
U.S DEPARTMENT OF THE INTERIOR
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**BENTHIC FORAMINIFERAL CENSUS DATA FROM BOX
CORES COLLECTED ON ARCTIC OCEAN SECTION
(AOS) CRUISE OF THE USCGC *POLAR SEA* (1994)**

Lisa E. Osterman
U.S Geological Survey, Reston VA 20192

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INTRODUCTION

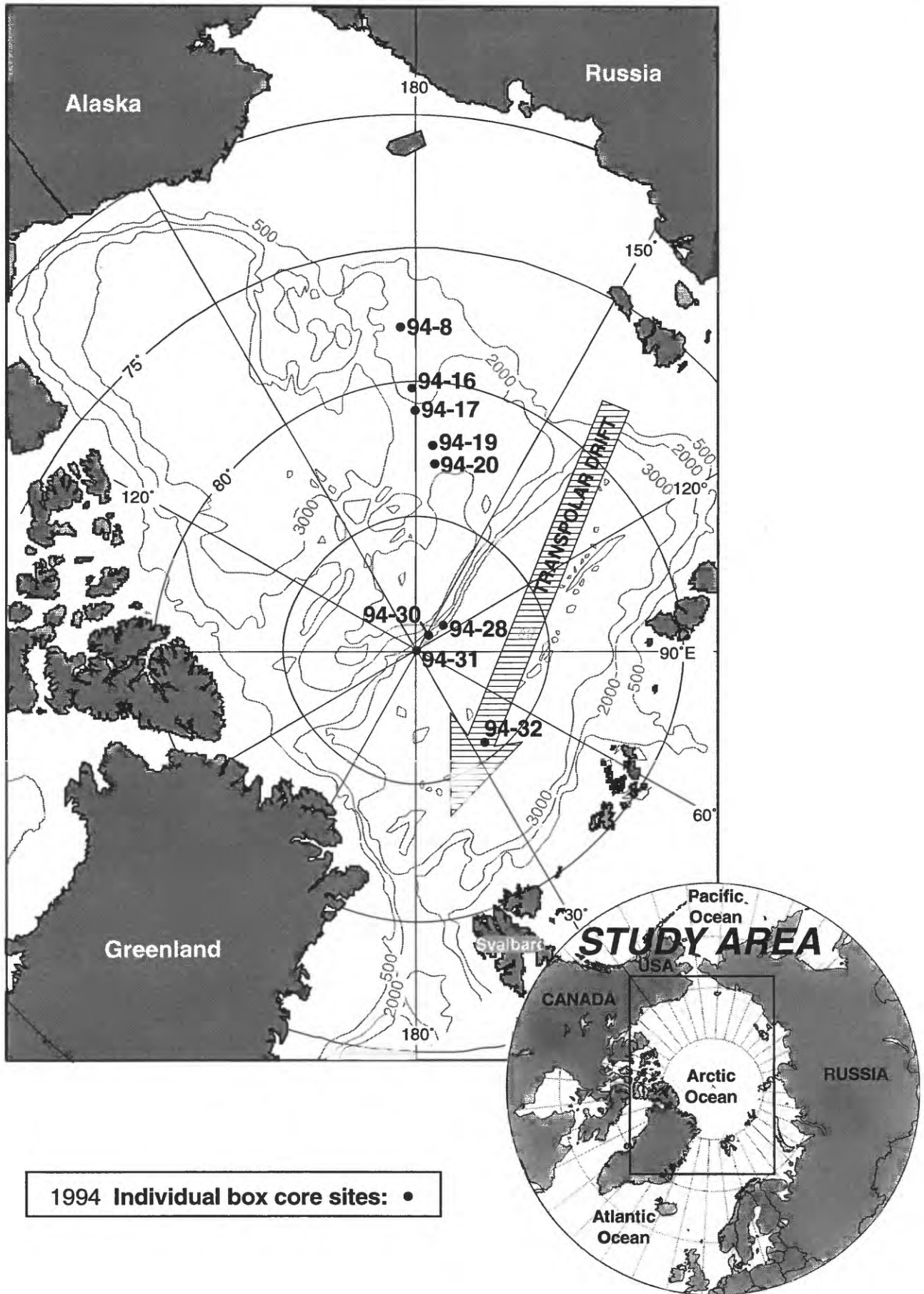
During the summer of 1994, two ice breakers (USCGC *Polar Sea* and CCGS *Louis S. St. Laurent*) crossed the central Arctic Ocean to investigate the role of the Arctic Ocean in global change. During this cruise, known as the Arctic Ocean Section (AOS) (Aagaard, and

others, 1996, Wheeler, 1997), 18 box cores were collected. This report contains the benthic foraminiferal census data from nine box cores (Table 1). Additional data from some of these box cores, including stable isotope data and AMS ¹⁴C dates, are presented in Poore and others (in press).

Table 1 – Latitude, longitude, water depth and location name of box cores studied in this report.

Box core no.	Latitude	Longitude	Water depth (m)	Location name
94-B8	78°07.68' N	176°44.67' W	1,031	Mendeleyev Ridge
94-B16	80°20.33' N	178°42.71' W	1,533	Mendeleyev Ridge
94-B17	81°15.91' N	178°58.05' E	2,217	Mendeleyev Slope
94-B19	82°26.80' N	175°45.50' E	2,400	Mendeleyev Slope
94-B20	83°10.20' N	174°06.36' E	3,110	Makarov Basin
94-B28	88°52.40' N	140°10.80' E	1,990	Lomonosov Ridge
94-B30	88°59.97' N	137°29.70' E	3,930	Eurasian Basin/Amundsen Basin
94-B31	89°58.85' N	40°30.39' E	4,180	Eurasian Basin/Amundsen Basin
94-B32	85°43.04' N	37°44.52' E	3,450	Eurasian Basin/Gakkel Ridge

Figure 1. Location map of box cores covered in this report.



METHODS

Sediment sampling and processing

Mark II box cores (40 x 40 x 60 cm) were collected along a transect from the Chukchi Sea to the Nansen Basin (Fig. 1). After recovery, each box core was subsampled by inserting several 10 cm diameter plastic core liner tubes into the box cores. In the foraminiferal laboratory of the USGS, the plastic tubes were split into archive and working halves and sampled at 1 cm intervals.

The sediment samples were oven dried at $\leq 50^{\circ}$ C then weighed to determine the dry sediment weight. The samples were soaked with a dilute calgon solution and agitated for one hour to assist in disaggregation, then wet sieved at 63 μ m. The washed residue was oven dried at $\leq 50^{\circ}$ C, then dry sieved at 125 μ m and 2000 μ m. Each size fraction was weighed and placed into three labeled vials.

RESULTS

The benthic foraminifer census data for six box cores B-8, B-16, B-17, B-19, B-20, B-28, B-32 are presented in Tables 2 through 8. The two additional box cores, 94-B-30 and 94-B-31, were barren of foraminifers. However, foraminifers were recovered in the surface sediment samples at these two locations (Osterman

Benthic foraminifers were hand picked from the size fraction of $>125\mu$ m. In foraminifer-rich samples a representative subsample of approximately 300 specimens was obtained with a microsplitter. However, in most samples the entire fraction of $>125\mu$ m was examined for foraminifers. The benthic foraminifers were placed on standard 60 square micropaleontological slide then sorted by species and glued. Identification of the benthic foraminifer species was made using standard literature. The taxonomy of Loeblich and Tappan (1988, 1994) was followed. Additional information about the benthic foraminiferal taxonomy is reported in Osterman and others (in press). A taxonomic list of species is presented in Appendix I.

and others, in press). Tables 2 through 8 also record the dry weight of sample and the split of sample, if any, examined for foraminifera. The actual counts of benthic foraminifera that were identified in each box core are recorded. If a species name is not listed it was not identified in the particular box core.

ACKNOWLEDGMENTS

Thanks to Angela Adams, Kate Pavich, and Anne Rogers, who provided laboratory assistance in processing

samples and separating foraminifers from the washed residues.

REFERENCES CITED

- Aagaard, K., Barrie, L.A., Carmack, E.C., Garrity, C., Jones, E.P., Lubin, D., Macdonald, R.W., Swift, J.H., Tucker, W.B., Wheeler, P.A., and Whritner, R.H., 1996, U.S., Canadian Researchers Explore Arctic Ocean: EOS, v. 77, n.22, pp. 209-213.
- Loeblich, A. R. Jr., and Tappan, H., 1988, Foraminiferal genera and their classification: Van Nostrand Reinhold, New York, 970 p, 847 plates.
- Loeblich, A. R. Jr., and Tappan, H., 1994, Foraminifer of the Sahul Shelf and Timor Sea: Cushman Foundation for Foraminiferal research, spec. pub., n.31, 661p.
- Osterman, L.E., Poore, R.Z., and Foley, K.M., in press, Distribution of benthic foraminifers (>125µm) in the surface sediments of the Arctic Ocean: U.S. Geological Survey Bulletin B-2164
- Poore, R.Z., Ostermann, D.R., and McGeehin, J. (in press), Stable Isotope data and AMS 14C dates from Arctic Ocean Section 1994 core top samples and box cores samples from the Mendeleev Ridge: U.S. Geological Survey Open File 98-598.
- Wheeler, P. A., 1997, Preface: the 1994 Arctic Ocean Section: Deep Sea Research II, v. 44, n. 8, pp. 1483-1485.

Appendix I

TAXONOMIC LIST OF FORAMINIFERAL SPECIES

Astacolus sp. is an unidentified species of this genera

Bolivina arctic Herman

Buccella arctica Voloshinova, can be included in *Buccella* spp.

Buccella frigida (Cushman) = *Pulvinulina frigida* Cushman

Buccella oregonensis (Cushman, Stewart and Stewart)= *Eponides mansfieldi* Cushman var. *oregonensis* Cushman, Stewart and Stewart. Rare species included in *Buccella* spp.

Bulimina aculeata d'Orbigny

Cassidulina reniforme (Nørvang) = *Cassidulina crassa* d'Orbigny var. *reniforme* Nørvang

Cassidulina teretis Tappan

Cornuspira involvens (Reuss) = *Operculina involvens*, Reuss

Dentalina spp. includes *Dentalina frobisherensis* Loeblich and Tappan and *Dentalina pauperata* d'Orbigny

Elphidium albiumbilicatum (Weiss)= *Nonion pauciloculum albiumbilicatum* Weiss

Elphidium excavatum (Terquem) = *Polystomella excavata* Terquem

Elphidium subarcticum Cushman

Epistominella arctica Green

Fontbotia wuellerstorfi (Schwager) =
Anomalina wuellerstorfi Schwager

Glandulina laevigata (d'Orbigny) =
Nodosaria laevigata d'Orbigny

Glomospira gordialis (Jones and
Parker) = *Trochammina squamata*
var. *gourdialis* Jones and Parker

Gyroidina sp. is an unidentified
species

Haynesina germanica (Ehrenberg) =
Nonionina germanica Ehrenberg

Ioanella tumidula (Brady) =
Truncatulina tumidula Brady

Laminononion stellatum (Cushman
and Edwards) = *Astrononion*
stellatum Cushman and Edwards

Lobatula lobatula (Walker and Jacob)
= *Nautilus lobatulus* Walker and
Jacob

Marginulinopsis sp. Is an unidentified
species

Melonis barleeanus (Williamson) =
Nonionina barleeana Williamson

Miliolinella subrotunda (Montague) =
Vermiculum subrotundum Montague

Nodosariids includes a variety of
unioocular forms.

Nonionella sp. is an unidentified
species

Oridorsalis umbonatus (Reuss) =
Rotalina umbonatus Reuss

Other calcareous benthics includes
rare, unidentified or reworked
calcareous specimens.

Patellina corrugata Williamson

Portatrochammina bipolaris (Brady) =
Haplophramium nanum Brady,
included in Agglutinated forms

Pullina bulloides (d'Orbigny)

Pyrgo murrhina (Schwager) =
Biloculina murrhina Schwager

Pyrgo williamsoni (Silvestri) =
Biloculina williamsoni Silvestri

Pyrgoella sphaera (d'Orbigny) =
Biloculina sphaera d'Orbigny

Quinqueloculina arctica Cushman

Quinqueloculina seminula (Linne)=
Serpula seminulum Linne

Quinqueloculina sp. B, Lago

Quinqueloculina stalker Loeblich and
Tappan

Recurvoides scitulus (Brady) =
Haplophramium scitulum Brady,
included in agglutinated forms

Reophax nodulosus Brady, included
in agglutinated forms

Robertinoides charlottensis
(Cushman) = *Cassidulina*
charlottensis Cushman

Rosalina sp. an unidentified form of
the genus

Stainforthia concava Höglund

Stetsonia horvathi Green

Triloculina frigida Lago

Triloculinella tegminis (Loeblich and
Tappan) = *Scutuloris tegminis*
Loeblich and Tappan,

Valvulineria arctica Green

Table 4 Benthic foraminifer census data 94-B17

0-1	7.96	50																													266	2
1-2	9.36	50																													365	3
2-3	10.3	75																													303	1
3-4	11.9	50																													350	
4-5	9.92	81																													308	
5-6	14.7	50																													301	
6-7	13	75																													318	3
7-8	12.2	100																													264	2
8-9	12.3	75																													346	
9-10	21.7	100																													390	2
10-11	10.7	100																													295	10
11-12	17.4	63																													287	7
12-13	22.9	100																													212	2
13-14	13.3	100																													82	
14-15	12.2	100																													113	1
15-16	14.1	94																													82	
16-17	14.7	100																													100	1
17-18	16.5	100																													176	
18-19	18.1	100																													84	
19-20	16.8	100																													260	
20-21	17.8	100																													102	1
21-22	17.6	100																													251	2
22-23	25.2	50																													322	1
23-24	12.8	50																													344	
24-25	15.1	100																													689	1
25-26	13.1	50																													333	
26-27	12.2	50																													294	
27-28	12	50																													401	
28-29	10.8	50																													346	1
29-30	9.39	50																													290	
30-31	9.12	50																													316	
31-32	8.52	50																													303	
32-33	9.23	50																													388	
33-34	10.2	25																													305	
34-35	13.2	25																													348	
35-36	13.7	25																													373	
36-37	15.7	50																													548	

Table 5 Benthic foraminiferal census data 94-B19

Depth in box core (cm)	Total sample weight (g)	Percent of sample examined	<i>Astacolus</i> sp.	<i>Bolivina arctica</i>	<i>Buccella frigida</i>	<i>Cassidulina reniforme</i>	<i>Cassidulina teretis</i>	<i>Dentalina</i> spp.	<i>Elphidium excavatum</i>	<i>Elphidium subarcticum</i>	<i>Epistominella arctica</i>	<i>Fontbotia wuellerstorfi</i>	<i>Haynesina germanica</i>	<i>Ioanella tumidula</i>	<i>Melonis barleeanus</i>	<i>Miliolinella subrotunda</i>	Nodosariids	<i>Oridorsalis umbonatus</i>	<i>Pyrgo williamsoni</i>	<i>Pyrgo murrhina</i>	<i>Pyrgoella sphaera</i>	<i>Quinqueloculina arctica</i>	<i>Quinqueloculina</i> sp. B	<i>Quinqueloculina seminula</i>	<i>Robertinoides charlottensis</i>	<i>Stainforthia concava</i>	<i>Stetsonia horvathi</i>	<i>Triloculina frigida</i>	<i>Triloculinella tegminis</i>	<i>Valvulineria arctica</i>	other calc. benthic	Total calcareous benthic foraminifers	Agglutinated forms				
0-1	8.74	25																																			
1-2	6.37	38																																			
2-3	10.18	38																																			
3-4	11.43	38																																			
4-5	11.41	50																																			
5-6	10.48	100																																			
6-7	12.81	100																																			
7-8	9.44	100																																			
8-9	10.5	100																																			
9-10	10.52	100																																			
10-11	11.09	100																																			
11-12	11.72	100																																			
12-13	11.92	100																																			
13-14	13.72	25																																			
14-15	12.48	19																																			
15-16	10.71	25																																			
16-17	9.62	25																																			
17-18	11.51	19																																			
18-19	9.75	13																																			
19-20	8.49	19																																			
20-21	7.4	16																																			
21-22	10.32	19																																			
22-23	8.88	25																																			
23-24	9.61	50																																			
24-25	9.4	50																																			
25-26	12.26	50																																			
26-27	15.66	100																																			
27-28	20.26	100																																			
28-29	7.78	100																																			
29-30	7	100																																			
30-31	10.6	100																																			
31-32	11.68	100																																			
32-33	14.82	100																																			
33-34	17.33	100																																			
34-35	17.24	100																																			
35-36	11.12	100																																			
36-37	11.11	100																																			

Table 8 Benthic foraminifer census data for 94 B-32

Depth in box core (cm)	Total sample weight (g)	Percent of sample examined	<i>Bolivina arctica</i>	<i>Buccella</i> spp.	<i>Bulimina aculeata</i>	<i>Cassidulina reniforme</i>	<i>Cassidulina teretis</i>	<i>Cornuspira involvens</i>	<i>Dentalina</i> spp.	<i>E. albibilaticum</i>	<i>Elphidium subarcticum</i>	<i>Elphidium excavatum</i>	<i>Epistominella arctica</i>	<i>Fontbotia wuellerstorfi</i>	<i>Haynesina germanica</i>	<i>Glandulina laevigata</i>	<i>Gyroidina</i> sp.	<i>Ioanella tumidula</i>	<i>Laminonion stellatum</i>	<i>Lobatula lobatula</i>	<i>Miliolinella subrotunda</i>	Nodosariids	<i>Oridorsalis umbonatus</i>	<i>Patallina corrugata</i>	<i>Pyrgo murrhina</i>	<i>Robertinoides charlottensis</i>	<i>Stainforthia concava</i>	<i>Stetsonia horvathi</i>	<i>Triloculina frigida</i>	<i>Triloculinella tegminis</i>	<i>Valvulineria arctica</i>	other calc. benthic	Total calcareous benthic foraminifers	Agglutinated forms
0-1	12.9	69																65				11	273									418		
1-2	16.4	50	1						2	9	11	11						51				4	211								28	340	5	
2-3	14.4	75		1					1	1	79							79				3	247								54	340	3	
3-4	14.8	63							1	3	89				3			89				4	159		2					80	451	11		
4-5	14.5	63							1	5	47							47				10	158		2					111	390	13		
5-6	14.4	100				2			1	2	46							46				14	157		3				120	359	5			
6-7	14.1	100							1	2	25				2			25				20	107		1				56	295	6			
7-8	13.5	100							1	2	17							17				11	102						24	185	4			
8-9	14	100							1	3	1							1				5	114						7	146	1			
9-10	11.2	100							2	3	1							10				10	159						10	209	2			
10-11	9.99	100							1	1								5				5	107						9	109	1			
11-12	10.2	100							1	1								3				2	101						5	211	1			
12-13	10.8	100							1	1								1				9	342						5	351	1			
13-14	12.9	50																5				8	894							555	905	1		
14-15	11.1	50																2				5	477							486	546	1		
15-16	9.99	50																2				7	894							77	63	4		
16-17	12.6	100																4				3	525							546	77	1		
17-18	13.4	100																1				8	37							49	49	4		
18-19	16.8	100																2				3	36							162	162	3		
19-20	10.9	100																5				1	46							57	57	4		
20-21	12.9	100																11				6	83							88	88	3		
21-22	12.2	100																3				2	76							33	33	3		
22-23	12.2	100																3				2	25							48	48	6		
23-24	14.1	100	2															40				4	40							7	49	7		
24-25	17.9	100																5				7	42							24	24	4		
25-26	19.7	100																7				1	254							291	291	4		
26-27	19.1	100																4				2	10							381	381	1		
27-28	16.3	100																4				3	42							451	451	1		
28-29	15.1	100																4				1	391							810	810	1		
29-30	11.2	100																4				6	351							437	437	1		
30-31	12.6	100																4				6	431							507	507	1		
31-32	14	100																4				8	424							481	481	1		
32-33	13.2	100																4				12	338							375	375	2		
33-34	13.3	100																4				13	501							283	283	1		
34-35	15.4	100																4				4	606							607	607	1		
35-36	17.1	100																4				4	606							607	607	1		
36-37	13.9	100																4				8	424							554	554	1		
37-38	12.9	100																5				13	501							283	283	1		
38-39	16.3	100																4				4	606							607	607	1		
39-40	10.4	100																4				4	606							607	607	1		
40-41	10.5	100																4				4	606							607	607	1		
41-42	10.5	100																4				4	606							607	607	1		
42-43	8.45	100																4				4	606							607	607	1		