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Tectono-stratigraphy of the Lower Cretaceous Syn-rift Succession in Bongor Basin, Chad Republic: Implication for Structural Controls on Sediments Infill

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In a rift basin, the dispersal and deposition of sediments is significantly influenced by the paleo-topography, which is highly controlled by the structural evolution and the interaction of normal faults. To figure out the impact of structural elements towards sedimentary fillings, we investigated the Lower Cretaceous syn-rift package in the north slope of Bongor Basin, south of Chad Republic. Constrained with 2D and 3D seismic data, core data and logging information, a sequence stratigraphy architecture and a variety of depositional systems are present, including fan delta, braided delta, sub-lacustrine fan and lacustrine system. We also studied the spatial distribution and temporal evolution of clastic depositional systems of the syn-rift complex, as well as the relationship between syn-sedimentary faults and depositional systems. Valuable insights into structural controls of sequence architectures and depositional systems are provided in the syn-rift stage of Bongor Basin. During the evolution of rift basin, marginal structures such as relay ramps and transfer faults are major elements that influence the main sediments influx points. Different types of cross faults provide detailed controlling on the transportation and distribution of sediments inside the basin. Release faults in the hanging-wall could form a differential evolution pattern for accommodation, and affect the deposition system in the early stage of rift evolution. Erosional uplifts on the foot-wall inside the basin play unique roles in both providing interior secondary provenance and baffling the major sediments flux from drainage area. Oblique minor normal faults that develop on the foot-wall would cut the uplifts and provide faulted-through paths for the over-filled sediments in the early individual rifts, making it possible for developing sedimentary systems behind the uplifts during the early stage of rift evolution, although the origins of such minor faults need further discussion. By considering the principles of Source-to-Sink system and the structural controlling effects, comprehensive models has been built to achieve better understanding of the influx, transportation and deposition of sediments during the syn-rift stage in the north slope of Bongor Basin.