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The Research Status of River Mouth Bar and the Research about Configuration Mode

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Abstract: Sand mud material brought by rivers accumulates at the mouth and then river mouth bar is formed. River mouth bar consists by sand and silt, classify is better and Quality is pure. Sand form is middle to thick layer. It develops wedge shaped cross bedding, shape prior product texture, horizontal texture. The formation of the mouth bar is a former product. Rhythm type is the counter rhythm which features the bottom of the sand body is fine, and the upper sand body is rough. The curve of the log is a funnel shape.
Keywords: river mouth bar, the counter rhythm, the curve of the log.

INTRODUCTION

According the analytic hierarchy Process, the mouth bar is divided into three levels: estuary dam complex, single mouth bar, estuarine dam body. The 3 levels of sandbody architecture development controlled by medium term base level cycle , short term base level cycle, super short term base level cycle respectively.

River mouth bar sand body is the most characteristic sand body in the delta front and is a very important type of oil and gas reservoir. A large amount of work has been done on the research of the river mouth dam Paied attention to macro distribution and vertical sequence of mouth bar. River mouth bar is regarded as a set of genetic elements, a connected component or a structure element. Research on internal hierarchy is less. Along with improvement of oil field exploitation and rise of comprehensive water cut, residual oil is highly dispersed but local enrichment. Distribution of remaining oil in the reservoir of the mouth bar controlled by structure and heterogeneity. So it is of great importance to analyze the structure of the sand body in the prediction of remaining oil distribution and to improve the development efficiency of the oil field

MATERIAL AND METHODS

The domestic and foreign research status of river mouth bar

In China, Xia Wenchen *et al*. in the study of rift basin and large inland depression basin riparian sediments identified water diversion channel type lake delta system. At the same time, another delta system worthy of attention in the basin filling stage is the lacustrine deltaic system with subaqueous distributary channel-mouth bar couplets[1]. Xi Nong, Li Sitian researched The Jiangxi Fengcheng Mining Area on the Permian series Longtan Formation lion barrier island - relief lake sedimentary system. Li Sitian, Fu Qingping researched northeastern margin of erdos basin of shenmu county test gongwusu ditch area[2] Jurassic yanan formation of lacustrine deltaic plain sand bodies. Zhang Chunsheng, Liu Zhongbao through the study of Jingjiang section of the middle reaches of the Yangtze river: under water diversion channel sand body has near horizontal stacked structure; Zhang Chunsheng *et al*. were conducted to simulate the formation process of the Delta and the river mouth and discovered that the change of the water diversion channel is closely related to the falling speed of the lake level and the intensity of the moving floor[2]; Wei Pingsheng *et al*. took Sedimentary system of West and south of Songliao Basin as example , began from the cause distribution and internal structure of the river mouth dam and the coastal dam ,discussed the genetic relationship of the mouth bar, the coastal dam and the small fault and the low amplitude structure, analyzed the characteristics of oil and gas in the mouth bar and the coastal bar, obtained the forming mechanism of oil and gas, the main controlling factors and the distribution law of oil and gas and pointed favorable target areas for exploration [1]; He Wenxiang *et al*. used high resolution sequence stratigraphy theory and reservoir configuration analysis and took Shengtuo oilfield - two District Sha two section 8 sand group Dongying in Jiyang depression for example to research the configuration of estuary dam[3]; Li Yunhai *et al* used theory and analytic hierarchy process method for the configuration of the river mouth bar, analyzed Configuration interface of the reservoir of estuarine dam in Two sand two section 8 sand group and formed distribution model of the internal structure of reservoir

in the description of the interface layer of the reservoir configuration in the delta front mouth bar. What he has done provided direction for the estuary dam studying reservoir heterogeneity and remaining oil tapping; Sun Yuhua *et al*. divided The estuary dam into 2 types: a single mouth bar and a stack of mouth bar, formed a total of 18 conceptual models of different thickness, permeability, different frequency, different injection production conditions, etc, conducted numerical simulation to model limit water cut, got factors which affect the remaining oil of the river mouth bar and remaining oil distribution pattern; Guo Jingxing *et al* studied and classified the structural levels, rock types, causes, etc. of the two sections of the Shahe block of the 11 block of the beam systematically; Zhang Hui analyzed the distribution law of the different position and the different types of the estuary dam environment in the research of sediment types and changes in a group of Hong gang oilfield SA sand body in the ancient estuary dam; Liu Yan took Sheng li Oilfield permanent 3-1 block sand two 5 sand group for example to research fine division of reservoir in the estuarine dam and solid development plan; Wu Yi *et al*. researched the control effect of the inner spacer layer on the formation of remaining oil in the sand body of the thick layer mouth bar, accurately described The internal configuration of the general development of estuarine bar sand body and developed features that there is a large number of layers in the thick layer[3].

In other countries outside China Farqaharson firstly divided the delta system into two types: the Gilbert type and the river mouth dam type [2]; A D. Miall proposed an analysis method for building structure elements suitable for river phase analysis and this method is value to the research of Configuration of estuary dam[4-5]; Ellott stated the sedimentary environment and sedimentary facies which involve micro facies of river mouth bar; Lowry study a large number of field outcrop and found: The length and width of a single mouth bar are related to the width of a river dam, the length and thickness of a single mouth bar is related to the thickness of a river, the distribution scale of sand body in the estuary dam can be predicted depend on the thickness of the mouth bar; M. A. Chandler *et al*. researched effect of reservoir heterogeneity on permeability; Atkinson C D *et al*. got many achievements about the research of macroscopic heterogeneity and the development of vertical sequence depend on the research of estuarine dam; Reynolds analyzed distribution scale of ancient river mouth dam and discovered: the width of the sand body in the river mouth bar is 1.1 ~ 1.14km, the length is 2.6 ~ 9.6km[4].

He provided that the length of the estuarine dam is two times the width and thought the estuarine dam Seen in the modern landscape is still in the growth stage; Makaske B *et al*. researched the Rhine - the Maas River Delta lateral accretion[4]. He provided that estuary sand dam performed double convex for the overall, top curvature is less than the bottom curvature, the side edges are serrated on the plane. He summed up a total of 5 types which involve distributary channel sand, sand dam at the top of sand, sand dam slope sand, far sand bars and sand dam wing depended on log curve.

Allen clearly divided into 3 levels in the research of river sediment and this division scheme is widely used by many geologists. Allen's 1 lever interface is a single cross layer system. Allen's 2 lever interface is staggered sequence group or a set of rock facies composite interface whose formation is related. Allen's 3 lever interface is a set of configuration elements or interface of complexes. The 3 interface is usually an obvious scour surface.

Miall Added a 4 level interface depended on Allen's Interface division that is the bottom interface of the river in the canyon[5]; Miall extended 4 level interface till 6 level interface. What he did completes interface classification; Miall increases two - level interface. The seventh level interface is large depositional system, vannus, sequence. The eighth level interface is basin filling complex; Miall division of the 1 level of the interface and the 2 interface recorded the boundary of the micro base and middle scale deposit. The 2 lever interface is a simple layer system group. The 3 level interfaces is the cross cutting erosion surface. The 3 lever interface represents water change. The 4 lever interface represents top surface of a large scale and it, surface usually flat or convex. Another 4 lever interface is called bottom erosion surface of small river channel. 5 level interfaces is a large sand table boundary.6 lever interface represents interface of limited channel group or ancient Valley Group.

Configuration mode of estuarine dam

1. Sedimentary model of estuarine dam

According to the formation mechanism of the estuary dam, the estuary dam is divided into the River Delta estuary dam and the wave controlled delta estuary dam. River Delta estuary dam types accounted for the majority. Wave controlled delta estuary dam mainly formed in wave action. Wave controlled delta estuary dam is a destructive Delta. The type of wave controlled delta estuary dam is crescent or lump. Wave controlled delta estuary dam is no longer expanded after the formation.

A) Deposition model of river Delta estuary dam

Deposition model of single channel

This type of river mouth dam is due to the strong function of the river and the full supply of sedimentary material and this river mouth dam is parallel to a single diversion channel. The rhythm of this type of mouth bar is counter - rhythm. The bottom of the particles is fine, and the top of the upper is coarse .River and estuary dam symbiosis.

Deposition model of multi channel composite

This type of mouth bar is formed in the river crotch and it，s formation is due to the strong function of the river and the full supply of sedimentary material. The rhythm of this type of mouth bar is counter - rhythm. River and estuary dam symbiosis.

B) Deposition model of wave controlled delta estuary dam

Deposition model of wave controlled vertical source

The formation of this type of mouth due to clastic sediment which river brings changed by strong wave action. The shape of this type of mouth is crescent or transverse strip. Log response characteristic is reverse cycle. There is no associated with the corresponding channel in the river mouth bar sand body.

Deposition model of wave controlled radial

The formation of this type of mouth due to river course changed by the Strong wave action . The shape of this type of mouse is radiation lump or sheet sand dam. Log response characteristic is reverse cycle. River mouth bar sand body is not associated with the river.

2. Interface level division and characteristics of estuarine dam

Sand body of delta front facies river mouth bar can be divided into 5 levels of interface. Different interfaces have different causes, characteristics and scale [3].

a) 1lever interface. 1 lever interface is cross layer interface and formed by a series of identical stripes. The direction of the interface is related to the direction of the ancient water flow. The bedding types of this lever interface are wavy cross bedding , parallel bedding, tabular cross bedding or low angle cross bedding.

b) 2 lever interface. 2 lever interface formed by the combination of large number of layers. 2 lever interface illustrates constantly change of water flow condition. 2 lever interfaces is different lithofacies interface in a sand body. The direction of the interface is closely related to the flow of water in the deposition. The main distinction between the 1 lever interface and the 2 lever interface is that the upper and lower lithofacies of the interface are different.

c) 3 lever interface.3 lever interfaces is the top and bottom interface of the same body in a single mouth bar sand body. The interface tends to the centre of the lake. The upper part of the interface is covered with a thin layer of mud. This kind of interface reflects the transient changes of estuarine sedimentation.

d) 4 lever interface.4 lever interface is the top and bottom interface of a single estuary dam which formed by multiple hyperplasia Inside the mouth bar overlapping. The 4 level interfaces and the 3 interface have the same tendency. 4 lever interfaces is the interface between different layers of rhythm of Internal of sand body of delta front mouth bar. 4 levels of the interface are generally able to coincide with the 3 level of interface and even combined together.

e) 5 lever interface.5 lever interface is the top and bottom of the mouth bar complex which formed by multiple single mouth bar sand body constantly adding in the vertical direction and constantly coinciding on the side. 5 lever interfaces is the top sediment interface that can be distinguished in the delta front sedimentary body. The interface tends to the direction of Lake. 5 level interface distributions are extremely stable. The formation of 5lever interface due to the changes of the water diversion channel and the migration of the Delta. 5 lever interfaces can be regarded as the interface layer inside the small sand group.

3. The research about layer, interlayer of estuarine dam

Interlayer is non permeable layer which stops the flow of fluids in reservoir. Thickness of interlayer changed much. Lithology is generally mudstone, silty mudstone, and calcareous silt.

Layer is non-permeable layer of sand body distribution. The thickness change is generally in a few centimeters to tens of centimeters. The distribution layers have poor stability. Layer is not effective in preventing and restricting the flow of the fluid. Layer Influence fluid flow characteristics in the local area. The lithology is generally silty mudstone, mudstone. The formation of Low permeability interlayer due to the deposit or the strength of the rock is not equal.

The cause of interlayer of estuarine dam mainly divided into two types of deposit formation and diagenetic formation. Interlayer of muddy silt and silty mudstone is general deposit formation. Interlayer of calcareous interlayer is general diagenetic formation.

RESULT AND DISCUSSION

1. The research about estuarine dam begin from 1990s in china. Research content includes configuration mode about estuarine dam, deposition model about estuarine dam, Types about estuarine dam.
2. The research about estuarine dam begin from 1980s in other countries outside China. Research content includes types about estuarine dam, sedimentary microfacies about estuarine dam, growth phase about estuarine dam, Interface type about estuarine dam.
3. Deposition model about estuarine dam divided into delta estuary dam controlled by wave and delta estuary dam controlled by rivers based on its formation mechanism. Delta estuary dam controlled by wave divided into deposition model of wave controlled vertical source, deposition model of wave controlled radial

4. River mouth bar sand body is divided into 5 level interface, I level interface, II level interface, III level interface, IV level interface and V level interface.
5. The inner of river mouth bar has interlayer ,the cause of formation of interlayer is deposit genesis and rocks genesis.

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