

12. DATA REPORT: EOCENE BENTHIC FORAMINIFERS FROM THE WESTERN NORTH ATLANTIC, SITE 1276, ODP LEG 210¹

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ABSTRACT

Benthic foraminifers were investigated from the western North Atlantic, Ocean Drilling Program (ODP) Site 1276, to document the occurrence of Eocene abyssal benthic foraminifers in this region. Foraminiferal fauna in the middle–upper Eocene consists mainly of agglutinated foraminifers such as *Reticulophragmium amplexens*, *Spiroplectammina spectabilis*, *Recurvoides* spp., and *Paratrochamminoides* cf. *corpulentus* with tube-shaped forms. These faunal associations are basically similar to that of ODP Legs 105 (Labrador Sea), 149, and 173 (Iberian margin).

INTRODUCTION

An outline of the faunal changes of calcareous benthic foraminifers in the bathyal to abyssal zones of the North Atlantic during the Paleogene has been presented by Tjalsma and Lohmann (1983), Katz et al. (2003), and so on. Additionally, agglutinated foraminifers commonly dominate the Paleogene deepwater foraminiferal fauna of the North Atlantic both along the Labrador margin and northern Grand Banks (Gradstein and Berggren, 1981) and in the abyssal Labrador Sea (Miller et al., 1982; Kaminski et al., 1989). Such Paleogene agglutinated faunas have been investigated with respect to biostratigraphy and paleobiogeography during a previous Ocean Drilling Program (ODP) cruise to the Iberian Abyssal Plain (e.g., Kuhnt and Collins, 1996; Kuhnt and Urquhart, 2001). However, abyssal foraminifers from the upper Paleo-

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gene are still poorly studied in the western North Atlantic since upper Paleogene sediments are often absent because of submarine erosion (corresponding to Horizon A^u) along the continental margin of North America (e.g., Miller and Tucholke, 1983). The only published reports of Eocene–lower Oligocene agglutinated foraminifers are from earlier studies by Miller et al. (1982) from Deep Sea Drilling Project Site 112 and by Kaminski et al. (1989) from ODP Hole 647A in the Labrador Sea. A relatively continuous section of the middle–upper Eocene sediment was recovered at ODP Site 1276, Leg 210 (Newfoundland margin) (Fig. F1). The preliminary investigation results of abyssal benthic foraminiferal assemblage from Eocene sediments in the western North Atlantic, ODP Hole 1276A, are reported in this paper.

MATERIALS AND METHODS

A total of 56 sediment samples were collected with one or two samples per section from Cores 210-1276A-1W through 11R (754.74–893.73 meters below seafloor [mbsf]), corresponding in age from middle to late Eocene. The major lithologies of these samples are composed of dark gray mudstone and white sandstone. Samples were dried at 40°C and weighed. The samples were processed with precipitate naphtha and washed on a 250-mesh (63- μ m opening) sieve. These residues were dried at 40°C. Approximately 100–300 benthic foraminiferal specimens were picked from adequate split aliquots ($\frac{1}{2}$ – $\frac{1}{32}$) of the >63- μ m fraction of 26 samples from (754.74–862.37 mbsf), corresponding to lithologic Unit I (Tucholke, Sibuet, Klaus, et al., 2004). The species of these specimens were identified and counted.

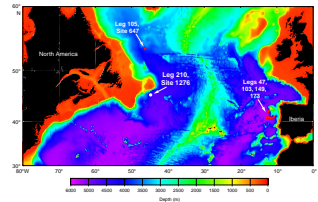
RESULTS

Benthic foraminifers occurred commonly in the intervals from 754.74 to 822.47 mbsf and 841.67 to 862.37 mbsf in Hole 1276A (Table T1; Plate P1), whereas they were found rarely in the 823.96- to 840.18-mbsf interval. Benthic foraminifers were moderately to poorly preserved, and agglutinated forms were often deformed significantly. The Eocene foraminiferal assemblage of this site consist mainly of agglutinated foraminifers from muddy sediments, whereas calcareous forms, such as *Cibicides* spp. or *Nuttallides truempyi* (Nuttall), and abundant planktonic foraminifers occurred in sandy turbidite sediments (e.g., 856.77 and 860.87 mbsf). *Reticulophragmium amplexens* (Grzybowski), *Glomospira gordialis* (Jones and Parker), *Paratrochamminoides* cf. *corpulentus* (Krasheninnikov), and *Recurvoides* spp. with tube-shaped agglutinated forms were common taxa, and they were found almost continuously from the middle to upper Eocene. *Spiroplectammina spectabilis* (Grzybowski) and *Ammodiscus* spp. occurred commonly in the 841.67–862.37 mbsf interval.

The occurrence of Eocene benthic foraminifers in Hole 1276A are summarized as follows:

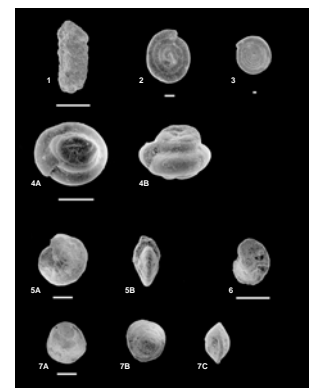
1. 841.67–862.37 mbsf: Benthic foraminifers occur commonly (1.80–14.80 individuals/g). Agglutinated taxa are dominant, whereas calcareous forms occur occasionally. Common species are *R. amplexens*, *P.* cf. *corpulentus*, and *Glomospira* spp. associated with tube-shaped agglutinated forms. Because these

F1. Location of ODP sites in this report, p. 6.



T1. Hole 1276A foraminiferal occurrences, p. 7.

P1. Benthic foraminifers, p. 8.



taxa are thought to be common constituents of abyssal depths below the calcium carbonate compensation depth (e.g., Gradstein and Berggren, 1981), these agglutinated taxa in muddy sediments probably lived in place. It is suggested that calcareous forms in sandy sediments were transported from shallows (e.g., Grand Bank) by turbidity currents because neritic species, for example *Cibicides* spp., are commonly found.

2. 823.96–840.18 mbsf: Benthic foraminifers occur rarely (0–0.53 individuals/g). Such rare foraminiferal occurrence is likely because of the dilution of large amounts of radiolarian tests in this interval.
3. 754.74–822.47 mbsf: Benthic foraminifers occur commonly (0.49–11.89 individuals/g). Common species are *R. amplexans* and *P. cf. corpulentus* with tube-shaped agglutinated forms. Some taxa in the interval 841.67–862.37 mbsf, such as *S. spectabilis* and *Ammodiscus* spp., occur rarely.

Eocene faunal associations in the abyssal zone of the North Atlantic have been reported from Leg 105 Site 647 (Kaminski et al., 1989) in the Labrador Sea and Legs 149 (Kuhnt and Collins, 1996) and 173 (Kuhnt and Urquhart, 2001) on the Iberian margin. Kaminski et al. (1989) indicated that occurrences of *R. amplexans* and *S. spectabilis* have biostratigraphic significance during the Eocene–Oligocene in the North Atlantic. The faunal succession of Hole 1276A was similar to that of Leg 105 in the Labrador Sea and Legs 149 and 173 on the Iberian margin.

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APPENDIX

Faunal Reference List

- Ammodiscus cretaceus* (Reuss) = *Operculina cretaceous* Reuss, 1845
Ammodiscus latus Grzybowski, 1898
Glomospira charoides (Jones and Parker) = *Trochammina squamata* Jones and Parker var. *charoides* Jones and Parker, 1890
Glomospira gordialis (Jones and Parker) = *Trochammina squamata* Jones and Parker var. *gordialis* Jones and Parker, 1890
Glomospira irregularis (Grzybowski) = *Ammodiscus irregularis* Grzybowski, 1898
Gyroidinoides soldanii (d'Orbigny) = *Gyroidina soldanii* d'Orbigny, 1826
Karrerulina conversa (Grzybowski) = *Gaudryina conversa* Grzybowski, 1901
Nuttallides truempyi (Nuttall) = *Eponides truempyi* Nuttall, 1930
Paratrochamminoides cf. *corpulentus* (Krasheninnikov) = *Trochamminoides corpulentus* Krasheninnikov, 1973
Reticulophragmium amplexens (Grzybowski) = *Cyclammina amplexens* Grzybowski
Spiroplectammina spectabilis (Grzybowski) = *Spiroplecta spectabilis* Grzybowski, 1898
Spirosigmoilinella compressa Matsunaga, 1955
Trochammina altiformis (Cushman and Renz) = *Trochammina globigeriniformis* (Parker and Jones) var. *altiformis* Cushman and Renz, 1946
Trochamminoides proteus (Karrer) = *Trochammina proteus* Karrer, 1866

Figure F1. Location of ODP sites in this report (modified from Tucholke, Sibuet, Klaus, et al., 2004).

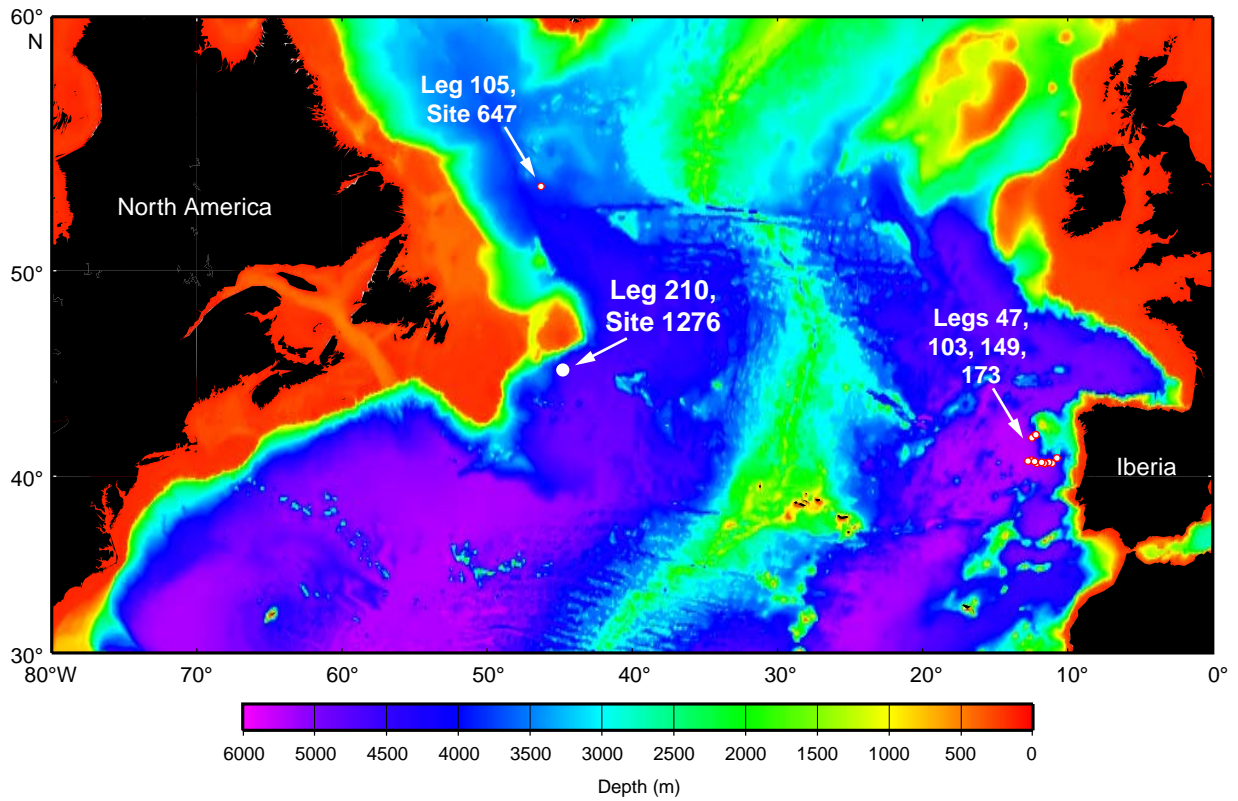


Table T1. Hole 1276A foraminiferal occurrences.

Core, section, interval (cm)	Depth (mbsf)	<i>Ammodiscus cretaceus</i> (Reuss)	<i>Ammodiscus latus</i> Grzybowski	<i>Ammodiscus</i> sp. A	<i>Ammodiscus</i> sp. B	<i>Ammodiscus</i> sp. C	<i>Ammodiscus</i> sp. D	<i>Ammodiscus</i> sp. indet.	<i>Cibicides</i> spp.	<i>Glomospira charoides</i> (Jones and Parker)	<i>Glomospira gordialis</i> (Jones and Parker)	<i>Glomospira irregularis</i> (Grzybowski)	<i>Glomospira</i> sp. A	<i>Glomospira</i> sp. B	<i>Glomospira</i> sp. C	<i>Gyroidina</i> sp.	<i>Gyroidinoides soldanii</i> (d'Orbigny)	<i>Haplophragmoides</i> sp. A	<i>Haplophragmoides</i> sp. indet.	<i>Karreriina conversa</i> (Grzybowski)	<i>Nuttallides truempyi</i> (Nuttall)	<i>Paratrochamminoides cf. corpulentus</i> (Krashennikov)	<i>Paratrochamminoides?</i> sp. indet.	<i>Quinqueloculina</i> sp.	<i>Recurvoides</i> sp.	<i>Reticulophragmium amplexans</i> (Grzybowski)	<i>Spiroplectammima spectabilis</i> (Grzybowski)	<i>Spirosigmoinella compressa</i> Matsunaga	<i>Textularia</i> sp.	<i>Trochammima altiformis</i> (Cushman and Renz)	<i>Trochammima</i> sp. A	<i>Trochamminoides proteus</i> (Karrer)	Tube-shaped agglutinated foraminifers	Other agglutinated foraminifers	Other calcareous hyaline foraminifers	Planktonic foraminifers	Sample weight (g)	Number of benthic foraminifers per unit weight (N/g)			
210-1276A-																																									
1W-2, 25-28	754.74									7	4											10	3		2	45				1	3	2	59	43			16.91	10.59			
1W-3, 26-28	755.99										6									4		7	9		4	21		1	6		3	49	54			14.07	11.66				
1W-5, 25-27	758.74									1	3	1										2	6		6	14					2	79	49			13.88	11.89				
3R-4, 26-29	812.94		1							3										2		3	3		6						19	8	1			19.54	1.49				
3R-5, 26-29	814.44																1					3	3								12	5				32.09	0.65				
3R-6, 24-27	815.91																				1										7	10	1			42.27	0.71				
4R-2, 27-30	820.97																																								
4R-3, 27-31	822.47										5					1						1	1		3	12		4		1		1	63	25			25.43	4.68			
4R-4, 26-29	823.96			1	1																											1	2					8.11	0.37		
4R-5, 25-28	825.45																																3					7.49	0.53		
5R-2, 26-29	830.56																																1					6.01	0.17		
5R-3, 26-29	832.06	3																													16	5					25.67	0.97			
5R-4, 27-30	833.57																																					40.20	0.00		
5R-5, 26-29	835.06															1																						31.63	0.03		
6R-2, 28-31	840.18																																	20	2				38.65	0.60	
6R-3, 27-30	841.67		1					1			3											8			11	13							65	28	1			19.90	6.53		
6R-5, 28-31	844.68																1					8	3			1						4	39	20	2			14.74	5.16		
6R-6, 28-31	846.18		1							3	5	5		1			5					12	5		7	17			1		1	125	41				20.85	10.99			
7R-4, 27-30	852.77	1	2		1						3	4					3					6	23		17	30					86	21					38.79	5.08			
7R-5, 27-30	854.27	3	3							1	5	1					3					3	5		9	25		1			128	38	2				15.61	14.80			
7R-6, 27-30	855.77	5		1	3						1						7	15				7	15		8	15		7	1		73	27	5				28.65	5.86			
7R-7, 27-30	856.77	1	2						66								5					5		6	9		8				41	15	14	7			26.84	6.41			
8R-2, 27-30	859.37										1						2					4			3	4					25	10		5			24.97	1.80			
8R-3, 27-29	860.87	1	2				1			3				1			6					4	2	1	7	10		4		47	19	26	90			16.34	8.33				
8R-4, 27-30	862.37		2	1							1							2				3	1		13	10	16				96	29	1				27.51	6.36			

Note: Numbers in this table show actual counted number.

Plate P1. 1. *Spiroplectammia spectabilis* (Grzybowski) (Sample 210-1276A-8R-4, 27–30 cm). 2. *Ammodiscus latus* Grzybowski (Sample 210-1276A-8R-3, 27–29 cm). 3. *Ammodiscus cretaceus* (Reuss) (Sample 210-1276A-5R-3, 26–29 cm). 4. *Glomospira gordialis* (Jones and Parker) (Sample 210-1276A-6R-6, 28–31 cm). 5. *Reticulophragmium amplectens* (Grzybowski) (Sample 210-1276A-1W-2, 25–28 cm). 6. *Cibicides* sp. (Sample 210-1276A-7R-7, 27–30 cm). 7. *Nuttallides truempyi* (Nuttall) (Sample 210-1276A-8R-3, 27–29 cm). Scale bars = 100 μ m.

