

Geological modeling study of North NO.1 area off the west and west block

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Abstract:- Daqing Oilfield has entered extra high water cut period, in the case of the North West, North Saertu Development Area beiexidong block has the water flooding and chemical flooding, history of wells is complicated, but the area still contains a large amount of residual oil. The main purpose of this stage is to develop and adjust the main purpose is to find the remaining oil, the remaining oil recovery. With the development of the computer, the petrel software is developed by the Schlumberger Corp, which can be easily and quickly to build three-dimensional geological model to quantitatively characterize the reservoir. Through the integrated use of geological, seismic and logging data, the establishment of structural model and attribute model, the fine description of reservoir space geological characteristics, development and adjustment of oil and gas reservoirs has important guiding significance, so as to further improve the recovery ratio of the residual oil.

Keywords: -3D geological modeling, stochastic modeling, structural model, sedimentary facies model and attribute model.

I. INTRODUCTION

Developed in the 1980s based on drilling data and 3D geological modeling technology has become currently in development stage of oilfield. Reservoir research is one of the important means of Schlumberger company that the petrel software is quickly established geological model is the outstanding feature of the integration of exploration and development tools, Modeling software development system using reservoir modeling technology.

The model and attribute model of the vertical structure of the vertical structure of the model, which provides a basis for the reservoir development and comprehensive adjustment, is the basis of the reservoir geological characteristics.

II. STRUCTURAL MODEL

Structural modeling is the basis and key of geological modeling. And the establishment of the model and the model of the fault model is a reflection of the space frame of the reservoir. The fine structural model can describe the structural features of the strata. The first step, the most basic requirements for establishing a fault model is that fault plane must be coincide with drilling breakpoint position . Then the preliminary fault model was established by the previous interpretation. According to the drill point data in the 3D space, the cross section shape of the cross section is corrected to reach the section of the cross section.

The second step, the high accuracy of the 3D fault model based combination drilling hierarchical data that is stratigraphic data and previous geological understanding built in small layer as the basic unit of fine structural model using stratified drilling data to calculate the layer structure model of the study area, average well spacing is about 100 meters, with well spacing for the grid spacing determined that plane grid size and then

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according to stratified drilling data on the calculation results were manually editing the correction layer by layer correction surface structure to and drilling hierarchical data perfectly for no hierarchical data control area, the overall structural trend to implement the 3D. The research work of the structural form of its structure has reached the precision of the previous two dimensional structure. (Figure 1).

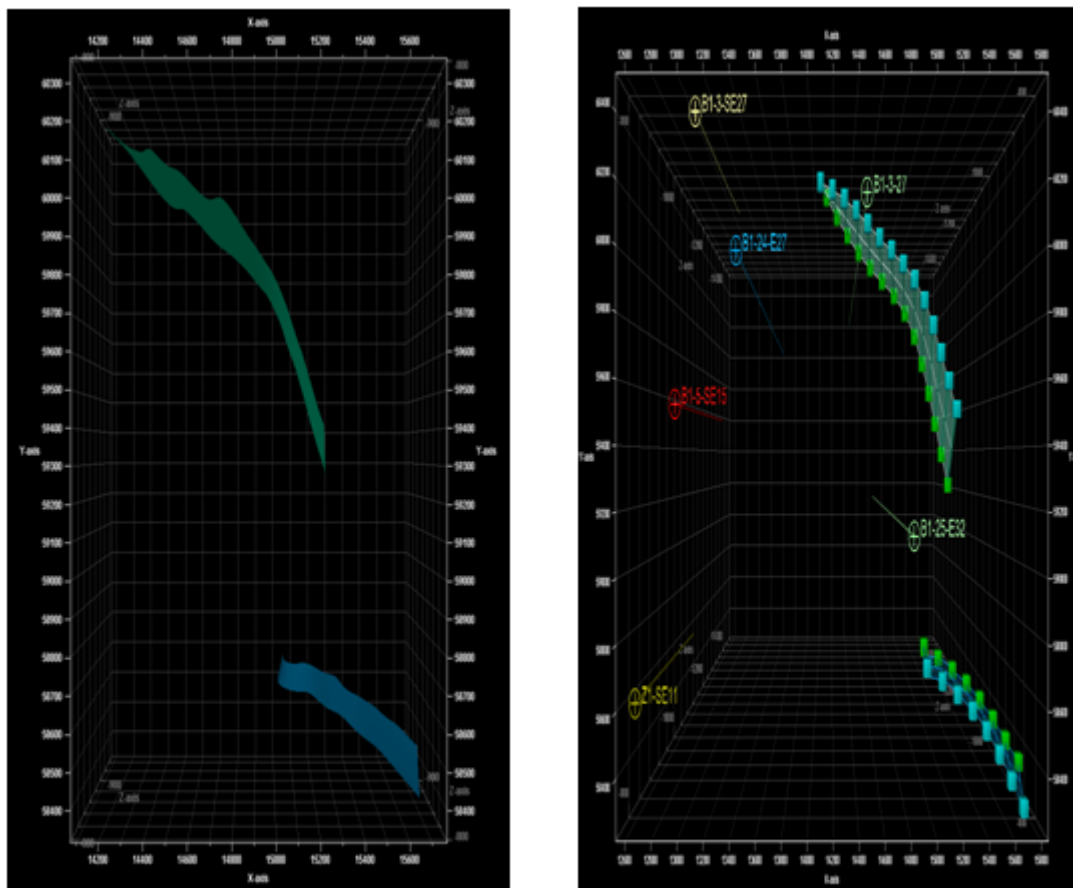


Figure1 the comparison map between fault model in petrel and 3D view fault in discovery

III. SEDIMENTARY FACIES MODEL

Modeling of the spatial distribution of sedimentary facies is the basis and core of the whole reservoir heterogeneity. The spatial distribution of physical properties, such as permeability, porosity and oil saturation, is determined by the distribution of sedimentary facies. In the fluvial facies reservoir, permeability, porosity and oil saturation and other physical parameters of the region, is often the location of the river. The sedimentary facies model can reflect the characteristics, scale, structure and development of the reservoir in the study area. The contact relationship between the target layer and other geological features, and can be used to analyze the distribution of various types of sand body. The distribution of various types of sand bodies is analyzed. This block deposition microfacies types including the main river, First level River ,Second level River, third level River, fourth level River , Crevasse channel, Natural levee, crevasse splay, mud, sand sheet body, a kind of sheet sand, two sand sheet and so on. There are 20 SEDIMENTARY FACIES MODEL had been made, and figure 2-a and figure 2-b are the facies' picture of the first and the last layer.

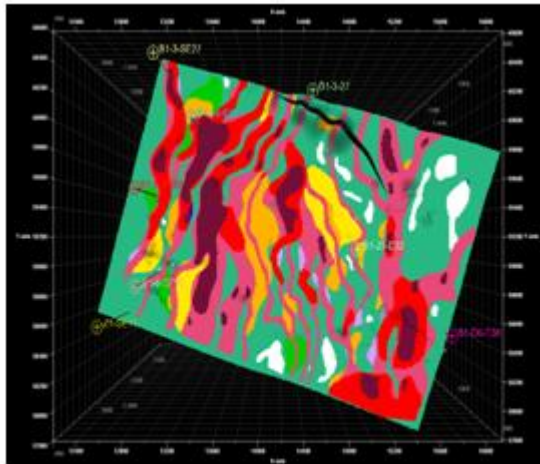


Fig2-a The first lay's facies' picture

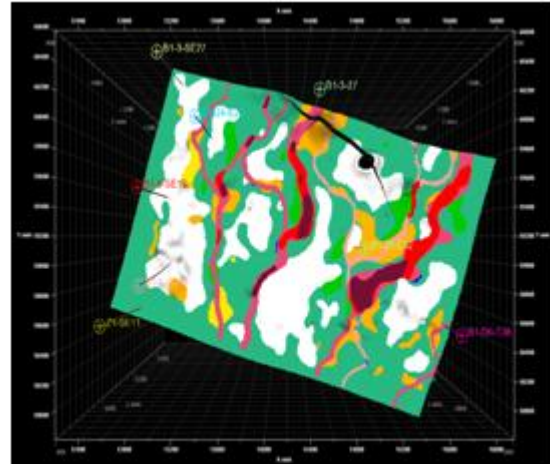


Fig2-b The last lay's facies' picture

IV. ATTRIBUTE MODEL

The porosity model is established in this model the same also permeability model and effective thickness model. The purpose of reservoir parameter modeling is give the 3D structural model grid unit for physical property of the rock, which reflects the heterogeneity of the reservoir. The porosity model reflects the pore volume distribution of the reservoir fluid, and the general porosity of the main variable range is consistent with the distribution of the river, which is basic on the porosity.

The change of degree is in the scope of the micro phase control. The model of the porosity is calculated by using the sequential Gauss simulation method under the constraint of lithofacies model. Permeability model reflects the permeability of the fluid in the reservoir, which is related to the reservoir's migration and accumulation. They generally can be used in sequential Gaussian simulation method, through the Kriging function, sedimentary microfacies model and porosity model do double constraint, permeability model is constructed. Fig3 is porosity picture, Fig4 is permeability picture, Fig5 is effective thickness picture.

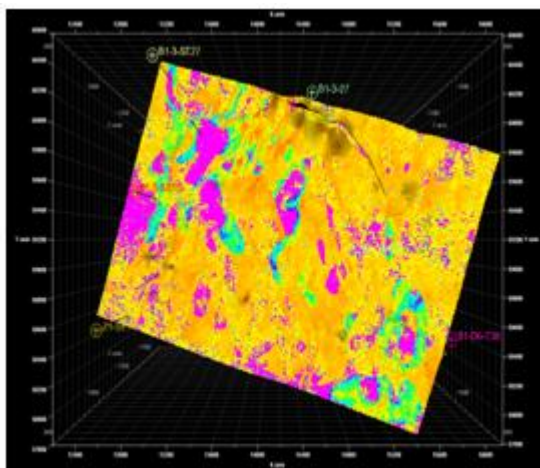


Fig3-a The first layer's porosity picture

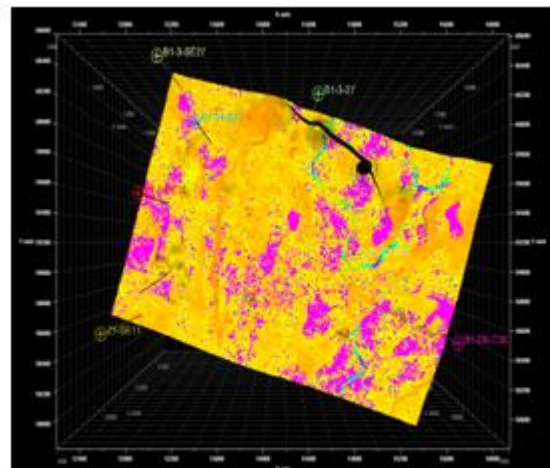


Fig3-b The last layer's porosity picture

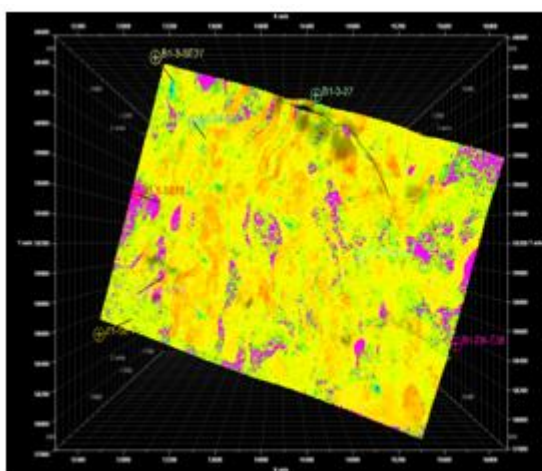


Fig4-a The first layer's permeability picture

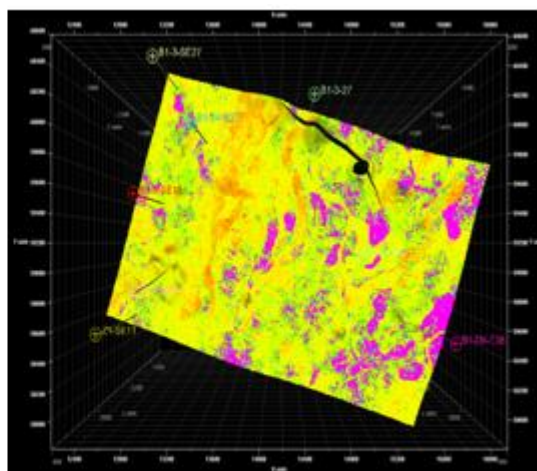


Fig4-b The last layer's permeability picture

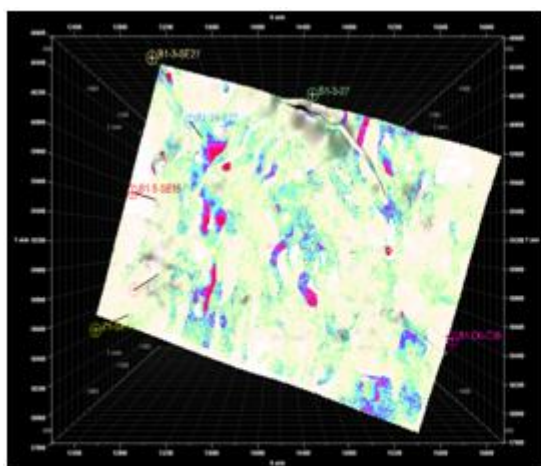


Fig5-a The first layer's thickness picture

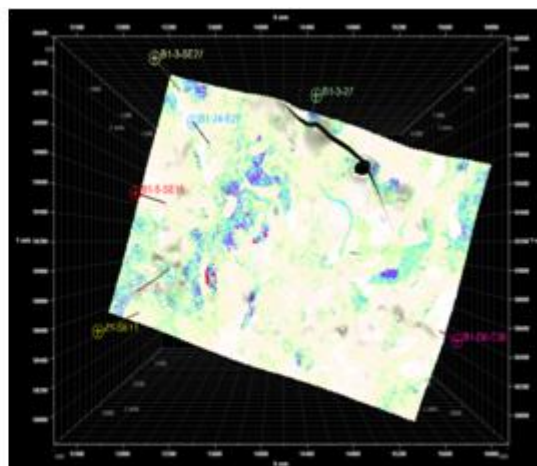


Fig5-b The last layer's thickness picture

V. CONCLUSION

The fine structure modeling phase modeling and reservoir property modeling to establishment conforms to the actual reservoir geological model and precisely depict the reservoir characteristic in detail to establish the structure model. Attribute model can not only provide static model can also be used for geological research in order to provide the basis for reservoir development and comprehensive adjustment for numerical simulation. The 3D visualization of Petrel software can be compared directly and objectively. The internal structure of the block can be directly judged to be the sand body distribution and oil and water in the block.

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