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Research on Tectonic Evolution and Their Responses to Deposition of The Cretaceous in Kuqa Foreland Basin

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According to the recent research on overthrusts at the front of orogenic belts, thrusts and faults propagate intermittently forward to the craton, owing to interplay of accumulating and releasing over pressure. In the early stages, they are characterized by long-period and lowvelocity and in the later stage by short-period and highvelocity, resulting in typical overthrust nappe. Therefore, it could be presumed that tectonic loads operate mainly vertically during the early stages and propagate during the later stages. The cretaceous Kuqa depression is a foreland basin generated by flexural subsidence resulting from the south and thrusting of southern Tianshan Mountains. The Lower Cretaceous recorded an episode of tectonic evolution of a foreland basin. From significant changes in stratigraphic geometry and the migration of erosional truncation sites, we may infer that the Kapushaliang Group and Bashijigike Formation in the Kuga Depression developed during thrust tectonics and quiescence period, respectively. This paper has divided Cretaceous sequence stratigraphy of Kuqa foreland basin into two tectonic sequences and eight 3rd order sequences based on outcrops, well loggings and seismographic profiles. The sequences and system tracts in the Kuqa foreland basin spread from east to west as a whole and vary obviously from south to north. Two different models of sequence stratigraphic framework were established through studying the internal composition of sequence strata and boundary of individual sequences and corresponding to thrustfaulting activities in the early and in the later stages.

In the kapushaliangqun group, this basin appeared as a strong compressive piedmont alluvial-hungry basin, a typical foreland basin. The development o f sequence is attributed to the foreland tectonic process from flexural subsidence caused by thrust loading to rebounded uplift due to the erosion and stress release. The evolution of three depositional system of fan delta, shore-shallow lake and delta have clearly reflects the coupling process between basin and the southern Tianshan mountains fold belt. In the evolution of the foreland basin, according to the internal structure of sequence, kapushaliangqun group represents the sedimentary filling what grow out of thrust deflection from the rapid subsidence to thrust weakened and rebounded uplift. the coarse gravel sediment in Yageliemu Formation marked the beginning of the thrusting. Because the thrust generated flexural rapid subsidence, the accommodation space increased rapidly, engendered transgressive system. With the weakening of thrusting, flexural subsidence slows down causing rebounded uplift, rivers and deltas moved toward basin, engendered highstand system. The delta system in Baxigai Formation implied that a wide and even wedge top belt was produced by the rapid propagation of thrusting. In the seismic profiles, the lower and the upper part s of Kapushaliang Group developed propagation reflection forward to thrust-belt and retrogression reflection forward to craton.

In contrast, the basin shows smooth and expansive features in the bashijiqike age, and it has a unique model o f sequence stratigraphy framework and special internal stratigraphic composition. An abrupt change of deposition between the Bashenjiqike Formation and Baxigai Formation and the coarse gravel sediment at the bottom of Bashenjigike Formation resulted from violent rebounding of lithosphere. In the period, with the thrust weakened of southern Tianshan mountain fold belt, sediment supply is greater than the increasing space of accommodation in Kuqa depression. Lowstand system is characterized by the transgressive delta or alluvial plain. When the lake level rise rate exceeds the rate of sediment supply, engendered transgressive system. The basin developed mudstone intercalated with river sand. In the highstand system, river equilibrium profile position rising, the basin developed river and piedmont alluvial fan. At the same time, the edge

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of the basin developed coastal sand dam.

The thrusting period of a foreland basin can be subdivided into four stages: primary thrusting, w edgethrusting, propagation-thrusting, and weakening to termination of thrusting. The sequence framework and depositional pattern of the Cretaceous foreland basin were predominantly determined by the four stages and the changes of climate mainly impacted on sedimentary facies with in sequence frameworks.

Key words: foreland basin, thrusting, controlling factors, Kuqa depression, cretaceous

References

- Li Yong, Wang Chengshan, Zeng Yunfu, 2000. Orogeny and sedimentary response. Chengdu: Journal of Mineralogy and Petrology, 20(2) : 49-56(in Chinese).
- Wang Jiahao, Wang Hua, Chen Honghan, et al, 2005. Sequence stratigraphy of the foredeep in Kuqa Foreland Basin, Xinjiang: an example from the Cretaceous Kapushaliang Group.Wuhan: Geological Science and Technology Information, 24(1): 25-29 (in Chinese).
- Jia Chengzao, Wei Guoqi, Li Benliang, et al, 2003. Tectonics evolution of two-epoch foreland basins and its control for

natural gas accumulation in China's mid-western areas. Beijing: Acta Petrolei Sinica, 24(2) : 13-17 (in Chinese).

- Lin Chan gsong, Liu Jingyan, Zhang Yanmei, et al, 2002. Depositional architecture of the Tertiary tectonic sequences and their response to foreland tectonism in the Kuqa depression, the Tarim Basin. Beijing: Science in China: Series D, 32 (3) :177-183 (in Chinese).
- Jia Jinhua,2000. Depositional sequence and reservoir of Cretaceous Bashijiqike Formation in Kuqa foreland basin. Beijing: Earth Science Frontiers, 7(3) : 133-143 (in Chinese).
- Liu Shaofeng, Li Sitian, 1995. The theoretical models for simulating the flexural process of foreland basin. Beijing: Earth Science Frontiers, 2(3) : 69-77 (in Chinese).
- Lu Huafu, Jia Chengzao, Jia Dong, et al,2001. Features of the thrust wedge of deformation belt in Kuqa rejuvenation foreland basin. Nanjing: Geological Journal of China Universities, 7(3): 257-271 (in Chinese).
- Liu Zhihong, Lu Huafu, Jia Chengzao, 2000. Orogeny timing and fault slip rate and the its significance to the rejuvenated foreland thrusts belt of Kuche. Beijing: Petroleum Exploration and Development, 27(1):12-15 (in Chinese).
- Liu Hefu, Wang Zecheng, Xiong Baoxian, et al,2000. Coupling analysis of Mesozoic-Cenozoic foreland basin and mountain system in central and western China. Beijing: Earth Science Frontiers, 7(3):55-72 (in Chinese).