

Sequence Stratigraphy of Shallow-Water Deposits in the Sihapas Group, Northwest Central Sumatra Basin*

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Abstract

Based on 4 continuous core-holes, well logs, and 2D seismic lines (Figures 1, 2, and 3), five transgressive-regressive sequences have been identified within shallow-water Sihapas in Northwest portion of Central Sumatra Basin. The study reveals that Sihapas Group represents the spectrum of depositional environments and facies spanning offshore marine/shelf to fluvial (Figure 1). Sediment was delivered trending southwestward, represented by prograding sandy delta front/shoreface-belts. This shallow-water Sihapas Group was deposited in the low-angle shelf setting with moderate tide energy and low to moderate wave energy.

The Lowstand System Tract (LST) contains three main facies; incised valley fill (IVF), shallow channel, and prograding lowstand wedge of delta/shoreface. The IVF deposit is identified in the proximal portion of the shelf and it is characterized by thick, up to 90 ft, cross-stratified coarse to conglomeratic sandstone. The upper part of the IVF is estuarine fill deposited during transgression, and the uppermost is capped by ravinement lags. The LST also is characterized by the development of shallow channel, 10 – 20 ft, cross stratified coarse sandstone with minor evidence of mud drape. In the distal portion of the shelf, the LST, in sequences 3 and 4 only, is characterized by the development of sharp-based delta-front/shoreface deposit that formed during forced regression. The LST can also be absent; it is represented by late HST paleosol. Two type of sequence boundary are developed; 1) sequence boundary related to fluvial incision and 2) sequence boundary as a correlative conformity at the base of the late/forced regression. The LST log signature varies from blocky-fining upward to coarsening upward. The overall thickness ranges from 0 to 90 feet.

The Transgressive System Tract (TST) is represented by complex relationship of lithofacies, and can be characterized by a single or multiple transgressive events (TSE). In the proximal shelf portion, the TST deposit is dominated by estuarine fill and tidal-flat complex deposits, whereas in the distal portion, the facies change from previous HST/LST to TST is quite abrupt, and shelf deposits overlie shoreface units. The maximum flooding surface (MFS) within this system tract is interpreted to lie in the laminated mud to very fine sandstone with sideritic layer, a outer shelf deposit. This deposit, with boundstone/reef and with an overall fining-upward log signature, has

thickness that ranges from 0 feet to 150 feet.

The Highstand System Tract (HST) is predominantly characterized by prograding shoreface and delta deposits. During high influx of sediments to the coastline, the shoreface can prograde more than 10 km across to the shelf. The complete HST succession is composed of shelf/offshore units that grade into shoreface (lower to upper) and beach/foreshore deposits in the uppermost part of the sequence. In some cases the upper portion beach/foreshore deposits have been eroded by LST fluvial channel system. This sequence with coarsening-upward log signature has thickness that ranges from 20 feet to 200 feet; it thickens toward the distal part of the shelf as the accommodation increase basinward.

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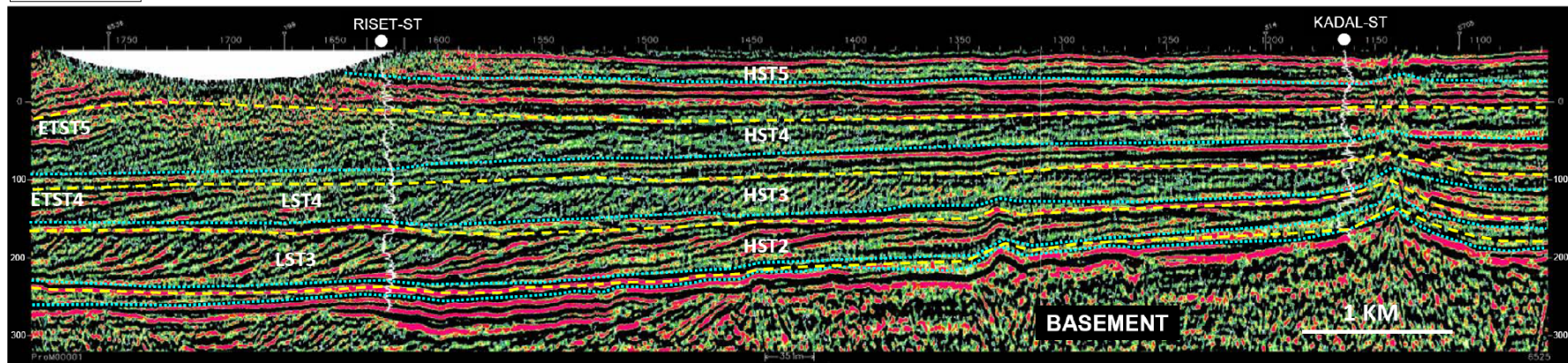
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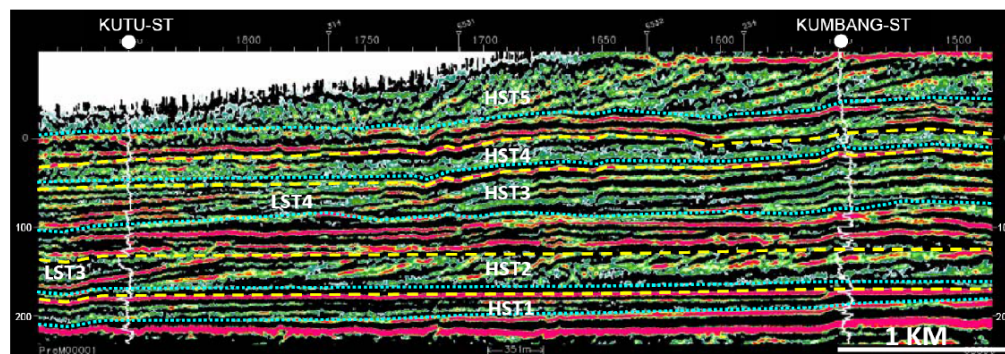
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LN 6525



LN 6539



VE = 4X

- Maximum Flooding Surface (MFS)
- Transgressive Surface of Erosion (TSE)

Figure 1. Seismic sequence stratigraphy framework based on two 2D seismic lines.

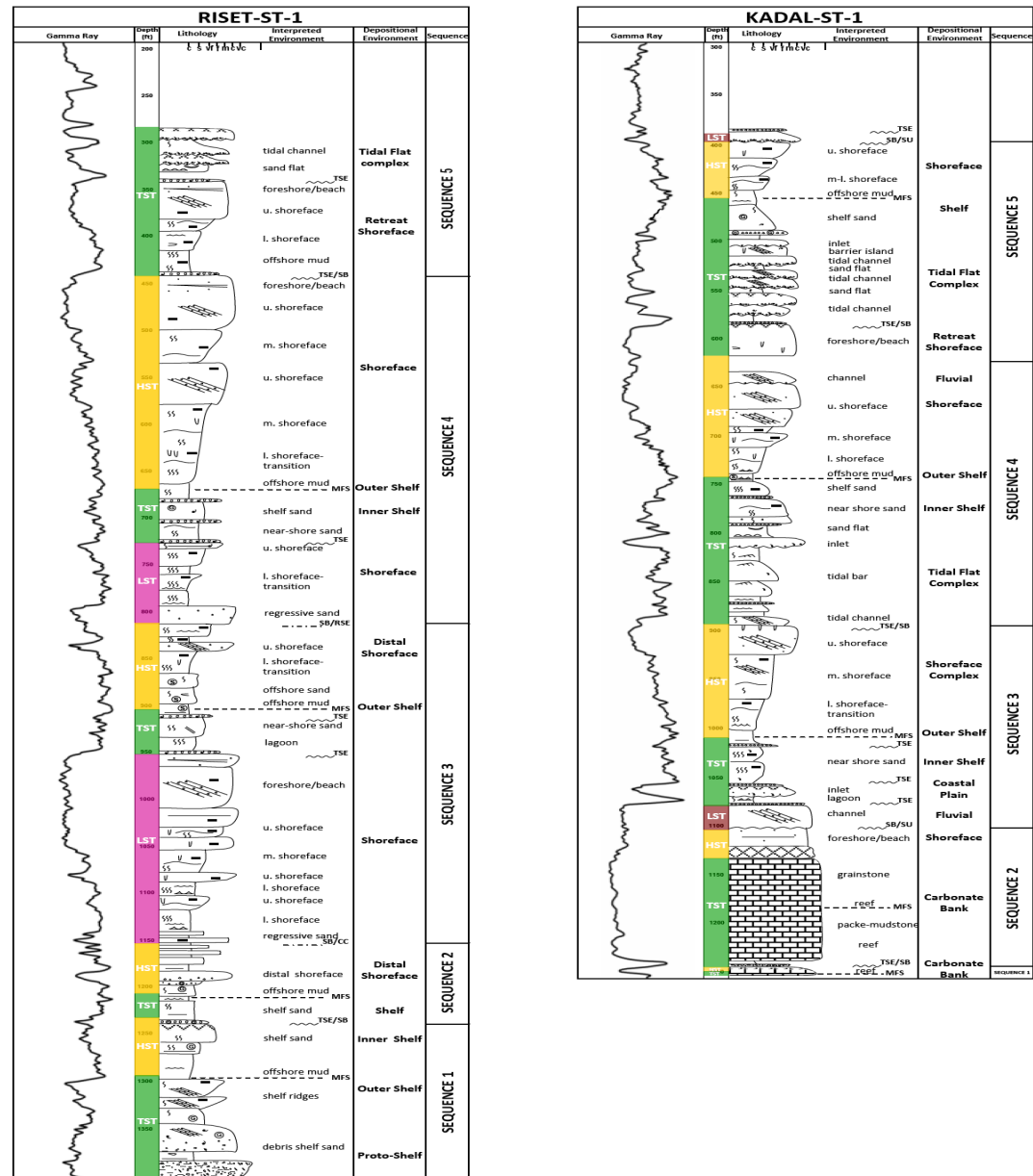


Figure 2. Integrated seismic sequences based on core, log signature, and seismic stratal termination, Riset-ST-1 and Kadal ST-1.

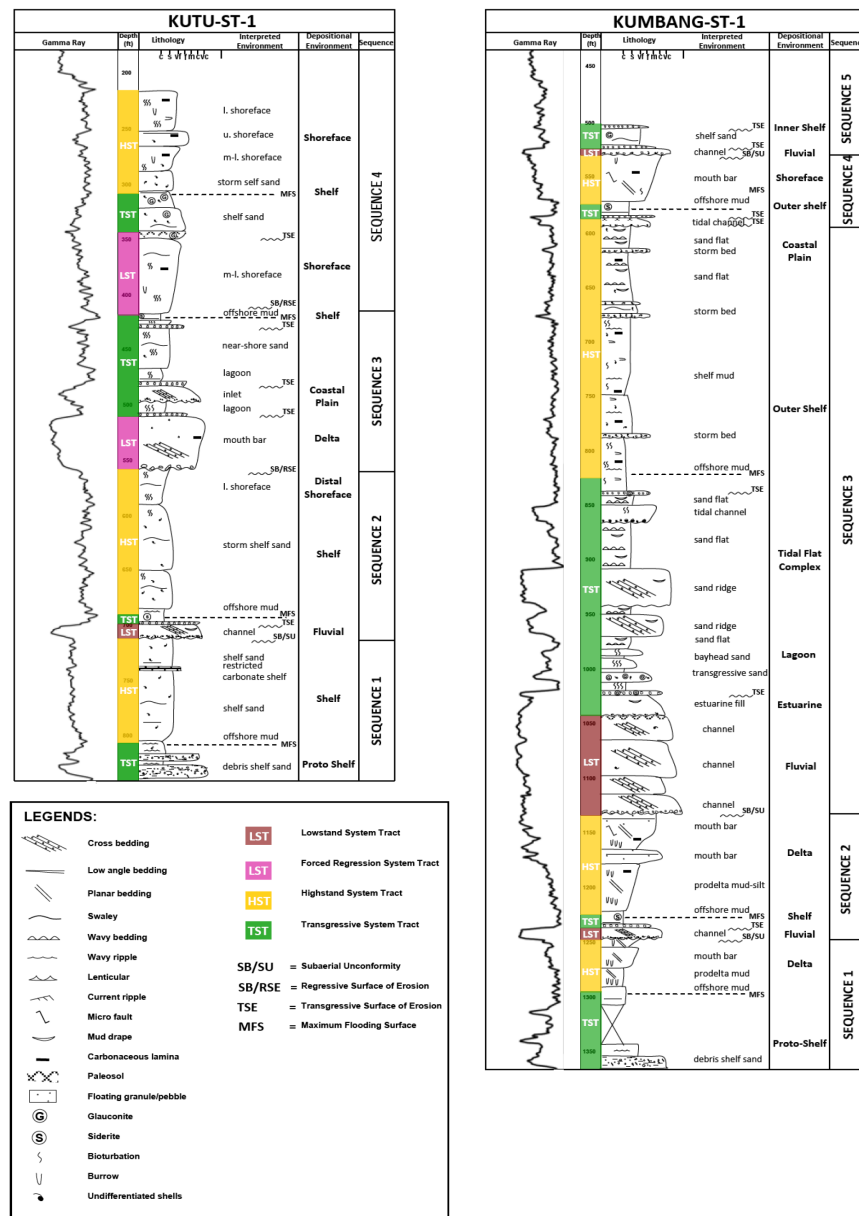


Figure 3. Integrated seismic sequence stratigraphy based on core, log signature, and seismic stratal termination, Kutu-ST-1 and Kumbang – ST-1.