

Anticline axes displacement between Fatha and Jeribe formation of structures In the south Hemreen area (Central Iraq) from seismic evidence

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ABSTRACT

The present study is concerned with interpretation of the available seismic data in the South Hemreen area (Central Iraq), the aim of this study is to measure the amount of apparent anticline axes displacement between Fatha Formation (surface) and Jeribe Formation (sub surface), The maximum of the value is noted at the crest of the anticline, so 1250m, 1350m, and 2800m at crest Injana, Khashem Al-Ahmar and Munsuria anticlines respectively. While the horizontal stress (NE-SW) was lead to folded and faulted the sedimentary cover and displace the Fatha Formation horizontally, where its salty rocks played an important role in this displacement.

Introduction:

The study area contains the linear anticline structures having NW-SE trend. These anticlines are a symmetrical horst type, doubly plunging, officiated by minor and major faults as well as this anticline shows swing movement around their axes as in the case of Injana anticline (1, 2) .

The shape of the structures below the Fatha Formation (Middle Miocene) is differ from what is known to exist at the surface . This situation is probably occurred due to the horizontal compression forces produced during Plistocene which may led to folding and generation of thrust faults . The evaporate beds play an important role in increasing the lubrication which cause the displacement motion between different under the effectiveness of tectonic forces (Fig.1), (3,4).

The study area (Fig.2) occupies some 2400km² and lies south Kirkuk city in the folded zone of Iraq (5) between latitudes (34 38 & 33 55)N and longitudes (44 15 & 45 12) E. Tectonically the under study is located within the unstable shelf (the Mesopotamian force deep) in the Middle and alpine geosynclines of Zagros mountains (5). The unstable shelf characterized by sedimentary cover, however prominent folds are prevailed and divided into two zones, Mesopotamian zone which characterized by its long and widely spaced anticline separated by broad and shallow synclines, and the high folded zone which characterized by its high regularly distribution .

Abd,1989 (6) studies the same area , shows that the values of horizontal displacement ranges between 3100m in the centre of Saadia anticline to 50m in the West Tharthar lake, where the maximum value present in the direction of its plunges and the

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values of this displacement are generally reduce from SE to NW direction.

The seismic method in structural and stratigraphic studies has not been related directly to the discovery of hydrocarbons, but more indirectly in casting light upon the depositional environment and history of the deposition in the areas where exploration is being carried out (7).

The ultimate aim of the whole seismic survey is to work out the corresponding subsurface geology. The aim of this study is to determine the values and amount of the anticline axes displacement between Fatha and Jeribe Formations of structures south Hemreen area .

INTERPRETATION OF SEISMIC DATA

31 seismic lines were carried out in South Hemreen area towards the attitude of the existed structures . The dip lines have been recorded with (24%) fold coverage, mean while the strike lines were covered with (12%) folds . In order to reduce ambiguous features which may develop in certain seismic sections and came out with the right geological solution, certain additional processing may be made.

Two identified seismic reflectors are fair to good quality . For the purpose of this study, intension is directed towards Fatha and Jeribe horizons . Firstly,

a seismic interpretation is performed to identify the structural configuration for both horizons misties have been measured and corrected, however, isochrones maps were also constructed (Figs. 3 and 4) .

Using the results of velocity analyses data (stacking velocities) and well velocities, two average velocity maps have been constructed to the top of the Fatha and Jeribe reflectors for the South Hemreen area (Figs. 5 and 6) .

These two maps are used for the conversion of data from time to depth map for both reflectors . Moreover, this is useful for the next step, amount of the displacement between the two axes of Fatha and Jeribe reflectors was also a single map determined, two depth maps were constructed in depending upon isochrones and average velocity maps for the above reflectors(Fig. 7). .

DETERMINATION OF THE DISPLACEMENT :INJANA ANYICLINE:

The apparent displacement for this structure around well (Injana-5) has its maximum value of 1250m at the crest and decrease towards its plunge . It shows a value of 550m at the SE direction while a value of 850m is observed at the NW.

KHASHEM AL-AHMAR ANTIC- LINE:

The apparent displacement for this structure

decaled near well (Khashem Al-Ahmar- 2) . A maximum value of 1350m is seen at the crest while minimum value of 800m are noticed, is going a way from the culmination towards the plunges .

MANSURIA ANTICLINE :

The apparent displacement for this structure is near well (Mansuria- 1), seems to vary between (200m-2800m), the minimum value 200m occurs at the SE of the structure, while the maximum value of 2800m occurs in the crest .

The composite depth map (Fig. 8) shows that the axes of Fatha and Jeribe formations are oriented in the same direction i, e NW-SE and no major twisting was observed . This map shows that both axes of horizons exhibit bending towards SW . This observation indicates that the origin of displacement may be due to horizontal force directed from NE to SW consequently . The thrust faults seem to be confined within the near surface formation (8), where its salty rocks played an important role in this displacement.

CONCLUSION:

The following remarks could be established:

- 1- The maximum values of the apparent displacement between axes of Fatha and Jeribe formations are noticed at the crest of the

anticlines, and decrease toward the plunges.

- 2- Maximum values of displacement of 1250m, 1350m, and 2800m while the minimum values of 550m, 800m, and 200m for Injana, Khashem Al-Ahmar, and Mansuria anticlines respectively .
- 3- The horizontal compressive acting from NE – SW, lead to folding process addition thrust faults are limited to the near surface formation to the increasing of the value of apparent drift, where salty rocks played an important role in this displacement .

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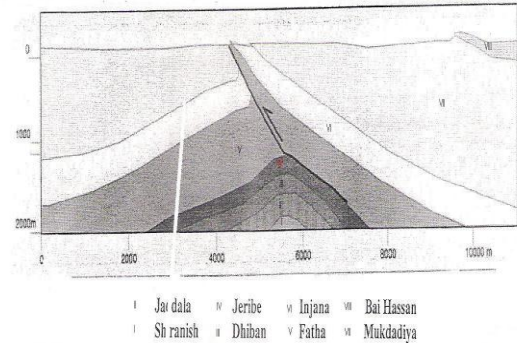


Fig. 1 : Cross section across Himreen South in the Injana area (3).

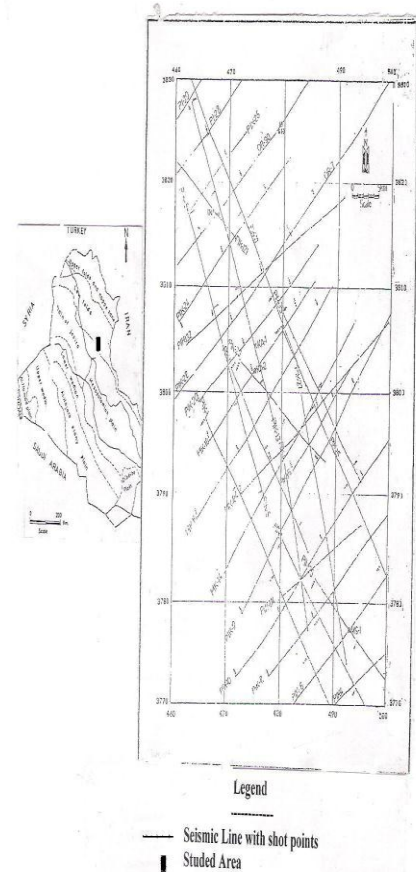
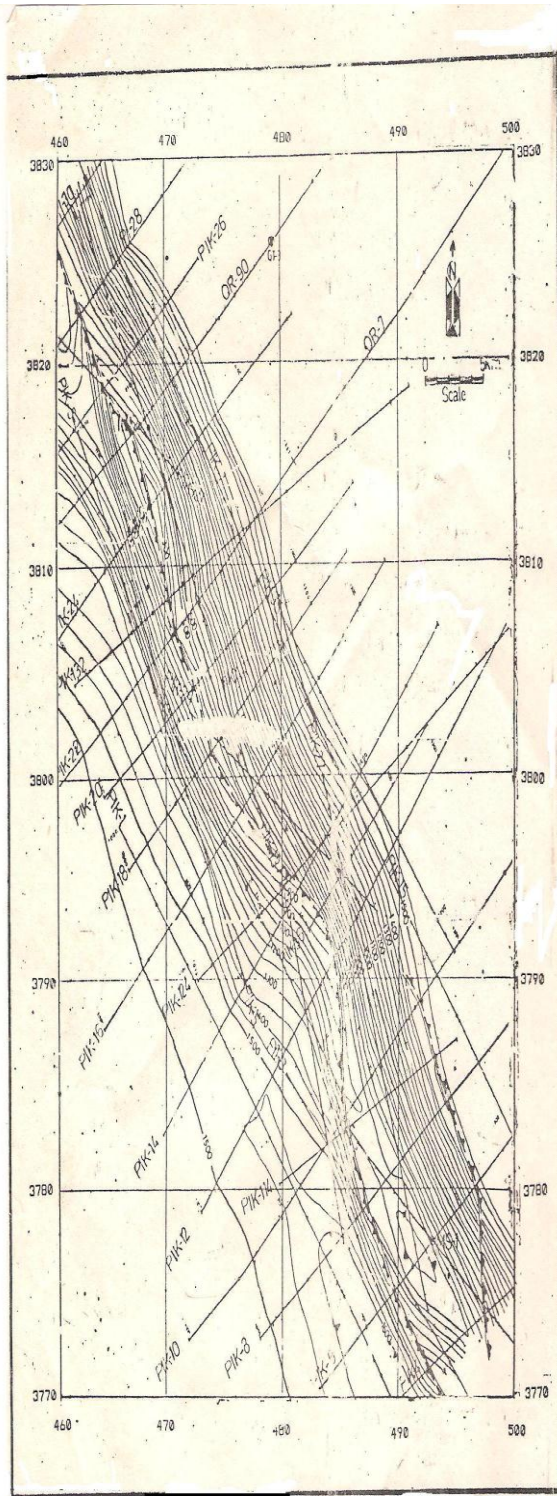
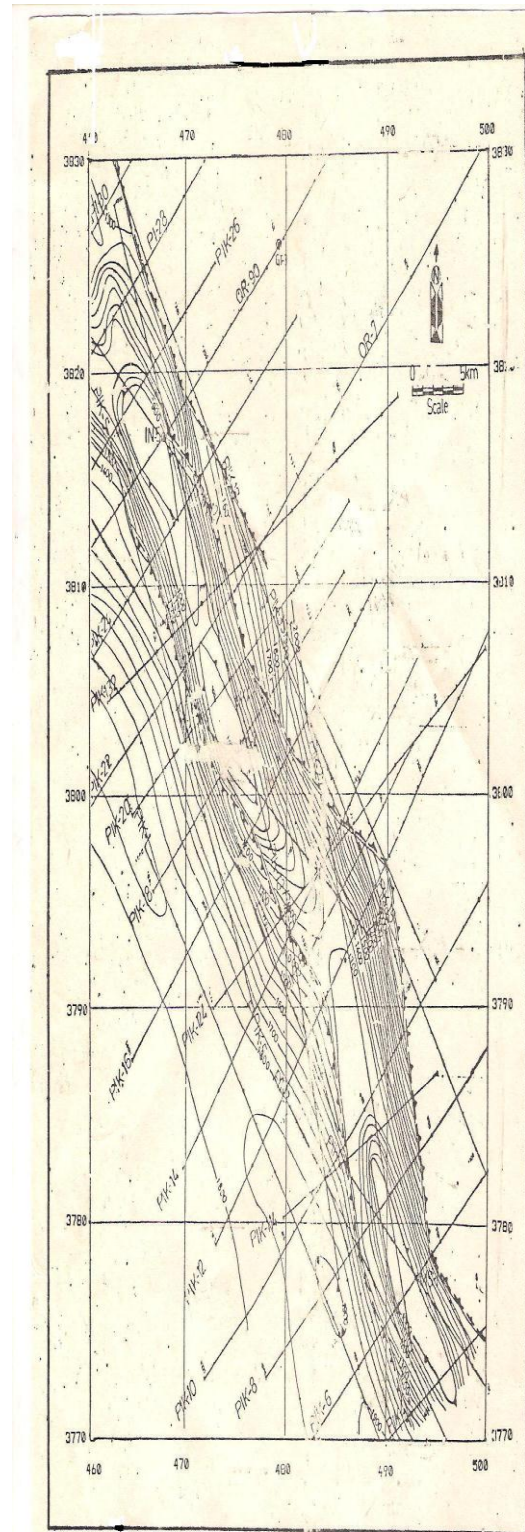


Fig. 2 : Local and Base Maps of the South Himreen Area



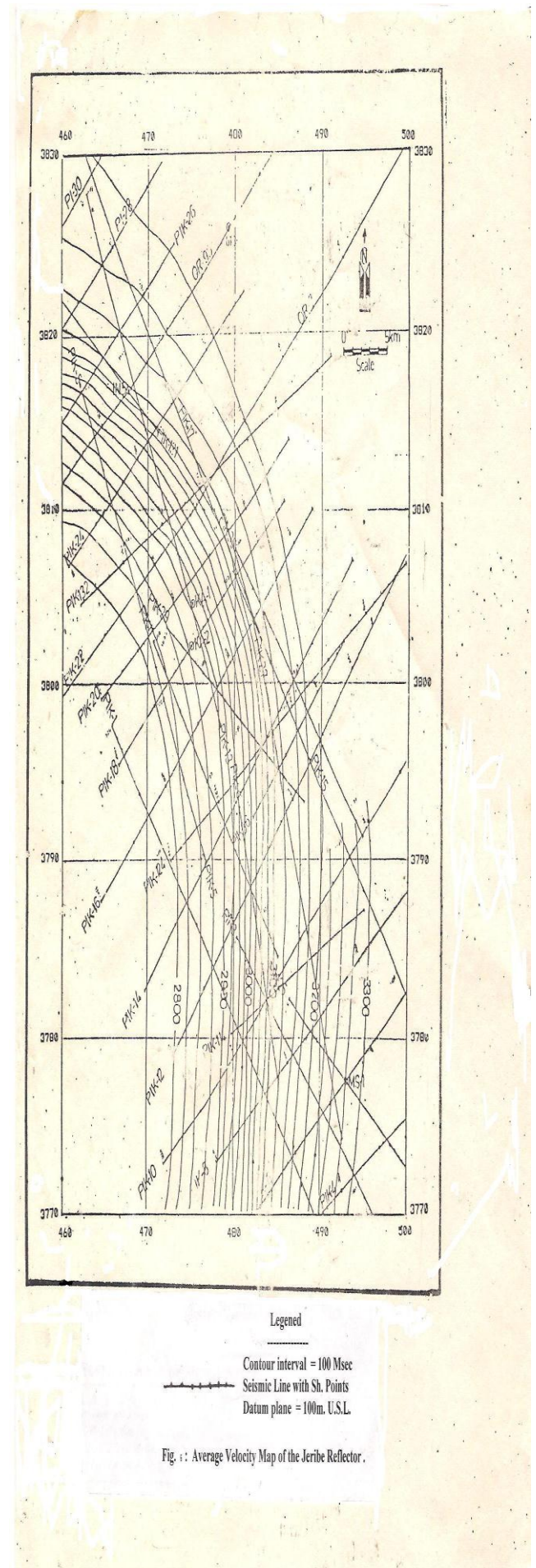
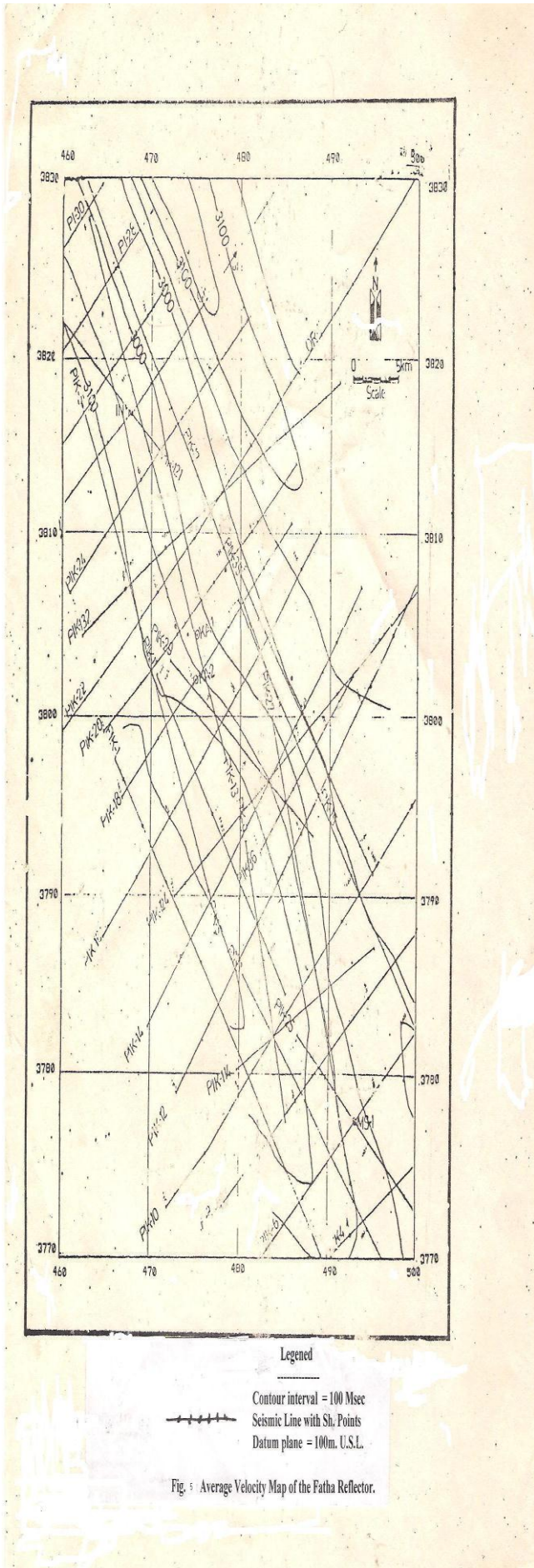
Legened
 Contour interval = 50 Msec
 Seismic Line with Sh. Points
 Major Fault
 Datum plan = 100m. U.S.L.
 Two way time high
 Two way time low

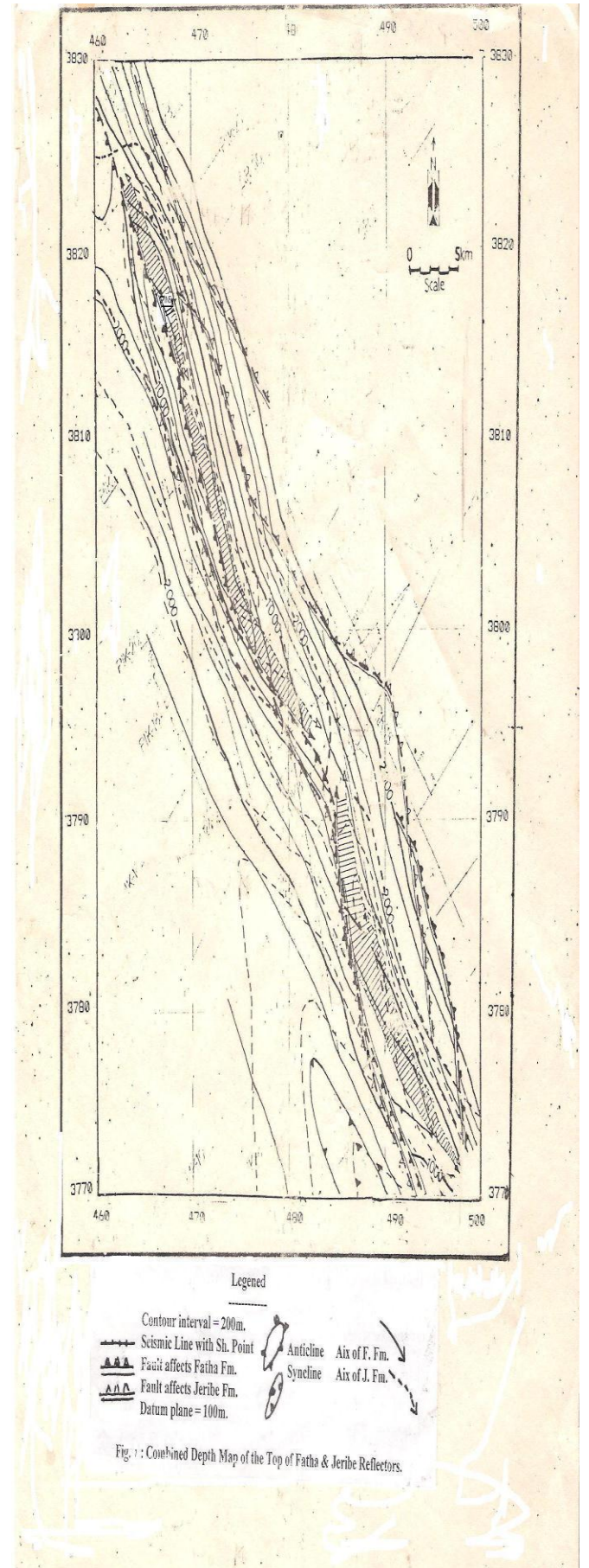
Fig. 3 : Isocrone Map of the Top of Fatha Reflector.



Legened
 Contour interval = 50 Msec
 Seismic Line with Sh. Points
 Major Fault
 Datum plan = 100m. U.S.L.
 Two way time high
 Two way time low

Fig. 4 : Isocrone Map of the Top of Jeribe Reflector.





ازاحة محاور الطي بين تكويني الفتحة والجريبي لتراكيب منطقة حميرين الجنوبي (وسط العراق) باستخدام المعطيات الزلزالية

خالد شهاب المختار علي مشعل عبد

الخلاصة:

تمثل الدراسة الحالية تفسيراً للمعلومات الزلزالية المتوفرة عن منطقة حميرين الجنوبي (وسط العراق) والتي تمت تغطيتها بشبكة من الخطوط الزلزالية. بهدف قياس قيم الزحف بين محاور الطيات المتمثلة بتكوين الفتحة (فوق السطح) عن محاور طيات تكوين الجريبي (تحت السطح) والتي كانت قيمها القصوى ١٢٥٠م، ١٣٥٠م، و ٢٨٠٠م عند قمم طيات التراكيب انجانة والخشم الأحمر والمنصورية على التوالي. والقوة الضاغطة الأفقية من الشمال الشرقي الى الجنوب الغربي هي المؤثرة في الطي الحاصل إضافة الى الفوالق الأندفاعية التي عملت على زيادة ازاحة التكوين السطحي نسبة الى التكوينات العميقة بمساعدة الطبقات الملحية لتكوين الفتحة التي لعبت دوراً مهماً في هذه الأزاحة.