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Northeast China Eastern basin group of lower cretaceous lithofacies palaeogeographic characteristics

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Abstract: By using the field measured section and predecessors' studying results, considering the fault basin stretching environment, based on the study of fault basin sedimentary characteristics, further the overall grasp the eastern basin of northeast lithofacies palaeogeographic characteristics of the early cretaceous. Research shows that in the early cretaceous, eastern basin group of whole presents the "north hainan land" sedimentary characteristics, formation in northern main Marine development, in the land and sea, lake sedimentary system, equal in southern basin sedimentation in delta, fan delta, littoral and shallow lake and deep lake - deep lake facies and coal development in northern and southern shale development. Enhanced because of the tethys domain collision, volcanic activity presents the " North weak south strong ", the north high degree of thermal evolution of organic matter, and then shale development.

Keywords: *Northeast China Early Cretaceous lithofacies palaeogeo graphy sedimentary facies*

I. INTRODUCTION

Northeast China Eastern basin formation refers to Yilan - Yitong fracture of the east of the small and medium-sized sedimentary basin [1-2].Lower cretaceous in the basin, reservoir and caprock development, is the region a major exploration target zone. Yanji basin in the north of the study area, and in the lower cretaceous in Jixi basin, has discovered the industrial flows and coal-derived air flow, found here flows in Hulin basin [3-6]; In the study area in the south of the lower cretaceous also made a breakthrough, Tonghua basin is of drilling Wells, D1 meet good oil and gas shows. All this indicates the eastern basin group of lower cretaceous has good conventional oil and gas and shale oil and gas prospects in oil and gas exploration potential. So the early cretaceous lithofacies paleogeographic characteristics of the region is particularly important, which will provide a scientific basis for further oil and gas exploration.

II. REGIONAL GEOLOGICAL

Eastern basin group of a total of 38 basin, located in China's northeast, contains the region east of the Heilongjiang and Jilin Jiamusi - Yitong fracture, area of 54 square kilometers, the latitude in N45 ° 53 are 'and N34 ° 9', longitude in E123 ° 2 'and E137 ° 18' between. In the stage of early cretaceous, weakened due to collision of the Pacific plate and tethys domain collision enhancement, causes the entire eastern left-hand stretching environment, first deposit formed on the fold basement fault basin group. [7-9] Basement is mainly composed of palaeozoic group and the former metamorphic rock of palaeozoic group of parts with different period of granite intrusion. In the northern region from the drop down to the upper and lower cretaceous in turn Didao group, Chengzihe and Muling group, in the southern region in turn of from bottom to top and bottom cretaceous Guosong group, Yingzuilazi group, Lingzitou and Hengtongshan group.

III. THE SEDIMENTARY CHARACTERISTICS OF SMALL AND MEDIUM-SIZED FAULT BASIN GROUP

1. Proximal deposit quickly

North of Songliao basin in the east of peripheral small fault basin in the smaller size of each fault depression, combined with the fault cause intense relief, terrigenous clastic supply sufficient, nearly has a source, fast and large thickness, sedimentary lithofacies change fast, narrow facies zone, and the sedimentary characteristics of small scale of sedimentary system. Formed in the slope area often rapid filling overlap pinchout belt, sandstone composition, mineral maturity is low, poor sorting. Is given priority to with development of radial flow, the flow length is less than the width, narrow facies belt, phase change rapidly. The rift tectonic activities in space-time inhomogeneity, have greater differentiation on the sedimentary types and thickness.

2. Give priority to with fresh - brackish lake basin

North of Songliao basin in the east of peripheral small fault basin is smaller more long and narrow basin, integral sex is extremely strong, lake scope is limited, terrestrial water sufficient supply of fresh water, fresh water and lake water exchange in full, with fresh - brackish lake (salinity < 35 g/l) , freshwater creatures flourish, such as freshwater algae, ostracod and small bivalve, lake basin edge higher plant development, higher plant supply fully. Only in the deep fault depression in the middle, in part due to strong volcanism and the addition of deep material, combined with the continuous deep water environment, may be brackish development the deep lake sediment. But in the Sanjiang basin, cretaceous Marine deposits.

Fault basin of Songliao basin peripheral exploration purpose layer formation water salinity table

Basin	Formation water salinity (mg/L)
Fangzheng fault depression	1945～7600
Tangyuan fault depression	2700～6300
Hulin basin	4400
Jixi basin	3400～5600
Yanji basin	2500～3000
Hegang basin	90～250
Boli basin	2000～3000

3. A variety of clastic sedimentary system

Due to the fault basin is narrow, multiple terrestrial water supply the detritus, the lake area and the proportion of all kinds of clastic sedimentary system is about 1:1 ~ 1:2 (Zhou Liqing, Liu Chiyang, 2004). Clastic rock general distribution in the structural high part,deep sag become deep lacustrine facies zone, thus forming the thickness and white pattern. Lake area range is limited, clastic sedimentary system, including alluvial fan, fan delta, underwater fan higher percentage. Various sedimentary basin development system, namely, alluvial fan sedimentary system, fan delta sedimentary system, nearshore subaqueous fan sedimentary system, system of deep-water gravity flow deposits, and lakes sedimentary system. Different geological period, the sedimentary system space configuration has obvious difference and stages. In strong expansion phase lake basin, river - fan delta - deep lake sedimentary system; In tensile stage, developed fan delta - bathyal lake system; In extrusion uplift stage, development of braided river - river flood plain sedimentary system.

IV. THE EARLY CRETACEOUS PALEOGEOGRAPHIC CHARACTERISTICS

A, The eastern basin group of whole presents the sedimentary characteristics of " North sea south terrestrial ". Study area in northern main development Marine strata, the sea and river, lake sedimentary system equal to each other, inheritance and development, the basin has the similar sedimentary environments. Sanjiang basin in cretaceous development in the land and sea, half deep lacustrine facies, fan delta sedimentary system, such as coal seam and the Marine strata . In southern jilin basin sedimentation in delta, fan delta, littoral and shallow lake, half deep lake - deep lake facies, and the basin sedimentary facies change fast. e.g. Fig.1.2

FIG. 1. lack thin layers of mudstone, semi deep lake mud microfacies

FIG. 2. grey block tuffaceous conglomerate, delta underwater channel microfacies

B, The early cretaceous, volcanic activity " North weak south strong ". In Heilongjiang province in northern study area, Mesozoic volcanic activity development, eruption time is short; The Mesozoic of lower cretaceous in the south of Jilin frequent volcanic activity. In the Liaoyuan basin, Shuangyang basin, Huihua basin, Liuhe basin, Tonghua basin, Guosong basin, extensively Fusong basin, Ma anshan basin volcanic basin, such as: Tonghua group of lower cretaceous basin consists of a set of Korean pine group neutral volcanic rocks and volcanic clastic rocks and a small amount of acidic volcanic rock type; The woods head group of the acidic volcanic rocks and volcanic elastic rocks and conglomerate, sandstone, relying mainly on volcanic eruption clip intermittent period characteristics of sedimentary rocks. Iron within the volcanic clastics magnesite material by hydrolysis, forming a large number of Fe^{2+}, Mg^{2+}, and the metal cation is beneficial to the photosynthesis of algae and plants, promoted the flourish of creatures. Biological death, leading to the formation of a large number of sedimentary organic matter, is conducive to the formation of high-quality hydrocarbon source rocks and oil shale and development.

C, The development of coal seam in northern, the southern region development of oil shale .The larger area of the northern basin in the study area, characterized by unified basin, although there are Marine strata, water distribution range is larger, but the water is shallow, limnetic facies strata; And Jilin province south complex structure, in accordance with the Yishu fracture and Dunmi fracture control, basin area is generally small, large difference of stratigraphic distribution, depositional environment is complex, but in the fault basin depocenter water deeper, to strong reducing environment, development of oil shale. For example, the study area in the north of Sanjiang basin, Jixi basin of lower cretaceous city river and Muling group is the main coal series. Luozigou Basin, south of the study area, Dalazi group of oil shale develop. Oil shale of lower cretaceous is mainly occurs in the south in the study area. Of course, in the northern part of organic matter thermal evolution degree is higher, it is also one of the causes of oil shale development not.

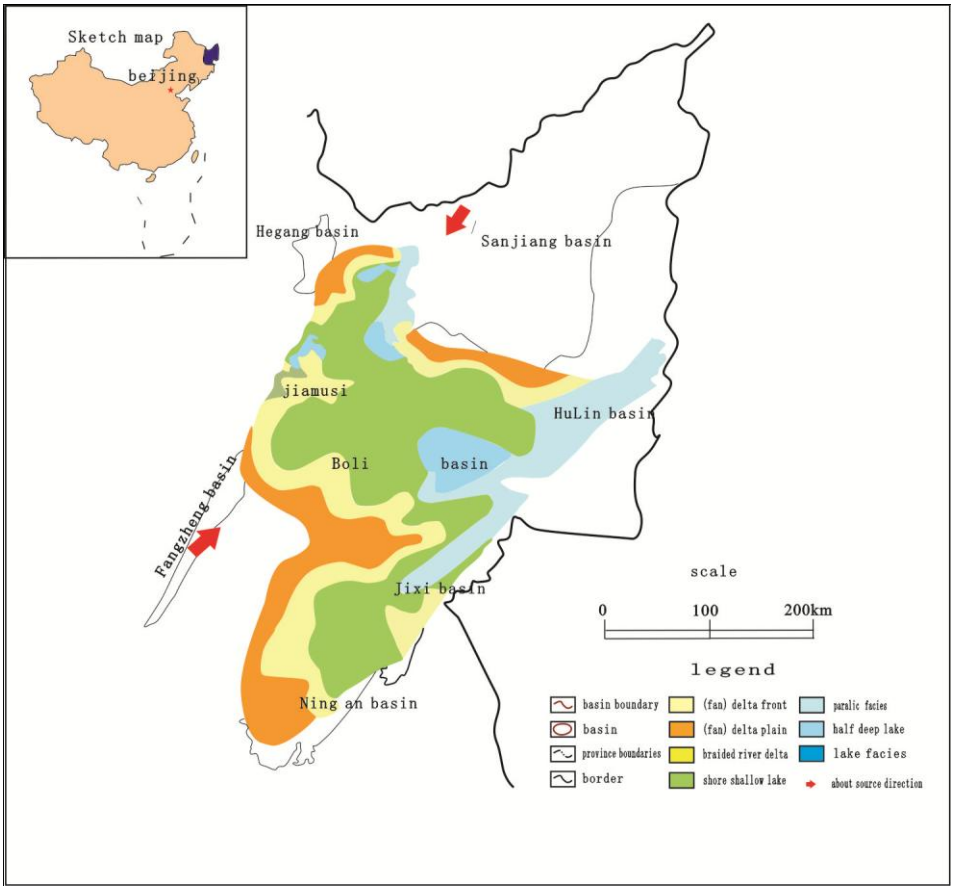

Fig.3. The floor plan of sedimentary facies in northern basin of cretaceous Muling period

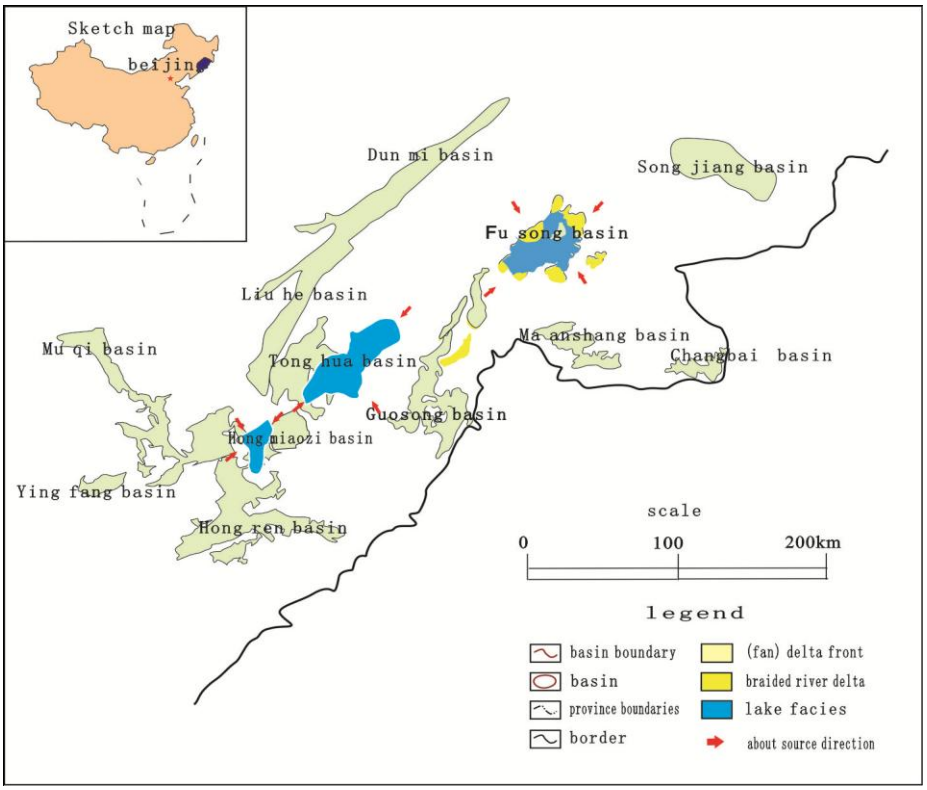

Fig.4. The floor plan of sedimentary facies in southern basin of cretaceous Muling period

V. CONCLUSION

A. The early cretaceous basin group of northern formation mainly Marine development, in the land and sea, lacustrine facies, sedimentation is given priority to with delta and lacustrine facies in southern basin [10].On the whole present a "north hainan land" sedimentary characteristics. e.g. Fig.3.4

B. Mainly from sedimentary basin group of northern source area of the northeast, and southwest is more complex, and the southern source from around lake.

C. Because of the tethys domain collision, volcanic activity is " North weak south strong ", volcanic rock is beneficial to the growth of higher plants, iron magnesite from north and the development of coal seam in the south.

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