

## **The architecture of braided deltas in modern Daihai lake, Northern China: implications for 3-D sedimentation models of rift lakes**

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Daihai Lake, a modern lacustrine rift basin, located in the Inner Mongolia, Northern China, serves as an important modern analog for understanding processes and architecture of deltaic sedimentation in an active rift setting. The lake has an area of 86.5 km<sup>2</sup> and variable depth between 2 m to 16 m. The basin covers an area of 653.3 km<sup>2</sup> and catchments of 2289 km<sup>2</sup>. Two of the largest deltas (Muhuahe delta and Tianchenghe delta) on the margins of Daihai Lake were surveyed to compare and contrast stacking patterns using aerial photographs, field trenching and sediment sampling. The Tianchenghe delta on border fault has much steeper offshore gradients than the Muhuahe delta on the axial shoaling margin where the trend of faults is orthogonal to the shoreline, resulting in relative narrow sandy dominated shelf and typical sigmoid progradation configuration. In contrast, the Muhuahe delta on shoaling margin has broad, sandy shelf and shingled progradation configuration which are strongly influenced by coastal currents.

This research presents preliminary results of integrated study using sedimentary logs and cores data collected from 49 trenches in the two deltas. Grid spacing of trenches is approximately 200 m over most of the study area, allowing for reasonably detailed mapping of spatial sedimentary facies. A 3-D sedimentation models which employ chronostratigraphic correlation technique was generated utilizing the Schlumberger proprietary simulation software Petrel. The spatial depositional models of the deltas demonstrate the various sediment compositions which were controlled by structural setting, slope gradients, the amount and type of sediment discharge by rivers. The architectural elements are characterized by coarse-grained beds in proximal delta, representing significant amalgamation of elements and well connectivity of sandbodies. On the contrary, the architectural elements in distal lobe (delta front) are characterized by fine-grained lithofacies with ripples and laminas, and predominantly represent sheet-like or lenticular shape. The chronostratigraphic sedimentation model predicted and represented the architectures and sand-body continuity of sediments, which can be applied in reservoir characterization of braided deltas in rift lakes.

**Keywords:** Architectures, Braided delta, Sedimentation Models, Daihai Lake