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ABSTRACT

FORAMINIFERAL ASSOCIATIONS IN THE SAN JOSÉ CALCAREOUS SILT (LATE MIOCENE, TRINIDAD)
AND THEIR SEQUENCE STRATIGRAPHIC SIGNIFICANCE

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Benthonic foraminifera are examined in a ~270 m section of the San José Calcareous Silt member (Manzanilla Formation, Late Miocene *Globorotalia acostaensis* Zone) at eastern Manzanilla Bay, Trinidad. Where possible, the thirty-six samples were taken 5 m apart. Four samples, not used in statistical analysis, yielded <100 specimens, although one yielded only *Hapophragmoides wilberti*—a species that is in the Recent associated with intertidal mangroves. Of the 94 species recovered, only 24 formed >0.5% of the total recovery. *R*-mode (species-wise) cluster analysis conducted using these 24 species revealed five associations. The mean percentage abundance of planktonic foraminifera (mean %*P*) was calculated for each association. Palaeo-depths were estimated from this mean, as were 95% confidence limits on these palaeo-depths, using

$$D = 19.7 + 1.34\%P.$$

Palaeo-environments inferred as follows:

Association 1: Ammonia beccarii (1 sample), %P = 3.4%, shallow middle neritic waters (estimated depth, 24 m; 95% confidence interval, 4-42 m) influenced by fluvial outflow

Association 2: Amphistegina gibbosa (1 sample), %P = 0.9%, inner neritic, clear water (estimated depth, 21 m; 95% confidence interval, 3-41 m)

Association 3: Dominant Pseudononion atlanticum with subdominant *Cibicidoides pseudoungerianus* and *Elphidium translucens* (10 samples), %P = 17.5%, mid middle neritic water (estimated mean depth, 43 m; 95% confidence interval for mean depth, 24-58 m)

Association 4: Dominant Textularia sawhi (3 samples), %P = 3.6%, shallow middle neritic water (estimated mean depth, 24 m; 95% confidence interval for mean depth, 4-42 m)

Association 5: Dominant Hanzawaia carstensi (17 samples), %P = 9.7%, mid middle neritic water (estimated mean depth, 32 m; 95% confidence interval for mean depth, 16-50 m).

Despite the relatively small range in estimated palaeo-depths (*Haplophragmoides wilberti* at 0 m; Association 3 at a maximum ~58 m), fluctuations in %P and the mean palaeo-depths estimated from %P suggest that the distribution of these associations may be broadly related to sequence stratigraphic events. Association 3 is allied with transgressive and highstand systems tracts in the middle of the section, and Association 5 with relative lowstand systems tracts in the upper and lower parts. Foraminifera provide no firm evidence for the existence of a falling stage systems tract in the San José section examined. The remaining associations, and the sample with *Haplophragmoides wilberti*, are intimately allied with relative lowstands indicated by Association 5, and reflect times of shallowest water and greatest riverine influence. Our knowledge of the ecology of the species in Associations 1-5 supports this sequence stratigraphic model.