

Combined seismology and logging study the sedimentary face

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Abstract: The Chao yang gou oil field seismic data acquisition has been basically completed, as the development of the oilfield in recent years, the sand body in the Outside enlarge develop worse, urgently need to use the geophysical data and logging data to describe the tectonic characteristics and fault distribution of the research area. This way can enhance prediction accuracy of the fault and sand body. Build a set of Prediction method and train of thought to suit Chao yang gou oil field geological characteristics. This paper use the geological structure data and logging data to describe the reservoir characteristics of the research area. This paper has important significance for the guide the oilfield development adjustment.

Keywords: Chao yang gou, oil field, seismic data acquisition.

DISCUSSION

I. Train of thought and process

This paper studied the Fuyu reservoir of Chao 631 block .This research area has 152 wells, now in the area has finished forty sedimentary face pictures. But these pictures are only based on the well describe. There are many human factors in the phase combination. The real space distribution condition has not been recognized. This is harmful for the further exploration and

development. The sedimentary face of the reasonable prediction is particularly urgent. To the above questions, this study use the seismic inversion and attribute technology to make up the lack of data between wells .Combine the drilling information to forecast the sand body distribution and continuity between wells. Depict different sedimentary microfacies sandbodies distribution to finish the final figure of sedimentary face of modification.[1]

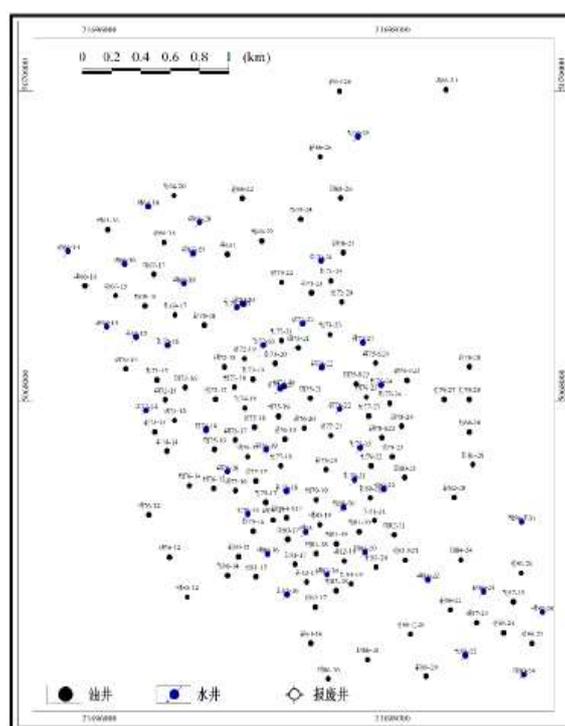


Fig-1: Well seismic joint change range of sedimentary facies

1. Select appropriate small layers based on the wave impedance section for reproduction. On the wave impedance inversion data volume, every 0.1ms make a slice along the layer, according to the study section from the bottom to up, clear the change rule of sand body, combine with the original phase diagram results and well point data,[2] carefully compare, select sedimentary facies to the superiority of corresponding slice to do on the basis of reproduction facies zoned points, at the same time considering other inversion section, when the map is depicting the sedimentary facies belt, for didn't tally with the drilling data in section, need to combine modified drilling data.
2. Check the GR and SP shape of the electric logging curve of the well, on the basis of the existing small layers of sandstone database, combining single-well GR and SP and depth of dual log curves form the effective sandstone and development situation for the analysis of single well, to determine the drilling strata belong to sedimentary faces belt, ensure that sand body explain data in conformity with the drilling of monolayer sedimentary faces belt.
3. Apply layer wave impedance section, study the river period time, determine the plane in different periods, in a combination of the sedimentary sand body in the unit. In order to clearly depict different channel sand sedimentary period of development, get a slice on the inversion data volume per 0.2 ms, from the changes of the slice observation on the river.
4. The inversion profile, inversion section to carry out the sand body width, continuity and to inversion prediction of sand body thickness figure is the cumulative sample point between the layer information, then get a statistical effect, Although on the plane can be seen in the development of sand body distribution, but for the development situation of inter well sand body to carry out the poor, through the inversion profile, inversion section further implement sand body width, connectivity and directions.
5. Refer to sedimentary faces belt graph of the production plant. Sedimentary faces belt graph is a hard field experts summarizes the experience of the results, [3]So we should be fully on the basis of predecessors experience for reference, back to describe the sedimentary faces belt, to modify existing sedimentary phase diagram, to better guide the production, under the guidance of the fine division of sedimentary faces flow, finished the 631 well block in fu yu oil layer 41 small layers of sedimentary faces belt and correction of maps.

II. Seismic attribute the qualitative identification of river channel

1. Methods and principles

Seismic attributes are those that pre-stack and post-stack seismic data contained in the dynamics, kinematics, geometry and demographic characteristics, some attributes have the exact geological significance, can be obtained directly from the original seismic section, while others need derived through mathematical operation, seismic attribute is a subset of the total raw seismic data information. The extraction of seismic attributes can be divided into the extraction of seismic attributes along the layer, the extraction of interlayer absorption properties and the three dimensional attributes extraction.

2. The three dimensional attribute body extraction

Three-dimensional attributes based on the 3 d seismic data attributes, can use different seismic trace space combination model extract. Different space portfolio model can reflect the characteristics of the different reservoir, for example, fracture development direction, the fault types, rock and capability of space changes. [4]Based on 3d data volume of seismic attributes is according to the different space combination mode to deal with the original seismic data, for example, according to the principle of differential and integral calculus extraction way points and the trace differential information, through complex seismic trace analysis to extract the traditional three instantaneous attributes, through 3d data volume to compare similarity of local seismic waveform of two-dimensional coherency attributes.

3. The extraction of seismic attributes along the layer

Along the layer seismic attribute extraction along the objective interval to open a window in the first place records in a pair of window statistical characteristic analysis, then extract relevant seismic attributes.

4. The extraction of interlayer absorption properties

Absorption properties between the layers is the use of seismic reflection wave data to determine formation average absorption parameters, usually using amplitude ratio method, for example, the adjacent two layers of reflected wave amplitude attenuation absorption coefficient, the commonly used method is power spectrum, fourier spectrum. Porosity, oil and gas composition and other larger influence on absorption properties.

III. Extraction process

According to the characteristics of the data in this area, the original data to deal with the noise, apply after processing data Landmark, SVI, VVA multiple software for multiple attribute extraction, the application of the drilling data of seismic attribute optimization.

1. Denoising

Attribute extraction is the foundation of high quality raw seismic data, by denoising processing to improve the signal-to-noise ratio, resolution and fidelity. In the process, in order to provide high quality seismic attribute analysis of seismic data, must pay special attention to ensure the fidelity of signal processing method of application.[5]

2. The extraction and optimization

Application of a variety of properties to extract seismic attribute extraction software, the optimal properties is obtained by attribute optimization combination. However, oil and gas sensitive seismic attributes combination is not set in stone, this is due to the complexity of the relationship between each of the

seismic attribute information and different properties of reservoir sensitivity, some of the properties to predict classification interference effect, so it is quite necessary attribute optimization. Through optimization analysis, we selected the SVI software layer between the mixed attribute extraction. Clear the attribute mapping effect of the channel characteristics reflect high sensitivity, drilling data coincidence rate is high.

IV. Target layer to deal with the noise channel quantitative characterization

Due to the seismic attributes can only be aimed at a particular frequency band lithology identification of a target body, therefore, after we use to deal with the noise, to meet the channel fidelity processing as the main lithologic body band, relative to suppress the influence of extremely high frequency or low frequency, the purpose of the application of seismic attribute technology is depicting the channel sand body distribution characteristics, to extract small layer seismic attribute layer along the way, good seismic attribute optimization in conformity with the deposit, eventually determine the average amplitude attribute correlation is best, to direct the sedimentary faces analysis.[6]

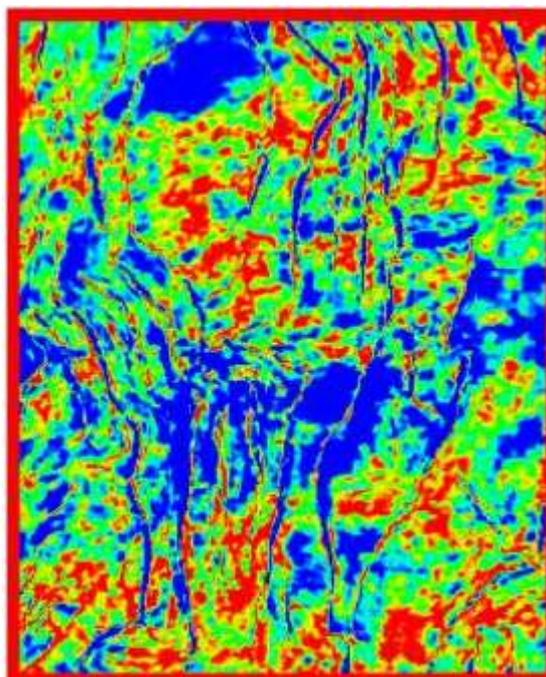


Fig-2: The study area F171 small layer average amplitude attribute

V. Seismic attributes and limitations

Due to the seismic attribute is rely on the lithologic body such as seismic data means river identification, And into the process of sedimentary faces is geological workers need to endow them with geological concept,

the division of sedimentary faces and prediction is a careful and rigorous process, according to sedimentary faces and seismic attributes can be seen, Seismic attribute on the macroscopic guide channel geometry, outline Such as form, but for large well spacing density

of work area, many details are still unable to pinpoint on the seismic attribute, At the same time as Characteristics of river channel development scale and inheritance, on the seismic attributes cannot be fine to sedimentary units. And from objectively, seismic attribute cannot fully replace the sedimentary facies, also need such as well point to the analysis of sedimentary faces.

VI. Conclusion

By means of detailed seismic, logging, dynamic analysis in the study area, such as material, combined with results of seismic tectonic and seismic inversion of reservoir prediction results establish fine structure model and property model in the study area, to guide the next pattern encryption, the development adjustment and deployment of horizontal well, through the study the following conclusions: Based on the sedimentary microfacies in the well point, seismic attributes along the layer as a reference, based on seismic inversion section, combined geophysical studies and logging studies completed 41 sedimentary units in the study area in 631 block sedimentary microfacies interpretation and facies mapping work, focus on the direction of channel sand body, scale, combination of the continuity and repainted and understanding, improve the accuracy of the channel sand body are known.

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