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Microbiostratigraphy Study of the Surgah Formation in West of Khoramabad, Iran

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ABSTRACT

:The study of planktonic foraminifera of the Surgah Formation in west of Khorram Abad enables us to find the most standard biozones defined in mediterranean regions, especially Tethysian domain. Three biozones were determined. Biozone I (*Helvetoglobotruncana* belong to the Upper Sarvak Formation and indicate the Middle Turonian and Biozones II (*Marginotruncana sigali* zone) and III belong to the Surgah Formation and Suggest Late Turonian –Coniacian. The thickness of the Surgah Formation at this section is 99.60 meters and consists of shale and thin bedded limestone that lies between Sarvak Formation at the base and Ilam Formation at the top.85 sample collected and studied from Surgah Formation and top of Sarvak Formation and basal part of Ilam Formation which led to identification of 13 genera, 33 species of the planktonic foraminifera.
KEYWORDS: Surgah Formation**;** Planktonic foraminifera**;** Turonian**;** Santonian; Sarvak Formation.

1 INTRODUCTION

The Surgah Formation is one of the most important source petroleum rocks in the Zagros Basin, Sw Iran [1]. Lithologicaly, it consists of thin to medium shale and intercalation of gray limestone [8]. The type section of the Surgah Formation was measured in the Tang-e Garab in Ilam province by [11]. In the most outcrops the Surgah Formation conformably overlies the Sarvak Formation and is overlain by the Ilam Formation [16]. The upper contact of the Surgah Formation with the Ilam Formation is marked by an unconformity . Deposition of the Sarvak and Ilam formations was coincident with broad marine transgression during Upper Cretaceous [24].The plagic argillaceous limestone; shale and marl of the Surgah Formation were laid down over shallower areas of the Zagros basin. Microfauna of the Surgah formations were studied by [6, 10,12, 13, 14, 30].The zonal scheme of the formations established by [29] and then discussed by [3]. The main purpose of this research was to establish a biostratigraphic zonation and correlation with other universally accepted standard biozones.

2 METHODS AND STUDY AREA

The study section is located West of Khorram Abad city and at the north flank of Sepid kuh Anticline, With geographic coordinates of N: 33º 28’ 43” and E; 48 º21’ 49 ” (Fig. 1). The study area is one of the parts of folded-thrust zone of Zagros basin in Southwest of Iran. At this locality, The Surga Formation consists of 85 m of dark grey shale and alternating with marly shale (Fig. 2, 3). More than 85 samples from Surgah Formation and upper most layers of Sarvak Formation and lower layers of Ilam Formation were studied. The foraminiferal assemblages of the Surgah Formation consist of planktonic forams that are a good tool for biostratigraphic analysis. Definition of microfossil is based on thin sections foraminiferal taxonomy and nomenclature follows [5,15, 18, 20, 21, 23, 28].

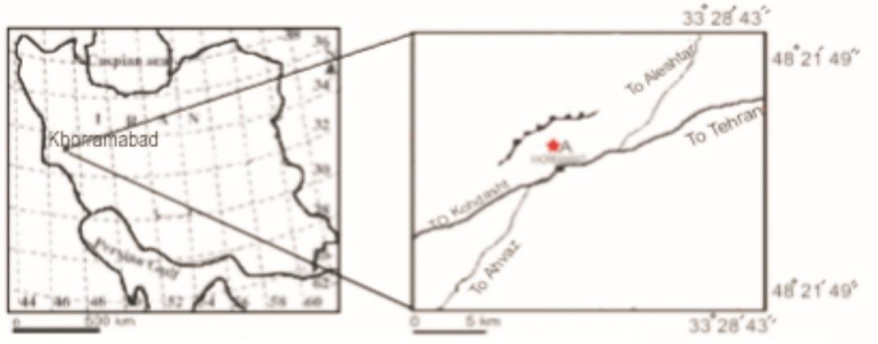

Figure 1 Map showing the location of the study areas in Sw Iran

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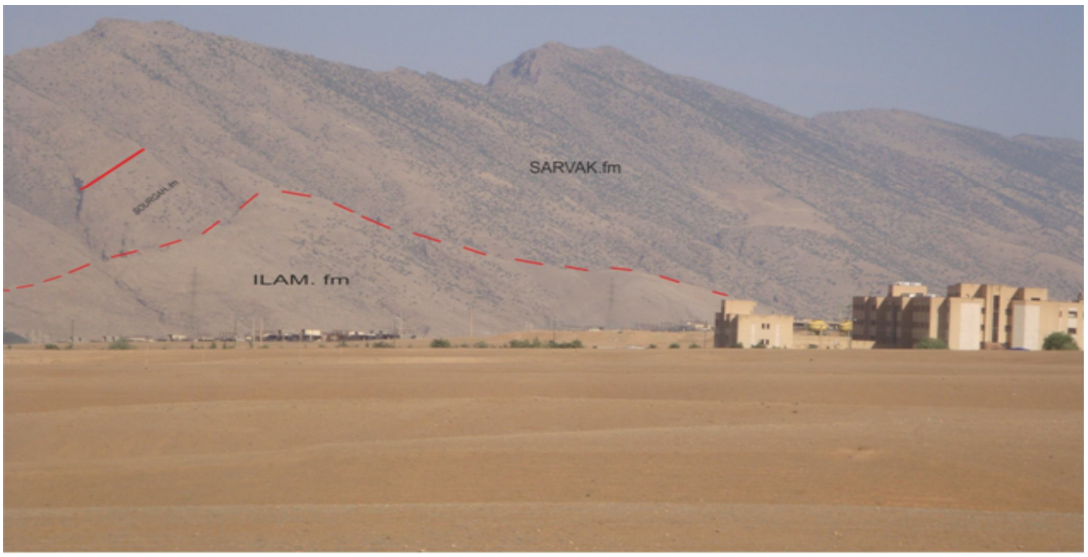

Figure 2 Outcrop photograph of the studied section at the north flank of sepid kuh anticline, Boundary of folded and imbricate zones of the Zagros basin, Iran.

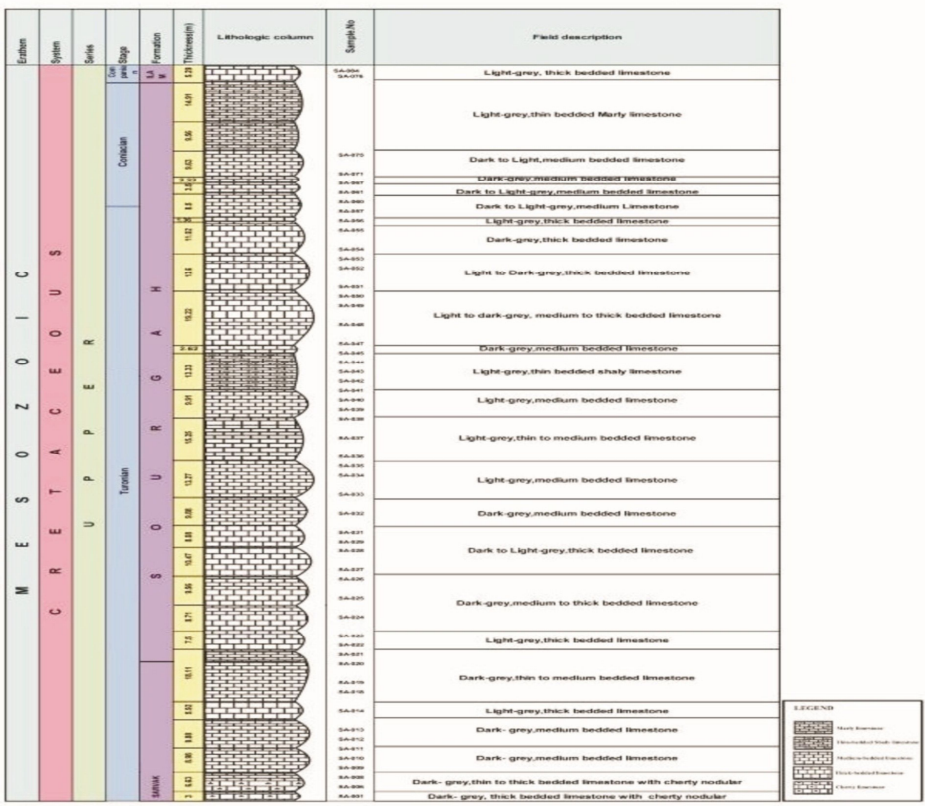

Figure 3 Stratigraphical column Of Surgah Formation at studied section

3 BIOSTATIGRAPHY

Planktonic foraminifera are abundance and diverse in most samples of the Sarvak, Surgah and Ilam Formations at the studied area. 13 genera and 23 species of planktonic forms were recognized.The zonal scheme presented here consists of three zones on the basis of the stratigraphical distribution of plaktonic foraminifera recognized in thin section (Fig. 4). Biozones I occurs in the Sarvak Formation and biozones II and III are in the Surgah and Ilam Formations.

1-*Helvetoglobotruncana helvitica* zone
Auuthor: [25].
Definition: Total range zone of the nominal taxon.
Characteristics:
The dominant taxa belong to *Whiteinella inornata, Whiteinella baltica, Whiteinella* sp., *Whiteinella praehelvetica, Textularia dorosia, Textularia* sp, *Heterohelix* cf. *reussi, Heterohelix cf. globulosa, Heterohelix* sp., *Gumbelina* sp., *Hedbergella* sp., *Hedbergella* cf. *monmouthensis,Marginotruncana* sp.
Remarks: The first appearance of large, robust planktonic foraminifera,as *Marginotruncana* fall within this zone.
Age: Early to Middle Turonian.
This biozone was introduced from western Tethys [4, 5] and Central Tethys [7, 26] and Atlantic realm [17].
2- *Marginotruncana sigali*
Author: [2].
Definition: Partial range zone from the Last occurrence of *Helvetoglobotruncan*a to the first occurrences of *Diacarinella cocavata*.
Charateristics: The dominant taxa belong to *Marginotruncana renzi, Marginotruncana* sp., *Hedbergella* sp., *Hedbergella rischi, Marginotruncana sinuosa, Marginotruncana coronate, Marginotruncana schneegansi , Hedbergella monmouthensis, Marginotruncana sigali, Dicarinella primitive, Dicarinella hagni, Heterohelix* sp., *Heterohelix* cf. *reussi, Whiteinella* sp., *Heterohelix globulosa, Hedbergella planispira, Dicarinella algariana, Marginotruncana marginata.*
Remark: This interval is also Known in literature as the *Marginotruncana schneegansi* Zone [23], *Diacarinella primitive- M.sigali* Zone [21] or *Marginotruncana sigali—Diacarinella primitive zone* [22].
Age: Late Turonian.
This biozone was introduced from western Tethys [4, 6] and Central Tethys [7].
3-D*icarinella concavata*
Author: [25].
Definition: Interval Zone from the first occurrence of *Diacarinella concavata* to the first occurrence of *Diacarinella asymetrica*.
Characteristics: The dominant Taxa belong to *Marginotruncana* sp., *Marginotruncana sigali , Marginotruncana sinuosa., Hedbergella* sp., *Hedbergella* cf. *monmouthensis., Hedbergella* cf. *simplex, Heterohelix* sp., *Heterohelix globulosa, Heterohelix* cf. *reussi.,Globigerinelloides* sp., *Whiteinella baltica., Whiteinella* sp., *Dicarinella* sp., *Dicarinella cancavata, Dicarinella algariana, Globotruncana coronata , Globigerinelloides* cf. *bollii ,Marginotruncana coronate*
Remarks: The last appearance of *Marginotruncana sigal , Diacarinella imbricate* and within this zone.
Age: Late Turonian- to Coniacian
This biozone was introduced from western Tethys [4, 6] and Central Tethys [25], Caribbean [9],wesrern Pacific [19]. The photographic some of recognized planktonic foraminifera show in Figs. 5 and 6.

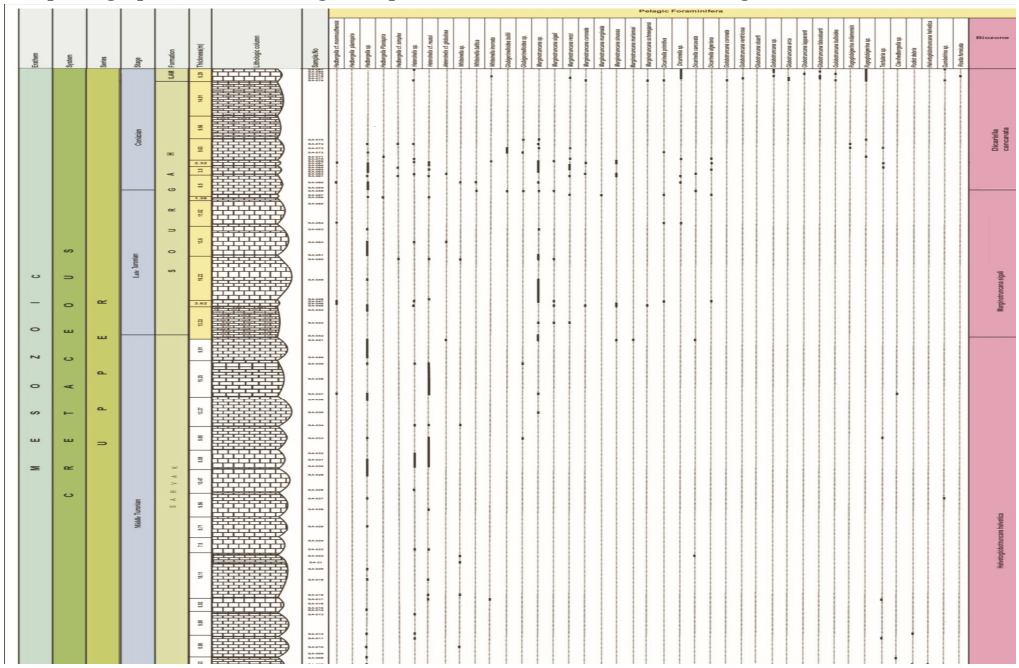

Figure 4 Biostratigraphy column of the Surgah Formation at the studied section

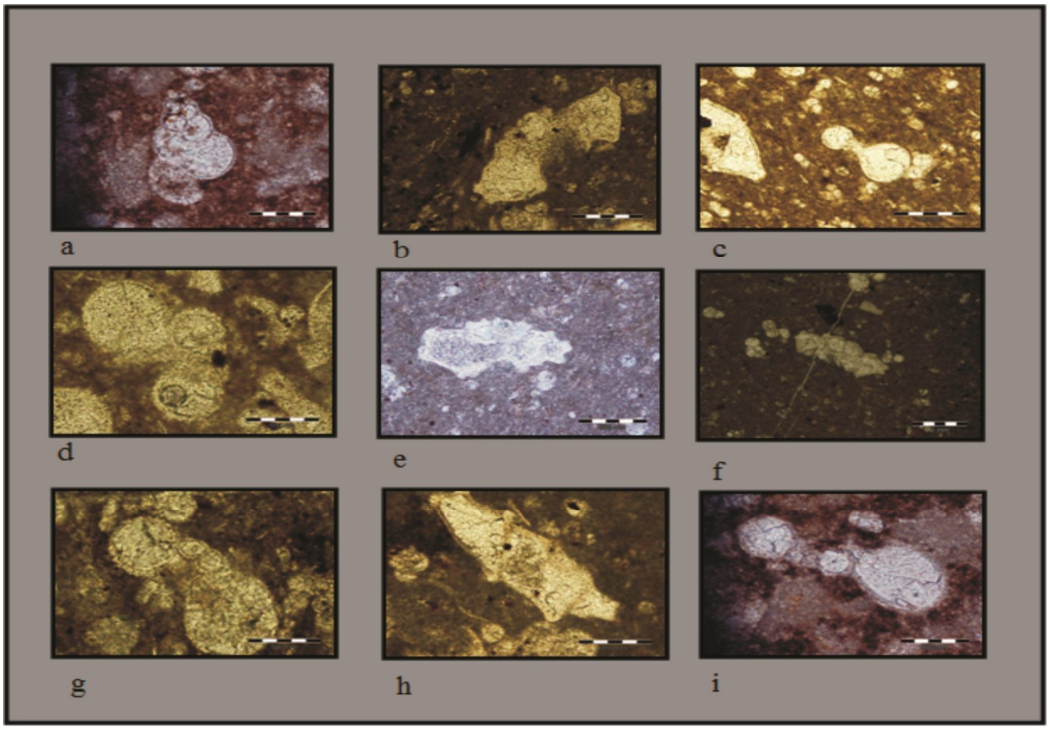

Figure 5: Photomicrograph of som planktonic foraminifera at Surgah Formation at khorram Abad area.
a *Heterohelix reussi* Sample No.Sa-076, Ilam Formation. **b** *Rosita fornicate*, Sample No.Sa-078, Ilam Formation. **c** *Globigerinloides* cf. *bolli*, Sample No.Sa-073, Surgah Formation. **d** *Rogoglobigerinloides* sp., Sample No.Sa-074, Ilam Formation. **e** *Marginotruncana sinusoa*, Sample No.Sa-070, Surgah Formation. **f** *Marginotruncana marginata*, Sample No.Sa-077, Ilam Formation. **g** *Hedbergella* sp., Sample No.Sa-072, **h** *Marginotruncana coronata*, Sample No.Sa-074, Ilam Formation. **i** *Globigerinloides* sp. Sample No.Sa-074, Surgah Formation.

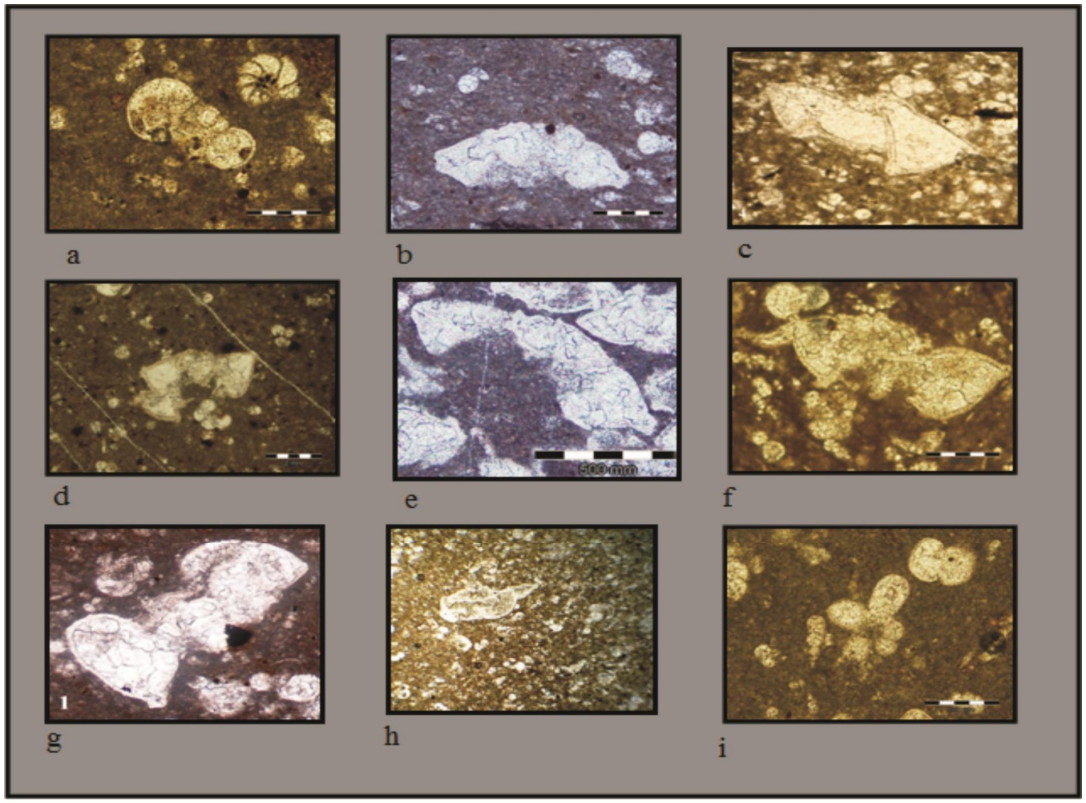

Figure 6: Photomicrograph of som planktonic foraminifera at Surgah Formation at khorram abad area.
a *Hedbergella* cf. *simplex*, Sample No.Sa-074, Surgah Formation. **b** *Marginotruncana sigali*, Sample No.Sa-069, Surgah Formation. **c** *Marginotruncana scheengansi*, Sample No.Sa-073, Ilam Formation. **d** *Marginotruncana marianosi*, Sample No.Sa-041, Sarvak Formation. **e** *Marginotruncana sinusoa*, Sample No .Sa-067, Surgah Formation. **f** *Dicarinella primitive*, Sample No.Sa-073, Ilam Formation. **g** *Dicarinella concovata* ,Sample No.Sa-062, Surgah Formation. **h** *Helvetoglobotruncana Helvetica* , Sample No. Sa- 07, Sarvak Formation. **I** *Clavihedbergella* sp., Sample No. Sa- 35, Sarvak Formation.

5 CONCLUSION

Planktonic foraminifera are abundance and diverse in most samples of the Surgah Formation at the studied area. The zonal scheme presented here consists of 3 zones on the basis of the stratigraphic distribution of planktonic foraminifera recognized in thin sections. Three biozones including: I- *Helvetoglobotruncana helvitica* zone, II- *Marginotruncana sigali* zone, III- D*icarinella concavata* zone. Biozone I occur in the top of Sarvak Formation and indicate Middle Turonian. Biozone II and III are in the Surgah Formation and represent the Late Turonian- Coniacian.

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