

Abundance biozone boundary types and characteristics determined using beta diversity: An example using Pleistocene benthonic foraminifera in DSDP Hole 148, eastern Caribbean Sea

Brent Wilson^{1*} and Ashleigh Costelloe²

¹*Petroleum Geoscience Programme, Faculty of Engineering, University of the West Indies, St. Augustine, Trinidad, West Indies;* ²*BioSTRATIGRAPHIC ASSOCIATES (TRINIDAD) LIMITED, Administration Building, 113 Frederick Settlement, Old Southern Main Road, Caroni, Trinidad, West Indies*
e-mail: Brent.Wilson@sta.uwi.edu

*Corresponding author.

Keywords: SHE analysis, pattern diversity, alpha diversity, complementarity, *Stilostomella* extinction event

ABSTRACT

There is not yet a precise classification of or terminology for ecostratigraphic boundaries. SHE analysis for biozone identification (SHEBI) objectively places boundaries between abundance biozones (ABs). Alpha diversity ($=S_E = e^H$, where H is the information function) measures the community diversity within an AB in units of effective species, whereas the dimensionless β diversity ($= S_{E2}/S_{E1}$, where S_{E1} and S_{E2} are the α diversities of successive ABs) quantifies the difference in α diversity between successive ABs. Three categories of AB boundary are recognized depending on the value of β . In Type -1β , the α diversity of the younger AB is significantly less than that of the older. In Type 0β , $S_{E2} \approx S_{E1}$, while in Type $+1\beta$, the α diversity of the younger AB is significantly greater than in the older. Benthonic foraminifera were sampled from the ~124-m-thick Pleistocene strata of DSDP Hole 148 (eastern Caribbean Sea). SHEBI indicated 18 ABs; of the 17 AB boundaries, seven were Type -1β , two were Type 0β , and eight, Type $+1\beta$. The direction of inflection of the graph of $\ln E$ versus $\ln N$ did not indicate AB boundary type. Although the Pleistocene was characterized by repeated alternations between glacial and interglacial conditions, there was no regular alternation of Type -1β and $+1\beta$ AB boundaries. Complementarity (i.e., species level distinctiveness of successive ABs) was measured using a percentage similarity index, C_p . Differing complementarities show that boundaries between ABs varied with respect to permeability to species, while beta diversities and C_p were uncorrelated.