

The Seismic Attribute Technology

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Abstract: This article describes the characteristics of seismic attribute technology, classification, extraction and optimization methods. Use examples illustrate the application of this technology in the fine interpretation, and the conventional interpretation methods were compared, results showed that: the technology for the interpretation of small faults and small collapse column has obvious advantages, can explain a smaller structure, having broad application prospects.

Keywords: Data Interpretation, Seismic attributes, Extracty.

INTRODUCTION

Currently, coal mining area of three-dimensional seismic exploration technology has become the technology of choice for construction of exploration; the country's major coal mines have been widely applied. However, the conventional three-dimensionally show data interpretation (three-dimensional data interpretation), the main advantage of the kinematic characteristics of the reflected wave (such as arrival times) to solve the problem of structural geology, kinetic information is not fully utilized and reflected waves (such as amplitude, frequency, etc.); on the other hand mainly rely on the experience of the interpreter to explain, virtually waste a lot of useful information, often resulting in false positives and false negatives small faults. With the rise of computers and the rapid development of three-dimensional seismic data interpretive processing technology, comprehensive utilization of three-dimensional seismic attributes to fine geological interpretation has been widespread concern [1].

APPLICATION SEISMIC ATTRIBUTE TECHNOLOGY INTRODUCTION

Seismic attribute refers to the kinematic extracted from seismic data out of the special earthquake dynamics and statistical measurements, past literature often called seismic characteristic parameters, it is now referred to as seismic attributes. Seismic attribute refers to the extraction, display, analysis and evaluation of seismic attribute technology, including seismic exploration in coal. Seismic attribute extraction, analysis and use of geothermal development properties distinguish structure, lithology and seismic attributes to predict target layer. Classification of seismic attributes no uniform standards, different scholars have proposed different attribute categories. Combined with coal. The

characteristics of seismic exploration, according to kinematics and dynamics characteristics of the property to the exhibition is divided into eight categories: amplitude, waveform, frequency, attenuation, phase, related to energy ratio. Many types of seismic attributes should be selected according to the geological seismic attributes corresponding to problem solving [2, 3].

SEISMIC ATTRIBUTE EXTRACTION

The key technology is the property of seismic attribute extraction, extraction methods including extraction phase axis data attributes and attribute extraction body.

Phase axis seismic attributes and attribute is an interface related to the specific extraction method includes instantaneous extraction, single-channel time-window. Extraction and multi-channel time-window extraction. Instantaneous extraction namely the traditional "three instantaneous" parameter, the instantaneous amplitude, instantaneous phase and instantaneous frequency. Single-channel time-window extraction method is to extract all kinds of seismic attribute parameters on a track with a "variable time window", by interpreting the reflected phase axis to define the upper and lower bounds when the variable window. Commonly used time-domain attribute parameters, frequency domain attribute parameters and fractal dimension attribute parameters. Multi-channel time-window extraction method is to use a variable time window parameters in the extraction of various types of property to show a plurality of tracks, in addition to the definition of a variable when upper and lower bounds of the window, but also need to define the number of processing channels. The resulting seismic attributes to the center track position. Commonly used quality factor and two-dimensional fractal parameters. Based on

seismic attribute data volume will produce a complete property body, its biggest advantage is to produce the relevant type of data.

Thus providing useful information to show the signal between track-by-similarity and continuity. The fixed three-dimensional data transformed to reflect certain geophysical characteristics of the new three-dimensional data volume. The most common is the coherent data volume and data volume variance.

From the body to show the data can be extracted to show many attributes, which are subterranean formation, physical properties of specific anti reflect. For example, to show property reflects the characteristics of hydrocarbon reservoirs, coal seam thickness or reflect the faults subsided column characteristic changes of seismic attributes, but also reflects the seam attenuation of seismic attributes, as well as research to show fracture properties of the belt. Therefore, the specific problem, you must choose to show some of the best properties or combination of properties from numerous seismic attributes, namely, from more to less seismic attributes optimization analysis [4].

APPLICATIONS

A coal mine in Shanxi is a limestone karst area, subsided column is also more developed. The landforms are hills, gullies and Development, Quaternary loess covering the whole exploration area, height 50m, phreatic 15m. The main coal layer is No. 3 coal seam average thickness 6.1 m, simple structure, is stable seam. The area better raw data, object layer reflection wave signal to noise ratio is high. Interpreted by the test team something, after which I attribute technology development team will be fine interpret, a plurality of small faults and small subsided column, explain the

accuracy has been greatly improved, and some results have been verified.

No. 3 coal seam along the first reflected wave upward, downward 15ms, 10ms, 5ms arc length extraction properties were analyzed to show the data in the body (figure 1), we see the seam on the reflected wave (frequency of open 60H :) when the window size, the results of the analysis for the property have a greater impact, taking seismic attribute extraction within the analysis window opened up down 15ms time window, when carried out, the results better than the other within a time window to show the extracted attribute analysis results. The results objectively reflect the area collapse column planar distribution, size and location of the development. Geofarme with a powerful interpretation software to extract 26 kinds of seismic attributes, the final preferred for fault and sink hole better reflect the eight seismic attributes. Finally, according to the eight kinds of attributes for fault and sink hole comprehensive explanation.

APPLICATION EFFECT ANALYSIS

Using seismic attribute technology has been greatly improved precision than the traditional interpretation. Compared with the traditional solutions of multi three interpretations, five faults have been verified by the roadway; explain subsided column 10, including five originally interpreted as faults, interpreted as a collapse of this column, there are five new explanation of collapse column.

For the long axis of less than 30m (to show CDP interval sm) of collapse column, manual interpretation is easy to miss, however, was able to clearly attribute analysis chart reflects the fall in coal pillar plane position and shape. While these five original interpretation results in collapse column are missing [5].

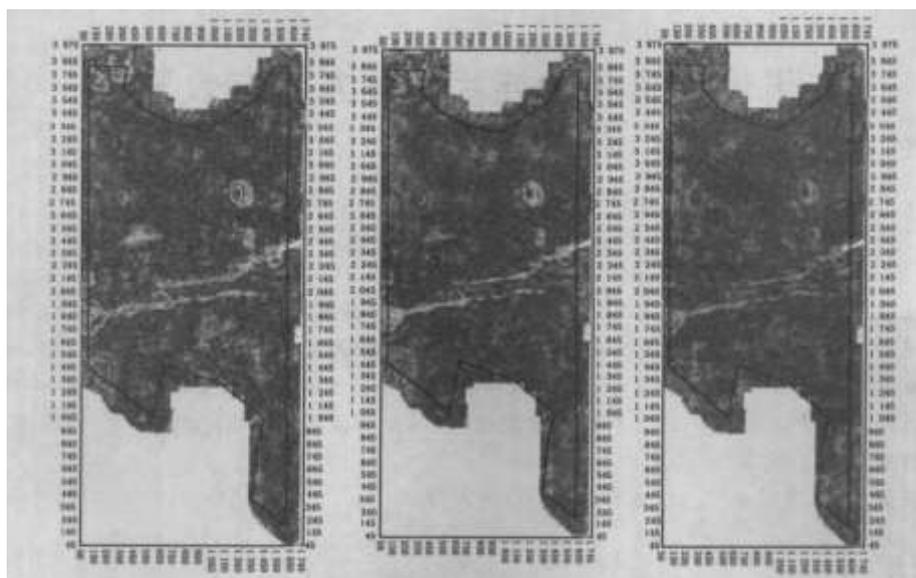


Fig-1: No. 3 coal seam is not the same window properties Figure

CONCLUSIONS

Earthquakes analysis techniques, applied to a coal mine in Shanxi structural interpretation, the results show that: the use of this technology is not only fast, intuitive, and is not affected by human factors, breaking the coal mining region in the development of the coal seam is less than the major axis of collapse column 30m and small faults are likely to be missed to explain the situation by hand.

Now under the direct use of geothermal exhibition attribute parameters to interpret the law is not much experience, which requires the use of the known data in the study area as constraint of seismic attribute parameter sensitivity test, correlation test, to identify changes in seismic attribute parameters the intrinsic link between the law and geological changes. With the exhibition to the deepening of understanding of the properties, seismic attribute technology will be in fine structural interpretation, and interpretation of sedimentary environment to show lithologic interpretation and many other aspects have broad application prospects [6].

REFERENCES

1. Jianyuan, C. (2001). Sophisticated 3D seismic data interpretation techniques. *Coalfield*, 29(6), 55-58.
2. Posamentier, H. W., & Suyenaga, W. (1998). Stratigraphicanlysis of the main member of the Upper Cibulakan Formation at E. Field, offshore Northwest Java, Indonesia. *26 the Annuindonetrolasscony*, 1-129.
3. Contreras, A., Torres-Verdín, C., Chesters, W., Kvien, K., & Fasnacht, T. (2006). Extrapolation of flow units away from wells with 3D pre-stack seismic amplitude data: Field example. *Petrophysics*, 47(03).
4. Xia, S., Liu, J., Deng, J., Li, P., Ren, Y., Chang, Y., ... & Liu, J. (2013). River channel sand body prediction by means of integrating well log and seismic attribute analysis in dense well patterns: a case study of the eastern Beierxi Block in the Sabei Development Area of Daqing Oilfield, China. *Arabian Journal of Geosciences*, 6(12), 4607-4617.
5. Berkhout, A. J. (1999). Seismic inversion in steps. *The Leading Edge*, (8), 7-19.
6. Sullivan, C., Ekstrand, E., Byrd, T., Bruce, D., Bogaards, M., Mesdag, P., & Boese, R. (2004). Quantifying uncertainty in reservoir properties using Geostatistical Inversion at the Holstein Field, Deepwater Gulf of Mexico. In *2004 SEG Annual Meeting*. Society of Exploration Geophysicists.