

ABSTRACTS

Design and application of seismic exploration source for the Mesozoic group in the northern South China Sea. Wei Chenglong¹, Hao Xiaozhu¹, Yi Hai¹, Wu Zhongliang¹, Yang Shuji¹ and Gu Chang¹. *OGP*, 2012, 47(Supplement 1): 1~7

Based on the exploration of Mesozoic group in the northern South China Sea facing complex seismic geological condition, in order to improve the marine seismic exploration difficulty area data quality, this paper designs the 6400in³ Bolt long-life air-gun array, its characteristic is the source wavelet output peak and low frequency energy are strengthened, also the low frequency direction edge is expanded from 8Hz to 6Hz. After the field test and actual marine seismic exploration data acquisition effect analysis and contrast, It confirms the designed source applied to the Mesozoic group in the northern South China Sea oil and gas resources exploration.

Key words : seismic data acquisition, offshore oil and gas exploration, seismic source design, seismic source parameters, the northern South China Sea, the Mesozoic group

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Ricker-like seismic wavelets. Mei Jinshun¹ and Wang Runqiu¹. *OGP*, 2012, 47(Supplement 1): 8~14

This paper presents a class of seismic wavelets, and proves that the continuous integral combinations of spectra for some of them approach to the spectrum of unit impulse function, which represents the maximum resolution. A new kind of combination wavelet can be obtained within the limited frequency bands using some suitable distribution functions. The paper establishes the relationship among band-pass wavelet, Ricker wavelet and unit impulse function. Suitable wavelets chosen by this approach can be used for both theoretical analysis and seismic data processing. Mathematical computations prove its correctness and effectivity.

Key words : Ricker-like wavelet, resolution, integral

combination, limited frequency band

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Acquisition footprints suppressions by amplitude-frequency-phase relative preservation. Zhang Hongjun^{1,2}, Wang Jun³, Din Changhui², Gao Jiangtao³ and Wang Xingyu³. *OGP*, 2012, 47(Supplement 1): 15~19

This paper presents an integrated approach for acquisition footprint suppression in seismic data processing after a detailed analysis of acquisition footprints characteristics with the actual seismic data, and comprehensive studies of seismic data processing methods for acquisition footprints attenuation. This approach contains a data processing technology series, including pre-stack data normalization, post-stack (pre-stack) time migration, 3D post-stack frequency wave number domain filtering, median filtering, and *F-X* coherent filtering. Our application in a work area shows that this approach effectively suppresses acquisition footprints in a way of relatively preserved amplitude, frequency, and phase property. The attributes of RMS amplitude, instantaneous frequency, and instantaneous phase of the target K2 are so clear that the data is advantageous to geological interpretation.

Key words : acquisition footprint, seismic attribute, RMS amplitude attribute, instantaneous frequency, instantaneous phase

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Seismic weak reflection characteristics on lithological reservoir. Wang Shugang¹, Lu Shenqiang¹, Li Hongmei¹ and Wei Wen¹. *OGP*, 2012, 47(Supplement 1): 20~25

Lithological reservoir usually appears in a

form of complex formation combination, and seismic reflections on interfaces between sandstone and mudstone are relatively weak. So it is difficult to identify these interfaces on seismic sections. Based on calculations of sand model reflection coefficients, analysis of synthetic seismogram with different magnitude, and statistical analysis of well and seismic data, we classify seismic weak reflections on lithological reservoirs. The classification can provide basic data and practical guidance for further reservoir prediction and characterization.

Key words : weak reflection, lithological reservoir, amplitude characteristics, reflection coefficient, synthetic seismogram

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Tomographic variable-velocity structure mapping and its application. Wang Xiaoping¹, Chen Daxian², Mei Qinghua², Ning Qingxiang², Chen Danmin² and Yang Ming². *OGP*, 2012, 47 (Supplement 1): 26~29, 39

To overcome difficulties of structure mapping in low-amplitude and deep or ultra deep structural area, this paper proposes a tomographic variable-velocity structure mapping method. Combining geologic, seismic, and log data, this method is different from the existing variable-velocity structure mapping methods. Considering sedimentary basins as divided into threefold structure, viz. before forming period, forming period, and after forming period, 3D seismic interpretation is performed on a few geological fields. Using sonic logging data with interval velocity, interval time difference, and its thickness, an interval velocity field is built. Isopach maps can be obtained by multiplying interval velocity field and its time difference. So stratigraphic structures can be mapped by combining different isopach maps. This method coincides with geologic theory, and also coincides with theory of seismic waves. Results obtained from the tomographic variable-velocity structure mapping method are closer the true geology.

Key words : tomography geological field, layer veloc-

ity field, low-amplitude structure, deep structure, sonic logging velocity

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Thin coalbed methane reservoir identification by geostatistics inversion. Liu Zhanzu^{1,2}, Zhang Lei², Huo Lina², Cao Mengqi³, Ding Qingxiang² and Gao Guangliang³. *OGP*, 2012, 47 (Supplement 1): 30~34

On the basis of conventional impedance inversion, geostatistics inversion can improve the vertical resolution of inversion results. This paper shows an example of thin coalbed methane (CBM) reservoir prediction based on 3D seismic data in E Basin, China. The lateral variogram is derived from the sparse spike impedance inversion and impedance values cross wells are interpolated by random simulation. By consistent iteration with seismic data, geostatistics inversion results are obtained, which match very well logging data. These results describe precisely distributional characteristics of thin CBM reservoirs. This new idea for thin CBM reservoir prediction is more accurate than conventional post-stack inversion.

Key words : thin reservoir prediction, geostatistics inversion, CBM, reservoir precise description, impedance inversion

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Identifying fan-shaped lithosomic bodies in Melut Basin, Sudan. Zhang Yuanyin^{1,2}, Wang Tianqi³, Su Yuping³, Sun Zandong^{1,2}, Fan Lehua³, Shi Zhongsheng³, He Weiwei³ and Bai Jie³. *OGP*, 2012, 47 (Supplement 1): 35~39

Fan-shaped lithosomic bodies in the northern sag of Melut Basin were identified and its distribution range were determined by application of series technologies including electrofacies, seismic facies, density inversion, 3D visualization, and strata slice.

The fan-shaped lithosomic bodies developed in the downthrow side of the boundary fault in the east that controlled the deposition of the northern sag, and they were shaped like waistband. Seismic inversion results show that sand content increased gradually from the west of the northern sag to the east of the major boundary faults and the maximum sand content is located near the major faults. This means the major provenance came from east. The above conclusion was approved by 3 exploration wells drilled based on the above prediction.

Key words : rifted basin, fan-shaped lithosomic body, seismic facies analysis, seismic slice, density inversion

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Volcanic rock identification in Liaodong Sag. Xu Yingxin¹, Yu Lin¹, Sun Lizhi¹, Pei Lihong¹, Zhang Jin¹, Xie Liang¹, Zhu Hong¹ and Qu Shufang¹. *OGP*, 2012, 47(Supplement 1): 40~44

In Liaodong Sag, the volcanic rock is controlled by the basement fault located in the middle of this area. The volcanic rock distribution appears as the North-South symmetry along the basement fault. Based on this understanding, we establish the volcanic rock development model with dome shaped eruptive rock in early stage and layered effusive rock in late stage. Using seismic inversion, waveform clustering, and time slices, 4 volcanic rock bodies are discovered and confirmed. According to comparative analysis, we consider that the volcanic rock bodies in the area have three eruption models: central eruption, multiphase central eruption, fissure eruption. Hongxing volcanic rock body belongs to multiphase central eruption model. By the comprehensive evaluation, we have proposed a few well locations. Commercial oil and gas

is discovered from one of the drilled wells, and good hydrocarbon show is found from another drilled well.

Key words : volcanic rock, eruption model, Liaodong Sag, crater facies, lithology and lithofacies

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Analysis of seismic volume attributes and their application. Wang Xia¹, Wang Guanmei¹, Liu Dongqin¹, Li Jianhua¹, Feng Jianguo¹ and Li Xiaoxi¹. *OGP*, 2012, 47(Supplement 1): 45~49

The paper discusses the geological and geophysical meanings of seismic volume attributes, such as dip, coherence, curvature, texture, spectral peak and so on. These seismic volume attributes are successfully applied in reservoir characterization and hydrocarbon detection. Structure-oriented filtering can improve not only S/N ratio but also fault interpretation. The most-negative curvature is used to delineate palaeo-currents. The most-positive curvature is used to describe the distribution of fractures associated with stress. Euler curvature details the deformation at azimuth, and volume texture highlights fractured zones. Applications of appropriate volume attributes can achieve very good interpretation results, but conventional means cannot.

Key words : seismic volume attribute, the most-negative curvature, maximum curvature, texture, high light volume

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Minor fault joint-interpretation. Zhou Shang¹, Wang Yongli¹, Han Tianbao¹, Li Nan¹, Shi Delian¹, Cheng Peng¹, Fang Haifei¹, Zhang Ying¹ and Ma Yihong¹. *OGP*, 2012, 47(Supplement 1): 50~54

In recent years, quite a few new seismic interpretation techniques are used for fault identification, such as coherence, spectrum decomposition, curvature and etc. Combining seismic attributes with seismic sections, minor fault identification can be greatly improved. The newly developed image processing and analysis techniques are used for characteristics of fault seismic attributes. So the longi-

tudinal continuity of fault seismic attributes is enhanced, and the background clutter is also minimized. Then fault properties are detected from the surrounding rocks and embedded with the seismic data to identify accurately the breakpoint location of minor faults.

Key words : minor fault, image processing, structural orient filter, curvature, attribute fusion

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Tight sandstone reservoir evaluation in the 3rd member of Xujiahe Formation, the northwest of Sichuan Basin. Ji Xuewu¹, Ma Wenhua¹, Zang Dianguang¹, Nie Gang¹, Si Guoshuai¹, Peng Xin¹ and Xu Baoliang¹. *OGP*, 2012, 47 (Supplement 1): 55~58

Continental sandstones of the 2nd, 4th, 6th members of Xujiahe Formation have always been main targets in northwest of Sichuan Basin. Recently in the 3rd member of Xujiahe Formation as an important hydrocarbon source layer, the high-yield industrial gas has been discovered. The 3rd member contains many sets of thin and tight ash conglomerate. Fracture development has greatly improved reservoir space. So it is considered as a great exploration potential. The 3rd member of Xujiahe Formation is a lithologic gas pool controlled by reservoirs, fractures and structure background. So it is very important to research the sandstone distribution and micro fracture distribution. In the practice, we propose some techniques suitable for identification, analysis and evaluation of gravel rocks in the 3rd member of Xujiahe Formation. Application results contain new well location propositions and favorable zones for further exploration.

Key words : Sichuan Basin, the 3rd member of Xujiahe Formation, tight sandstone, reservoir, micro fracture, potential

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Reservoir predictions in Yaxi and Liugouzhuang areas. Zhao Janru¹, Cao Xuelian¹, Bai Jun¹, Chen Chunji¹, Zhang Hongwei¹, Qin Suhua¹, Wang Zequan¹ and Yan Qun¹. *OGP*, 2012, 47 (Supplement 1): 59~65

Favorable reservoirs in multi-stage fans and

delta front were developed in Yaxi area located in the northeast of Qingxi Depression. Using series of interpretation approaches, such as sequence stratigraphy and structure interpretations under sequence stratigraphic framework, multi attribute comprehensive identification under system tract framework, poststack acoustic impedance inversion, prestack inversion, and spectrum attenuation fluid prediction, multi-stage fans are identified, and favorable reservoir distribution of multi-stage fans and delta front are predicted in Yaxi area. Using ant and curvature volume attributes, the distribution of favorable dolomite fractured reservoirs in Liugouzhuang are predicted. Commercial oil flow is discovered from 3 wells proposed based on our predictions.

Key words : fan-delta, dolomite fractured reservoir, prestack inversion, reservoir prediction, fluid prediction

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3D seismic interpretation of coalbed methane in Zhengzhuang Block, Qinshui Basin. Yan Wenhua^{1,2}, Chen Zongcui², Ma Ximei² and Zhang Chunlian². *OGP*, 2012, 47 (Supplement 1): 66~71

This paper demonstrates an example of 3D seismic interpretation for coalbed methane in Zhengzhuang Block, Qinshui Basin. According to seismic calibration and structural characteristics analysis, we describe micro fractures and Karst collapse columns by forward modeling and seismic cube attributes, such as ant, curvature, and variance. Then, using cross-plot analysis of logging data and the impedance inversion, we calculate coal bed thickness. Finally, we predict enrichment and accumulation areas of coalbed methane by the high-light cube attribute. Seven favorable zones of coalbed methane are proposed. And up to now, Zone No. 7 has been proved as an enrichment and accumulation zone of coalbed methane by drilling.

Key words : coalbed methane, micro fracture, Karst collapse column, coalbed thickness

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Gas-bearing reservoir prediction by elastic impedance inversion. Liu Baihong¹, Li Xueyun², Li Jianhua³, Mo Aling⁴, Xiang Liang¹ and Zheng Silian¹. *OGP*, 2012, 47(Supplement 1):72~77

On basis of the principle of the prestack elastic impedance inversion, we present in this paper an idea to predict gas-bearing reservoir using the prestack elastic impedance inversion. Firstly we calculate elastic impedance curves of traces near wells. Secondly we transform prestack seismic data from offset domain to angle domain. Thirdly we estimate seismic wavelets corresponding to different angles. Then we perform inversion to obtain elastic impedance sections. Finally we extract various elastic parameters. Applications of this prestack elastic impedance inversion to seismic data from Block A, Erdos Basin obtain good results, and demonstrate its feasibility and effectivity of gas-bearing reservoir prediction.

Key Words : prestack inversion, reservoir prediction, gas-bearing, elastic impedance

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Reservoir prediction by amplitude attributes. Wang Yongli¹, Zhou Shang¹, Gao Xiaoli², Zhao Xiuqi¹, Han Tianbao¹, Zhang Wanfu¹, Bai Feng³, Han Dongming¹, Li Changfen¹ and Cao Chunmei¹. *OGP*, 2012, 47(Supplement 1):78~83

Focused on a lithologic trap and a stratigraphic trap in Raoyang Sag, the paper demonstrates the relationship between seismic amplitude and reflection coefficient. Seismic amplitude is connected with reflection coefficient, especially with the reflection coefficient combination on thin beds. Strong amplitudes do not necessarily correspond to sand body developed areas. Different amplitude

attributes are extracted from two targets by different analytical methods. In order to find out interbedded sand bodies in the area, we analyze seismic data combined with well data, and reflection coefficient combination. Then we extract relative amplitude attributes. In marine deposition area, amplitude attributes can be extracted only based on reflection coefficient and seismic amplitude. Applications demonstrate good results obtained by this method.

Key words : amplitude attribute, reflection coefficient combination, reservoir prediction, Raoyang Sag

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Sequence constrained seismic reservoir prediction and its application in identification of lithologic trap. Dong Xuemei^{1,2}, Xu Huaiming¹, Hu Tingting², Chen yang², Li Jing² and He Luming². *OGP*, 2012, 47(Supplement 1):84~90

The key of sequence framework constrained seismic inversion for reservoir prediction is to apply sequence theory to interpret horizons, and build geologic models to constrain inversion results. The finer geologic models are, the better inversion precision is. Using the joint-research of horizon interpretation, seismic sequence identification and inversion, we apply quite few geological data such as sequence surface, maximum flood surface, system tract, subsequence surface, to build geologic models to constrain inversions. Application results show that the sequence constrained seismic inversion is improved.

Key words : sequence constrained, seismic reservoir prediction, lithologic trap identification

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Fine seismic interpretation and integrated evaluation of subsalt structure with lateral variation carbonate in North Tluwa Oilfield. Guo Shuangsheng¹, Wei Xiaodong², Chen Bo³ and Zhang Dawei². *OGP*, 2012, 47 (Supplement 1): 91~96

The North Tluwa Oilfield area is characterized by subsalt structures and lateral-variation carbonates. The fine seismic interpretation and integrated evaluation techniques used for this area are summarized in the paper. At the same time, the time-depth transform technique based on VSP calibration and the integrated interpretation technique of multi-data are used to solve these geological problems and enhance the seismic interpretation precision.

Key words : salt formation, salt dome, carbonate, underlying structure, fine interpretation, North Tluwa Oilfield

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Gas reservoir identification in Wangfu Fault Depression. Pan Hongwei¹, Shi Cunying¹, Wang Jingmiao¹, Zhao Jia¹, Ke Qin¹ and Bai Yuchun². *OGP*, 2012, 47 (Supplement 1): 97~102

Using 2D and 3D seismic data interpretation, we have conducted volcanic rock identification and favorable zone evaluation based on the geological structure, the sedimentary and tectonic history in Wangfu Fault Depression. The observations are obtained as follows: ① The main rift in NE has double fault structure properties controlled by three main faults. It developed three structural belts: Shandongtun structure belt, Xiaochengzi structure belt, and Wujiatun structure belt. The tectonic evolution of Wangfu Fault Depression can be divided into four stages: faulting period, fault-to-depression transforming period, depression period, and withered period. Three gas-bearing series were developed: clastic rocks of Quantou Formation, volcanic rocks of Shahezi Formation and Huoshiling

Formation. The primary gas reservoir of Huoshiling Formation is the largest reserve among them.

② The volcanic reservoir of Huoshiling Formation is divided into top rhyolite reservoir and andesite reservoir. Seismic reflections of rhyolite are characterized by high frequency and continuously strong amplitude, but andesite reflection is weak and messy, and discontinuous. The main reservoir of Shahezi Formation is sedimentary volcanic breccia in the bottom, which appears as low-frequency continuously complex wave with middle energy on seismic sections. ③ Our well location proposal focuses on the Xiaochengzi structural belt and the Shandongtun structural belt. Some important gas reservoirs are discovered by drilling.

Key words : Wangfu Fault Depression, geological characteristics, seismic reflection characteristics, volcanic identification, primary gas reservoir

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Structure styles in the West Qaidam Basin and its hydrocarbon exploration prospective. Zhang Jumei¹, Wu Wujun¹, Zheng Ximing¹ and Pei Mingli¹. *OGP*, 2012, 47 (Supplement 1): 103~110

Based on interpretation of a great amount of geology data in the West Qaidam Basin, the structure deformation style and structural style of the different stages in Himalaya period have been clearly demonstrated in the paper. With different episodic tectonic evolutions of Western Qaidam Basin, the different structural styles and trap type have been formed in depth. The main tectonic stacking pattern is delineated based on single structure pattern analysis. Further exploration areas have been clarified by analyzing the relationship between oil & gas generation, storage, and trap. The following conclusions are obtained: A. The west of Qaidam Basin has been affected by the early, middle, late Himalaya period movements. Mainly with local stretching movement, the early Himalaya movement developed an extensional tectonic style. The middle Himalaya movement developed

transpressional structural style. And with horizontal extrusion, the late Himalaya period developed a variety of fault fold styles. B. Eight styles of structure superposition were concluded by many times of such tectonic movements. The style of inverse structure + syn-sedimentary anticline + fault-propagated fold has the most advantages in petroleum geological conditions, and it may be the most mature oil & gas exploration area. The style of wedge shaped duplex overthrust + growth triangle has important instruction meanings for the exploration in Altun piedmont area. Around North Kun and Altun structural zones, the types of thrust fault of syndeposit + monocline block mountain and thrust fault of syndeposit + triangular structure are favorable clastic rock reservoir facies belts, and favorable lithological traps. The style of thrust fault of syndeposit + fault-propagated fold + pop-up structure and paleohigh (ramp) + fault-propagated fold + growth triangle have important practical significance for unconventional reservoir exploration in deep targets, and for lithological reservoir exploration in middle and shallow formations.

Key words : the West of Qaidam Basin, tectonic evolution, structure style, structure superposition style, hydrocarbon exploration prospective

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Structure features and exploration potential of the Paleogene-Neogene depressions in Western Qaidam Basin. Shen Ya¹, Li Hongge¹, Guan Junya¹, Wang Yunbo¹, Chen Haiqing¹, Li Yanming¹, Wang Guanghua¹ and Qu Yanwei¹. *OGP*, 2012, 47 (Supplement 1): 111~117

By influence of tectonic activity of the Cenozoic Eastern Kunlun orogenic belt, the Western Qaidam Basin has deformed strongly. With regional structural feature, this part can be divided into compression-shear thrust belts in the piedmont of the Eastern Kunlun range, Mangya depression with the Yingxiong Mountains reverse structural belts in the shallow layers, and the Dafengshan Salient.

The total hydrocarbon resources in the Paleogene-Neogene plateau saline lacustrine basin are about 25×10^8 t in the Western Qaidam Basin, among which the area effective hydrocarbon source rock amounts to 53%. This region is a typical hydrocarbon-rich depression with abundant surplus resources and great exploration potential. According to the exploration concept of hydrocarbon-rich depression, combined with the analysis of exploration degree and exploration technology, we propose the inverse structural zones in Yingxiong Mountains, lithologic strata in southwest of Qaidam Basin, the paleo-uplift in the piedmont of Altun Mountains, and the Mangya Depression with the periphery dense oil areas as four exploration fields.

Key words : Western Qaidam Basin, Paleogene-Neogene, hydrocarbon depression, Yingxiong Mountains inverse structural belts, structural features, exploration fields

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Structure features and potential prospect of Wenan slope in Baxian Depression. Zhang Wanfu¹, Li Xiaoheng¹, Zhai Xianlan¹, Wang Ziyi¹, Liu Caifeng¹, Nie Huili¹ and Zhou Qun¹. *OGP*, 2012, 47 (supplement 1): 118~124

Wenan slope experienced twice reversals and three faultings, namely, NE faulting, NW faulting and NEE faulting. The characteristics between the North and the South were quite different. The two netty faults in Suqiao area were in NE and NW directions. In the central Shigezhuang area, NEE faults were developed in echelon distribution. In Changfeng town of the south part, NE faults were arranged in parallel. Controlled by faults in Wenan slope, three structure zones were developed: Suqiao-Xinanzhen fault structure zone, a nose structure zone in Shigezhuang, and a nose structure zone in Changfengzhen-Yilunpu. Using merging 3D seismic data, we analyze in this paper the overall structures and obtain the following understanding: ① Hydrocarbon source rocks in Baxian Depression was deep, thick, and large; ② As exploration targets, there are multilayer in buried hills of the

slope ; ③Tight sandstones in the slope may be deep low-abundance tight sandstone reservoirs ; ④Horizon-lithology reservoirs outside the slope may have geological conditions for large multi-layer hydrocarbon resources.

Key words : Wenan slope, structure features, buried hills and inside of the buried hills, tight sandstone , horizon-lithology

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Shelf break zone identification and its control on sedimentary sequence formations. Ran Huaijiang¹, Lin Changsong², Dai Yiding³, Qin Chenggang³, Wu Wei⁴, Zhang Yu² and Qiao Yang². *OGP*, 2012, 47 (Supplement 1): 125~128

On basis of previous studies, Zhujiang-Hanjiang formations in the shelf break zone in Panyu low-uplift and the north slope of Baiyun Sag of Pearl River Mouth Basin are considered as a sequence stratigraphic framework. Using drilling, logging and seismic data and sequence stratigraphic principle, the paper analyzes characteristics of sedimentary sequence system tract for SQhj2 of the middle segment of Hanjiang formation. The main observations are as follows: ①SQhj2 can be divided into low-stand system tract, transgressive system tract and high-stand system tract. And the low-stand system tract can be recognized as two stages. ②Based on incised channels on system tract, time isopaches and cross-well sections, the boundary of the shelf break zone of the SQhj2 located in the southeast of Well area C, is distributed in the near northeast direction. The fracture slope break zone is an important controlling factor of the depositional sequence formation of the SQhj2. ③The shelf break zone and the low-stand system tract of the SQhj2 are well-developed favorable sand body area. Up-dip sand bodies overlay onto the sequence boundary or unconformity surface, and contact with the muddy layers of high-stand system tract and the upper slope. They are capped by overlying transgressive mudstone with a good sealing condition. So the onlap unconformity traps can be formed. Two-stage low-stand fans under the shelf

break zone and the deep sea mudstone can form better reservoir-seal assemblage and favorable stratigraphic traps.

Key words : Pearl River Mouth Basin, Panyu low-uplift, shelf break zone, the middle segment of Hanjiang formation, sedimentary sequence, stratigraphic trap

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Low resistivity reservoir detection using GR spectrometry logs: a case study. Xia Zhu¹, Liang Wei², Ling Yun¹, Guo Jianming¹, Li Xisheng², Zhang Sheng¹, Guo Xiangyu¹ and He Weisheng¹. *OGP*, 2012, 47 (Supplement 1): 129~135

The Oilfield LF13-2 is located in the Hui-lu lower uplift of Pearl River Mouth Basin. In this oilfield, the Enping and Zhuhai formations of Pleogene at the well LF13-2-1 was interpreted as oil-water bearing layers using the conventional well logging data. However, the sidewall core data indicate that these formations are oil-bearing reservoir. It is challenging to determine whether these formations are oil-water bearing or oil bearing with low resistivity due to the sparsity of the wells and the lack of the necessary test on the core data, which makes it difficult to accurately discriminate the reservoir type and evaluate the reservoir in the oilfield. In this paper, the test on the core samples from the zones of interest in this oilfield and adjacent one are sorted and analyzed as well as the diagenetic geology. Afterwards, using the histogram and scatter plot of the thorium and kalium from the gamma ray spectrometry logs, the clay mineral type with high adsorbing water, mass fraction and the low-resistivity mechanism caused by the conductive water-film net of the clay mineral are studied. Based on our study, the following new conclusion has been drawn on the formations at well LF13-2-

1; the zone in depth from 2879.5 meters to 2885 meters that was considered as oil-water formations is actually the oil layers with rich bound water and low resistivity. This conclusion has been indirectly verified by the scanning electron microscope and X-ray data of the core samples from the east of Huizhou depression in the adjacent oilfield.

Key words : gamma ray spectrometry log, low-resistivity oil formation, cross-plot analysis, clay mineral with rich bound water, Pleogene

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Reservoir logging evaluation of hybrid sedimentary rocks in Xiaoliangshan, Qaidam Basin. Peng Xiaogun¹, Wu Feng² and Zhang Yanhua³. *OGP*, 2012, 47 (Supplement 1): 136~139, 151

Deposition of Shizigou formation and upper Youshashan formation in Xiaoliangshan, Qaidam Basin has obvious mixed sedimentary features. According to the characteristic of lithology complex of hybrid rock reservoir, we classify the lithology which was determined by core analysis again for the purpose of logging evaluation. The lithology is divided into shale kind, sand kind and carbonate kind, where carbonate kind can be divided into micritic kind and algal limestone kind. Algal limestone kind is good reservoir, but in small monolayer thickness. Sand kind and micritic kind can be reservoir when the pore structure is good, and they are always in large monolayer thickness. There are obvious differences in logging response characteristics for different kinds of lithology. Combining the plate method with logging data can distinguish and identify reservoir with different lithology effectively.

Key words : reservoir prediction, hybrid rock, logging, lithology, Qaidam Basin, Xiaoliangshan

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Geological implications of gravity and magnetic anomalies in Erlian Basin and understanding of Upper Paleozoic structures. Song Jingming¹, Jin Fengming², Wang Yuqing¹, Sun Zhaohui², Gao Lin¹, Yao Huan², Zhao Li¹, Liu Xiheng² and Shi Cong². *OGP*, 2012, 47 (Supplement 1): 140~146

Erlian Basin is a middle-scale oilfield of China. Our work in the basin is as follows: merging and process gravity and magnetic data acquired in the basin, analyzing the geological implications of the data, and finally predicting Upper Paleozoic structures together with available seismic data. The comprehensive study concludes that Upper Paleozoic formations are dominantly controlled by big deep faults in the basin. In the north of the Xilamulun-River fault, the residual Upper Paleozoic formations have the big thickness. There are two thickness centers, i.e. Erlian-Suyouqi Zone and Xi-wuqi-Dongwuqi Zone. The maximum thickness of the former is about 3000 m, and the maximum thickness of the later is about 6300 m. Both of them have not only big thickness but also a wide coverage, and are considered as future potential targets.

Key words : gravity and magnetic anomalies, gravity and magnetic data processing, fault system, thickness prediction

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TFEM applications in the Block A, Niger. Sun Zhihua¹, Fu Jilin¹, Yang Shujiang², Qin Jincheng² and Zhao Zhi². *OGP*, 2012, 47 (Supplement 1): 147~151

There are vertical obvious differences of electric property and polarization effect of fluid in earth layer medium in the Block A, Niger. Therefore a TFEM survey was conducted, which provide some hydrocarbon anomaly parameters, such as polarization anomaly, frequency correlation coefficient,

time constant, phase and amplitude anomaly, and resistivity anomaly. The hydrocarbon indication standard and principle made by the integrated analysis of hydrocarbon anomaly parameters. And the previous drilled well results were used to classify the anomaly zones and guide the hydrocarbon exploration. Good results have been achieved by this approach in the Block A, Niger.

Key words: TFEM, polarization anomaly, resistivity profile, hydrocarbon detection

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Studying shallow low-velocity zone using electric data. Zheng Li¹, Xu Jianhua¹, Kang Suwei², Wang Caifu¹, Xu Shichao¹, and Hao Shujuan¹. *OGP*, 2012, 47(Supplement 1): 152~155

Geology condition of the earth surface is extremely complicated in Yingxiongling area in Qaidam Basin. Velocity and thickness of low-velocity zones are quite different from one place to the others, which cause statics problems for seismic exploration. Using magnetotelluric sounding (MT) data acquired in Youshashan and high frequency electromagnetic sounding (AMT) data acquired in Ganchaigou, we study shallow low-velocity zones in order to find out its thickness and velocity variation trend. Low-velocity zone thickness and its distribution are determined by the relationship between shallow high-resistivity layers and shallow low-velocity layers. Velocity variation of low-velocity

zones is determined using our improved Faust experience formula and fitting parameters. Our electric data results are consistent with uphole data and LVL data, which can be used for static corrections and velocity model building.

Key words: 3D MT, low-velocity zone, shallow high-resistivity layer, uphole, Faust formula

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TEM with rectangle transmitting loops and circle loop. Pei Jianguo¹ and Liu Hongfu¹. *OGP*, 2012, 47(Supplement 1): 156~161

Based on the basic theory of electromagnetic induction and transient electromagnetic method (TEM), we design four equal-circumference models (three rectangle loops with different length-width ratio and one circle loop). By contrast with these four models, we find that in TEM the equal-circumference circle loop has obvious advantages. It has stronger signal intensity and can detect deeper targets in deep-layer data under the circumstances of constant transmitting power and current. The circle loop size has little influence on cut-off time. In conclusion, the circle loop has more advantages.

Key words: TEM, Boit-Savart law, transmitting loop, detecting depth

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