IOSR Journal of Engineering (IOSRJEN) **www.iosrjen.org**
ISSN (e): 2250-3021, ISSN (p): 2278-8719
Vol. 06, Issue 03 (March. 2016), ||V2|| PP 22-26

A Study on the Well Combined Shock Structural Interpretation in the East Block of Chao 202-2

Liu Jiyu[1], Guo Xiaochen[2], Li Wei[3], Sui Chenglong[4]
[1,2] *（College of earth science of Northeast Petroleum University, Daqing, Hei Longjiang,China）*
[3] *(Geologging Company,Shengli Petroleum Engineering Co.Ltd.,SINOPEC;Dongying 257064 LI Wei）*
[4] *（CNOOC EnerTech-Drilling&Production Co.,Tianjin 300452 SUI Cheng-Long）*

***Abstract:* -** Well combined shock structural interpretation has become an important technology in oil and gas exploration and development, Structural interpretation in the past mainly on the basis of early 2D seismic interpretation results combined with wells drilled breakpoint to carry out faults and structure interpretation, it can not meet the need of oilfield fine potential since the lower combination rate of the breakpoints. Application of well and seismic structure interpretation, combined with the similarity coefficient, well breakpoint guide, multi-window technology linkage comprehensive study, in order to achieve structural interpretation of the results of the closest underground real situation, improve the accuracy of structural interpretation, can find out the whole configuration and fault features, implementation potential fault edge, guiding the corresponding measures for deployment.

***Keywords:* -** *Well seismic combination, Tectonic interpretation, The breakpoint, coherence*

I. HORIZON CALIBRATION

Horizon calibration is the key and basis of structural interpretation, which is also the bridge that connected with seismic, logging and geology. The accuracy of the formation is directly related to the success or failure of reservoir prediction. It is possible to use seismic data to describe the geometrical shape and other parameters of the reservoir more accurately, only if the horizon is accurately calibrated. There are many methods of calibration, such as average velocity, VSP, and synthetic record, but the most common method is the synthetic record calibration method. According to the drilling in the eastern region of 202-2, the well of Fuyu oil reservoir has many characteristics. First, the curve of sound velocity corresponding to the top of the Fuyu reservoir is obvious. Second, the well of Fuyu oil reservoir has many holes. Therefore, the calibration of the standard layer and target layer is mainly based on two methods, the average speed of the method and two methods of manual synthesis.

1.1basic principles of horizon calibration

The main method of producing synthetic seismic records using acoustic logging curves is: First, the synthetic record is compared with the well side seismic trace, finding out the corresponding relationship between the main wave group FⅠ、FⅡand FⅢ; Then，to make appropriate corrections for acoustic log curve with the time and the thickness of the seismic trace that are the standard. Thus，ensure the best matching between synthetic records and the well adjacent seismic traces. The principle of selecting the synthetic seismic record well in this area is:

1. The seismic profile of the well is reliable, and the single well is located in the middle part of the fault block as far as possible.
2. Logging data is reliable and the well logging data is longer, which drills through the Fuyu oil layeas as far as possible
3. It is distributed in different representative sedimentary facies belts or different seismic facies belts.

1.2 Calibration process and method

1.2.1 Wavelet selection test

It will obtain different synthesis records that don't match the actual profile, Using the same acoustic logging curves and the different wavelet production. So we use different wavelet test, it makes a synthetic seismogram contrast test between beside the actual well seismic trace extraction minimum phase wavelet and zero phase wavelet with the Ricker wave. After a lot of test work, interval (Fuyu oil layer corresponding to the f I, f II, F III Group reflection layer) extracted from borehole side seismic trace zero phase wavelet to make synthetic seismogram most wells and the actual borehole side seismic trace is well matched . A few wells using Ricker wave synthetic seismograms and the actual borehole side seismic trace is well matched. Therefore, it makes a synthetic record with different geologic features in the area by using these two methods (Figure 1-1).

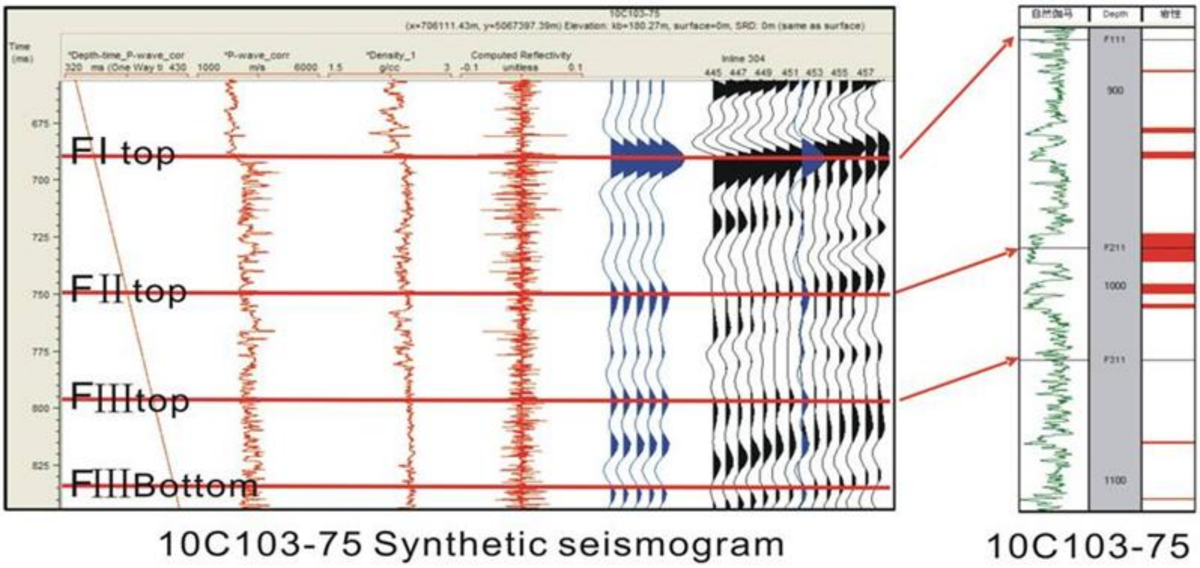


Figure 1-1 10C103-75 synthetic seismic record

1.2.2 Horizon calibration of well profile

In order to further test the accuracy of calibration based on single well synthetic record calibration, each well in the three-dimensional data volume is used as the connecting well line, and it check whether the well is calibrated to the same layer. If there is not consist with the layers of the wells, analyze the velocity curve or re calibration, reproduct synthetic records to the anastomosis. In the end, the layer of the synthetic record is chased to the same level in the three dimensional data body.

II. INTERPRETATION METHODS AND TECHNIQUES

2.1 Identification of small faults with multiple sets of data bodies

Interpretation of fault plays an important role in structural interpretation. On the basis of the in-phase axis and wave group fault, reflecting structural change, fault section wave, phase transformation, phase axis distortion, bifurcation, merger or other traditional fault identification of fault interpretation is still a kind of effective and reliable means.

Due to the faults in this area very well developed with many faults and fault distance is small, the extension is short, characteristics of fault is complex .Therefore, the fault interpretation gives full play to the advantages that three-dimensional data profile features is clear, three-dimensional data body space is continuous and interpretation system display has flexible and diverse means. In order to improve the accuracy of fault interpretation that not miss a small fault of about 5 meters, we used multiple sets of data to explain the fault. The technique uses three dimensional data to interpret the data, particularly the attention to the interpretation of small faults and the discovery ,with different angles among the plane, section and space.

2.1.1 Interpretation technique of plane fault

Plane fault interpretation techniques include seismic data body time slice interpretation technique, coherence time slice interpretation technique and edge detection technique. Using these techniques can be rapid and simple for section closed in three-dimensional space, quickly and accurately reflect the fault plane distribution characteristics, smaller fault can be showed more clearly (Figure 2-1).

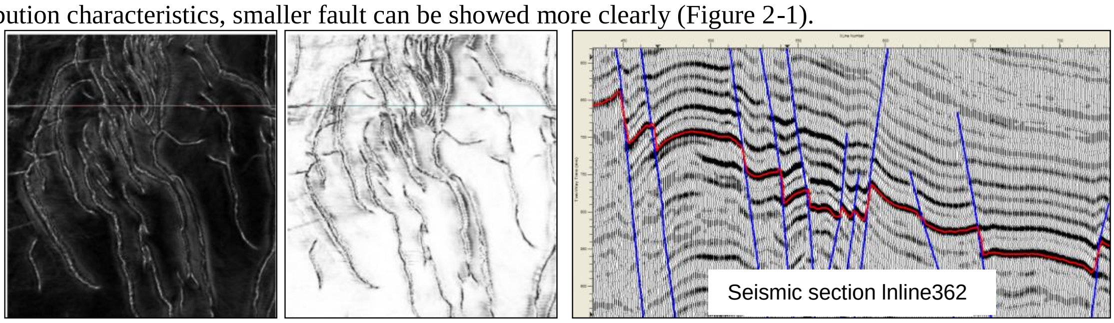


Figure 2-1 fault plane interpretation

2.1.2 Section fault interpretation technique

Sectional fault interpretation technique refers to the combination of parallel multi line interpretation technique, joint interpretation technique of arbitrary line, and the interpretation technique of longitudinal. Using this technique can determine the section and the plane position of the fault.

2.1.3 Spatial fault interpretation technique

Space fault interpretation technique refers to 3D visual interpretation technique. Using this technique to carry on the fault combination, can directly reflect the spatial distribution characteristics of the fault and the relationship of mutual transfer, which can visually check and verify. The method plays an important role in identifying the small faults, the end point of the fault, the contact relationship of the faults, the breakpoint combination of the fault location and the reduction of the interpretation of the faults.

2.2 Three dimensional fine interpretation technique

In the process of constructing the explanation, we mainly adopt the "three dimensional structure" fine interpretation technique ". This technology includes: full 3D structural interpretation, 3D visualization interpretation, 3D visualization interpretation and verification technology, 3D visualization technology. Application of the above technology in the interpretation make full use of the characteristics that workstations can flexiblely use a variety of attribute data, encryption interpretation of the grid; It Can stretch and compress section; can observe any line, horizontal slice, three-dimensional body, and so on, in order to ensure that the formation of small fault block layer, so that the the results of interpretation is more close to the actual geological situation (Figure 2-2).

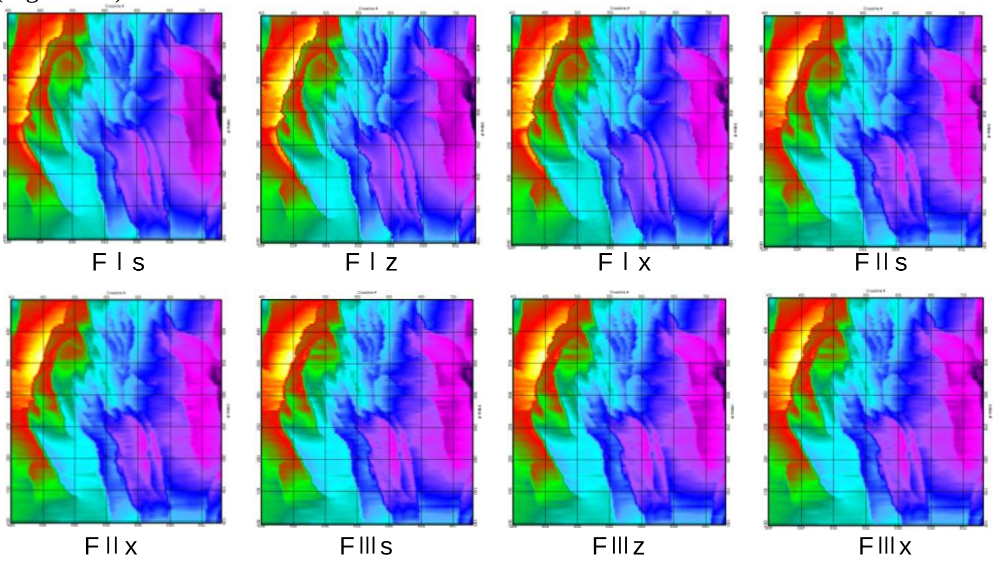


Figure 2-2 top surface interpretation results of 8 sandstone groups in Fuyu oil layer

2.3 Variable speed mapping technology

In order to accurately implement the small fault, micro structureand and take into account the vertical and horizontal velocity of the area, using variable speed mapping software to build the speed field to achieve the speed of the map. The main principle is to establish the velocity field by the combination of seismic interpretation horizon and drilling data by using the method of horizon constraint. With the above method, the average velocity field of F I s, F I Z, F I x, F II s, FII x, FIIIs, FIIIz, F III x have been achieved and carry out the time depth conversion of the T0 map, then the depth map was obtained. The main advantages of variable speed mapping:

1. The range is large: the place where the seismic horizon is interpreted can be controlled.
2. The accuracy of the velocity is high: the value of the velocity is accurate and the velocity field is reliable.
3. The depth conversion is accurate: the T0 value is converted to the depth value is accurate and reliable, the error is small.

2.4 Structural interpretation accuracy error analysis

Due to the use of multiple sets of data body combined interpretation of fault technology, three-dimensional structure of fine interpretation technique and the establishment of three-dimensional velocity field variable velocity mapping technology, thus improving the structure and fault interpretation accuracy. Compared with the structural interpretation of depth development wells relative depth error is less than 2 per thousand, which can meet the requirements of oilfield development.

2.4.1 Tectonic evolution analysis

According to the existing research results, combined with the fault development in this area, 4 types of fault formation stages (table 2-1) were established, and the formation stage of Fuyu oil layer was mainly fault in the middle and late stage and long-term.

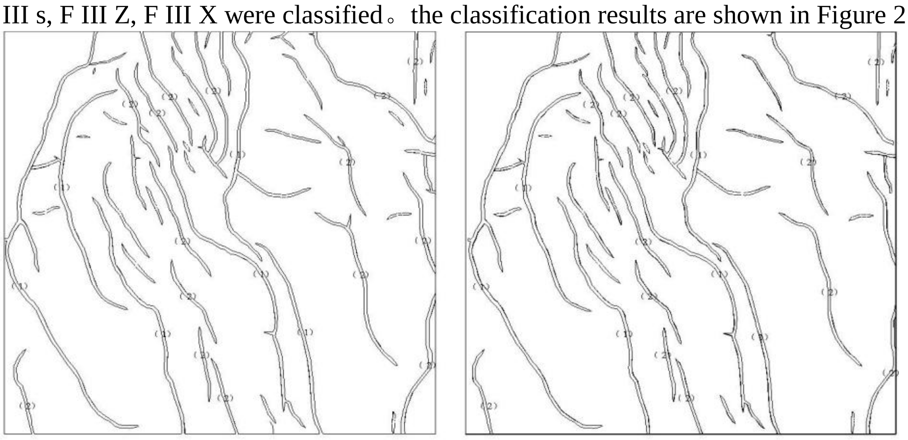
Table 2-1 fracture formation stage and classification table

Formation stage	Recognition feature	On deposition and accumulation	Fault level
Late fault	Break through the T2,generally terminate at the end of Fuyu, the fault of the layer is less	Controlled by these faults, a lot of fault block traps have been formed, which are controlled by these faults.	Three level fault
Three level fault	Break through T2, T3 to reduce the distance to the shallow layer, the majority disappeared in the Yao family group	It controls the formation of all kinds of traps in Fuyu oil layer, and provides the advantages of oil and gas migration.	Two level fault
Long-term fault	From the base has been broken through to T1 or even more than T2	On the one hand, the formation of regional structures and traps is controlled, on the other hand, the formation of secondary faults can be controlled as well as oil and gas migration pathways.	Primary fault

The fault of Fuyu oil reservoir is mainly in the early and late development, which is distributed in the inner of the spring head group, and the top of the F is broken. Due to the control of these faults, a large number of fault block traps are formed. Long term faults control the formation of the study area, generally the base has been broken through the T2 (F I top) growth fault, local faulti s close to the surface.

Long term faults control the formation of the study area, generally the base has been broken through the T2 (F I top) growth fault, local faulti s close to the surface. On the one hand, the formation of structural traps is controlled, on the other hand, the formation of secondary faults is also controlled. This fault can be the migration pathway of oil and gas, and it can also be a factor of the hydrocarbon accumulation in the oil and gas reservoirs.

According to the tectonic evolution characteristics and fault classification, the faults of F i s, I Z, I x, F I F, F II s, F II x, F III s, F III Z, F III X were classified。the classification results are shown in Figure 2-3.



Annotation:(1)Long-term（2）In the early （3）In the late

Fig2-3 distribution of fault phase in

The faults in the study area are mainly in the direction of the north and south, which is composed of the obvious banded fault zone. Fault and its main characteristic is quantity, small scale, fracture system complex, in the section graben and horst interphase structure pattern; different stages to different faults in the space formed complex fault system.

III. CONCLUSION

(1) From the horizon interpretation results, produced by the use of borehole extracted wavelet synthetic seismogram and well bypass correlation is highest, which can accuratly identify each sand group earthquake corresponding characteristics. At the same time, it also can provide reliable geological model for the subsequent reservoir prediction.

(2) From the fault interpretation results analysis, the faults of the study area are mainly to break away from 5-15m normal faults developed. The strike of the fault is basic nearly S-N oriented. It can effectively identify the fault by using time slice interpretation technique, coherent time slice interpretation technique and the edge detection technique.

(3) According to the regional evolution characteristics of fault zone can be divided into 3 stages. long-term growth faults and early faults mainly control the development of all kinds of traps in the study area, and migration of oil and gas of the main channel among them.

Journal Papers:

[1] Gregor P. Eberli, Jose Luis Masaferro, J. F. “Rick” Sarg. Seismic imagine of carbonate reservoir and system [J], AAPG Memoir 81,2004.

[2] Sloss,L.L. Sequences in the cratonic interior of North America [J]. Geol. Soc. Am. Bull, 1963,74:93~114.

[3] Connolly P. Elastic impedance[J]. The Leading Edge, 1999, 18(4):438~452.