[PS]Prototype Model of Modern Fluvial Deposits and Discussion on Architectural Units: A Case Study of Hailar River and Chaobai River*

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Abstract

Considering the great heterogeneity in fluvial reservoir of offshore oilfield, reservoir architecture characterization is the core for reservoir fine description. Based on previous study and under the research concept of historical comparison, the paper conducted GPR detection on modern sediments of meandering rivers, namely Hailar River and Chaobai River in China. This paper, through prototype model reconstruction, reviewed and explored fluvial architectural units features and concluded the following understandings. Firstly, due to the transformation of deposition dynamic mechanism and dominating factors, fluvial reservoir formation takes the 6th order interface as breaking point. As a whole, from lower order toward higher order, the sedimentation process of fluvial reservoir architecture tends to transfer from lateral to vertical, and the 6th and 7th orders are key interfaces. Secondly, under the influence of ancient valley landform, fluvial deposits present the characteristics of multi-stacked complex longitudinally, which is an indication of multi-stage valley terraces. Relatively continuous and stable sequence interfaces may be developed among different stages. Thirdly, individual point bars were mostly reserved in the form of remnant bodies. Generally, point bar complex, which is composed of several genetically related individual point bar remnants and takes abandoned channels as lateral boundary, may have favorable conditions to form isolated sedimentary units. Therefore, point bar complex is the most important unit for meandering river sand body architecture characterization of offshore oilfield development.

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Firstly, based on fluvial reservoir hierarchy scheme built by Professor WU[1], due to the transformation of deposition dynamic mechanism and dominating factors, fluvial reservoir formation takes the 6th order interface as breaking point. As a whole, from lower order toward higher order, the sedimentation process of fluvial reservoir architecture tends to transfer from lateral to vertical, and the 6th and 7th orders are key interfaces. Secondly, under the influence of ancient valley landform, fluvial deposits present the characteristics of multi-stacked complex longitudinally, which is an indication of multi-stage valley terraces. Relatively continuous and stable sequence interfaces may be developed among different stages(fig. 1). Thirdly, individual point bars were mostly reserved in the form of remnant bodies. Generally, point bar complex, which is composed of several genetically related individual point bar remnants and takes abandoned channels as lateral boundary, may have favorable conditions to form isolated sedimentary units. Therefore, point bar complex is the most important unit for meandering river sand body architecture characterization of offshore oilfield development.

Key words meandering rivers, GPR, Hailar River, Chaobai River, prototype model, architecture units, point bar complex

[1] Wu Shenghe, Yue Dali, Liu Jianmin, et al. Hierarchy modeling research of reservoir architecture of river reservoir[J]. Science in China(ser D), 2008, 38 (sup 1): 111～121.

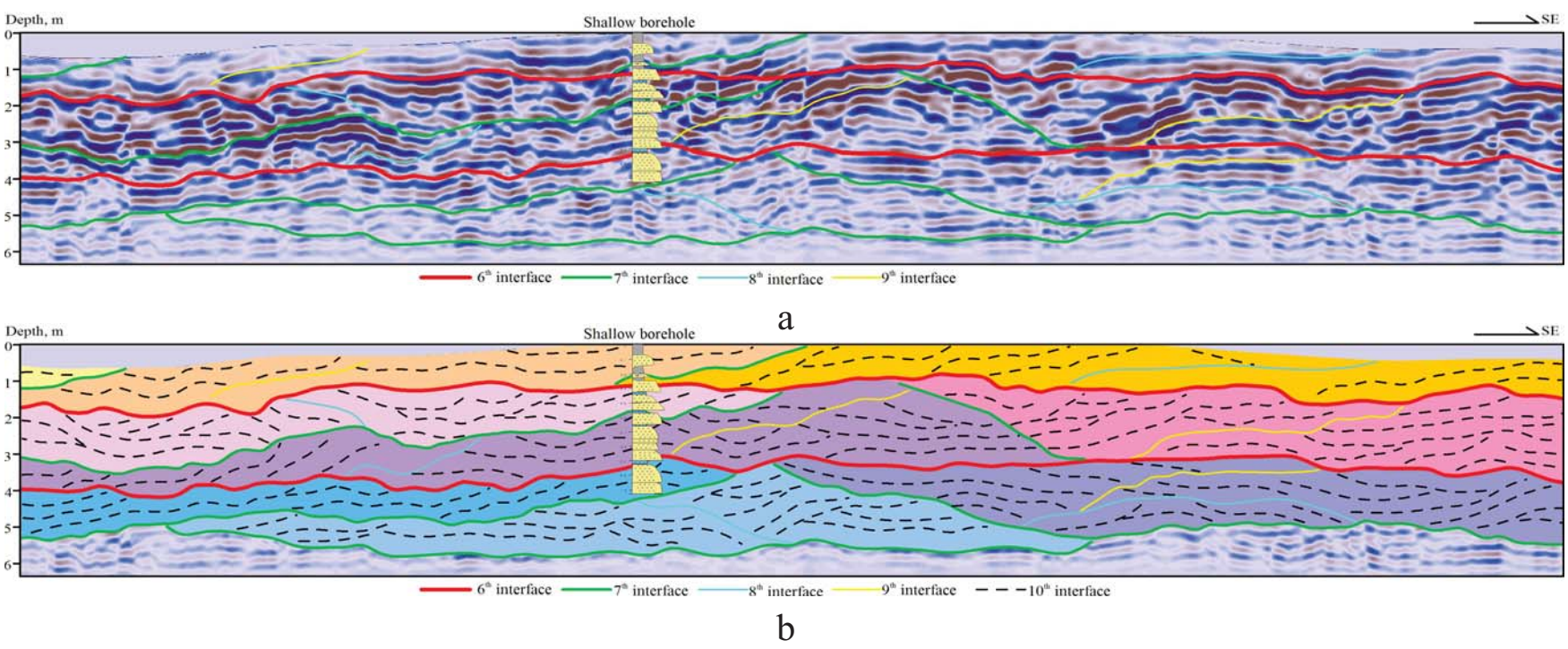
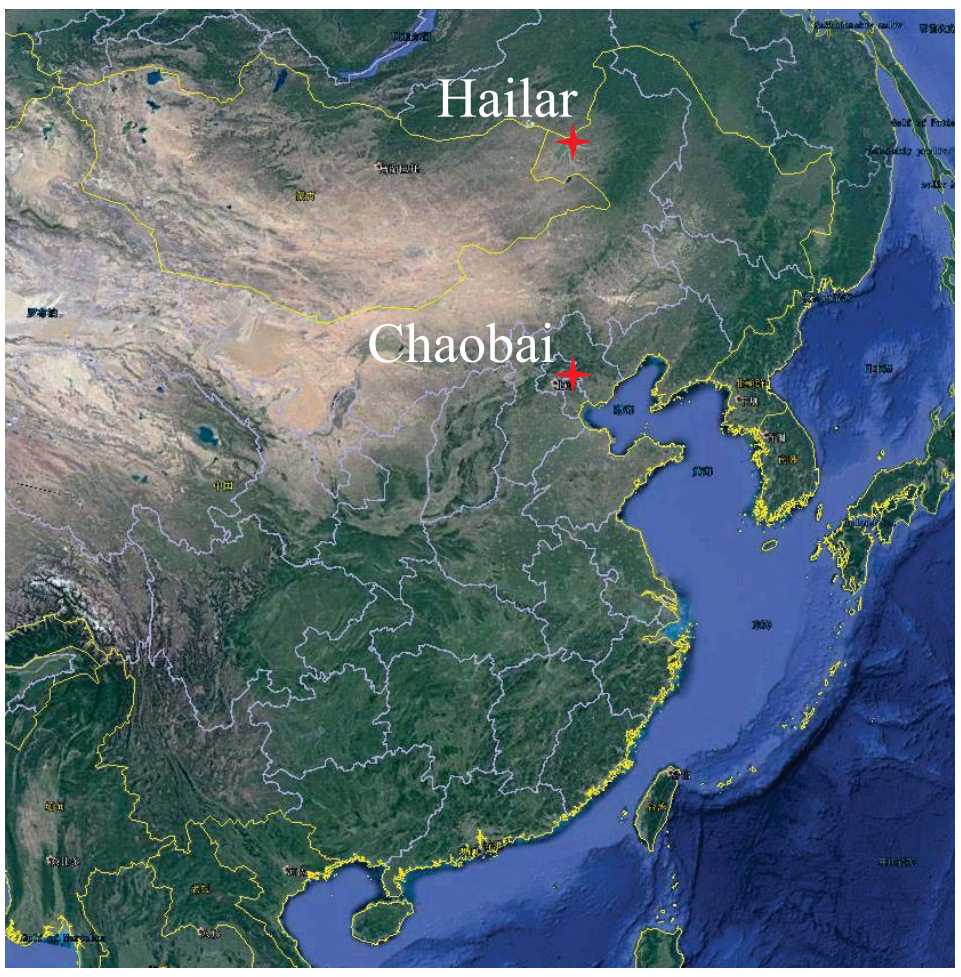
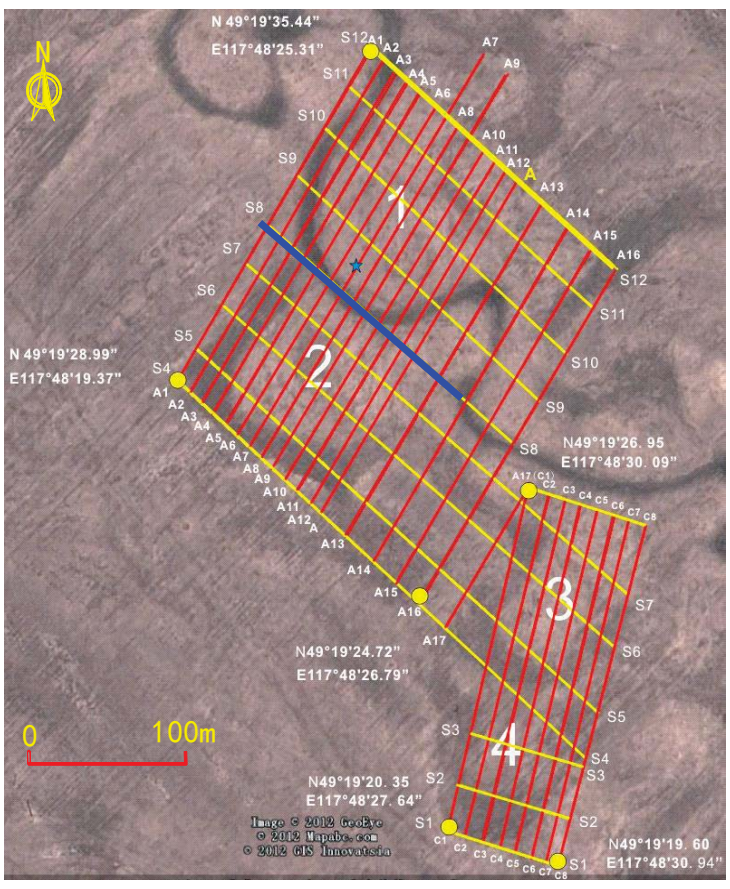


Fig. 1 Architecture interfaces interpretation on GPR section

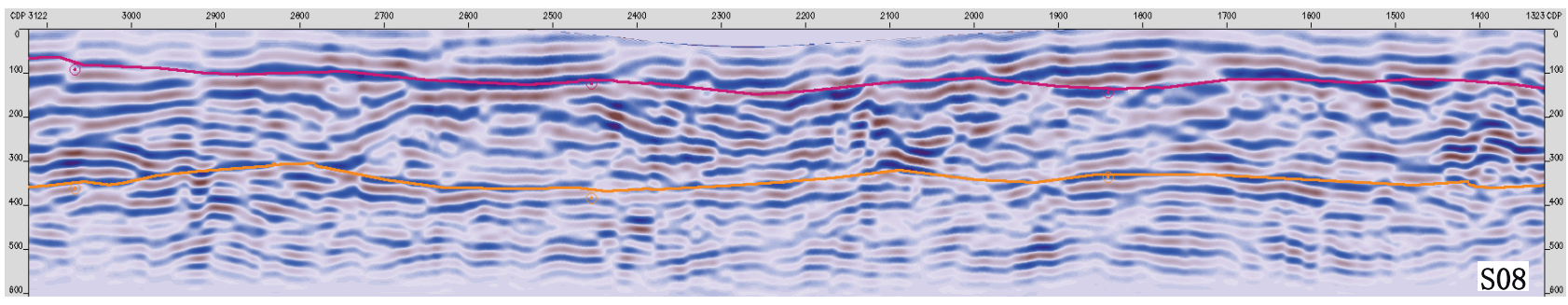
1. Geological Settings

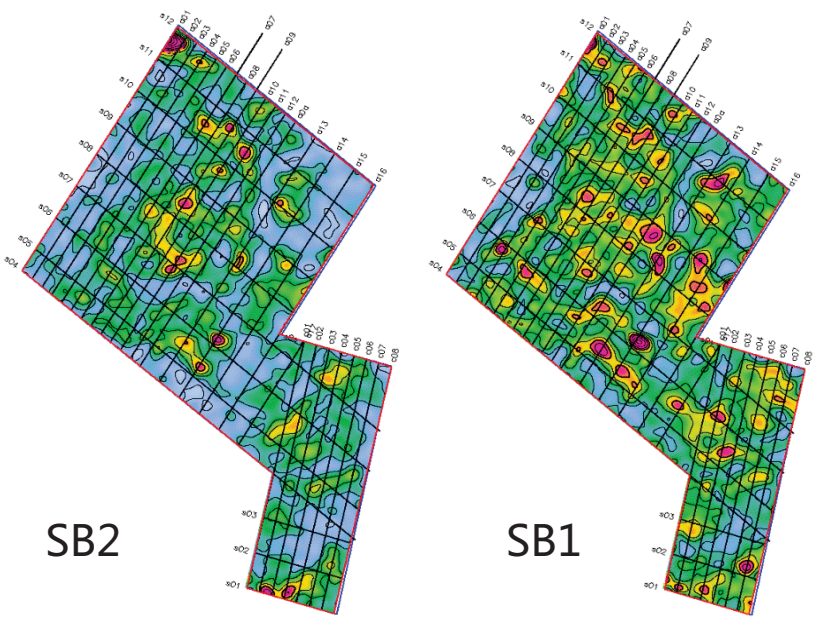




Hailar GPR survey
25inlines*12crosslines

2. GPR interpretation for Hailar River Sediments





Valley terraces

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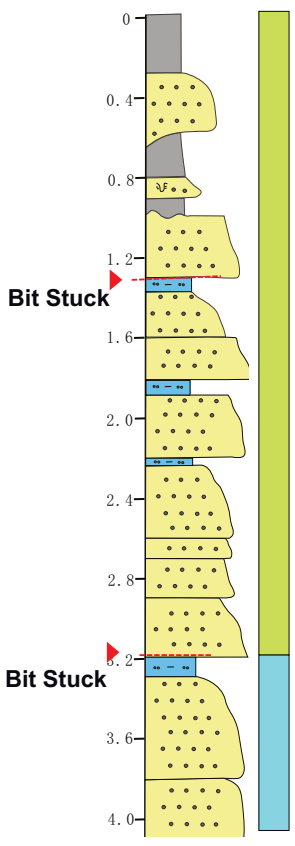
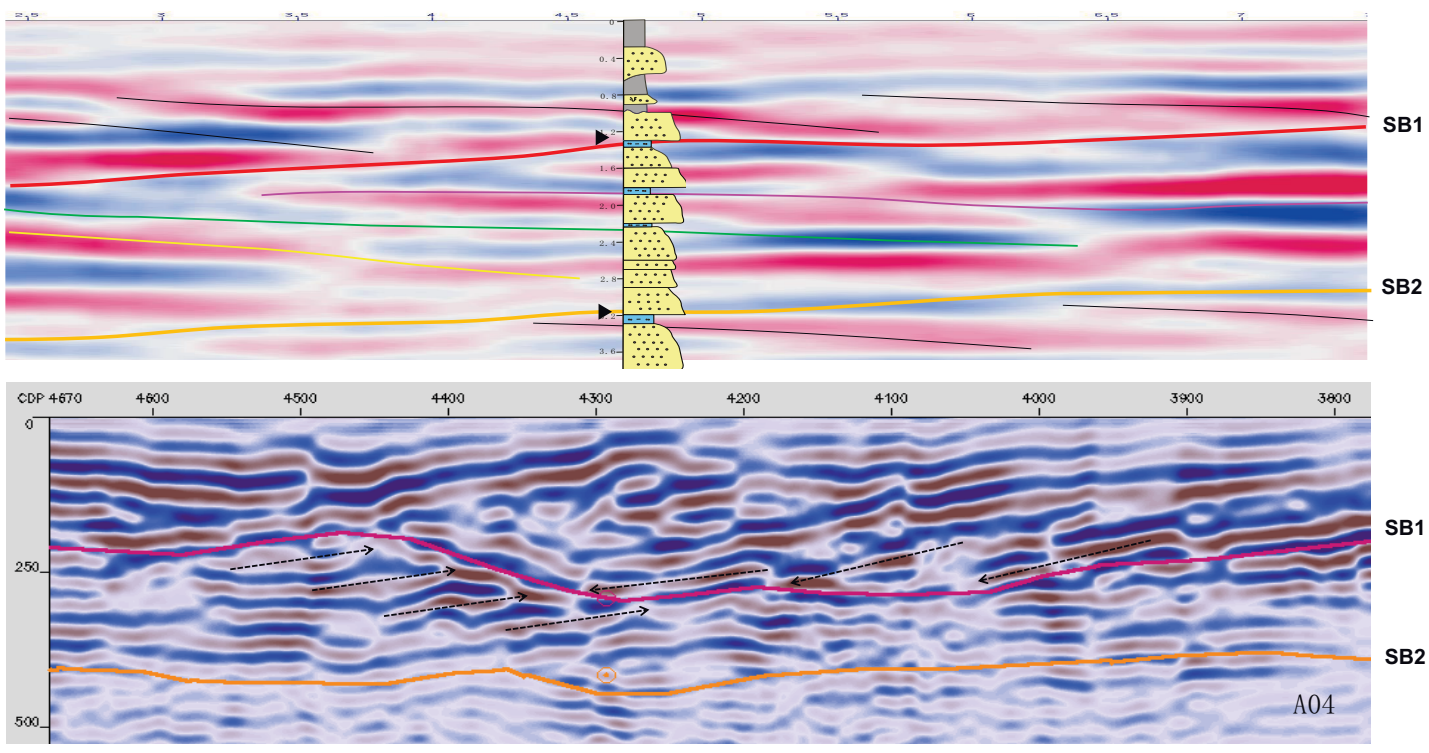


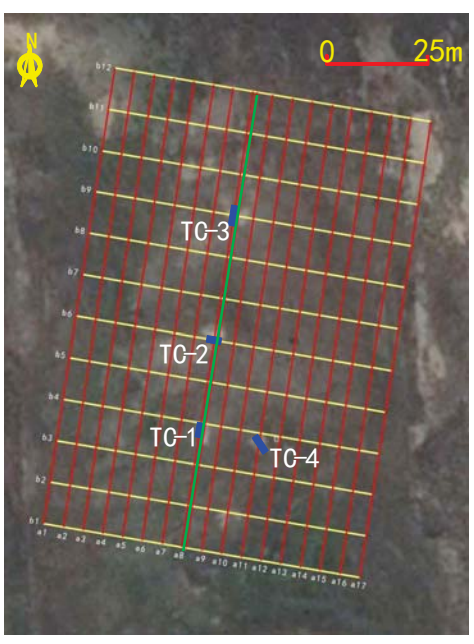
Interface marks: fine sediments; different colours; bit stuck; GPR reflection events erosion or downlap



Prototype model for Hailar River:

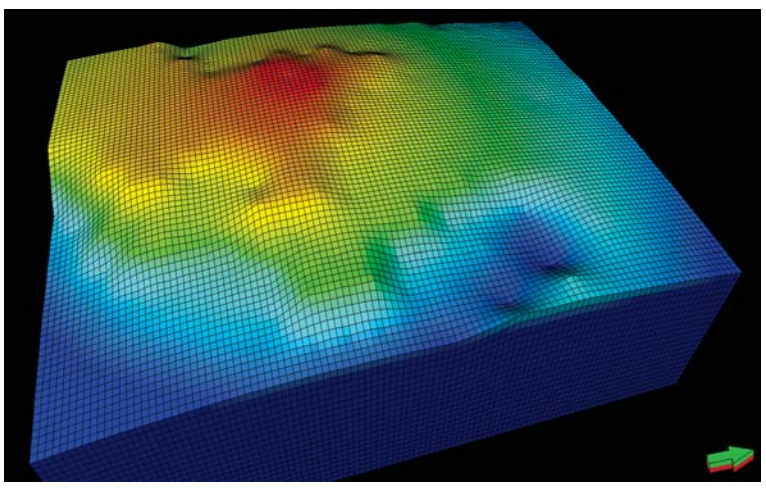
Multiple channel fills controlled by multiple terraces

3. GPR interpretation for Chaobai Sediments

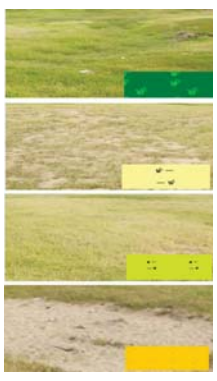


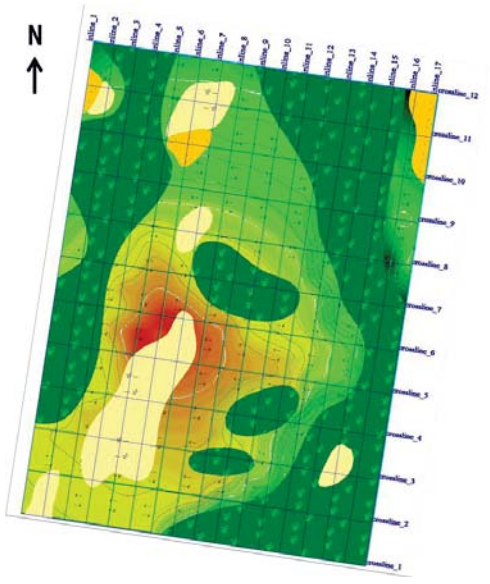
Chaobai GPR survey
18inlines*12crosslines

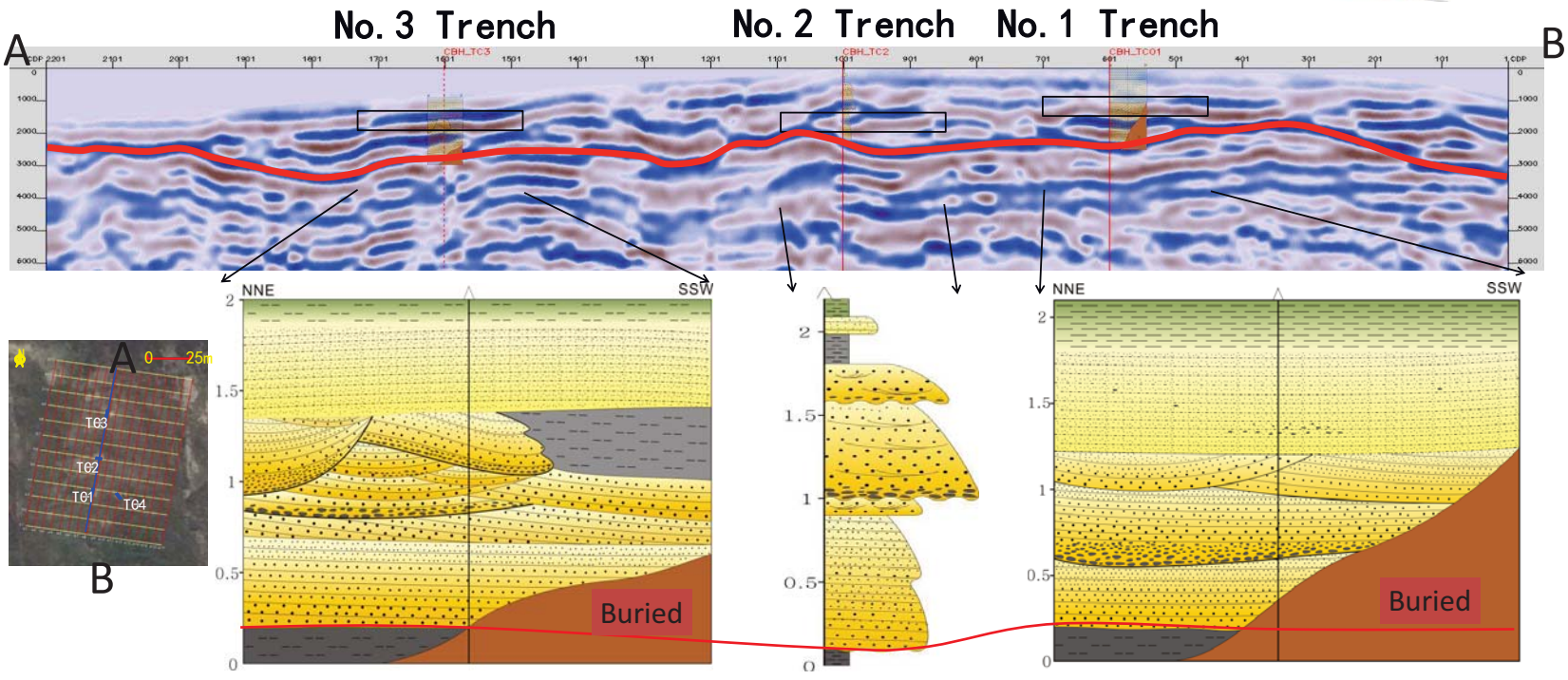
Present 3D landform

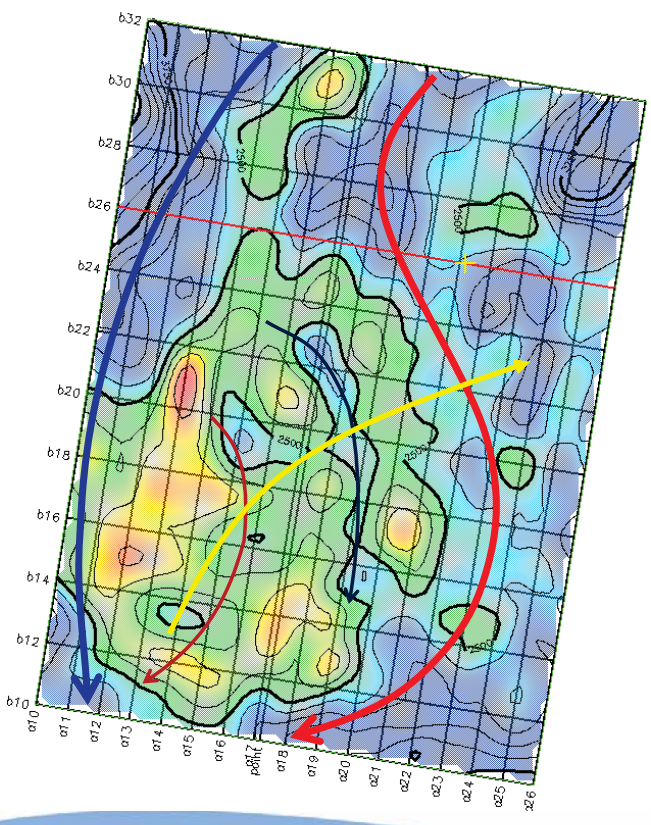


Present Vegetation coverage



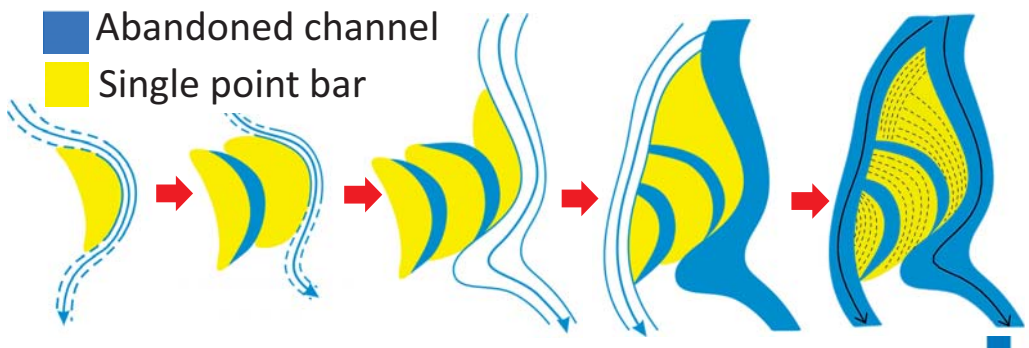






Prototype model for Chaobai River:

- Most single point bars are not complete
- point bar complex is common unit



Chaobai point bar complex evolution