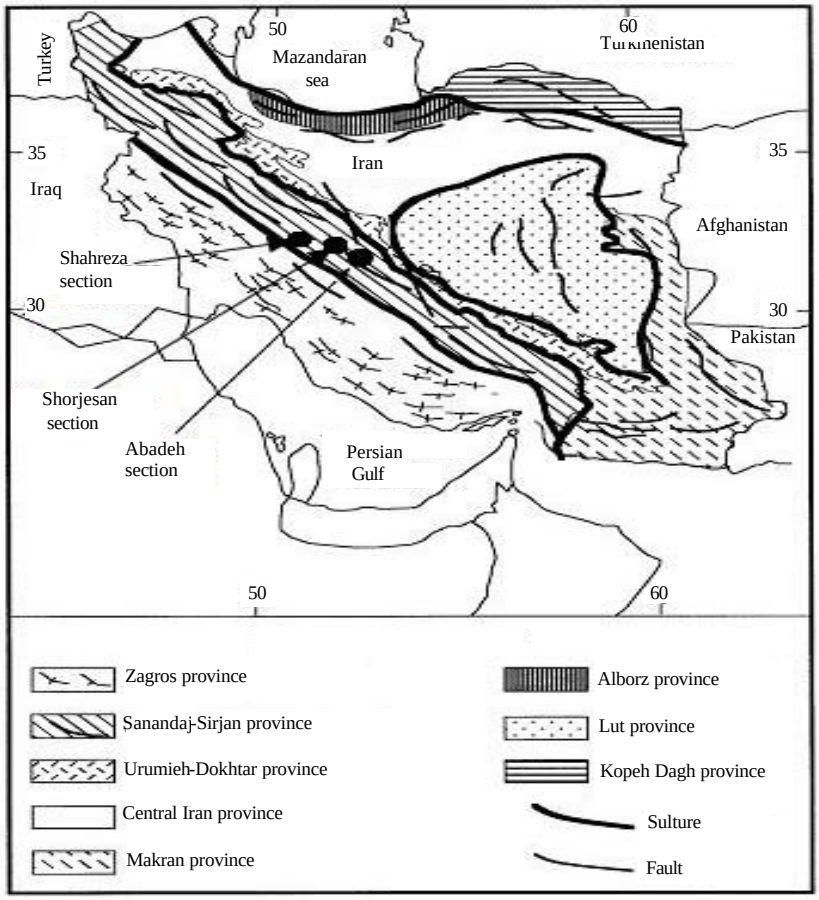

Fig. 1: General geologic map of Iran showing the 8 geologic provinces of Iran Shorjestan, Abadeh and Shahreza sections are located in the central part of Iran (Heydari *et al*., 2000)

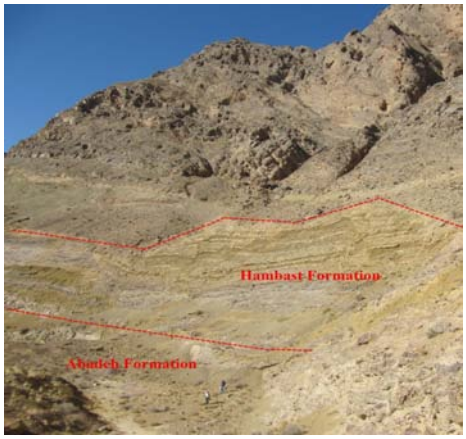

Fig. 2: Abadeh formation- Hambast formation depostis, Shorjestan area, Central Iran

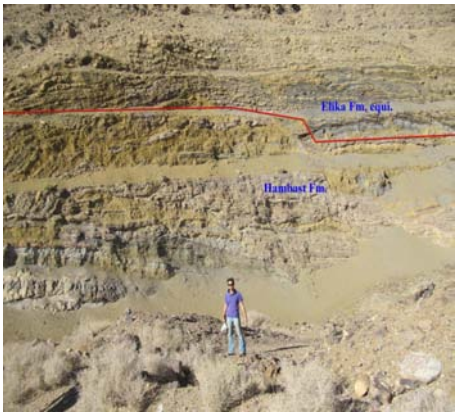

Fig. 3: Permo-Triassic boundary of studied section, Shorjestan area, Central Iran

Foraminifera are found in this unit, such as *Frondinapermica* and the limestones red color in this unit is distinguishable across the Shorjestanarea as an index layer. It should be mentioned that from deposits of Hambast formation some palynomorphs found such as *Vittatinalata*, *Florinites*, *Balmei*, *Alisporitesnuthallensis* and also *Laevigatosporitesovatus*.

Lithostratigraphy of Hambast formation in selected sections: To consider lateral changes of thickness and Lithostratigraphical features of Hambast formation, understudied section was compared with 4 other sections in adjacent regions (Fig. 4):

Shorjestan section (understudied section): Hambast formation deposits in understudied section have 23 m thickness that in this section the Hambast formation has continues and gradual boundary with Abadeh formation deposits in lower part and with Elika formation equivalent deposits in upper part.

Type section of Hambast formation (Taraz, 1974): It has 36.5 m thickness that includes two units (6 and 7). This section is located in Hambast mountain valley and both upper and lower boundaries are continues and gradual, 6th unit mostly includes thin bedded argillaceous limestone, green and gray shale and that limestone which contain brachiopods, corals, crinoids and Amonoides. The 7th unit contains red-purple limestone that in middle part the red shale were increased.

Esfeh section (Partoazar, 2010): These deposits that are equivalent of Hambast formation, named Shahreza informal formation because of enhancement of limestone and reduction of marl and shale. The 6th unit includes 20 m of nodular argillaceous limestone and 7th unit of this section also includes 30 m red-purple limestone and contains *Paratirolites* sp.

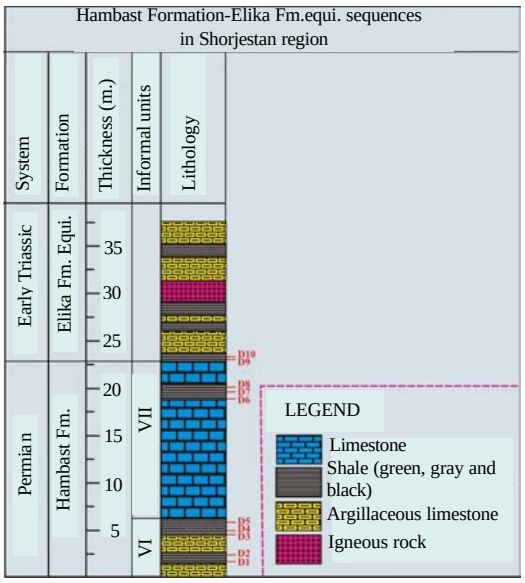

Fig. 4: Lithostratigraphic column of the Hambast formation, Shojestan area, Central Iran

Abadeh section (Heydari *et al.*, 2003): In this section that has 35 m thickness, the lower boundary of Hambast formation deposits was considered with Abadeh formation and its upper boundary was considered with Elika formation equivalent that all are gradual and continues. The 6th unit that was considered as old as Dzulfian has 17 m thickness and the dominate lithology is grey bioturbated lime mudstone/wackstone. In addition, the 7th unit has 18 m thickness that is as old as Dorashamian and dominant lithology considered as red nodular lime mudstone/wackstone.

Abadeh section (Liu *et al.*, 2013): This section has 35 m thickness and 2 units (6, 7) for deposits of Hambast Formation are considered. 6th unit that is as old as Dzulfian has about 9 m limestone lens that followed by 12 m argillaceous limestone. The 7th unit is as old as late Dzulfian-Dorashamian and has total thickness of 14 m that 3.5 m of its initiation was nodular limestone and followed by 10.5 m argillaceous limestone.

RESULTS AND DISCUSSION

In all of the selected sections from Hambast formation that are as old as Upper Permian (Dzulfian-Dorashamian) both of the units (6 and 7) are present but lithology and thickness of these deposits are different in various sections. In understudied section in Shorjestan area, Hambast formation has 23 m thickness but in section of Hambast mountain valley, Shahreza and Abadeh the thickness of these deposits are among 35-50 m.

In addition, lithology of these deposits is relatively different in various sections. The lithology of 6th unit in type section of Hambast mountain valley includes limestone, argillaceous limestone and green-gray shales, in under studied section this unit includes marly limestone, red, green and gray shale layers that contains palynomorphs, this unit in Abadeh section contains limestone and argillaceous limestone and in Shahreza seciton, the 6th unit includes argillaceous limestone.

The 7th unit in Hambast formation mostly contains nodular red limestone in all of the compared sections, except Liu *et al.* (2013)'s study, in this study dominant lithology includes nodular limestone and argillaceous limestone.

Differentiation in lithology and thickness of Hambast formation deposits in different sections probably indicates different procedures of tectonic activities in floor of sedimentary basin, differences in sedimentation rate and different depths of sedimentary basin in various area that leads to enhancement of limestone and reduction of marl and shale amounts in some regions such as Esfeh section.

CONCLUSION

Thickness of Hambast formation deposits in Shorjestan section was 23 m and its lithology includes argillaceous limestone, red, green and gray shales and red limestone.

Thickness and lithology of Hambast formation deposits in various sections are different, in Shahreza section (Shahreza informal formation) had the highest amount of thickness and enhancement of limestone and reduction of marl and shale.

Differentiation in lithology and thickness of Hambast formation deposits in various sections is probably because of different tectonic activities of sedimentary basin floor, differentiation in sedimentation rate and different depths of sedimentary basin in various regions.

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