SEISMIC REFLECTION DATA ANALYSIS AND THE TECTONIC SETTING OF MANSURIYA OIL FIELD

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Abstract

People who work on the analysis of seismic refection data usually use highly sophisticated software particularly when it is related to oil exploration data. In this article it will be shown how simple software like Reflex (2008) can deal with the seismic data with efficiency not less than professional software. Data of two seismic lines that were executed at Mansouriayah Oil field were used. After the filtering and processing reverse faults were detected. These faults isolate the top of Mansouriayah fold to form a gas reservoir. These types of reverse faults, which appear at the south western limb of the Mansouriayah fold, are also noticed for most High Folded Zone mountains. They are Gravity collapse faults that usually develop on both sides of the fold. They were developed following thin skin detachment movements in the basement rocks.

استخدام برنامج ريفلكس على خطين زلزالين من حقل المنصورية الغازي

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الخلاصة

العاملون في مجال التفسيرات للبيانات المتعلقه بالزلزالية الانعكاسية يعتمدون على برامجيات غايه في التعقيد لغرض تفسير هذه البيانات ولهذا الغرض فان هذا البحث يتعامل مع برنامج ريفلكس ٢٠٠٨ وهو برنامج بسيط التطبيق لتفسير بيانات الزلزاليه الانعكاسية مع كفاءة لاتقل عن كفاءة البرامجيات المعروفه في هذا المجال تم استخدام بيانات مساري زلزاليين في حقل المنصورية النفطي حيث تم تحديد وجود صدوع عكسية بعد اجراء عمليات المعالجه والفلترة حيث تحجز هذه الصدوع قمه طيه المنصوريه كمن غازي. هذه الصدوع العكسيه والتي تظهر في الطرف الجنوبي الغربي لطيه المنصورية تظهر كذلك في نطاق الطيات العالية حيث تعتبر صدوع انزلاقية جذبية تحدد طرفي الطيه حيث تنشا عن حركة احتكاكية على صخور القاعده.

Introduction

Seismic reflection survey was conducted at many places in Iraq. These were in the eighties and nineties; however the analysis and processing of these data were not done perfectly due to many reasons. Recently the seismic reflection data were gathered by international oil companies who tried to re-arrange and re-interpret these data. IPEX Cooperation Company [1] was one of these companies who worked on the seismic data of Iraq.

They gathered all the seismic data for Mansouriayah site, which is located about 100 kms NE Baghdad (Figure 1). They have used sophisticated software for seismic data filtering and processing. The resulted seismic maps and sections showing one or two reverse faults located at the south western limb of Mansouriayah Mountain (Figure 2 and Figure 3).

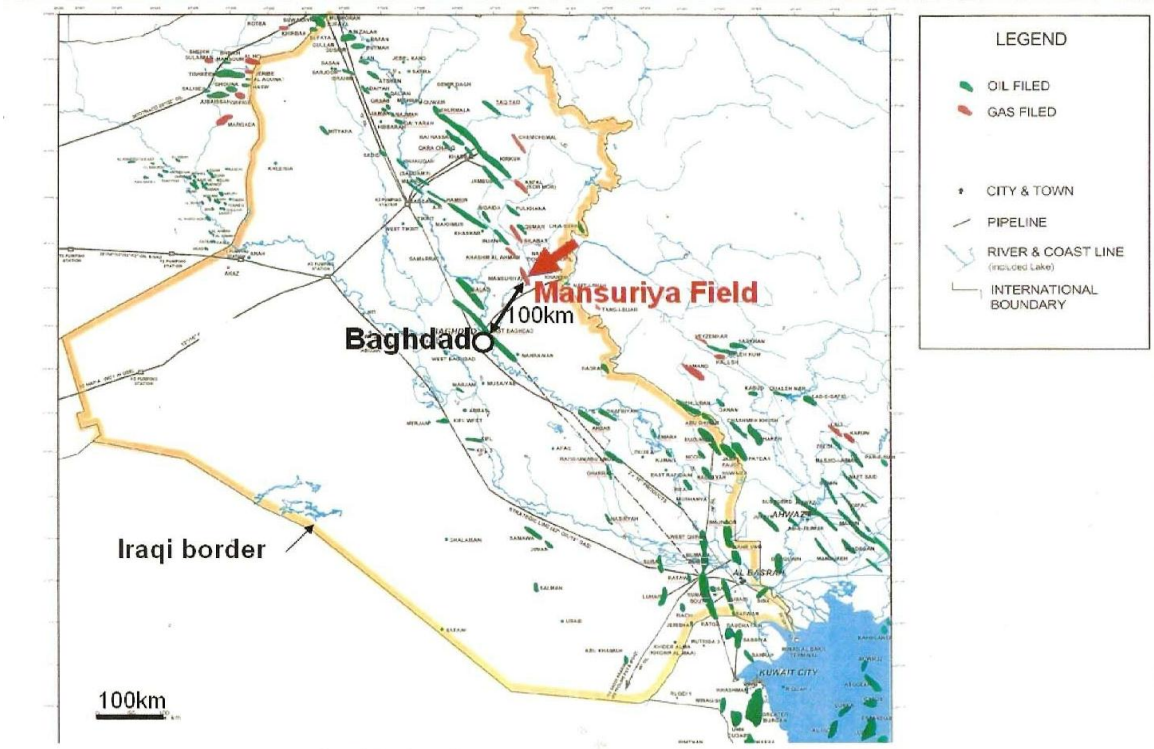

Figure 1: Location of Mansuriya Oil Field

Definitions of the interpreted horizons

Name	Color	Definition	Display Polarity	Correlation with well markers
Pink Horizon	Pink	The uppermost reflection in strong amplitude package near the top of the Lower Fars formation at the well locations	Trough	Near the top of the Lower Fars Fm.
Green Horizon	Green	The onlap-like reflection near the top of the Transition beds at the well locations	Peak	Near the top of the Transition beds
Light Blue Horizon	Light Blue	The reflection correspond to the top of the Jeribe Fm. at the well locations	Trough	Near the top Jeribe Fm.
Blue Horizon	Blue	The strong reflection about 100ms deeper than the Green horizon.	Trough	Intra-Dhiban Fm.

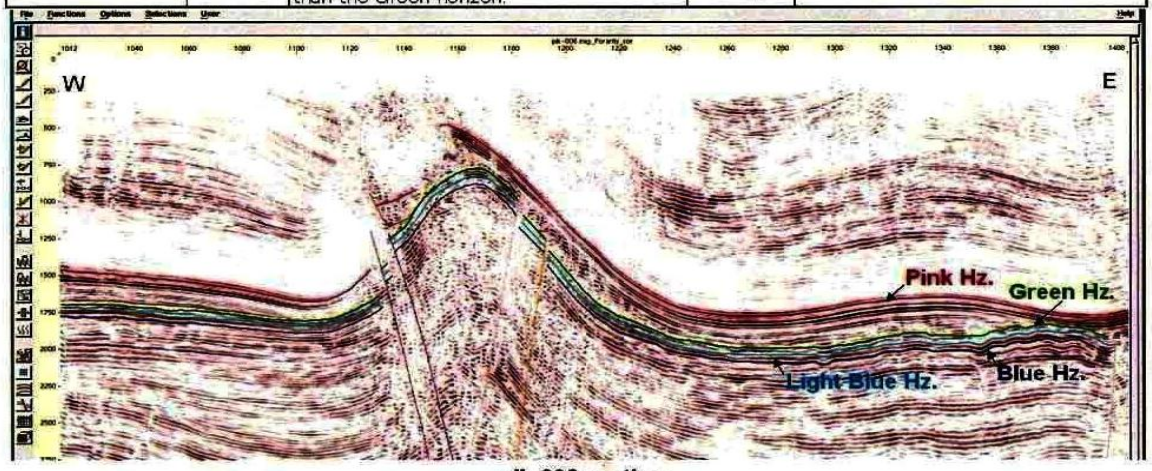

Figure 2: Fault set on the SW limb of Mansuriya (From IPEX 2007)

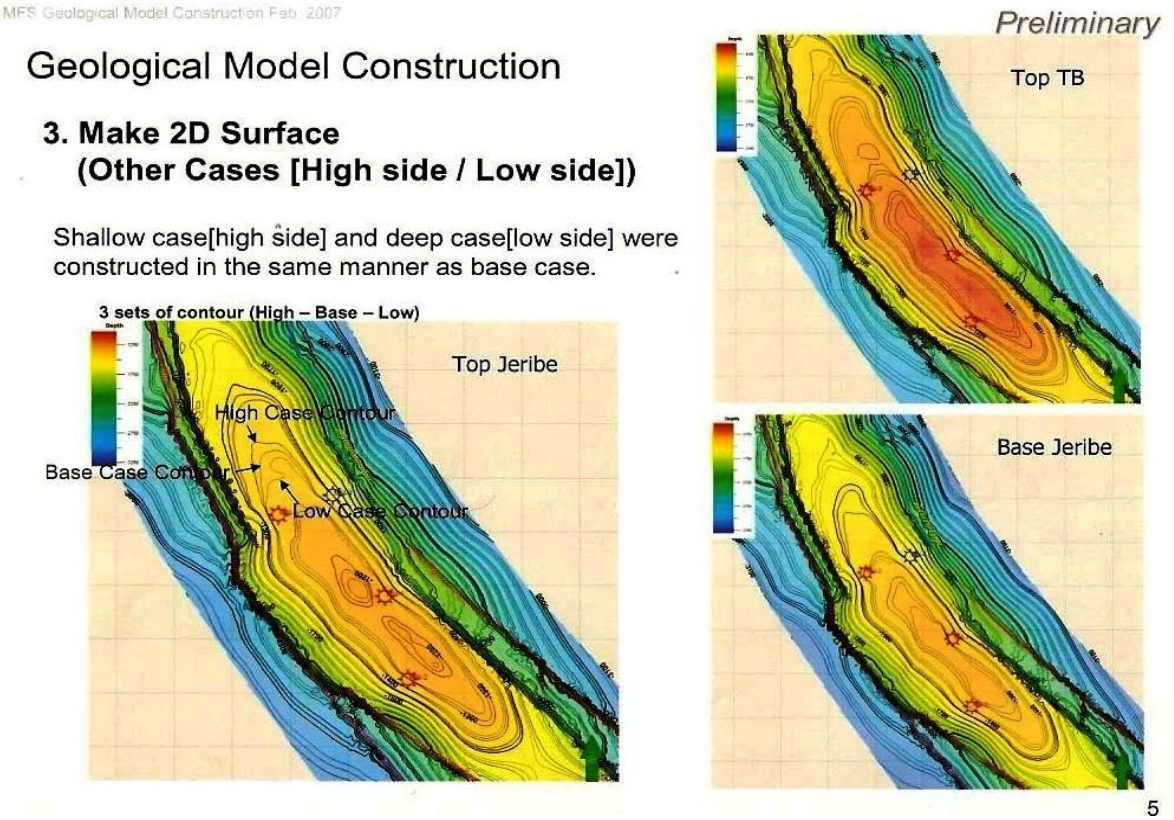

Figure 3: The two sets on the SW and NE limbs of the Mansuriya Fold (from IPEX 2007)

Seismic Line Analysis and Processing

Two seismic lines were obtained from Mansouriayah oil field area. The coordinates of these lines are:

34.42890 Lat, 44.53775 Long - 34.70096 Lat, 44.965279 Long

34.15081 Lat, 44.71477 Long – 34.44466 Lat – 45.04356 Long

The seismic data of these two lines were corrected for CDP from 2020 to 2900 and 2024 to 2640 for lines 1 and 2 respectively. These two lines are located at the NW part of the Mansouriayah fold belt they are so close to each other and appear in a bold thick line in (Figure 4) with a trend of SW toward NE. This is almost perpendicular to the fold axis (IPEX 2007).

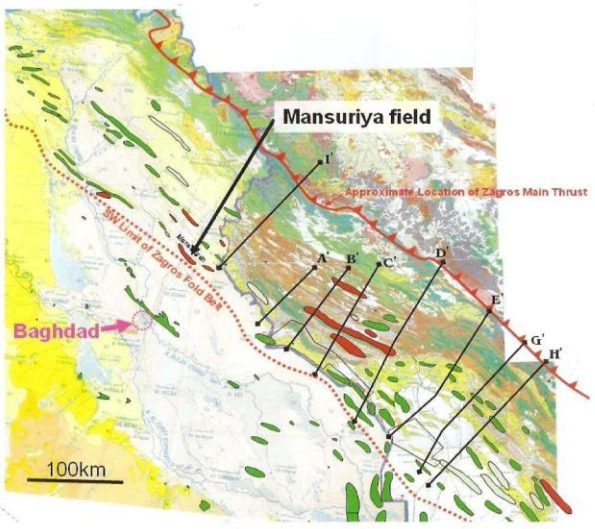

Figure 4: Location of the seismic lines at Mansuriya fold (from IPEX 2007)

The Reflex [2] software was used for filtering and processing the seismic data of these two lines. Figure 5 shows the main filters and processing that can be conducted by this software (5-A before processing < 5-B after processing).

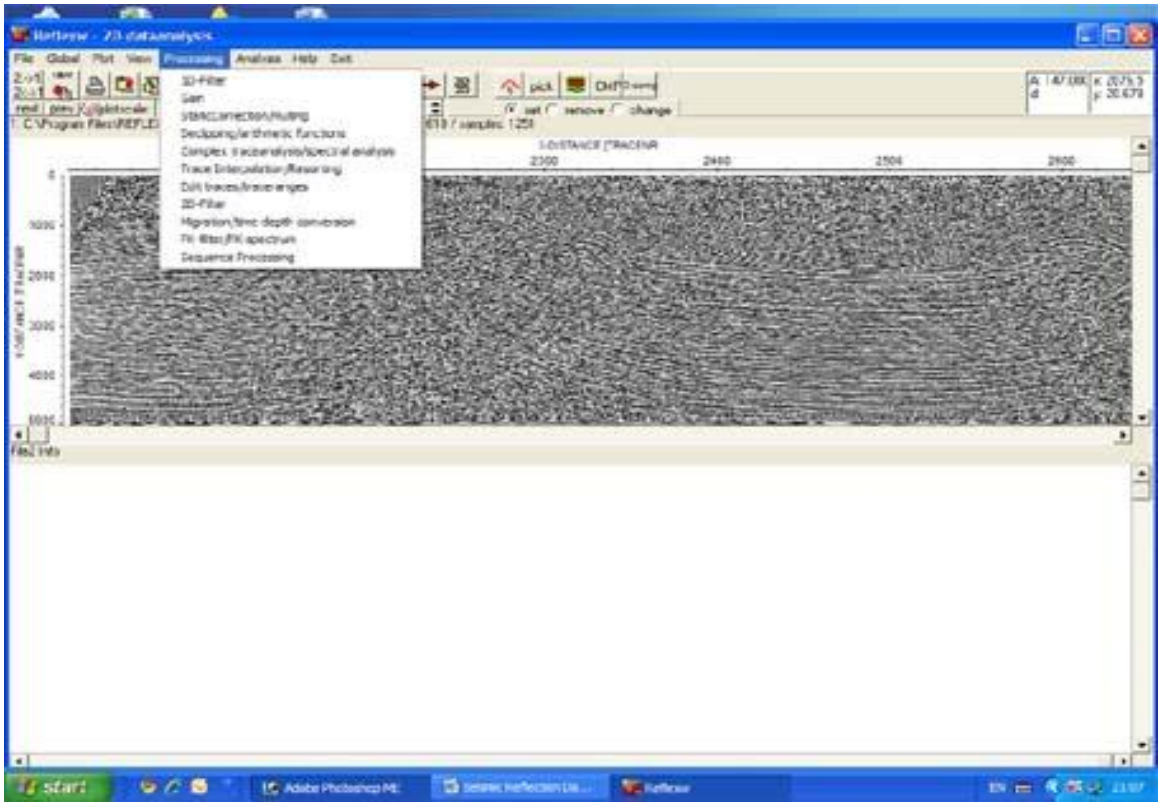

Figure 5-A: before processing

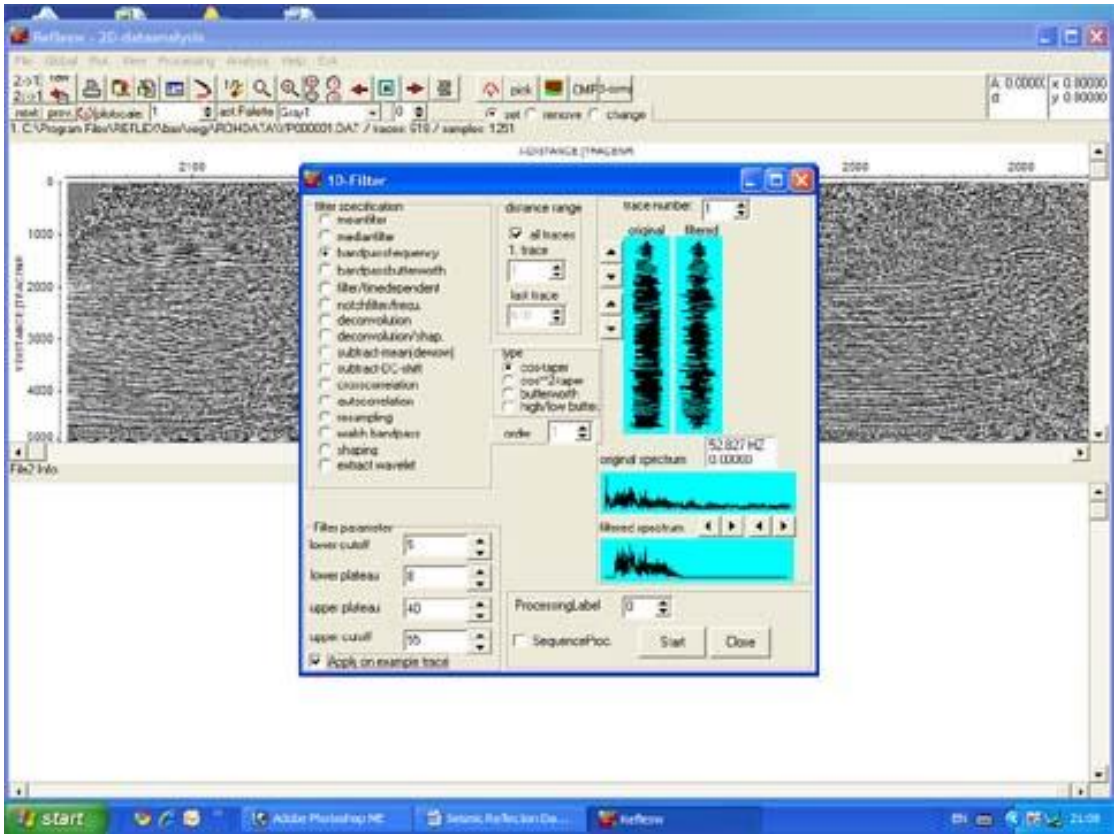

Figure 5-B: After processing

Figure 6 shows the seismic section of line -1. In this section the filtering was concentrated on the main faulted area at the fold axis. The section shows clear fault set that start as one fault then divide into two branches. These two reverse faults cause clear displacement around the fold axis.

The IPEX Cooperation [1] report has clearly indicated that the Mansouriayah structures are effected by two sets of faults (Figure 7). However in this seismic section only one set was detected, which is on the south-western limb of the fold. The north-eastern limb has not shown clear faults.

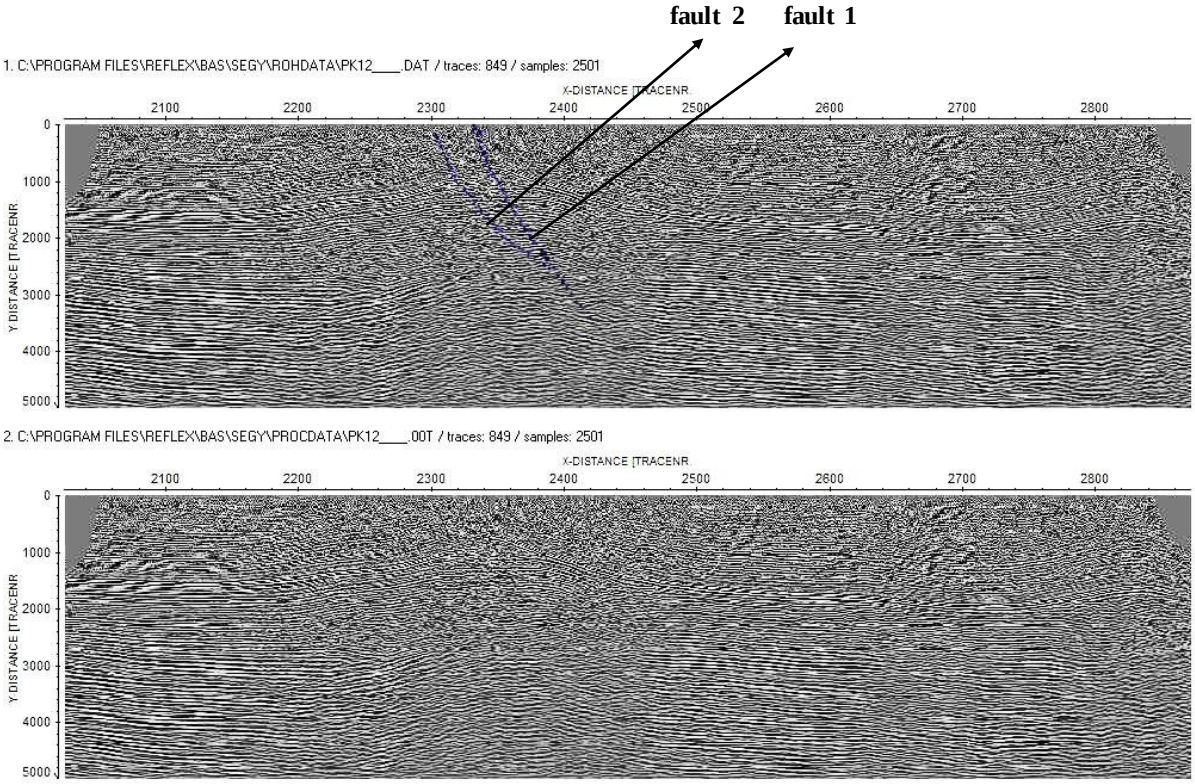

Figure 6: Seismic section for line 1 and 2

Consideration about the forming of the Mansuriya structure

3. The reverse faults were formed in northeast of the structure and the blocks between the faults were elevated. Therefore, mass in the "mobile layer" (which lies on the Green horizon) **is partly pushed out to both sides of the structure.**

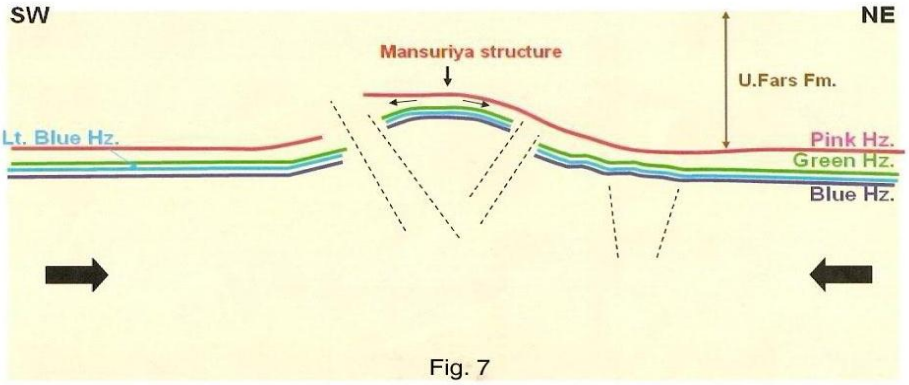

Fig. 7

Schematic interpreted section around the Mansuriya area post mid. Miocene – No.2 (from IPEX, 2007

Show fault 1 only

Omer [3] in his geological survey for the NE part of Iraq found that most anticlines are surrounded by two sets of faults. A set of reverse faults can be found on the south-western limb. While, normal faults sets can be found on the north-eastern limb. In fact the two sets are not reverse or normal they are simply collapse faults as results of the deep faults that rose up from detachment movements in the basements rocks and lower crust.

It seems that Mansouriya fold belts are developed in the same way as the High Folded Zone structures. They are folds which are built by faults that came from the detachment movements of the basement rocks.

Conclusion

The seismic raw data can be processed by using Reflex (2008) software. This software can deal with huge data and gives good results. In this study the seismic line-1 data has shown a clear set of two faults that cause a clear displacement. Filtering and processing of the raw data was done by Reflex software.

It seems that Mansuriayah structure is part of the regional structure type of the NE and E Iraq. The fold belts are developed by deep faulting which came from the detachment movements with the basement rocks and lower crust.

References

1. IPEX Cooperation **2007** General Geological Settings and Seismic Interpretation, *The Integrated Technical Study for Mansuriayah Field, Internal report, Mitsubishi Cooperation*.
2. Refex-Win **2008** Version 5.05, Sandmeier Software, Karlsruhe, Germany
3. Omer, A. A. **2007** Geological and Tectonics Settings of Shakrok, Safen, Shekh-Wasanan anticlines, Kurdistan, NE Iraq, Unpubl. PhD Thesis, Salah Aldin University, Erbil.