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Temporal Relationships in a Deep-Water Channel-Levee System and Application to Seismic Interpretation

Temporal relationships in a deep-water channel-levee system and application to seismic interpretation

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A superbly exposed deep-water channel-levee system allows mapping of deterministic relationships of the architectural elements. Prior to description of this outcrop, spatial relationships were inferred between similar architectural elements and used predictively to support subsurface interpretation without knowledge of the temporal relationships. In this study, levees are demonstrated to have developed during a period of non-coarse clastic deposition in the channel system. It is unknown whether non-deposition was caused by sediment bypass or channel abandonment. Initial coarse clastic deposition preceded levee growth and was focussed along structural trends. Following the first phase of channel-fill, the channel settled into surrounding muds forming a series of slumps and syn/immediately post sedimentary faults and a low area along which subsequent deposition was accommodated. Because of this channel-fills aggrade vertically. In this example later levees are offset stacked. A single example of an ancient channel-levee complex is clearly unrepresentative of all similar ancient systems, however, it provides some guidance when examining the validity of interpretational models of subsurface data. Comparison of subsurface and outcrop data demonstrate the value of using temporally rather than just spatially constrained analogue data. A methodology for the application of outcrop analogue in subsurface interpretation is presented using a case study.