ZHANG Daxiang, YIN Taiju, SUN Shaochuan and SHI Qian, 2017. Classification of Magmatic Sulphide Deposits in China and Mineralization of Small Intrusions. *Acta Geologica Sinica* (English Edition), 91(supp. 1): 148-149.

Application of Attributes Fusion Technology in Prediction of Deep Reservoirs in Paleogene of Bohai Sea

ZHANG Daxiang[1], YIN Taiju[1,*], SUN Shaochuan[1] and SHI Qian[2]

1 *Yangtze University, Wuhan, Hubei 430100*
2 *Yangtze University, Wuhan, Hubei 430100*

1 Introduction

The Paleogene strata(with a depth of more than 2500m) in the Bohai sea is complex(Xu Changgui,2006), the reservoir buried deeply, the reservoir prediction is difficult(LAI Weicheng,XU Changgui,2012), and more than half of the drilling loss wells are due to that the reservoir prediction is not accurate. Reservoir prediction results have become the keys to control the success of deep exploration in the Paleogene of the Bohai Sea(XU Changgui,2013). In the case of reservoir prediction based on seismic attributes, the application of the simple single attribute analysis into prediction of reservoirs are often more problematic for the characteristics of deep sandy sand in the area. Therefore, in order to make efficient use of seismic data and reduce seismic attributes Multi-solution, thus highlighting the seismic reflection characteristics of favorable reservoirs, thence the method of seisnic multi-attribute fusion is applied to predict and reservoirs. Prior to the integration of seismic attributes, it is generally necessary to optimize a large number of attributes(Yin Xingyao and Zhou Jingyi,2005). Analysis of correlation between attributes and reservoir lithology will be firstly operated, and select the most sensitive attributes to geological conditions(Gu Faming,2009). Secondly, the correlation between the selected attributes will be calculated. Finally, since the different attributes have different dimensions and range of values, some multi-attribute fusion methods need to optimize the attributes before the attribute fusion, such as normalization, the principal component analysis and so on. This paper will mainly introduce the application of RGB attribute fusion and cluster analysis attributes fusion in reservoir prediction.

This article would mainly discuss the above two technologies.

2 Two different attributes fusion techniques

2.1 RGB seismic attributes fusion technology

The seismic image based on RGB-IHS transform is a technique of spatial standardization of sliced multi-attribute images and reconstructing pixel code, and then mapping to IHS space to fuse and generate new images. Based on seismic multi-attribute imaging, the color resolution increased from 256 colors to 16 million colors, thus greatly improving the accuracy of reservoir identification. At present, RGB attributes fusion technology is mainly used for river identification(Zhang Chi etal,2013).Based on the integration of attribute data,the application of color overlay characteristics will highlight the geometric characteristics of the river, resulting a greater degree of improvement of a single attribute recognition effect.

2.2 Cluster analysis attributes fusion technology

Cluster analysis refers to grouping a collection of physical or abstract objects into a number of categories of analysis processes that consist of similar objects(Liu Qiang,2011;Wang Weitao and Wang Baoshan,2012).By extracting a variety of inter-layer seismic attributes and analyzing logging and geological data, thus eliminating the insensitive attributes and optimizing the seismic attributes in accordance with the law of geological background distribution, then reflecting the geological information and the sand bodies distribution prediction through the multi-attribute clustering analysis technology. In the case of optimizing attributes, the preferred seismic attributes are determined by attribute correlation coefficient analysis and four-dimensional intersection analysis. Based on the geological characteristics, well position and research purpose of the study area. Unconstrained cluster analysis was used to obtain the results and the results are calibrated with the well

* Corresponding author. E-mail:yintaij@yangtzeu.edu.cn

information, the existing sedimentation and seismic reflection characteristics to testify the sand distribution through the cluster analysis technology.

As a kind of mathematical classification method, cluster analysis can be effectively used to exploit the data distribution law from massive seismic data and depict the subtle changes in seismic data. The seismic attribute fusion method with cluster analysis significantly improves the correlation coefficient between seismic attributes and reservoir sand bodies.

Acknowledgements

This research work was funded by Major Projects of National Science and Technology “Large Oil and Gas Fields and CBM development”(Grant No. 2016ZX05 027). Our grateful thanks are due to Shanghai Branch of CNOOC Ltd. for their help in providing geological data. Thanks are also due to anonymous reviewers for their constructive suggestions.

References

Xu Changgui.*Genetic types of Paleogene slope-break zones and their controls on depositional system in Bohai offshore.China Offshore Oil and Gas*,2006(06):365-371.

Lai Weicheng, Xu Changhui, Jia Donghui and Wu Xiaohong.*Characteristics of Paleogenesequence boundary and sequences of different tectonic units in the Bohai area,Journal of Stratigraphy*,2012,(04):807-814.

Xu Changgui.*An application of differential attribute between far and near offsets to detecting fractures in carnonates reservoirs: a case of LH11-1oilfield,China Offshore Oil and Gas,*2013,(04):1-11+21+88.

Yin Xingyao and Zhou Jingyi.*Summary of optimum methods of seismic attributes.OGP*,2005,40(4):482-489

Gu Faming,Yin Cheng,Ding Feng, Song Liang.*Application of the rough set theory to seismic reservoir prediction.Progress in Geophys*.(In Chinese),2009,24(1):231-237.

Zhang Chi. *Application of RGB multi-seismic attribute fusion technology in river channel detection*. Chinese Geophysical Society. China Geophysical Research 2013- Twentieth Symposium [C]. China Geophysical Society: 2013: 1.

Liu Qiang. *Research on variable point recognition based on clustering analysis*, 2011,Tian Jin:Tianjin University.

WANG Wei-tao, WANG Bao-shan.*Technology of multi-scale similar seismic rapid identification method based on clustering analysis and its application in the analysis of aftershock sequence in northeastern end of Wenchuan earthquake*. Acta Geophysics, 55 (6): 1952-1962, doi: 10.6038 / j.issn.0001-5733.2012.06.016.