

## Su Deer special structure with 3 d seismic data interpretation

Yuting Dong, Shizhong Ma, Rubin Li

College of Earth Sciences, Northeast Petroleum University, Heilongjiang, 163318, China

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**Abstract:** The Sudeerte tectonic zone research, through the production of the forty wells synthetic seismograms, accurate calibration of each structural layers and the corresponding relationship between seismic reflections. According horizon calibration, determine the T5 reflective layer is reflective top surface bedrock Budate group, and the overlying strata Mountains form a strong earthquake in the region to respond. By variance cube slice and layer slices along better identification of faults and fault distribution characteristics and laws. By creating layers and structural composite structure diagram graph to determine the area of structural characteristics and tectonic evolution. By constructing the characteristics of the deep rift with the bedrock structure raised by the control, showing two concave clip a long tectonic pattern, that is, from north to south of Rabaul Tolgoi syncline Sudeerte uplift, Ao mind syncline Long alternating concave presented. Developmental history of tectonic rift mainly for Bell as well as apparent Hailar Basin basement fault-controlled, multi breaking off small Au Au transitional basins.

### 1. Profile of regional tectonic characteristics

By high resolution 3 d seismic data interpretation, the implementation of the different reservoir top surface structure and fault development situation, find out the characteristics of tectonic development [1]. Steve souders buir lake depression structural belt is located in hailaer basin, belongs to the sag in the eastern fault terrace zone, the geographical position in Inner Mongolia autonomous region within the territory of surveillance, Steve souders, tectonic belt hinggan mountains oil layer on the surface of the roof structure of the bei 10, 12, bei bei 14, 20, bei bei 16 Wells in a line from north to east of relatively complete arched structure, including oil Wells are distributed on the uplift belt, inheritance of deep large faults developed in the edge of the uplift belt, uplift area form relatively favorable structural trap. Throughout the main development of the hinggan mountains near the north east and near north-south fault, the fault cutting each other, make further complicate structure, forming the block structure of different sizes.

The top surface of Budate reservoir is mainly uplift to the North East, where along the Bay in 12, 14, 20, Bei Bei Bei 16 area development main uplift belt, development of a secondary uplift along the Bay 22, Bei 16 area. The main uplift belt distribution of multiple oil-bearing fault blocks, are distributed in the main uplift zone flow well sude Erte area industrial oil. The area is mainly developed in the North East fracture, substantially parallel to the uplift, the maximum displacement of 800m, 15km in the maximum extended length. In the edge uplift belt, fractures are most developed.

The Sudheer Te tectonic belt of Xingan Ling reservoir types are sandstone and conglomerate, tuff, tuffaceous sandstone and conglomerate, and tuffaceous conglomerate, glutenite reservoir has strong sensitivity. Budate reservoir for the slight metamorphic sandstone, mudstone fracture cave reservoir, reservoir lithology, complex and uneven fracture distribution of reservoir recognition and the relationship of oil and water distribution is very complex.

Vertically in the reservoir heterogeneity is serious, the plane distribution is stable, according to the research results of the regional sedimentary characteristics, fan delta sedimentary body Xingan Ling reservoir Sudheer Te tectonic belt of different provenance sedimentary, reservoir lateral changes, therefore, requirements in seismic data interpretation, pay attention to the prediction of different oil-bearing formation of structural and sedimentary fan body in order to ensure the effectiveness of the design and implementation of the reliability and the development plan of the reserves calculation.



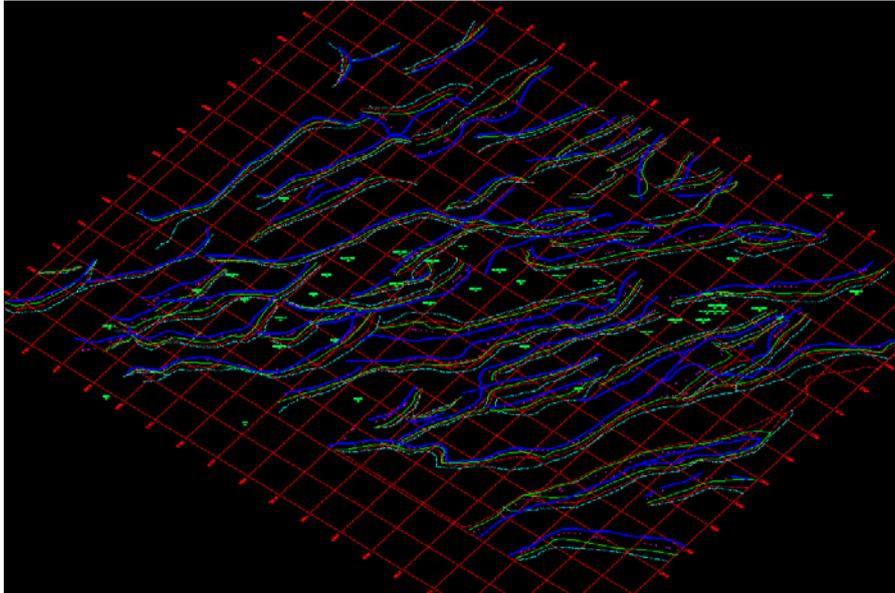


Fig. 2: Bei 16 Wells synthetic record

The explanation of budate group top layer for the purpose of (T5) and five hinggan mountains reservoir formation period, the structural fracture system basic similar, Steve souders, B8, B9, west of B10, B11, B3, B12 gradually transition to the en echelon arrangement, such as fault BaoErTao le cover syncline, the abnormal development of tectonic belt size fault formed the extremely complex fracture system, for acute Angle distribution in the west and the east for the echelon distribution.

From east to west, it seems, Y ", "order", "home", "graben" clearly these forms of fault distribution in the plane and on the seismic section (figure 4). The fracture on the T5 structural layer was very complicated, which mainly embodied in the local area is difficult to distinguish section T5 bedrock top surface, or indeed 2 face.

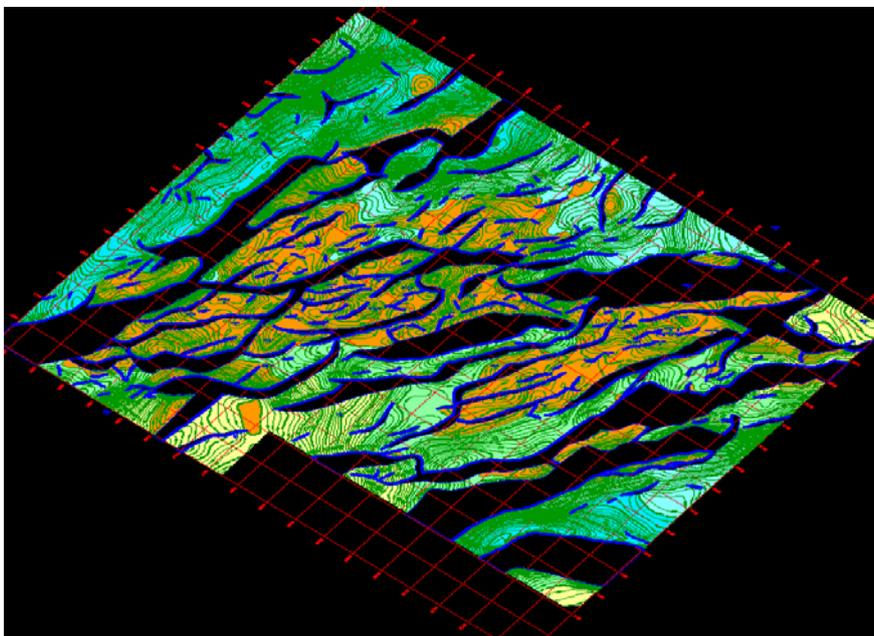


Fig3. T5 structure diagram

According to section and plane characteristics of fracture, fracture can be divided into the synsedimentary fault zone, fracture, fracture, early return late boundary die fracture [5]. Synsedimentary fault has obvious control effect to zone formation, late breaking is the most developed a fault zone, the oil and gas migration and the formation of local structure, control return fracture rupture surface is very clear, local slip is very small, that return the compressional reverse fault effect, boundary die early fracture of the hinggan mountains early sedimentary strata control role, after several times have been destroyed by the tectonic movement, the demise of the fault.

By identifying and combination of layer division and faults, the tectonic evolution history of the speculation. Baer and Hailar rift basin was a basement fault fault depression controlled multi sag fault sag transition basin less. Its main performance is: the synsedimentary faults control the formation of fault depression; the local structure of the main controlled by faults is very serious, so that the rift structures are well developed in the development of fracture strip.

Xing Mongolia Cenozoic geosyncline fold belt developed Baer depression, after a late Paleozoic early return, basement lithology is metamorphic rocks and granites.

Circum Pacific tectonic domain evolution stage started in Triassic period, due to the major sections of strenuous exercise extrusion impact, forming a lot from north to east deep fracture. To the late Mesozoic, because the mantle plume upwelling began gradually, India plate subducted northward extrusion, intense volcanic activity, gradually formed faulted depression.

Budate reservoir is the area of a more important oil-bearing series. The sandstone and mudstone fracture and cave reservoir reservoir resulting in extremely complex oil-water relationship. Its lithology is mainly metamorphic rock system.

The late Mesozoic J3-K1 phase plate collision is most intense, mantle plume upwelling climax, the most serious in Songliao rift tectonic deformation, and the Greater Khingan Range Mesozoic volcanic belt formed from the. Hailar basin is the product of our under the action of. That tension causing sideslip and the formation of basement fault. Gravity and magnetic data show that it is a basement fault and in the tension formed under the action of a half graben.

Xingan Ling sedimentary, by many later tectonic movement influence, formation suffered several fold, deformation, fracture and even local erosion, mainly in Tongbomiao formation of strong tensile action, rapid subsidence stage of Nantun Formation, the Damoguaihe Formation of stable tensile stress, shrinking return effect of Yimin group, make the Budate Group and Xingan ridge formation of tectonic features of today, a large number of faults and local structure formed in the late stage is mainly distributed in the Sudheer Te tectonic belt, and become the main places for hydrocarbon accumulation.

Structural interpretation (kinematics): reflect the seismic wave kinematics characteristics, mainly is the time of the reflected wave information, geometry information can be studied using the geological structure, spatial location, structural interpretation, searching for structural traps.

Structural interpretation: solve the problem of structure, spatial distribution and geometry of stratigraphical research, determine the fundamental basis for drilling locations, and also is the foundation of the follow-up work.

To determine the reflection standard layer, mainly based on the reflection characteristics of seismic profile, select the in-phase axis characteristics, combined with the geological explanation given its clear geological significance;

Wave comparison, applying the knowledge of the law of seismic wave propagation in aspect, the different section really belongs to the underground one formation reflected wave identified;

According to the characteristics of reflected wave in seismic profile, combined with a variety of typical tectonic style of analogy and analysis, interpretation of various tectonic geological section phase axis reflects is like, and related seismic response and formation mechanism etc.;

Results: according to the seismic profile interpretation map in the work area, make one of strata fluctuation structure map; and according to the relevant petroleum geological seismic information, make evaluation on its oil and gas.

### **3. The tectonic evolution**

Through strata division and fault identification and combination, the tectonic evolution history of [6]. Bell rift and hailar basin obviously for the basement faults control the transitional more sag less fault depression basin. Its main performance is: (1) synsedimentary fault controlled the fault formation; (2) the main local structure controlled by fault is very serious, so that the fault depression structure within the very development; Development on the fracture belt.

### **4. Summary**

Through the study on the horizon and fault interpretation and make the following conclusion. Research just Hinggan mountains in Budate reservoir formation and the main development in Steve Souders structure belt, the tectonic belt is located in the middle of Bei'er depression, is from the north east to distribution of inherited palaeohigh, development and on the basis of Budate group ancient uplift, divided into Steve Souders fault terrace zone of west and east uplift zone, composed of three tertiary structure, respectively Soviet-German west structure four constructs three structures, the Soviet Union, the Soviet Union, in between source subsags BaoErTao le cover and proud head. Steve Souders fault terrace zone of west near BaoErTao source subsags geller, eastern uplift zone near the source subsags proud head[7]. Hinggan mountains after the formation of sedimentary, after multiple tectonic movement, there are mainly copper bowl temple group strong tension, south Tuen group of rapid subsidence stage, big turn mill river group of stable tension, Yi Min group atrophy, return due to the formation after multiple fold, deformation, fracture, and even local denudation. The fracture of the broken to south Tuen set of above fault slip are relatively small, generally in 10 to 20 m, the area of fracture system as the role of oil and gas channel dominate, weaker damage. Of overlying strata is both source rocks and reservoirs, and also a good cap rock. Hinggan mountains and Budate reservoir of buried hill are distributed near the main control fault belt, which can be seen that the fault and buried hill location for its major reservoir is controlled[8].

Control of deep fault zone shortens the source rock and reservoir of Budate Group in Xingan Ling, bedrock weathering crust reservoir interlayer distance, the Nantun Formation source rocks of Budate Group reservoir, Tong Xing An Ling bedrock weathering crust reservoir connected by faults, direct lateral migration to Xingan hill reservoir, rock weathering in accumulation source rock of oil and gas generated at the same time make, lateral mudstone on oil and gas can also play a role in the zone of lateral sealing, create favorable conditions in oil gas migration and preservation.

## References

- [1]. Tectonic Interpretation of the Epicenter Distribution Map of China[J]. Earthquake Research in China,1994,02:4-15.
- [2]. Tectonic Interpretation of the Earthquake Distribution in the Contiguous Continent of the United States[J]. Acta Geologica Sinica(English Edition),1993,02:151-165.
- [3]Zhongbin Ouyang<sup>1,2</sup>,Yong Shi<sup>1,2,3</sup>,Le Yang<sup>1,2</sup> (1 Research Center on Fictitious Economy and Data Science,CAS,Beijing 100190,China) (2 Graduate University of Chinese Academy of Sciences,Beijing 100190,China) (3 College of Information Science and Technology,University of Nebraska at Omaha,Omaha,NE 68118,USA). A hybrid of fuzzy-link clustering and classification for seismic data[A].
- [4]LI Yue,YANG BaoJun,LIN HongBo,MA HaiTao,NIE PengFei. Suppression of strong random noise in seismic data by using time-frequency peak filtering[J]. Science China(Earth Sciences),2013,07:1200-1208.
- [5]Abdelmoneam Raef. Land 3D-Seismic Data: Preprocessing Quality Control Utilizing Survey Design Specifications, Noise Properties, Normal Moveout, First Breaks, and Offset[J]. Journal of Earth Science,2009,03:640-648.
- [6]HongyuZhai,Xu Chang,Yibo Wang,Zhenxing Yao. An Improved Q Factor Estimation Method for Micro-seismic Data[A].
- [7]Ping Jin,Chengliu Zhang,Xufeng Shen,Hongchun Wang,Changzhou Pan,Na Lu,Xiong Xu. A novel technique for automatic seismic data processing using both integral and local feature of seismograms[J]. Earthquake Science,2014,03:337-349.
- [8]. Purposeless repeated acquisition time-lapse seismic data processing[J]. Petroleum Science,2008,01:31-36.