

## **The study of fine reservoir characterization base on high precision seismic inversion prediction**

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**Abstract** : According to the potential of fine adjustment in Daqing Oilfield in high water cut stage, this study meet in dense well network condition more high precision reservoir description requirements. The study area of reservoir II and III reservoir formation in Saertu oilfield, Daqing oil field is studied. Through the full investigation of the ideas and methods of the reservoir characterization, this study tries to improve the seismic attribute resolution by a variety of inversion methods, and thus a set of high accuracy seismic inversion and prediction of underground real situation is formed. This study first analyzes the reliability of the well seismic combined with the correlation analysis of the scientific rigorous seismic inversion data and the reservoir log data. Then in the analysis of various factors to describe the influence of, and combined with the seismic sedimentology, research ideas, based on high precision seismic inversion to prediction of reservoir sand body fine then characterize. Has an important guiding significance, tapping the research results on the late stage of oilfield development.

**Keywords** - Well seismic combination, Seismic sedimentology, Reservoir characterization

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### **I. Introduction**

The north east block of Saertu reservoir in Daqing oilfield has been in high water cut period, and the distance between wells is very dense, while the depth of reservoir fine description is far more than other oil fields. In 2007, it was possible to develop a comprehensive and high precision 3D seismic data acquisition in Daqing oilfield, so this study is intended to explore a set of effective method to guide the reservoir sand body by high precision seismic inversion data.

### **II. Correlation Analysis Between Seismic Attributes And Reservoir Sand Bodies**

After treatment by various methods of seismic multi-attribute analysis, logging constrained inversion and stochastic inversion precision, seismic attribute sections and sandbody correlation statistical results extracted, trend and sedimentary unit sand seismic attribute sections are basically the same trend, the coincidence rate of sand is higher, but the coincidence rate is Hejian sand low, due in part to the rich river drilling belt rate is not high, so in order to help that characterize reservoir description more precise, better use of seismic attribute sections to improve precision of the microstrip sedimentary unit, and combined with seismic work before the seismic attribute slice and reservoir sand body correlation analysis, resulting in the existing technology the level can reach the precision of seismic sections, through correlation analysis summed up what is the prediction of sand body in different parts of the credibility of attribute sections, so as to guide the use of artificial combined with seismic data describe the phase diagram.

#### **1. Correlation analysis of seismic attribute slices and reservoir sand bodies in vertical**

After multiple inversion technique to improve the longitudinal resolution of the reservoir prediction, were randomly selected from 32 wells intercepted eight verify the inversion profile. After the test profile correlation analysis in the selected eight profile statistics showed that more than 3 meters of sand the coincidence rate reached 86.6%, 2 to 3 meters sandstone with rate reaches 75.1%, less than 2 meters of sandstone coincidence rate was 63.5%, namely vertical 2m above the sand body in multi channel, high reliability. However, 2m below the river and can not effectively identify, thin sandbodies predictions can only be as a reference to the trend. To select a B4-364-E76~B261-457 8 wells to verify correctness of the inversion profile and the use of the same color Dan Jingsha body thickness data comparison char, Fig.1.

Except for the thickness of sand body, profile effect profile attribute slice with rate factors still has a lot of, for example, two sedimentary unit or a plurality of sedimentary units in the same vertical to the development of river, when interlayer thickness in 2M below, the log data can be distinguished, but attribute slice it is difficult in the section difficult to distinguish. The statistical results are as follows, interlayer thickness greater than 5m of time, channel sand with rate was 84.2%; thickness between the 2m~5m meet rate was 73.5%; when



sand bodies, the coincidence rate is 78.3% when the channel width is 80m~250m, but when the channel width is <80m, the coincidence rate is only 62.5%. So the process of using the method of "mud to find sand" is still strictly follow the log data, only in the area of the non well data or the sand body prediction.

For example: the 5+6a sedimentary time unit of the three oil layer group B2 - 4 - P61 well, B 062 - 24 well area ,Figure 5a, the sedimentary microfacies types are the main channel sand in the delta front, and the average width of the channel is less than 120m. According to the characteristics of conventional log microfacies, the thinking of sedimentary micro facies is plotted to determine the two channels are different from the branch of the river, which is not connected with each other. Two profiles were selected from the same location on the sedimentary facies diagram and the Properties section,B2-4-P061 and B2-4-P062, B2-4-P061 and B2-D5-P053 ,Figure 5b.

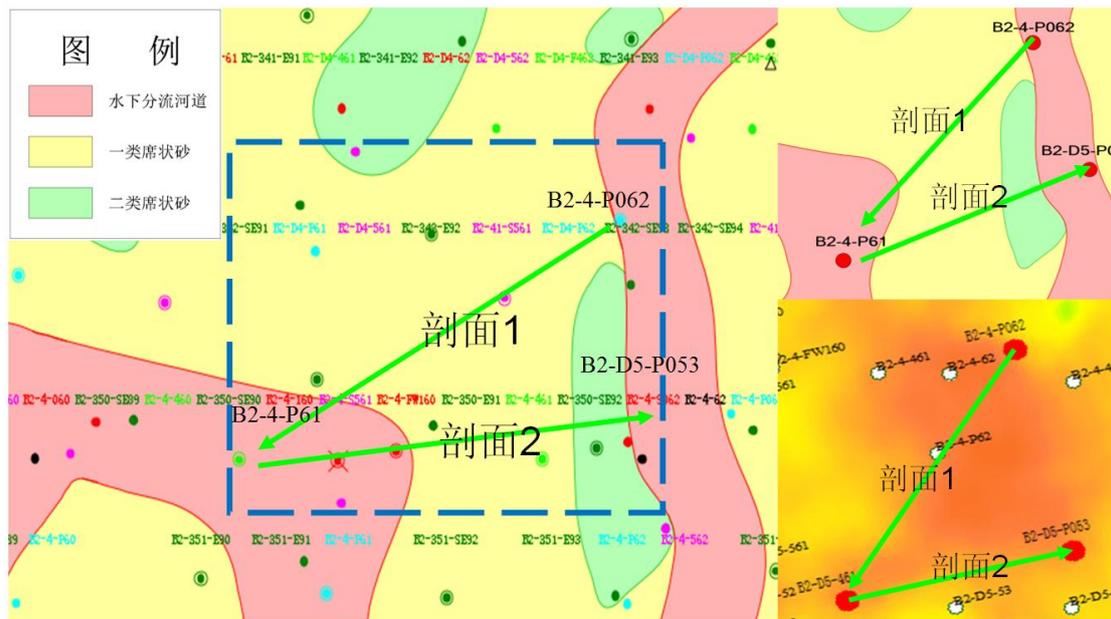


Fig.5(a), well combined with the former sedimentary facies distribution map of the sand body trend Fig.5(b),respectively, in the sedimentary facies diagram and the properties of the same location on the same location selected two sections.

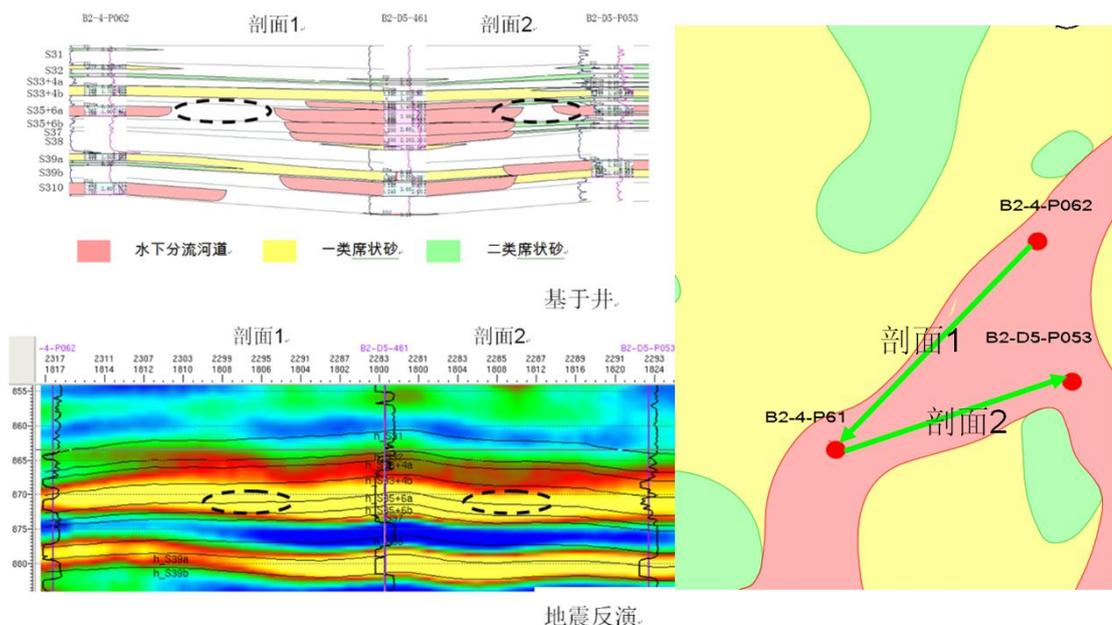


Fig.6(a), Comparison between reservoir and seismic inversion section  
Fig.6(b), Phase diagram of the combination of well and seismic

Through the observation of the plane inversion, and the inversion profile and the reservoir profile analysis and comparison (Figure 6a), the two section of the reservoir profile is not connected, but the relationship between the formation of the channel is changed, and the sedimentary facies diagram (Fig. 6b) is modified by the combination of the well.

#### **IV. Conclusion**

This study is based on the data of 3D seismic data and time division in Changyuan Daqing. The research is based on the multi attribute fusion and analysis technology, and a series of high precision seismic inversion and prediction system is formed.

High precision seismic attribute slice and reservoir sand body correlation analysis work, in guiding the well seismic combined with the guidance of reservoir characterization plays a vital role, in order to the correlation analysis of the normalized method, give a general basis for the work experience of the reservoir is very thin, more scientific judgment.

Application of high precision attribute slice guidance storage layer of fine description of the results, the reservoir in the horizontal and vertical to the physical property changes more clearly, thus single sand bodies in different types of remaining oil distribution know more clearly and improve the residual oil mining design for, the extra high water cut period oilfield fine adjustment and tapping possess important significance.

#### **References**

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