

## **Influence of multiple relative sea-level changes in a wave-dominated estuary (Miocene), São Luis Basin, northern Brazil**

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Miocene deposits between Alcântara and Guimarães (MA) record low-amplitude/high-frequency sea-level changes within an estuarine paleovalley. The estuarine interpretation is based on: i) depauperated ichnological assemblage and abundant *Gyrolithes*; ii) alternating thicker/thinner sand bundles with reactivation surfaces and mud drapes (tidal bundles); and iii) widespread channel deposits. Three stratigraphic units are present: 1) Unit 1- shoaling shoreline and tidal channel deposits; 2) Unit 2- shoaling shoreline, tidal channel, lagoon, and flood-tidal delta/washover deposits; and 3) Unit 3- tidal channel, estuarine bay, and fluvial-influenced channel deposits. Individual units are progradational, pattern also reflected by the upward stacking of units showing successively more restricted conditions. These characteristics, combined with the position in the uppermost portion of the valley succession, suggest deposition during rising to highstand relative sea-level. Mapping of discontinuity surfaces allowed the recognition of a sequence boundary (DS1) separating the Miocene succession from underlying Cretaceous rocks. Unit 1 onlaps against DS1 and is topped by a ravinement surface (DS2), which separates two shoaling up successions (Units 1 and 2) interpreted as parasequences from a same depositional sequence. A discontinuity surface (DS3) between Units 2 and 3 records another sequence boundary formed by a renewed incision within the estuary. Unit 3 is topped by surface DS4, which is a sequence boundary recording the end of the estuarine deposition in the study area. Thus, Unit 3 is defined by unconformities, representing a complete depositional sequence resulting from a low amplitude/high frequency relative sea-level cycle superposed upon the overall highstand stages of the estuary evolution.