Available online at www.sciencedirect.com
ScienceDirect
Revue de micropaléontologie 49 (2006) 245–253
Revue de micropaléontologie
http://france.elsevier.com/direct/REVMIC/

Original article

Calcareous nannofossil biostratigraphic framework for middle Eocene sediments from ODP Hole 1260A, Demerara Rise

Cadre biostratigraphique des nannofossiles calcaires des sédiments de l'Éocène moyen sur le site ODP 1260A, plateau de Demerara

Claudia Lupi[a,*], Sherwood W. Wise Jr.[b]

[a] *Dipartimento di Scienze della Terra, Università degli Studi di Pavia, Via Ferrata 1, 27100 Pavia, Italy*
[b] *Department of Geological Sciences, 4100, Florida State University, Tallahassee, FL 32306-4100, USA*

Abstract

Ocean Drilling Program (ODP) Site 1260 recovered a near-continuous and expanded (187-m thick) middle Eocene carbonate sequence at mid-bathyal depths on Demerara Rise off Suriname, South America. A calcareous nannofossil biostratigraphic framework has been established for the sequence to aid multi-proxy cyclostratigraphic analyses. The diversity of calcareous nannofossils is reasonably high and preservation moderate throughout most of the section, and the proximity to the continent is indicated by the occurrence of braarudosphaerids in the lower three quarters of the section. The species richness of sphenoliths is particularly high, and our data confirm the occurrence of new sphenoliths during the middle Eocene as shown recently by Bown and Dunkley Jones (2006). In particular we corroborate the occurrences of *Sphenolithus strigosus* and *S. runus* that these authors found in their Zone NP16 Tanzania sediments, however we extend the ranges of these taxa down into Zone NP15 (CP13). Moreover we document the occurrence of *Bramletteius serraculoides* in Zone NP15 (CP13b) and the occurrence of *Sphenolithus predistentus* in NP16 (CP14a), extending their known ranges down column.

Résumé

Le forage du site Ocean Drilling Program (ODP) 1260 a permis de récupérer une séquence carbonatée continue et épaisse de 187 m de l'Éocène moyen sur le plateau de Demerara, au large du Suriname (Amérique du Sud). Le cadre biostratigraphique des nannofossiles calcaires a été établi pour cet intervalle afin de réaliser une analyse cyclostratigraphique sur différents signaux acquis lors de cette campagne. La diversité des nannofossiles est relativement haute et leur préservation est modérée tout au long de la coupe. La proximité du continent est indiquée par la présence de Braarudosphéridés dans les trois premiers quarts de la coupe. La richesse spécifique des sphénolithes est particulièrement élevée et nos données confirment l'apparition de nouvelles espèces de sphénolithes à l'Éocène moyen comme l'ont montré précédemment Bown et Dunkley Jones (2006) dans des sédiments de Tanzanie. Ainsi, nous confirmons la présence de *Sphenolithus strigosus* et *S. runus* au sein de la zone NP16. Toutefois, nos données nous permettent d'étendre l'occurrence de ces taxons jusque dans la zone NP15 (CP13). Nous documentons également l'occurrence de *Bramletteius serraculoides* au sein de la Zone NP15 (CP13b) et de *Sphenolithus predistentus* au sein de la Zone NP16 (CP14a), en élargissant ainsi sa répartition stratigraphique.

Keywords: Calcareous nannofossils; Biostratigraphy; ODP Leg 207; ODP Site 1260; Demerara Rise; Middle Eocene; Equatorial Atlantic

Mots clés : Nannofossiles calcaires ; Biostratigraphie ; Leg ODP 207 ; Site ODP 1260 ; Plateau continental de Demerara ; Éocène moyen ; Atlantique équatorial

* Corresponding author.
E-mail address: clupi@manhattan.unipv.it (C. Lupi).

0035-1598/$ - see front matter © 2006 Elsevier Masson SAS. All rights reserved.
doi:10.1016/j.revmic.2006.10.001

1. Introduction

A major goal of Ocean Drilling Program (ODP) Leg 207 to Demerara Rise off Suriname, South America, was to recover expanded, shallow-buried Cretaceous and Paleogene sediments that can be used in the paleoceanographic study of the tropical Atlantic. Prominent among the sections recovered for that purpose is a 235-m-thick middle to lower Eocene chalk recovered in Hole 1260A (Fig. 1) located at a water depth of 2549 m on the northwest-facing slope of the Rise, ~380 km north of Suriname (Shipboard Scientific Party, 2004a, Leg 207 Summary). Core recovery within the rotary-cored hole was 79.6%, and the presence of abundant and well-preserved radiolarians and moderately well-preserved diatoms and silicoflagellates in the middle Eocene section plus shallow burial helped preserve the calcareous nannoflora (Wise, 1977), the biostratigraphy of which is the object of this study.

Because establishing the biostratigraphic framework of this extended section is a prerequisite for any paleoceanographic analysis, we studied a 187-m thick middle Eocene section. The succession is well expanded (average sedimentation rate = ~20.5 m/m.y.) and reasonably complete although it is bounded above and below by hiatuses. A periodic variability in the middle Eocene color-reflectance, gamma-ray attenuation (GRA) bulk-density data, and down-hole logging data suggest that the section should be suitable for cyclostratigraphic analysis. Indeed, preliminary investigation of the magnetic susceptibility data has suggested dominant Milankovitch periodicities of 40 ky (Shipboard Scientific Party, 2004b, Leg 207 Summary). In addition, a composite depth section based on the overlap of Holes 1260A and 1260B was constructed for the upper portion of the middle Eocene section (38–133 m composite depth, mcd) where the multisensor-track data provide an excellent record of the cyclic nature of carbonate/silica variability (Shipboard Scientific Party, 2004c, Site 1260).

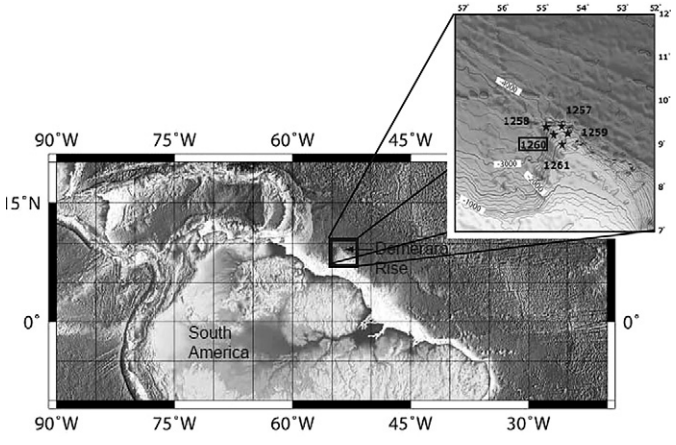

Fig. 1. Location of Demerara Rise off South America and of ODP Leg 207 drill sites, including Site 1260 (modified after http://ofgs.ori.u-tokyo.ac.jp/~odpjapan/NL20_html/Leg207_fig1.html).

Fig. 1. Position géographique du plateau continental de Demerara à l'Est de l'Amérique du Sud et des forages du Leg ODP 207, incluant le site 1260 (modifié d'après http://ofgs.ori.u-tokyo.ac.jp/~odpjapan/NL20_html/Leg207_fig1.html).

On the other hand, there are two significant gaps in the middle Eocene section within intervals not cored in the overlapping Hole 1260B and where recovery was poor in Hole 1260A. The first of these is between Cores 1260A-21 and -22 (Fig. 2), at 182.5–201.4 m below seafloor (mbsf). Peaks in the resistivity, density, and velocity electric logs plus Formation MicroScanner (FMS) images suggest the presence of chert nodules through a 13.5-m interval (Shipboard Scientific Party, 2004b, Leg 207 Summary). Core recovery in Cores 21R and 22R was only 23.0% and 0.5%, respectively. A shorter coring gap occurs in Core 16R (134.5–144.2 mbsf), where recovery was 10.2%; the origin of this second gap is unknown.

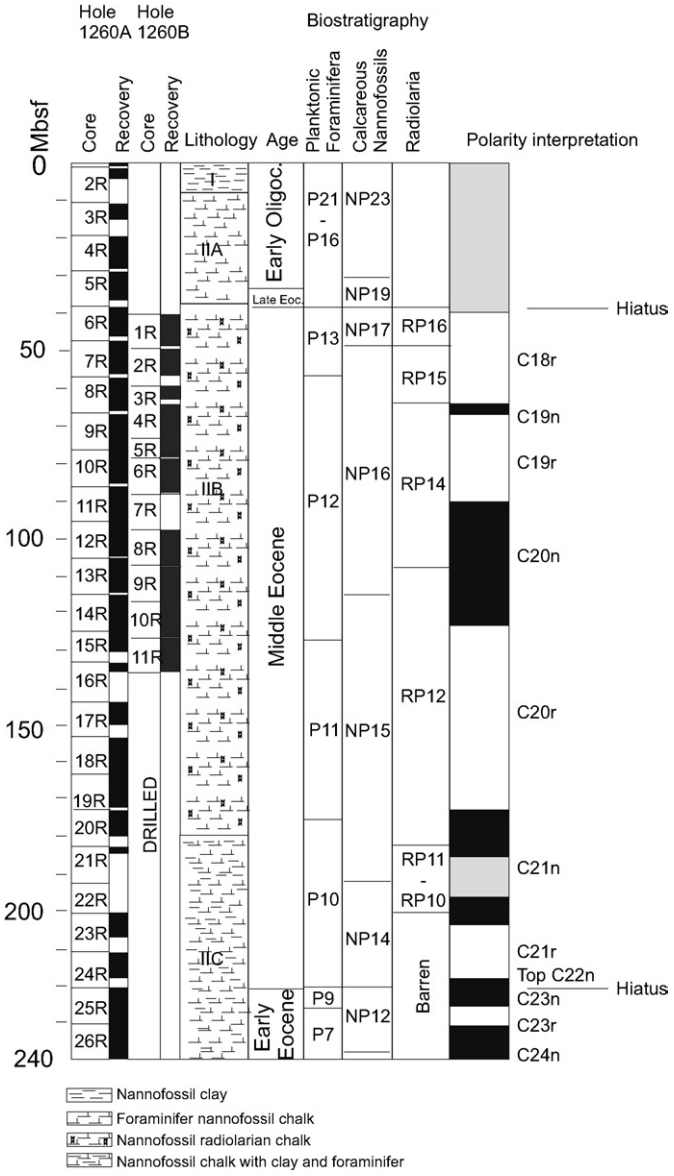

Fig. 2. Core recovery, lithostratigraphy, shipboard biostratigraphy, and magnetostratigraphy for ODP Site 1260 (modified from Shipboard Scientific Party, 2004c).

Fig. 2. Récupération des carottes, lithostratigraphie et cadres biostratigraphiques et magnétostratigraphiques préliminaires pour le site ODP 1260 (Shipboard Scientific Party, 2004c, modifié).