

Construction of Bathymetric Index of Recent Benthic Foraminifers in the Eastern Pacific and Paleobathymetric Change off Western Costa Rica

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博士論文

Construction of Bathymetric Index of Recent
Benthic Foraminifers in the Eastern Pacific and
Paleobathymetric Change off Western Costa Rica
(中米西方沖現世底生有孔虫群集解析による水深指
標の構築とコスタリカ西方沖の古水深推定)

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Benthic foraminifera provide essential information for paleobathymetric reconstructions. However, the modern distribution of benthic foraminifera, especially at depths below 1500 mbsl, is still obscure in the offshore regions near Central and South America. To characterize the bathymetric scale in the eastern equatorial Pacific Ocean, I examined the depth distribution of benthic foraminifera using piston core samples taken off the coast of Costa Rica. A foraminiferal faunal analysis indicates the presence of six clusters that vary according to water depth: 1) Cluster I (mainly composed of *Uvigerina incilis*, *Nonion* sp., *Nonionella* sp.A, and agglutinated species), II (*Uvigerina incilis*, *Brizalina.bicostata*, *Cibicorbis inflatus*, and *Brizalina alata*) and III (*Epistomella baradyana*, *Cibicorbis inflatus*, *Anglogerina angulosa* and *Cibicides* sp.) are continental shelf and continental shelf edge faunas (<~400 mbsl); 2) Cluster IV (*Uvigerina peregrina*, *Uvigerina auberiana*, *Paracassidulina* sp., *Globocassidulina subglobosa* and *Bulimina mexicana*) represents the bathyal zone at depths ranging from 600 to 1600 mbsl, with two subclusters separated by a boundary at the 1400 mbsl (upper/lower middle bathyal); 3) Cluster V (*Uvigerina auberiana*, *Uvigerina peregrina*, *Uvigerina excellens*, *Brizalina argentia* and *Stainforthia complanata*) is related to the lower-middle bathyal assemblages at depths ranging from 1800 to 2000 mbsl; and 4) Cluster VI (*Pullenia* spp., *Ordorizaris* spp., *Gyroidina* spp., and *Melonis* spp., and *Agglutinated species*) contains deep-water cosmopolitan faunas; this is comparable to a lower bathyal assemblage at depths of more than 3000 m in the Pacific Ocean. On the basis of a comparison with several environmental parameters, dissolved oxygen concentrations are likely to be the most effective factor controlling foraminiferal depth distributions in the eastern equatorial Pacific. While the typical low-oxygen genus *Brizalina* prefers deeper (i.e., more oxygenated) habitats than *Uvigerina*, these genera are not able to adapt to an extremely low-oxygen environment (<~0.2 ml L⁻¹) probably because of their weak dependence on nitrate respiration.

IODP Exp.344 (Costa Rica Seismogenesis Project: CRISP-A2) is designed to understand the processes that control nucleation and seismic rupture of large earthquakes at erosional subduction zones

and drilled five sites off the western coast of Costa Rica around the southern end of the Middle America Trench, where the oceanic Cocos Plate is subsiding beneath the Caribbean Plate. In this cruise, the benthic foraminiferal data were strongly needed because the distribution of recent living benthic foraminifera is essential tool to estimate the past bottom-ocean environment and paleobathymetry. However, there are few data about the distribution of the recent foraminifera southern off Middle America. I examined the depth distribution of benthic foraminifera using my samples taken off the coast of Costa Rica and established the new bathymetry scale.

Based upon these results, it suggests the complicated tectonic record of this area, and also proposed the rapid uplift due to fault, then subsidence around 20 mbsf. This site has often big events shallow sediments move into deeper because of the results of the changes of benthic foraminiferal assemblages. The slump mass might reflects the active subsidence due to tectonic erosion or passage of subducting seamount at the plate interface.