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ABSTRACT

LITHOFACIES ASSEMBLAGES AND DEPOSITIONAL PROCESSES IN THE MORNE L'ENFER FORMATION: OUTCROP INSIGHTS INTO PLIOCENE SOUTHERN BASIN SEDIMENTARY FILL

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The Morne L'Enfer Formation outcrops along the western portion of the Southern Basin of Trinidad and is one of the best exposed formations on the island. Despite this, there is little published literature on depositional processes, bed correlations, mineralogy and provenance although larger scale cycles have been inferred from well logs and outcrop (Barr et al. 1958, Suter 1960, Ablewhite and Higgins 1968).

Over 1200 metres of Morne L'Enfer outcrop were examined across the western Southern Basin (Figure 1) guided by the geological map of Trinidad (Kugler 1959). That stratigraphic column is adopted for this study. Correlative stratigraphic sections were obtained along Puerto Grande Bay and Cedros Bay where the Lower and Upper Morne L'Enfer members are well exposed. Lithofacies seen in continuous sections along the coasts have been correlated to outcrops farther inland. Physical and biogenic sedimentary structures were integrated with mineralogy, palynofacies and paleocurrent orientations to derive regional constraints on depositional patterns within this portion of the Southern Basin.

At least seven lithofacies assemblages can be differentiated throughout the Morne L'Enfer Formation, each representing specific depositional processes and stages of basin fill. Depositional environments within the Lower Morne L'Enfer Member vary from unbioturbated prodelta silts, extensively bioturbated shoreface silts and sandstones, to fluvial-estuarine channels. Tidal processes become dominant towards the top associated with a transgressive fill into the overlying Lot 7 Silt. The Upper Morne L'Enfer Member is characterized by laterally accreted channelized fills, tidal flats and

floodplain-swamp deposits. Fluvial facies towards the top of this member may represent a key basinal shift in facies that is continuous into the Erin Formation.

The Lower and Upper Morne L'Enfer members represent at least two major depositional cycles separated by the Lot 7 Silt (Suter 1960, Kugler 2001). The latter is a shale prone interval and provides a key marker recognized from subsurface electrical well logs (Ablewhite and Higgins 1968). Although the Lot 7 Silt was not exposed, its relative position along Puerto Grande Bay is established from the geological map. A landward shift in lithofacies is associated with the Lot 7 Silt, supported by a recognized marine palynofacies assemblage. Numerous smaller depositional cycles are noted from this study both above and below the Lot 7 Silt, likely associated with a combination of tectonic and depositional processes.

The model presented for sedimentation during the Pliocene contributes to our understanding of wider deltaic deposition within the Southern Basin. In addition, the style of basin fill may be analogous to the Columbus Basin towards the east where syn-depositional faulting played a key role in sediment distribution. Sediment thickness variations associated with faults have already been demonstrated in the Morne L'Enfer Formation (Wilson 1968) and is supported by correlations from this study.

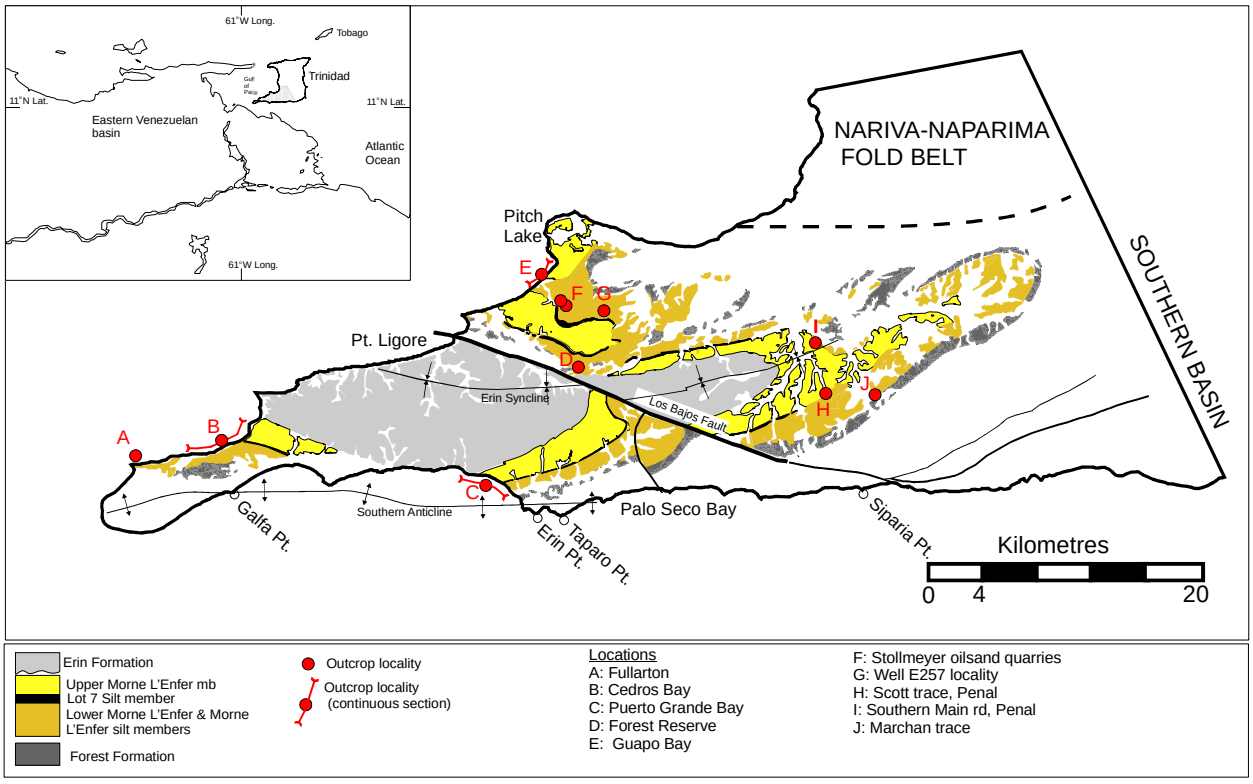

Figure 1. Geological map of southwest Trinidad showing location of sections examined within the Morne L'Enfer Formation. The location of the study area relative to South America is shown in the inset (stippled). Geology modified from Kugler (1959).

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