

Larger Benthic Foraminifera of Paleogene Carbonate Banks, Caribbean Colombia – Ages and Paleoenvironmental Implications

Claudia Baumgartner-Mora¹, Peter O. Baumgartner¹, Edward A. Salazar Ortiz², and Daniel Rincón Martínez³

¹*Institut des Sciences de la Terre, Géopolis, Université de Lausanne, CH-1015 Lausanne, Switzerland.*

²*UT UP Consultorías, Bucaramanga, Colombia*

³*ICP-Ecopetrol, Kilómetro 7, vía Piedecuesta, Santander, 681011, Colombia*

Abstract

The Sinú Sedimentary Province (about 200 km in NW-SE and 450 km in SW-NE direction) includes the San Jacinto folded belt and the Sinú folded belt, and extends along the Caribbean coast of Colombia and into the Caribbean offshore. This province, floored by deformed/accreted ocean and transitional crust, is separated from S-American continental crust by the Romeral Fault system. Larger Benthic Foraminifera (LBF) occur abundantly in this area in shallow water limestones of Middle Eocene to Oligocene age. LBF communities clearly reflect the Caribbean LBF-Province. Variation in tectonic uplift, subsidence and continental detrital input resulted in short-lived but extended carbonate banks alternating with detrital sediments, similar to shallow carbonates observed along the active margins of south Central America and the Antilles. These short-lived carbonate paleo-environments differ markedly from those of large passive-margin carbonate shelves.

LBF in the Middle Eocene Chengue Formation are generally broken and have micritic rims, and occur in intraclasts, indicating displacement or reworking. Nevertheless, we recognized orthoforminids, such as *Discocyclina* sp., *Pseudophragmina* spp., *Pseudophragmina* cf. *stephensoni*, *Asterocyclina* sp. and *Asterocyclina* cf. *cruzi*, fragments of equatorial cuts of *Nummulites* spp., *Sphaerogypsina globulus*, *Linderina* sp., miliolids, microbenthic biserial foraminifera, rotalids and few planktonic foraminifera. The stratigraphic range of these LBF includes the Late Palaeocene-Eocene but the fragments of *Asterocyclina cruzi*, *Pseudophragmina* cf. *stephensoni* and *Sphaerogypsina globulus* indicate a Middle Eocene age.

The Upper Eocene Toluviejo Formation is characterised in several localities by the succession of “round lepidocyclinid” limestone – operculinid limestone – quartzose operculinid-bearing sandstone. This succession can be interpreted as a shallowing upward sequence, based on sedimentary structures and LBF morphology. Round ellipsoidal forms are found today in shallower water than are flattened ellipsoidal forms. The dominance of operculinids in near-shore facies (related to the Romeral Fault System) and the dominance of lepidocyclinids in offshore areas could also be the consequence of increased nutrient and detrital input in shallower/more coastal areas. However, operculinids are also present in offshore facies (eg. El Hueso), where well-washed and well-sorted and imbricated, flat *Lepidocyclina* facies dominate. Hummocky cross stratification and swale sedimentary structures confirm a palaeo-environment swept by multidirectional bottom currents. Eocene–early Oligocene eustatic sea level change combined with tectonic subsidence and uplift produced discontinuous sigmoidal limestone bodies separated by detrital facies along the Romeral Fault margin. The Sinú sedimentary Basin W of the Romeral Fault, resting on

oceanic/transitional basement, was potentially more affected by subsidence or tectonic uplift in a transpressive system. Deeper water, flat *Lepidocyclina* were deposited on a submarine relief, swept by intense bottom/storm currents that explain the mud-free facies.

The *Lepidocyclina* facies is characterized by *Lepidocyclina macdonaldi* (this species dominates), *L. pustulosa*, *L. ariana*, *L. chaperi*, *L. cf. ocalana*, *L. (polylepidina) antillea*, *L. cf. ecuadorensis*, *L. ariana*, *Helicolepidina sp.*, *Sphaerogypsina globulus*, *Tribliolepidina sp.*, *Linderina sp.*, *Helicostegina sp.*, *Helicostegina cf. giralis*, *H. polygiralis* and *Eofabiania grahani*. The presence of few species known until now only from the Middle Eocene may indicate reworking or poorly known stratigraphic ranges of these species.

In the Oligocene Cantera Canta Gallo NE of Monteria we found *Amphistegina* spp., *Heterostegina antillea*, *Heterostegina sp.*, *Operculina dia.* Rotalids, *Spiroclypeus* and *Miogypsina* sp.