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14. STABLE ISOTOPE ORGANIC GEOCHEMISTRY OF SEDIMENTS FROM THE LABRADOR SEA (SITES 646 AND 647) AND BAFFIN BAY (SITE 645), ODP LEG 105[1]

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ABSTRACT

Stable carbon and nitrogen isotopic compositions as well as organic carbon and total nitrogen contents are reported for Site 645 in Baffin Bay and Sites 646 and 647 in the Labrador Sea. Both low-resolution analyses (1 sample/section) and high-resolution results (up to 7 samples/section) are presented. These records indicate that large-scale changes in productivity since the middle Miocene have occurred in Baffin Bay. Such changes are not evident in samples from the Labrador Sea. Isotopic records of all the sites are influenced strongly by rapidly changing influxes that combine terrigenous debris with planktonic production. In parts of the cores, relationships to other phenomena, such as ice stages, are present. However, these correlations are not common and indicate that these events were masked by the dynamic changes in sources of organic matter occurring in this complex system.

INTRODUCTION

Three separate sites were drilled during Leg 105 for information about (1) the initiation, timing, magnitude, and periodicity of high-amplitude climatic fluctuations of the Late Cenozoic; (2) variations in paleoceanography along a north-south transect from Baffin Bay to the Southern Labrador Sea; and (3) biotic, isotopic, and sedimentary responses to the establishment of colder water circulation in the Labrador Sea and Baffin Bay. Results of measurement of stable isotope carbon and nitrogen and determination of organic content for samples collected during Leg 105 are presented in this study. The northernmost Site 645 was situated on the lower continental slope, east of Baffin Island in a water depth of about 2020 m (Fig. 1). The two other sites were located in the Labrador Sea. Site 646 was on the northern flank of the Eirik Ridge, at a water depth of almost 3500 m beneath the subarctic West Greenland Current, while Site 647 was farther south beneath the North Atlantic Drift in a water depth of nearly 3900 m.

Organic matter incorporated into marine sediments is the product of many biological and chemical transformations of the original source material. This source material may have originated in the photic zone of the marine system as terrigenous organic debris or, more likely, as a mixture of the two in nearshore marine environments. Documentation of the variation of influx from various sources by determining organic carbon and nitrogen contents and stable carbon and nitrogen isotopic compositions is presented. Stable isotope compositions may serve as signatures of both the origin of organic material and of specific factors influencing that origin, such as temperature, nutrient levels, and productivity.

In numerous marine environments, relative contributions of terrigenous and marine influxes have been documented by using stable carbon isotopes. For example, in the deltas of both the Pedernales River in Venezuela (Eckelmann et al., 1962) and the Niger River (Gearing et al., 1977), woody fragments and more finely disseminated terrestrial plant debris give a clear terrigenous isotopic signature to deltaic sediments. In the Gulf of Mexico, surface sediments contain increasing amounts of the heavier isotopes of carbon when nearing the sea, indicating decreasing influence of land-derived detritus (Sackett and Thompson, 1963; Hedges and Parker, 1976; Gearing et al., 1977). In more northern environments, the transport of terrigenous material may be more extensive. In the Beaufort Sea, lateral transport of terrestrial debris is enhanced by ice rafting (Gearing et al., 1977). These variations in source record the sedimentary history of an area. In the Gulf of Mexico, variations downcore were correlated with glacial and interglacial periods that are related to lower sea levels and to the influence of the Mississippi River (Parker et al., 1972; Newman et al., 1973). In systems that are exclusively or heavily dominated by marine productivity, other environmental parameters, such as temperature, growth

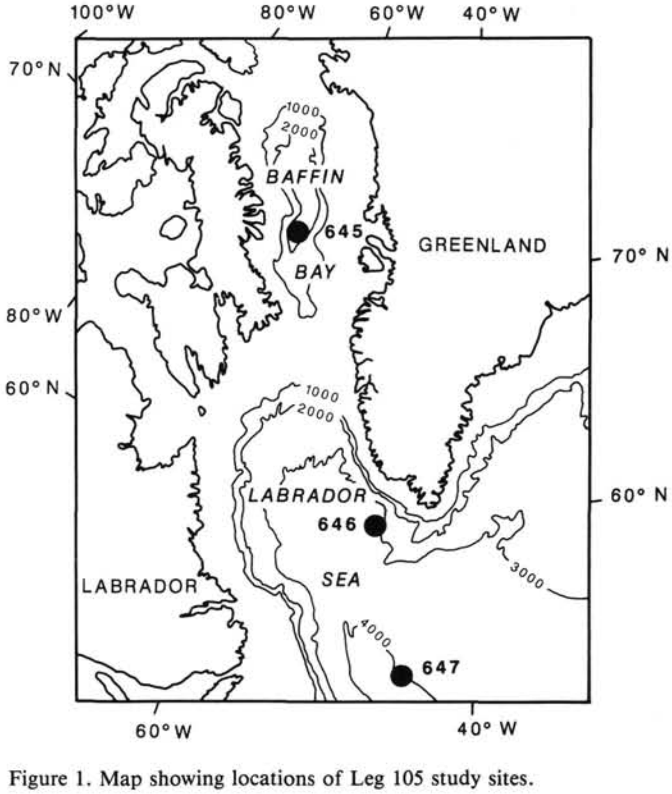

Figure 1. Map showing locations of Leg 105 study sites.

[1] Srivastava, S. P., Arthur, M., Clements, B., et al., 1989. *Proc. ODP, Sci. Results*, 105: College Station, TX (Ocean Drilling Program).

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rate, species distribution, and CO_2 availability, may affect carbon isotopic composition (Sackett et al., 1965; Degens et al., 1968; Degens, 1969; Gearing et al., 1977; Fontugne and Duplessy, 1978; 1981).

Large temperature differences in water masses correlate with planktonic organic material that is depleted in ^{13}C. This observation and its interpretation are based on the premise that the isotopic fractionations by phytoplankton growing in the open ocean are affected by temperature. These temperature-induced signatures were interpreted as the cause of carbon isotopic variations observed in high-latitude, deep-sea sediments (Sackett, 1986; Sackett et al., 1974; Rogers et al., 1972). However, carbon isotopic variations may also be associated with changing populations of phytoplankton. For example, the transition of diatom ooze to a dinoflagellate/coccolithophore-dominated sediment at the Antarctic Convergence is associated with a change in carbon isotopic signature (Sackett et al., 1974). Isotopic differences exist among classes of phytoplankton of different sizes (hence, different species) from the same population of a bloom (Gearing et al., 1984). Such variability would probably affect the organic isotopic record preserved in a sediment.

In a similar fashion, stable nitrogen isotopes may be useful indicators of the source of organic material entering the marine environment. Peters et al. (1978) correlated nitrogen isotope signatures with the relative contributions of terrigenous and marine influxes into a sediment. Such contributions of organic matter can be quantified by simple mass balance calculations from which sources may be estimated (Macko, 1981; 1983).

Because the major sources of nitrogen used in terrestrial systems (N_2 through nitrogen fixation) are isotopically distinguished from those used in marine systems (oceanic nitrate through nitrate reduction), these sources often may be resolved. Furthermore, in purely aqueous environments, the processes by which phytoplankton (or bacteria) incorporate nitrogen may be resolved if one can eliminate sources of nitrogen from land. The process of nitrogen fixation has a small isotopic fractionation associated with the utilization of molecular nitrogen. Such a process can be easily distinguished from the more common nitrate reduction, in which phytoplankton fully utilize dissolved nitrate, reflecting its isotopic signature (Macko et al., 1984). When algae only use a small portion of the dissolved nitrate, more depleted ^{15}N values may be evident, reflecting the isotopic fractionation associated with that incorporation (Macko et al., 1987). Such changes then may be useful for interpreting the paleoceanographic record of an area. Sediments derived from periods of higher productivity, in which phytoplankton fully utilized the oceanic nitrate, may be more enriched in ^{15}N than sediments associated with lower productivity, where larger fractionations are possible.

However, the situation is complicated by factors that include microbial action, diagenesis, and recycling of organic matter. Variations in isotopic signature may occur as a result of deamination reactions associated with organic-rich materials (Sigleo and Macko, 1985; Zieman et al., 1984; Wada, 1980). Such alteration processes may be especially important in changing isotopic signatures below the euphotic zone (Altebet and McCarthy, 1986).

This study establishes the isotopic and organic variations in sediments for three Leg 105 sites. Isotopic analyses were used previously to suggest extent and timing of glacial influences on the total organic carbon found in Quaternary marine sequences. Here, isotopic signatures of nitrogen and carbon are correlated to help delineate different processes, including changing water column temperatures, productivity, or organic matter sources, all of which may influence the photic-zone organic matter and the relative influx of organic material into the underlying sediment.

METHODS

Sediment samples to be analyzed for organic content and isotopic composition were kept frozen until analysis. Samples were initially lyophylized and then acidified with 30% HCl to remove carbonate. The carbonate-free residue was dried to preserve all soluble organic matter and any ammonium or nitrate. A portion of the dried materials then was weighed and combusted in quartz in the presence of purified cupric oxide wire and high-purity granular copper for 1 hr. at 850°C (Macko et al., 1984). The nitrogen and carbon dioxide obtained were cryogenically isolated from other combustion products and analyzed using a V.G. Micromass 903E stable isotope-ratio mass spectrometer. On the basis of replicate analyses of samples, the reproducibility during combustion and measurement is within ±0.2‰. Data are presented as ‰;

$$\delta^{N}E = \left(\frac{R_{sample}}{R_{\mathrm{standard}}} - 1\right) \cdot 10^3,$$

where N is the isotope of the element E and R is the abundance ratio of the heavy to light isotope; the standard for ^{15}N is atmospheric nitrogen and the standard for carbon is the Chicago PDB. For routine measurement, samples were analyzed vs. a laboratory standard tank of either pure nitrogen or carbon dioxide gas. Total nitrogen content was calculated from the ion intensity of the gas in a calibrated volume of the mass spectrometer; the organic carbon content was determined using a calibrated manometer in the vacuum purification line. Low-resolution analysis was performed with at least one sample per 150-cm section, while high-resolution sampling included as many as seven samples per 150-cm section. Statistical analyses were performed using SPSS-X on a VAX 11780 mainframe computer. The significance defined by Pearson R correlation coefficients was significant (0.95 level), highly significant (0.99 level), or not significant.

RESULTS

Site 645 Low-Resolution Composite

Nearly 700 samples were analyzed for this part of the study. Organic carbon and nitrogen contents indicate a general trend of lower levels during the middle Miocene, which increased toward the late Miocene (reaching the highest levels observed in this study), and then diminished to lower levels by the end of the Miocene (Figs. 2 and 3). A similar but lower-magnitude increase is seen throughout the Pliocene, with very low levels occurring at the end of the Pliocene. Pleistocene sediments exhibit lower levels of organics and indicate no simple trends, except for higher levels at the beginning, rather than the end, of the period. Carbon contents range from 0.2% to 3.8% for the Miocene, while nitrogen varies from 0.02% to 0.32%. Pliocene levels are 0.3% to 1.8% and 0.03% to 0.37% for carbon and nitrogen, respectively. Pleistocene levels are 0.08% to 1.5% for organic carbon and 0.01% to 0.16% for total nitrogen. Throughout the core, organic contents are highly variable when adjacent samples are compared. Extended periods of low organic content, such as at 850 m, are occasionally evident.

Carbon isotopic compositions for this site are fairly uniform during the middle Miocene and have slightly greater fluctuations toward the late Miocene (Fig. 4). Compositions for this period range from −26.0‰ to −19.1‰. Pliocene samples show a slightly wider range in values, from −27.4‰ to −21.6‰. Furthermore, this period shows greater fluctuations between adjacent samples than in the Miocene. The Pleistocene has the largest range at this site, with values between −27.7‰ and −20.9‰. Coincident with this wider range is a larger, almost erratic variation in adjacent samples downcore with little clus-

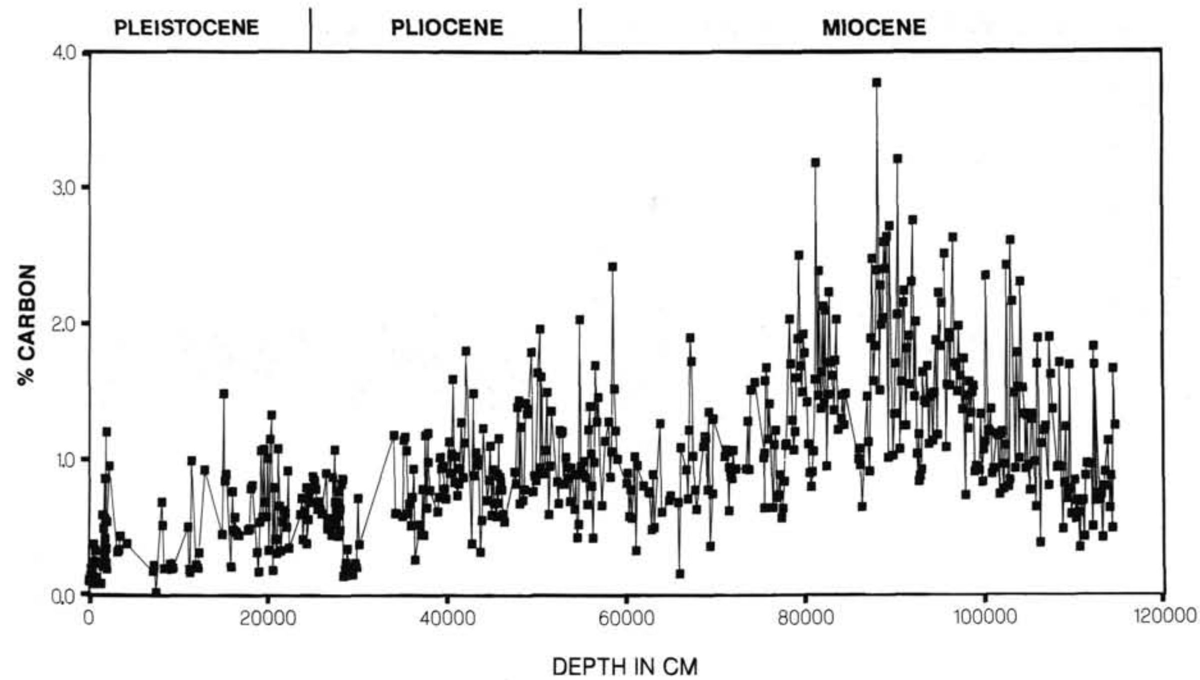

Figure 2. Organic carbon in Site 645 low-resolution samples as a percentage of carbon vs. depth.

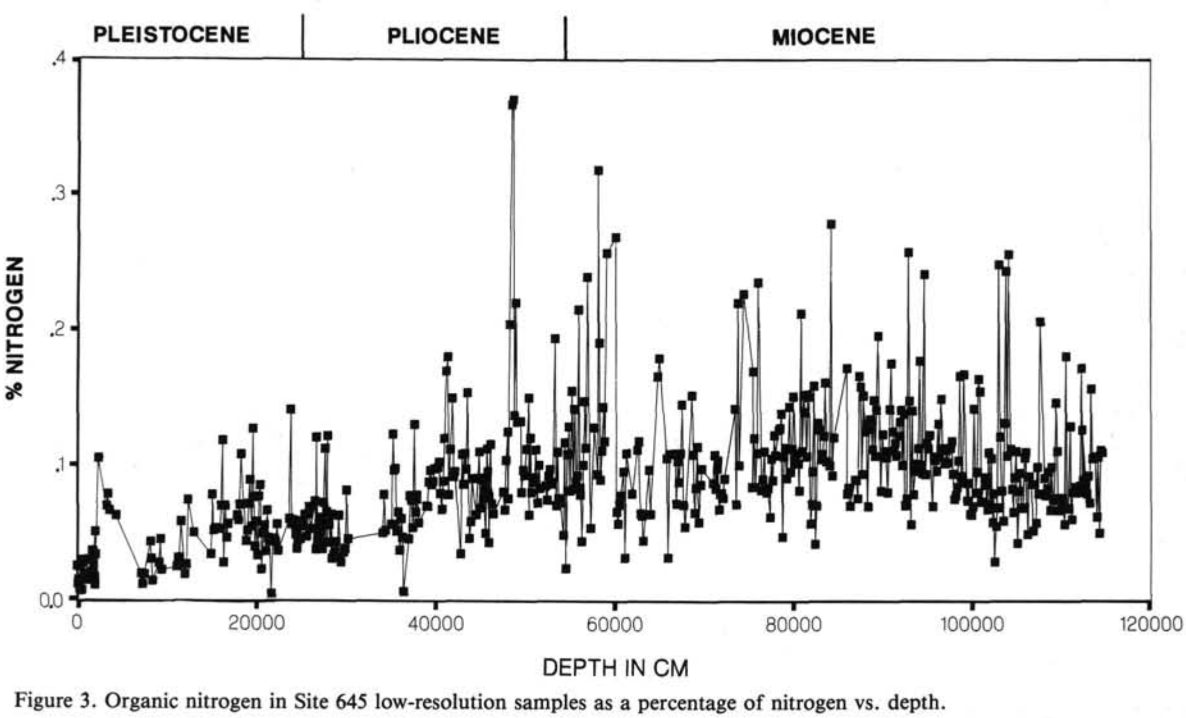

Figure 3. Organic nitrogen in Site 645 low-resolution samples as a percentage of nitrogen vs. depth.

tering of values. Compositions during the Miocene are also somewhat enriched (~2‰) when compared to Pliocene and Pleistocene samples.

Similarly, nitrogen isotopic compositions of sediments during the Miocene are fairly uniform and vary only occasionally from values near 5‰ (Fig. 5). The total range is 1.8‰ to 6.9‰, although only a few samples account for this range. During the Pliocene, values may have been fairly constant, with a slight increase in variability occurring in the late Pliocene. The overall range is similar to that in the Miocene, from 1.9‰ to 6.7‰. The Pleistocene shows a large variation in ^{15}N compositions which range from 3.6‰ to 11.5‰. Little constancy downcore was observed.

Highly significant positive correlations were observed (Pearson R) between organic carbon and total nitrogen and between total nitrogen and nitrogen isotopic composition. Significant or highly significant negative correlations were seen between total-nitrogen and carbon isotopic values, including organic carbon

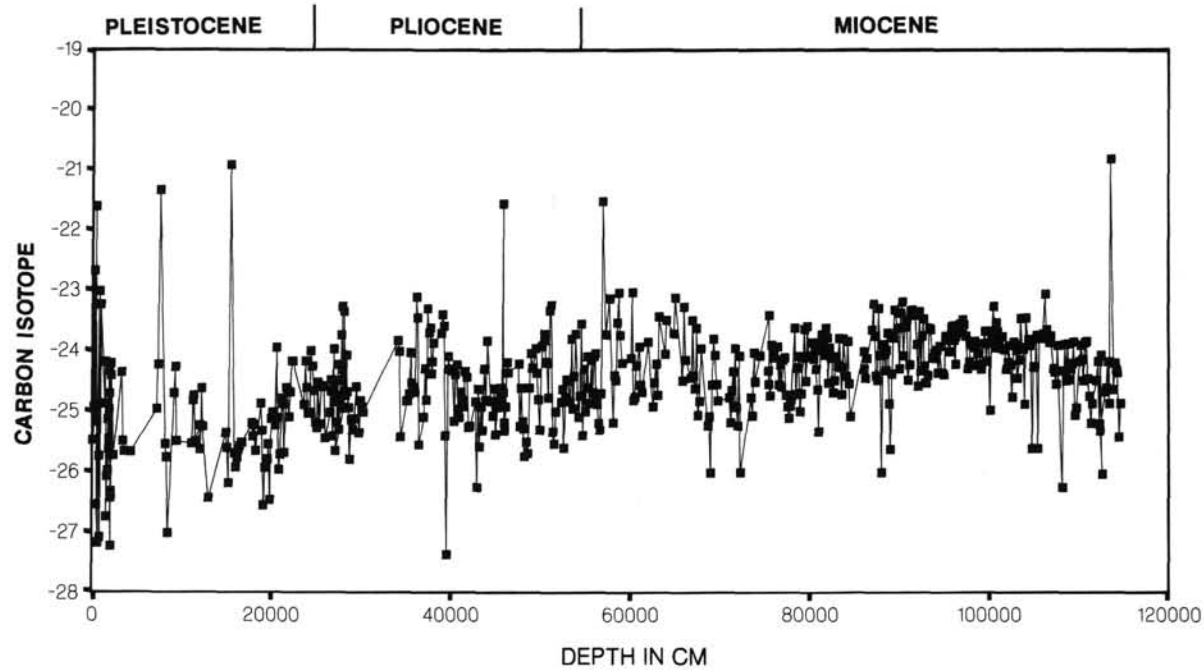

Figure 4. Carbon isotope vs. depth in Site 645 low-resolution samples.

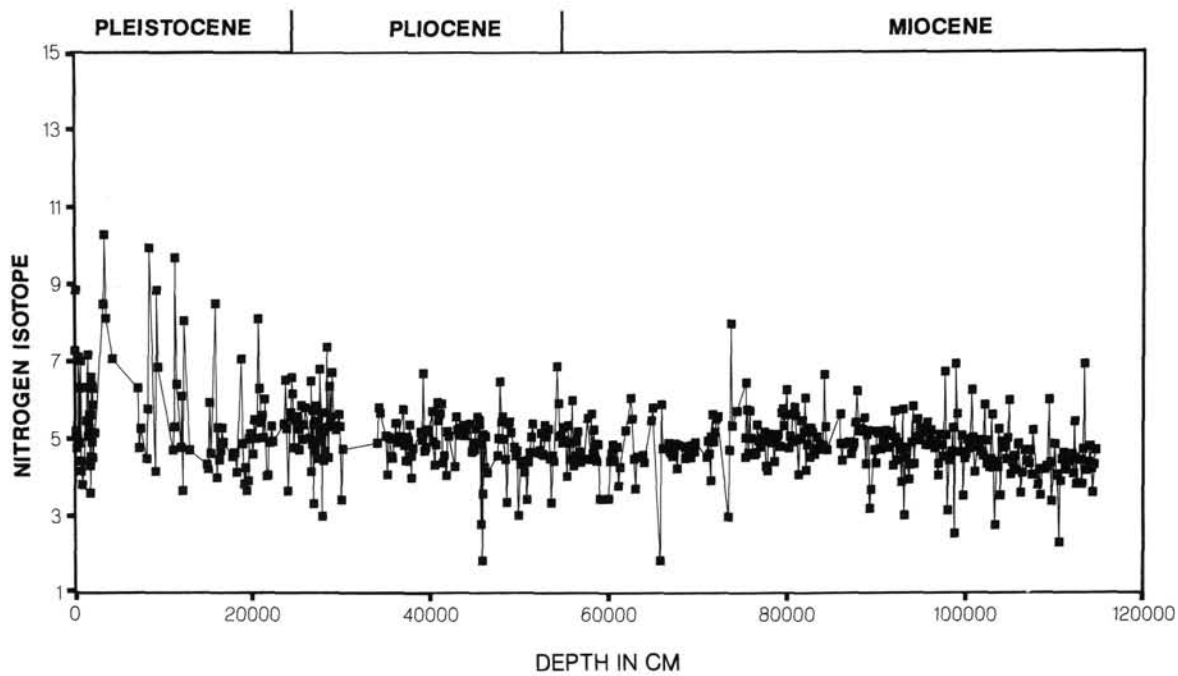

Figure 5. Nitrogen isotope vs. depth in Site 645 low-resolution samples.

and carbon isotopes as well as nitrogen isotopes. The isotopic compositions of nitrogen and carbon did not correlate at Site 645.

Site 646 Low-Resolution Composite

Nearly 550 samples from this site were analyzed. The organic carbon and nitrogen contents for this location are significantly lower than those at Site 645, with little variation except for occasional sharp increases (Figs. 6 and 7). Average values for carbon and total nitrogen are 0.2% and 0.03%, respectively. Miocene sediments have the largest ranges in organic carbon (0.1% to 1%) and total nitrogen (0.03% to 0.14%), while those of the Pliocene are more constant in carbon (0.1% to 0.6%) and have similar variations in nitrogen (0.02% to 0.13%). Pleistocene sediments have one high organic-carbon value at 1.2% but otherwise deviate little from the minimum of 0.1% to 0.4%. For total nitrogen contents, a range similar to that observed downcore can be seen (0.01% to 0.09%).

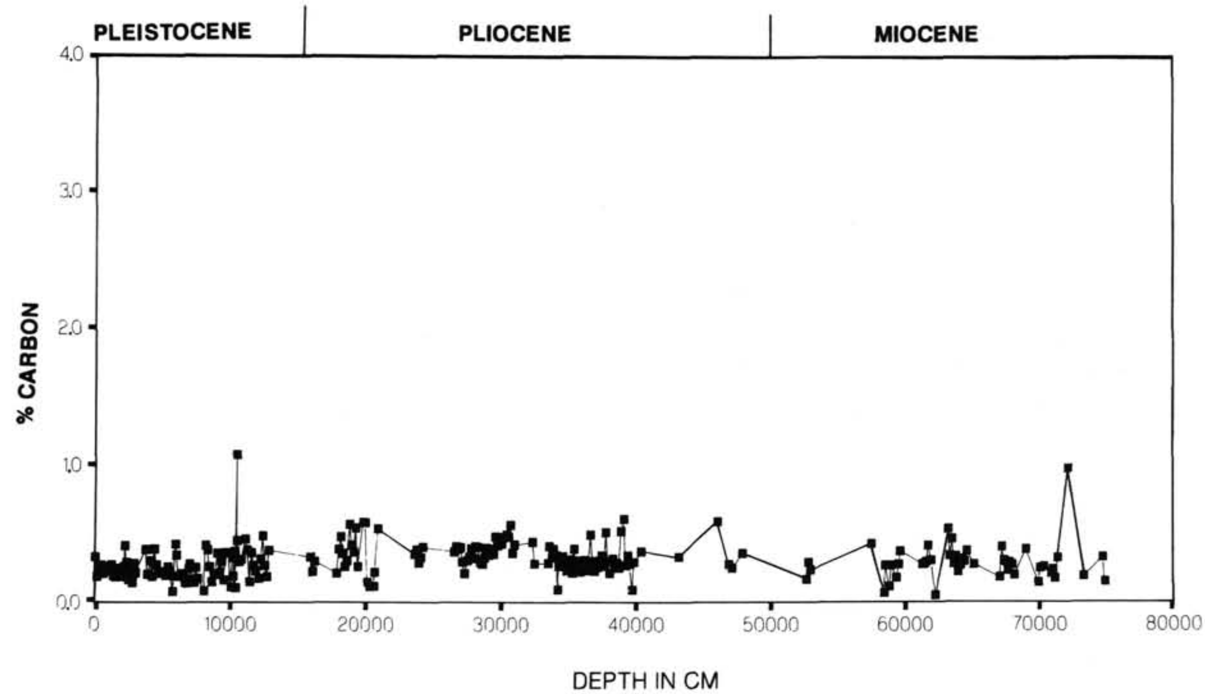

Figure 6. Organic carbon in Site 646 low-resolution samples as a percentage of carbon vs. depth.

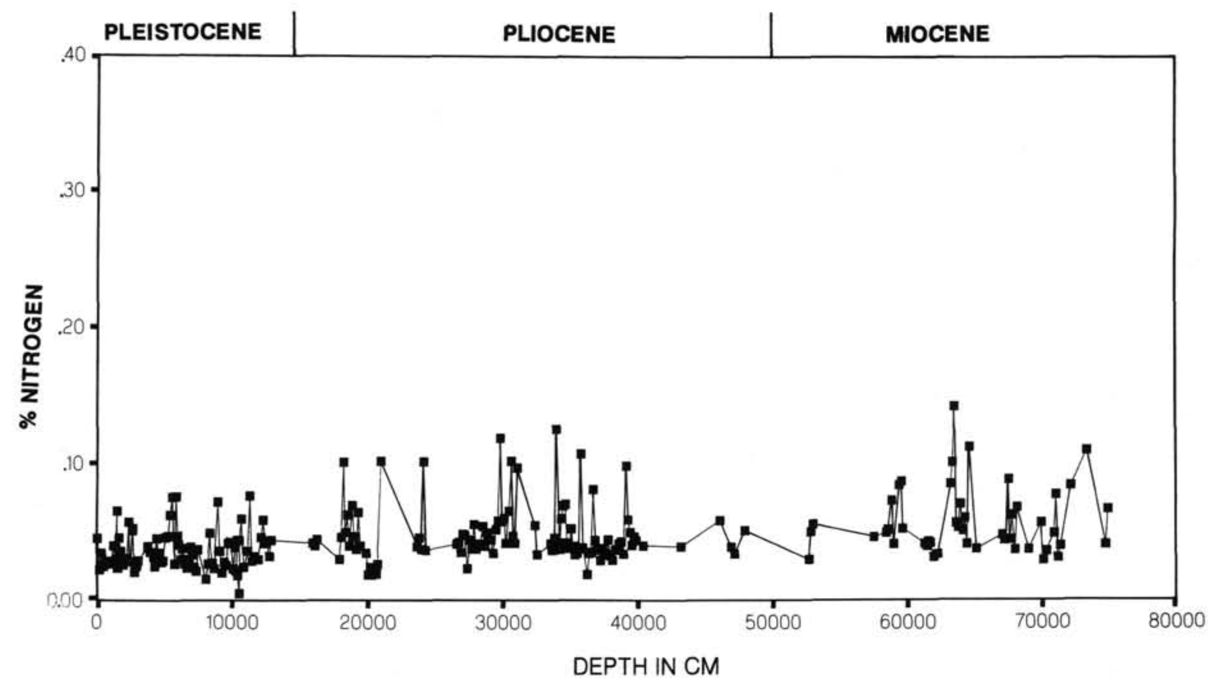

Figure 7. Organic nitrogen in Site 646 low-resolution samples as a percentage of nitrogen vs. depth.

Carbon isotopic compositions at Site 646 varied more in the Miocene than those seen at Site 645 (Fig. 8), and the range is smaller, from −26.2‰ to −22.9‰. As at Site 645, Pliocene compositions become increasingly variable, with a spread of from −27.4‰ to −22.0‰. This is similar to the spread seen at Site 645. The values obtained from Pleistocene samples vary more irregularly than those from the Pliocene, with values between −27.7‰ to −22.1‰. In general, the values for ^{13}C are slightly more enriched than those obtained from Site 645.

As with the carbon isotopic compositions, an increasing fluctuation in ^{15}N is evident from the Miocene to the Pleistocene sections (Fig. 9). This can be seen in the increasing range in values for this site: Miocene, 2.3‰ to 7.6‰; Pliocene, 3.6‰ to 9.6‰; and Pleistocene, 3.0‰ to 11.5‰. Very little constancy was observed downcore with apparent extended periods of enriched nitrogen preserved in the sediments (i.e., near 50 m).

Significant or highly significant positive correlations (Pearson R) again were observed between total nitrogen and organic

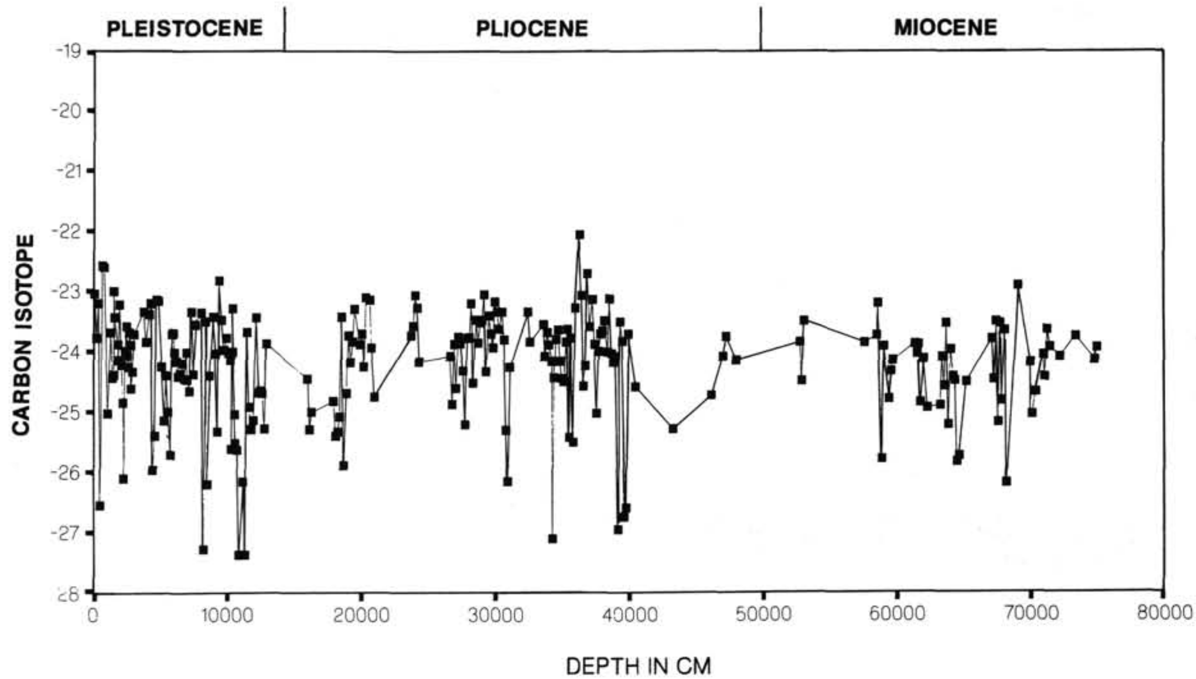

Figure 8. Carbon isotope vs. depth in Site 646 low-resolution samples.

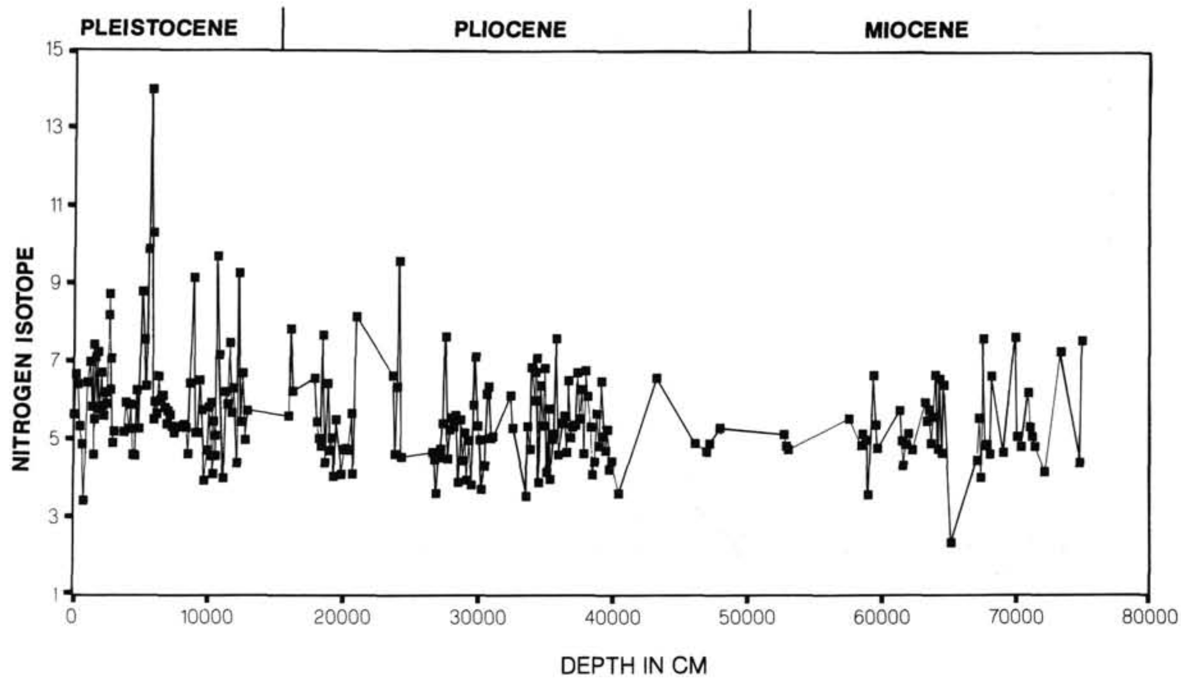

Figure 9. Nitrogen isotope vs. depth in Site 646 low-resolution samples.

carbon as well as total nitrogen and nitrogen isotopes. Significant negative correlations between total nitrogen and nitrogen isotopes, organic carbon and carbon isotopes, and organic carbon and nitrogen isotopes were also found. No correlation was seen between nitrogen and carbon isotopes.

Site 647 Low-Resolution Composite

Approximately 350 samples were analyzed from cores at this site. Here, the organic loading of sediments is similar to that seen at Site 646 (Figs. 10 and 11). The deepest samples analyzed at this site were the oldest of all study samples and were Oligocene in age. These samples have low carbon (0.1% to 0.3%) and low total-nitrogen (0.02% to 0.05%) contents. Sediments from the Miocene section of this site contained 0.1% to 0.5% organic carbon and 0.02% to 0.11% total nitrogen, which was similar to levels observed at Site 646. Pliocene sediments were fairly uniform in contents, with a range of 0.1% to 0.6% organic carbon and 0.01% to 0.11% total nitrogen. Pliocene sediments also were

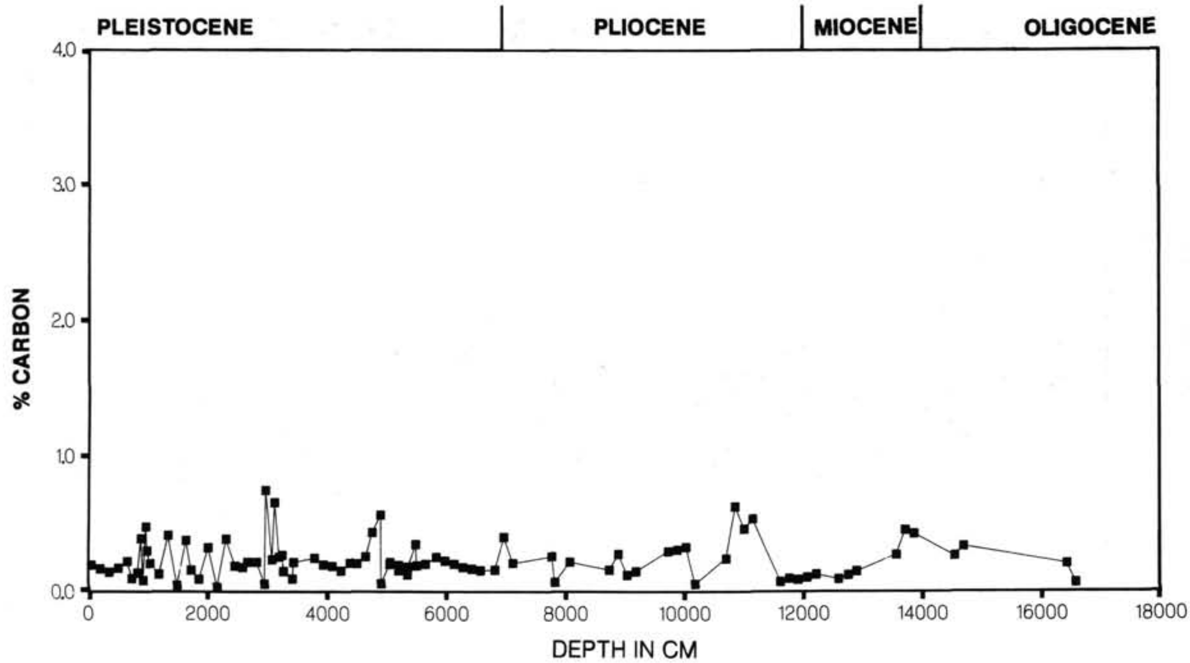

Figure 10. Organic carbon in Site 647 low-resolution samples as a percentage of carbon vs. depth.

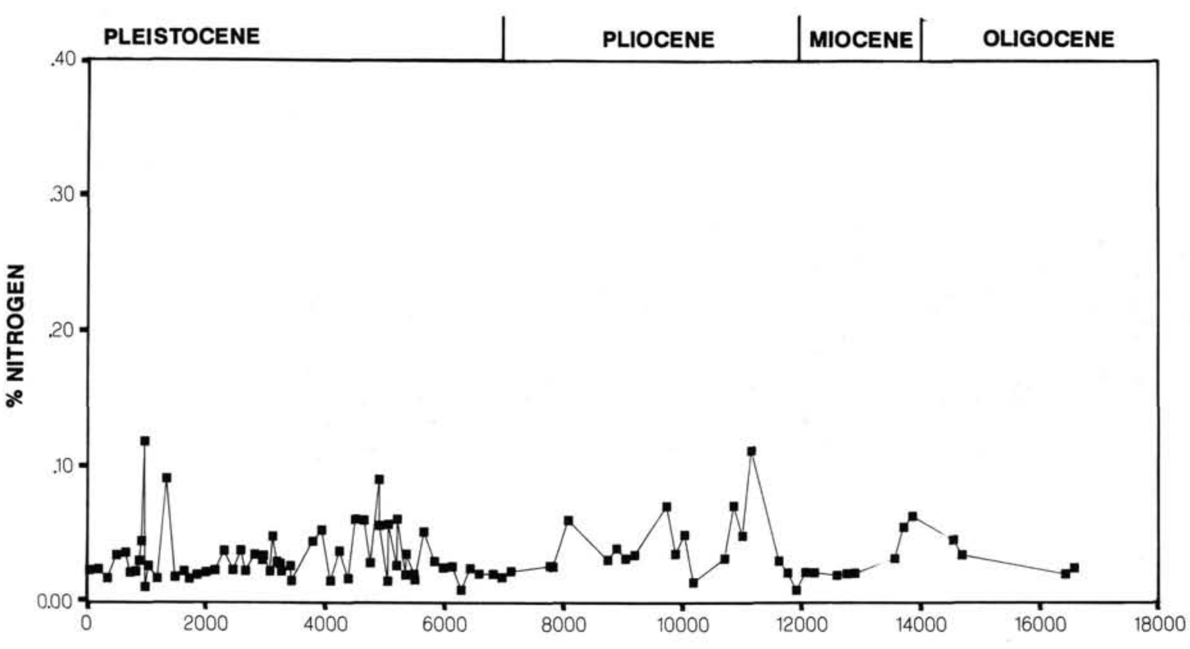

Figure 11. Organic nitrogen in Site 647 low-resolution samples as percentage of nitrogen vs. depth.

characterized by sharp increases and decreases downcore. Pleistocene sediments indicated some variation and similar organic loading as the sediments from Site 646, with 0.04% to 1.0% organic carbon and 0.01% to 0.13% total nitrogen.

Carbon isotopic compositions also were similar to those seen at Site 646, with sediment values generally near −24‰ and with numerous sharp deviations in the direction of more depleted organics (Fig. 12). Oligocene sediments range from −26.7‰ to −24.8‰, which is similar to the range seen in Miocene sediments (−27.2‰ to −24.0‰). Pliocene sediments likewise are characterized by compositions of between −26.7‰ and −24.3‰. Pleistocene sediment values range between −26.6‰ and −19.8‰, which is nearly identical to the range observed at Site 646.

In addition, nitrogen isotope contents at Site 647 are similar to those seen at Site 646, although on average, a slight decrease with increasing age can be seen (Fig. 13). Sediments of Oligocene age are generally near 4‰ and range between 3.8‰ and 7.2‰. Like-

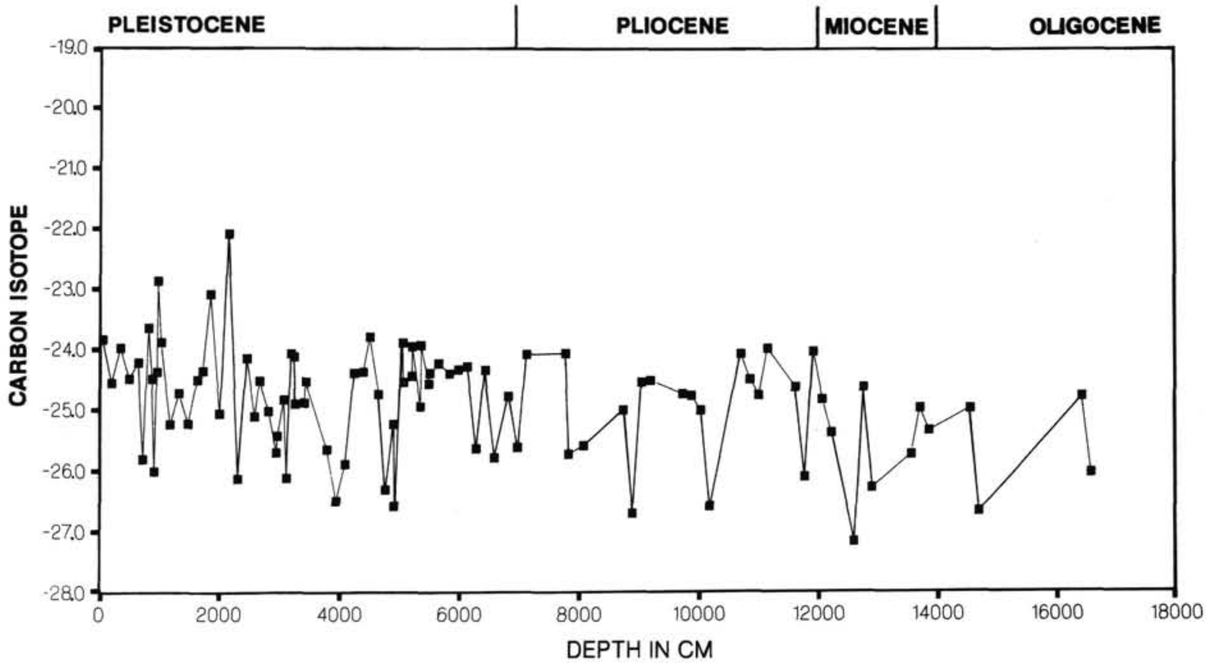

Figure 12. Carbon isotope vs. depth in Site 647 low-resolution samples.

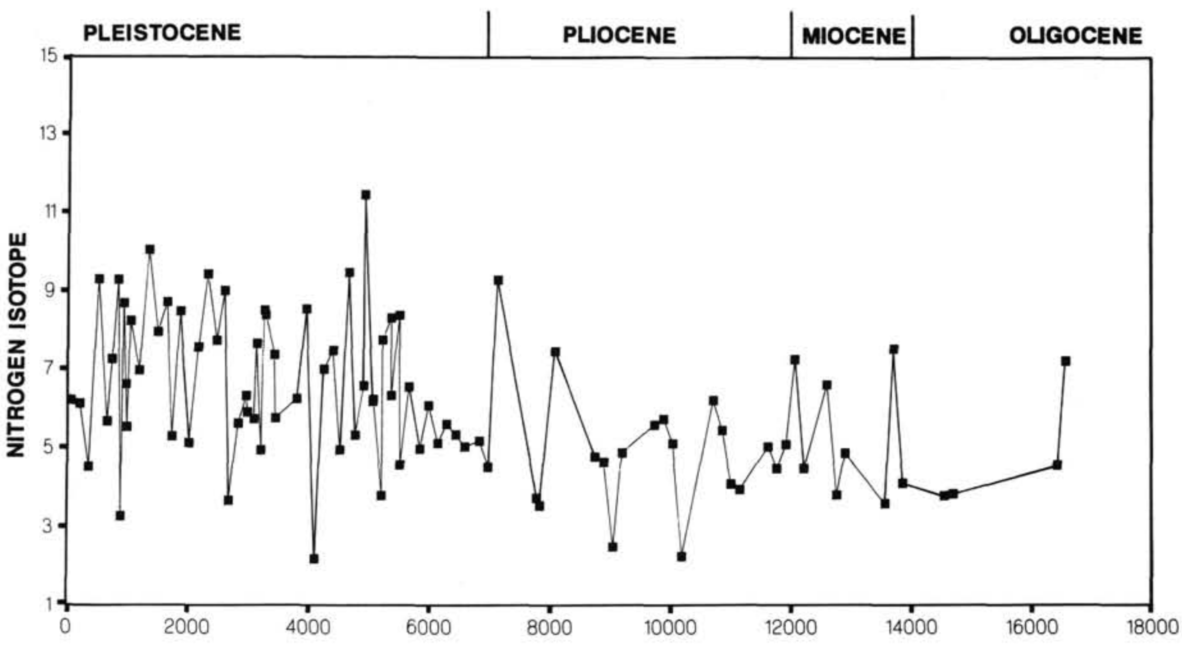

Figure 13. Nitrogen isotope vs. depth in Site 647 low-resolution samples.

wise, Miocene sediment values are almost 4‰, with some excursions to more enriched values near 7‰ (overall range is 3.6‰ to 7.5‰). Pliocene and Pleistocene sediments vary more and have ranges of 2.2‰ to 9.3‰ and 2.2‰ to 12.7‰, respectively.

Highly significant positive correlations were observed between nitrogen and organic carbon contents as well as between nitrogen content and nitrogen isotopic compositions. A significant positive correlation was seen between carbon isotopic signature and organic carbon content, which is the opposite direction of the other two sites. Significant negative correlation can be seen between total nitrogen and carbon isotopes, which is similar to correlations at Sites 645 and 646. However, unlike the previous sites, a highly significant negative correlation was noted between stable nitrogen and stable carbon isotopic compositions. No correlation between the percentage of carbon and the nitrogen isotopic composition can be seen.

High-Resolution Studies

Greater sampling frequency was undertaken in portions of cores from all three sites, with the intention of enabling observation of small-scale periodicities associated with predicted Milankovitch periodicities of eccentricity, obliquity, and precession in the orbit of the Earth. These respective periods were approximately 93, 41, and 19 k.y. To detail the shortest of these, sampling intervals must be at least double the period. With five high-resolution samples for each 1500-mm section and with approximate sedimentation rates of 134, 90, and 47 mm/k.y. for Sites 645, 646, and 647, respectively, the frequency needed to observe even the smallest periodicity was achieved. For Site 645, one sample per 2.2 k.y. was collected; for Sites 646 and 647, one sample was collected for 3.3 and 6.4 k.y., respectively (Figs. 14, 15, and 16).

To facilitate the overall interpretation of sediments at Site 645, the high-resolution organic geochemistry results for that site are included with the high-resolution synthesis (see Appendix) of Hillaire-Marcel et al. (this volume). Although Asku et al. present another high-resolution synthesis for Sites 646 and 647 (this volume), only organic geochemistry results for these sites are included here. Thus, interpretations for these sites may be slightly different.

Organic carbon and nitrogen contents in samples from Holes 646A and 646B were similar and of the same range and variation as that observed in the low-resolution survey. Of importance is that (1) these samples show little change in the organic carbon or total nitrogen contents with depth and (2) the surface of Hole 646A contains more organic material than that of Hole 646B, which indicates possible loss of surficial material in one core. Some infrequent small-scale perturbations were noted, although this does not reflect the normal low-level loading of the sediment. Carbon and nitrogen isotopic compositions also show similar ranges to those noted in the low-resolution analysis. Carbon isotope values average near −24‰, while nitrogen isotopic signatures average about 7‰. These norms vary by frequent excursions of enriched nitrogen and depleted carbon values that often, but not always, occur simultaneously. No simple correlation was observed between the two.

Organic contents from sediments of Hole 647B (high-resolution) are also uniform. Organic carbon occurs at generally low levels, and its distribution is similar to that of total nitrogen. Both analyses show occasional sharp increases in organic content, but do not correlate with each other.

Both stable carbon and nitrogen isotope analyses of these high-resolution samples show a much greater variation and range than was seen in the low-resolution study. Only occasional clustering of points was noted. Again, most of the variations were observed to be enrichments in ^{15}N and depletions in ^{13}C and were simultaneous only occasionally.

DISCUSSION

In oxygenated environments, the amount of organic matter preserved in the underlying sediment directly correlates with sedimentation rate (Müller and Suess, 1979). Diminished exposure to zones of decomposition is associated with increased sedimentation rate. With increased organic matter burden, less material is degraded and greater preservation occurs. Heightened productivity has been observed to parallel sedimentation rate (Müller and Suess, 1979). Higher productivity may then be directly associated with increased organic matter loadings in a sediment. Furthermore, in biologically dominated sedimentary sequences, productivity is often the principal control on the organic content of a sediment. All sediments analyzed here were from areas having fairly high sedimentation rates in Baffin Bay and the Labrador Sea (90 to 134 mm/k.y. and are likely to have been deposited under oxic conditions (Stein, 1986).

Suspended particulate materials also undergo chemical and isotopic changes while in the water column. Isotopically heavier (in ^{13}C) carbohydrates or proteins can be preferentially lost, and isotopically depleted lipids can be preserved (Ittekkot et al., 1982; Handa et al., 1972). Thus, the isotopic composition of a sediment may not be related to that of overlying particulate organic materials (Entzeroth, 1982). In general, carbon isotopic compositions of clastic sediments were observed to be about 1‰ more enriched than the overlying water column suspended particulate material, whereas carbonate-rich sediments are about 2‰ more enriched than the associated particulate organics (Entzeroth, 1982). Little data exist about the relationship between $\delta\,^{15}N$ of particulates to that of underlying sediments, but indications are that they can be quite different (Macko et al., 1984; Altebet and McCarthy, 1986).

Sediments from Site 645 show large changes in organic content, total nitrogen, and the organic isotopic compositions. Those changes may be directly related to the paleoceangraphic history of Baffin Bay. The progressive opening of the Labrador Sea from south to north increased northward flow of warmer Atlantic water into Baffin Bay during the early to middle Eocene (Srivastava et al., 1981). This was followed by intrusions of cooler Atlantic water, which was cooled by eastern Greenland waters during the Oligocene. The deepest samples analyzed at this site were of Miocene age. By that time, the termination of warm and cooler flows of nutrient-rich Arctic waters were intruding into Baffin Bay from the north and proceeding southward. The continuous flow of Arctic waters through Baffin Bay and the Labrador Sea was only fully established by the middle Pliocene. These intrusions of nutrient-rich, cooler waters may have caused periodic, possibly long-term, increases in productivity (as estimated from Müller et al., 1983). When the warm-water influx ended, a collapse of the seed phytoplankton population may have occurred toward the end of the Miocene. Evidence for such collapses may be the long-term, low-level content of organics at ~850, 750, and 650 m. More frequent and larger incursions of cooler waters during the Pliocene along with colder water species increased productivity and are associated with large fluctuations. With the formation of the ice sheets of the Pleistocene (with productivity probably by limited light and by the presence of more ice-rafted debris) extremely low levels or organic matter were produced and are preserved in the upper 300 m of Pleistocene sediments. This scenario is reflected in the isotopic compositions and correlations of the organic measurements. In the Miocene, fairly constant isotopic signatures typical of phytoplankton-dominated northern waters can be seen. With the end of the Pliocene and variable influxes of waters, more fluctuation can be seen in both carbon and nitrogen isotopes. Finally, in the Pleistocene, highly irregular values in both ^{15}N and ^{13}C (as well as more depleted ^{13}C and enriched ^{15}N values) reflect the effects of ice-rafted debris mixing with low-level productivity growing under ice.

Influx dominated by terrigenous debris (ice-rafted) was not seen because both ^{15}N and ^{13}C may have been more depleted. Depleted ^{13}C and enriched ^{15}N also were not observed consistently. This would have indicated the presence of phytoplankton that were fully utilizing the nitrate, with probable intense nitrogen recycling and increased fractionation of ^{13}C from slower growth rates in cooler waters. Differential production by the phytoplankton of biochemical storage materials like lipids that are depleted in ^{13}C may also be indicated. Shifts in ^{13}C also may be the result of species changes (Gearing et al., 1984). The lack of significant correlation between the isotopic signatures indicates that both processes were operating at this site. Negative correlation of the carbon isotopic signature with organic carbon content and total nitrogen should be true in either increased productivity or increased terrigenuous and ice-rafted debris. Because ^{15}N has a negative correlation with the percentage of nitrogen and carbon, terrigenous influxes most likely were present. Variability in the Pleistocene further emphasizes a rapidly changing environment in which both low productivity and low amounts of terrigenous organic debris were being added to the sediment.

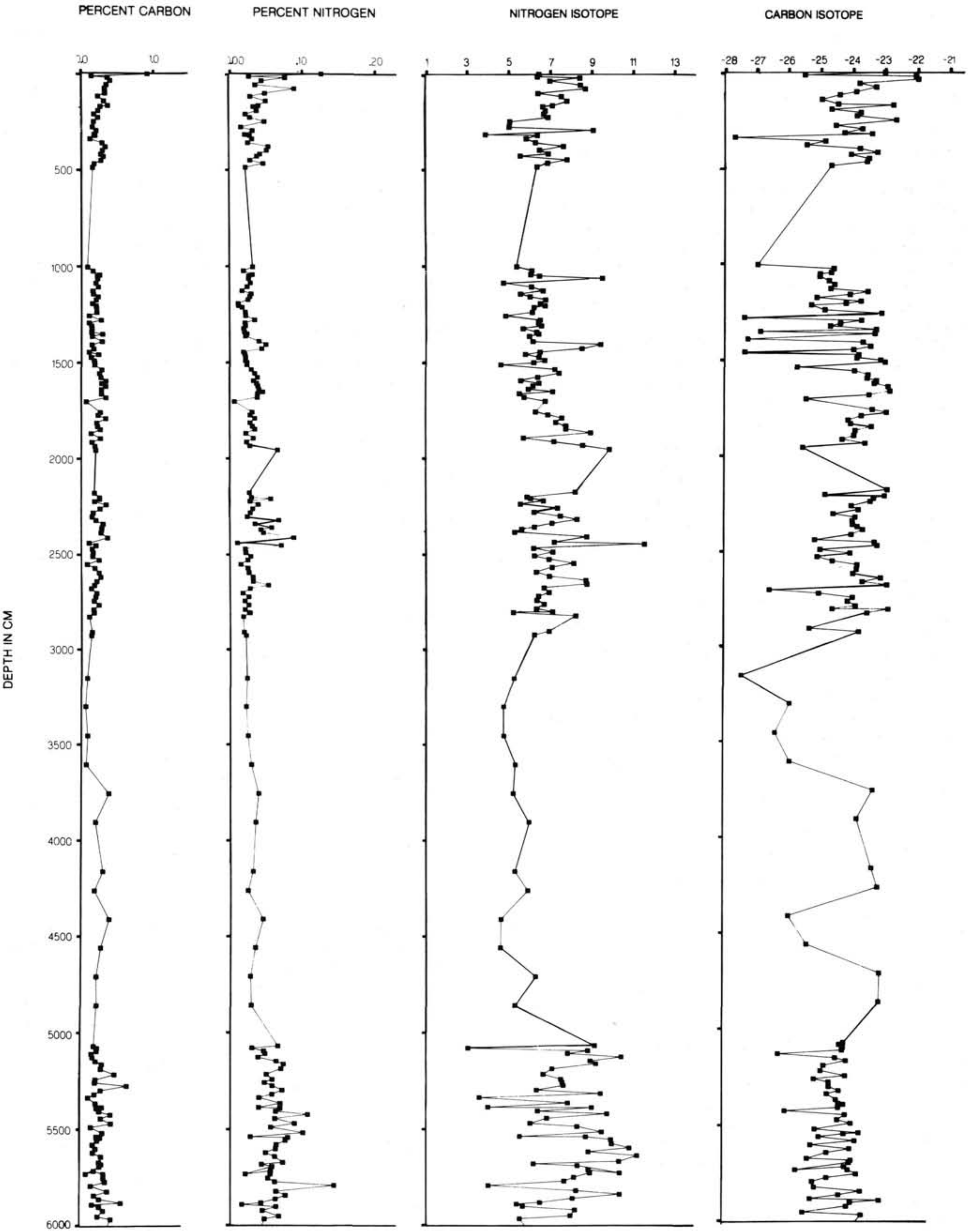

Figure 14. Percentage of carbon and nitrogen and carbon and nitrogen isotopes vs. depth for Hole 646A high-resolution samples.

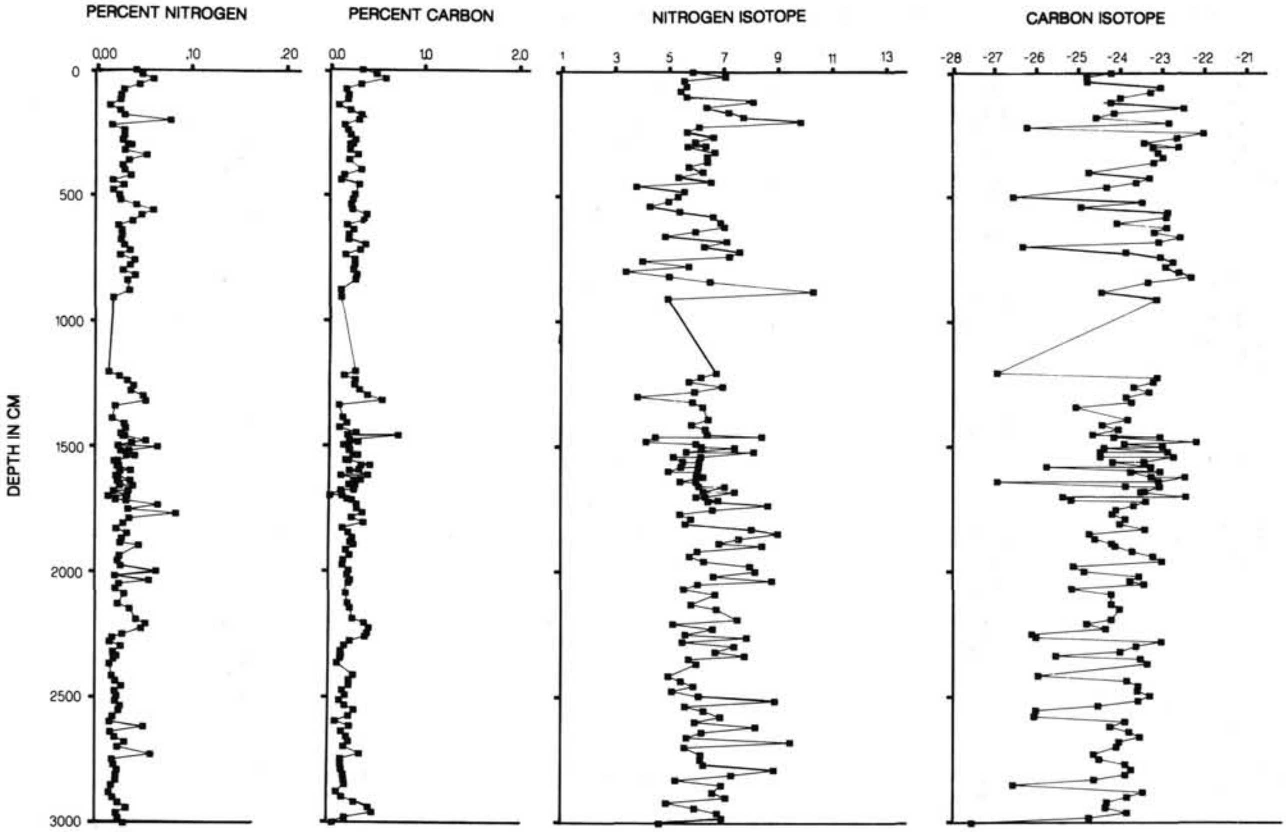

Figure 15. Percentage of carbon and nitrogen and nitrogen and carbon isotopes vs. depth for Hole 646B high-resolution samples.

No simple correlation could be made with ice stages nor was a simple periodicity observed, which indicates that these features were overprinted by a constant total organic matter influx.

Site 646 sediments were seen as having a constant organic influx from the Miocene to the present. With the Labrador Sea open and cooler water entering from eastern Greenland, a constant low productivity was established. Occasional increases in nitrogen content (this decreasing carbon/nitrogen) appear to correlate with interglacial periods. No significant temperature effect was noted (Sackett, 1986); however, the correlation of increasing ^{15}N (phytoplankton using recycled nitrate) with the percentage of carbon and nitrogen could support an increase in planktonic productivity (possibly accompanied by a decrease in ice-rafted debris). This could also be supported by the significant positive correlation of organic carbon with total nitrogen, and the negative correlation of organic carbon with carbon isotopic composition. More depleted carbon associated with some interglacial episodes, possibly indicating a change in the dominant phytoplankton population. No consistent simple relationship was evident between glacial stages (Asku et al. this volume) and any of the organic parameters observed here. Occasional parallels between increasing ^{15}N and decreasing ^{18}O in carbonate can be seen. These were not evident throughout the core, nor was an increase in productivity evident, as defined by Müller et al. (1983) and Muller and Suess (1979). This northern oceanic ice-covered environment, with multiple influxes of terrigenous debris, that mixed with planktonic productivity is much more complex than the more southerly environment observed by those scientists. For this reason, no simple correlation between isotopic signatures and ice stages can be seen. Isotope compositions are a dynamic response of the system to numerous changes in the water column or to influxes, and in this complex environment, are evidence of how variable that system is. The low, constant production of organic matter also indicates that, while variations in total foraminifers or dinocysts can be observed, these organisms represent only a portion of the total organisms available to the organic pool entering the sediment; in fact, they most likely are the more refractory representatives of those influxes.

Site 647 is quite similar to Site 646 in that overall low-level influx and preservation could be seen from the Oligocene to the present. The organic signatures co-vary, which indicates small-scale changes in influxes. These changes correlate significantly with nitrogen isotopic signatures. With increasing primary production and the use of nitrate, more organic matter can be produced having a more enriched signature (toward full utilization of the nitrate and intense recycling). The organic matter content again correlates negatively with the carbon signature, probably an effect of growth rate or of changing populations. Finally, the isotopic signatures of both carbon and nitrogen have a significant negative correlation, which indicates that at this offshore location the major influences throughout the history of the site have been changes that depended upon marine plankton/productivity with little influence, if any, from ice-rafted and terrigenous debris. Such debris (in the form of pollen, etc.) is of minor importance to the overall organic influx at this site.

CONCLUSIONS

These preliminary data on the organic compositions and analyses of carbon and nitrogen isotopic compositions of sediments from Baffin Bay and the Labrador Sea indicate the following:

1. Baffin Bay experienced large-scale changes in total productivity with the establishment of continuous water circulation from the Arctic. These changes had little overall effect on the

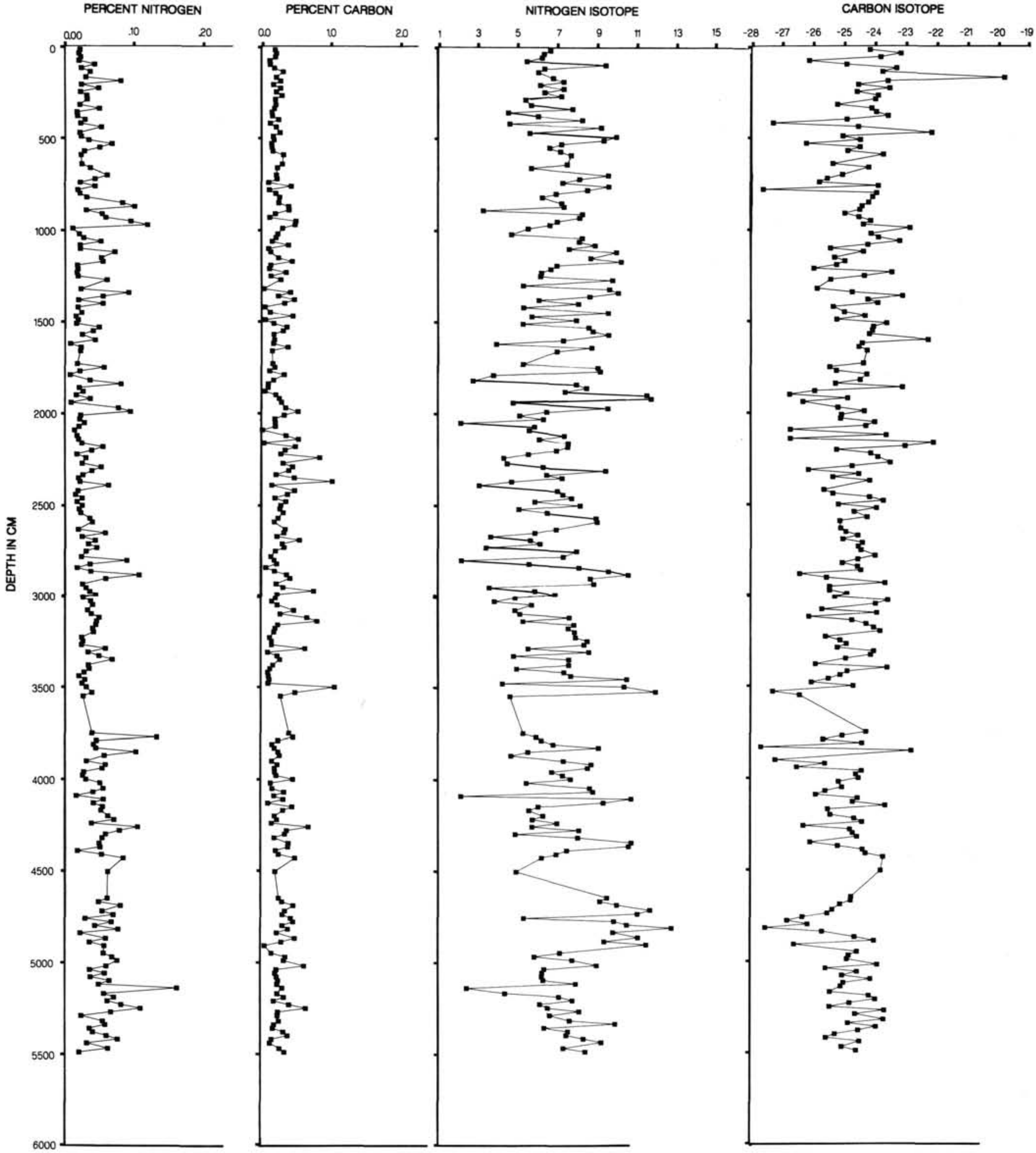

Figure 16. Percentage of nitrogen and carbon and nitrogen and carbon isotopes vs. depth for Hole 647B high-resolution samples.

more southerly Labrador Sea, which experienced relatively constant influxes.

2. Isotopic signatures in the Labrador Sea and Baffin Bay are strongly influenced by a combination of terrigenous and ice-rafted debris and by a rapidly changing planktonic signature affected by growth rates, nutrients, species, and temperature, which cause rapidly fluctuating compositions.

3. No simple relationship between the ice stages and the organic matter content or isotopic signatures was apparent in this complex system. The organic matter is the result of a dynamic

response to a multitude of factors in this location. A better understanding of the relationships between isotopic fractionations and those factors is needed.

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APPENDIX
Organic Geochemical Results, Leg 105

Core and section	Sample interval (cm)	$\delta^{15}N$	$\delta^{13}C$	N (%)	C (%)
645A-1H-1	2–3	9.44	−21.09	0.06	0.49
645B-1X-1	18–19	6.40	−24.64	0.01	0.13
1X-1	39–40	8.87	−24.52	0.02	0.24
1X-1	50–53	7.27	−25.49	0.03	0.12
1X-1	62–63	4.23	−26.35	0.01	0.20
1X-1	80–81	6.83	−23.46	0.02	0.25
1X-1	100–101	6.79	−25.99	0.16	0.22
1X-1	117–118	4.97	−23.66	0.03	0.38
1X-1	139–140	7.42	−23.18	0.03	0.32
1X-2	3–4	4.98	−23.11	0.02	0.16
1X-2	20–21	7.15	−23.80	0.02	0.20
1X-2	39–40	3.61	−25.05	0.02	0.15
1X-2	50–53	5.19	−22.69	0.02	0.15
1X-2	62–63	4.26	−23.20	0.02	0.25
1X-2	80–81	6.97	−26.81	0.01	0.08
1X-2	99–100	5.93	−25.17	0.02	0.20
1X-2	119–120	7.63	−26.99	0.03	0.20
1X-2	136–137	8.23	−23.73	0.04	0.12
1X-3	50–53	5.08	−21.62	0.01	0.12
2X-1	31–34	6.87	−21.96	0.03	0.27
2X-2	30–31	5.97	−26.02	0.03	0.33
2X-2	52–55	4.90	−24.89	0.01	0.09
2X-2	60–61	8.89	−25.43	0.06	0.35
2X-2	80–81	4.49	−25.29	0.02	0.31
2X-2	96–97	4.98	−23.67	0.07	0.77
2X-2	119–120	8.26	−23.92	0.04	0.29
2X-2	140–141	8.94	−24.55	0.02	0.12
2X-3	3–4	5.39	−25.43	0.02	0.38
2X-3	20–21	5.44	−25.48	0.02	0.36
2X-3	40–41	5.66	−26.07	0.01	0.19
2X-3	53–56	4.16	−25.75	0.02	0.13
2X-3	62–63	4.53	−25.63	0.02	0.44
2X-3	79–80	4.38	−26.34	0.02	0.17
2X-3	99–100	5.33	−25.83	0.02	0.40
2X-3	118–119	5.11	−26.79	0.01	0.11
2X-4	20–21	4.65	−25.71	0.01	0.39
2X-4	41–42	10.54	−25.65	0.02	0.46
2X-4	51–53	3.81	−23.25	0.02	0.09
3X-1	40–43	5.47	−24.89	0.02	0.09
3X-2	40–43	5.08	−26.08	0.03	0.22
3X-3	40–43	5.26	−25.14	0.04	0.49
4X-1	10–16	5.81	−24.34	0.05	0.14
4X-1	40–46	5.15	−25.74	0.10	0.95
5X-1	20–25	10.66	−22.28	0.08	0.44
5X-1	40–46	8.48	−24.37	0.07	0.32
5X-1	63–68	11.19	−24.19	0.05	0.12
5X-1	79–84	11.39	−25.60	0.05	0.21
5X-1	100–106	7.15	−25.46	0.06	0.38
5X-1	120–126	6.30	−25.54	0.09	0.88
5X-1	141–147	6.32	−23.98	0.06	0.60
5X-2	20–26	6.22	−25.62	0.05	0.44
5X-2	41–46	10.28	−25.50	0.08	0.34
5X-2	62–68	8.20	−25.57	0.08	0.72
5X-2	80–86	8.21	−25.69	0.03	0.47
5X-2	98–104	5.32	−25.39	0.02	0.33
5X-2	117–122	6.59	−25.35	0.06	0.32
5X-2	134–139	8.49	−26.71	0.06	0.40
5X-3	20–26	9.59	−27.66	0.07	0.58
5X-3	46–52	8.11	−25.67	0.07	0.44
5X-3	62–68	8.33	−25.46	0.08	0.43
5X-3	80–86	11.47	−26.49	0.06	0.48
5X-3	94–99	7.60	−25.20	0.03	0.26
5X-4	8–14	7.20	−25.12	0.06	0.38
6X-1	12–17	6.47	−23.45	0.05	0.98
6X-1	42–48	7.07	−25.68	0.06	0.38
6X-1	61–67	7.90	−26.79	0.03	0.35
6X-1	85–90	7.33	−24.32	0.08	0.50
9X-1	27–30	6.32	−24.97	0.02	0.18
9X-2	27–30	4.77	−24.24	0.01	0.22
9X-3	71–74	5.27	−21.35	0.02	0.08
10X-1	39–44	4.49	−25.55	0.04	0.69
10X-2	6–12	5.77	−25.77	0.03	0.52
10X-3	22–27	9.94	−27.02	0.01	0.51
11X-1	43–48	4.16	−24.71	0.03	0.24
11X-2	43–48	8.84	−24.28	0.05	0.19
11X-3	42–47	6.85	−25.50	0.02	0.20

Appendix (continued).

Core and section	Sample interval (cm)	$\delta^{15}N$	$\delta^{13}C$	N (%)	C (%)
13X-1	96–102	4.72	−25.54	0.03	0.50
13X-2	82–87	5.31	−24.83	0.03	0.19
13X-3	17–23	9.69	−24.75	0.03	0.17
13X-4	46–51	6.41	−25.50	0.06	0.99
14X-1	31–37	4.78	−25.24	0.02	0.23
14X-2	38–44	6.11	−25.64	0.03	0.22
14X-3	25–31	3.66	−24.63	0.03	0.20
14X-4	2–8	8.06	−25.26	0.07	0.32
15X-1	30–36	4.72	−26.44	0.05	0.92
17X-1	38–42	4.35	−25.36	0.03	0.45
17X-2	38–42	4.23	−25.61	0.08	1.48
17X-3	18–22	5.94	−26.19	0.05	0.84
17X-4	38–42	4.64	−20.93	0.05	0.89
18X-1	50–54	8.50	−25.70	0.05	0.21
19X-1	40–45	4.00	−25.93	0.07	0.76
19X-2	40–45	5.29	−25.77	0.12	0.48
19X-3	38–43	4.47	−25.64	0.03	0.57
19X-4	38–43	4.71	−25.58	0.07	0.47
19X-5	39–44	5.28	−25.52	0.05	0.45
19X-6	29–35	4.91	−25.52	0.06	0.44
20X-1	21–28	4.55	−25.20	0.06	0.48
20X-2	19–24	4.64	−25.42	0.06	0.49
20X-3	19–24	4.65	−25.23	0.07	0.79
20X-4	19–24	4.14	−25.66	0.11	0.81
21X-1	65–70	7.07	−24.88	0.04	0.32
21X-2	65–70	4.88	−25.33	0.05	0.17
21X-3	65–70	3.84	−26.56	0.07	0.54
21X-4	65–70	4.26	−25.94	0.09	1.07
21X-5	65–70	3.66	−25.84	0.06	0.58
21X-6	65–70	3.92	−25.80	0.13	1.07
21X-7	15–20	5.00	−25.55	0.08	0.68
22X-1	118–123	5.13	−26.47	0.04	0.58
22X-2	118–123	5.08	−25.13	0.06	1.01
22X-3	118–123	4.61	−25.03	0.03	0.33
22X-4	118–123	5.50	−25.05	0.08	1.15
22X-5	118–123	5.01	−25.24	0.09	1.33
22X-6	118–123	5.47	−23.96	0.02	0.18
23X-1	29–35	8.10	−25.12	0.05	0.79
23X-2	29–35	6.31	−25.97	0.06	0.41
23X-3	29–35	5.43	−25.72	0.04	0.31
23X-4	29–35	5.61	−24.80	0.07	1.08
23X-5	29–34	5.03	−24.89	0.05	0.66
23X-6	27–32	6.03	−25.69	0.04	0.33
24X-1	24–29	4.04	−24.62	0.01	0.54
24X-2	24–29	4.07	−24.66	0.05	0.62
24X-3	24–29	4.91	−25.10	0.05	0.60
24X-4	24–29	4.91	−24.69	0.04	0.50
24X-5	24–29	5.33	−24.18	0.06	0.92
24X-6	6–11	4.94	−24.18	0.04	0.35
26X-1	56–61	5.39	−24.90	0.06	0.59
26X-2	62–67	6.53	−24.18	0.14	0.72
26X-3	57–62	5.27	−24.62	0.06	0.41
26X-4	44–49	3.66	−25.04	0.06	0.62
26X-5	114–119	5.57	−25.03	0.06	0.79
26X-6	31–36	5.69	−24.01	0.05	0.38
26X-7	37–41	6.59	−24.27	0.04	0.56
27X-1	48–53	6.17	−24.27	0.04	0.75
27X-2	48–53	4.78	−24.67	0.06	0.79
27X-3	48–53	5.51	−25.19	0.05	0.68
27X-4	48–53	5.59	−25.28	0.06	0.88
27X-5	48–53	5.26	−24.53	0.06	0.85
27X-6	48–53	4.72	−25.22	0.06	0.78
28X-1	55–60	5.86	−24.59	0.05	0.63
28X-2	55–60	4.99	−24.60	0.06	0.69
28X-3	41–46	5.37	−24.61	0.07	0.64
28X-4	41–46	5.81	−25.45	0.05	0.60
29X-1	45–51	5.03	−25.03	0.07	0.90
29X-2	21–26	4.16	−24.49	0.04	0.54
29X-3	41–46	5.74	−24.66	0.05	0.54
29X-4	39–44	5.38	−24.86	0.06	0.50
29X-5	38–43	4.70	−25.66	0.04	0.52
29X-6	5–10	5.45	−25.19	0.06	0.87
30X-1	42–46	4.97	−24.24	0.06	0.69
30X-2	20–24	3.00	−23.28	0.12	0.77
30X-3	131–135	4.94	−24.32	0.04	0.44
30X-4	32–37	5.68	−24.50	0.06	0.59
30X-5	34–39	4.44	−24.69	0.06	0.48
30X-6	34–39	4.69	−24.76	0.04	0.82

Appendix (continued).

Core and section	Sample interval (cm)	$\delta^{15}N$	$\delta^{13}C$	N (%)	C (%)
645B-30X-7	30–35	5.30	−24.08	0.06	0.86
31X-1	40–45	7.37	−24.68	0.03	0.14
31X-2	40–45	4.53	−24.95	0.03	0.19
31X-3	40–45	6.36	−25.80	0.04	0.24
31X-4	40–45	5.57	−25.15	0.04	0.35
31X-5	40–45	6.71	−25.31	0.03	0.18
31X-6	40–45	5.33	−25.13	0.06	0.21
32X-1	105–110	5.24	−24.60	0.03	0.15
32X-3	105–110	5.64	−25.36	0.04	0.24
32X-4	105–110	5.33	−24.83	0.04	0.21
32X-5	105–110	3.43	−24.93	0.08	0.71
32X-6	105–110	4.75	−25.02	0.05	0.38
645C-3H-3	110–111	4.31	−25.63	0.04	0.86
3H-3	132–133	3.60	−24.98	0.02	0.28
3H-4	3–4	5.62	−25.46	0.03	0.42
3H-4	21–22	5.15	−25.62	0.02	0.28
3H-4	38–39	6.60	−24.72	0.02	0.33
3H-5	10–11	6.37	−24.22	0.02	0.35
3H-5	32–33	5.87	−27.23	0.01	0.24
3H-5	50–51	6.31	−26.44	0.01	0.20
3H-5	94–59	4.52	−24.42	0.03	0.54
645D-1R-1	69–74	6.50	−24.68	0.12	0.49
1R-2	69–74	4.87	−25.42	0.04	0.55
1R-3	69–74	3.32	−23.98	0.06	0.57
1R-4	69–74	5.86	−24.50	0.05	0.45
2R-1	36–41	5.80	−24.75	0.04	0.55
2R-2	36–41	4.50	−25.31	0.07	1.07
2R-3	33–38	6.81	−24.80	0.11	0.62
2R-4	36–41	5.19	−23.75	0.07	0.69
2R-5	36–41	5.21	−24.96	0.06	0.59
2R-6	36–41	5.21	−23.36	0.06	0.64
8R-1	42–47	4.90	−23.84	0.05	1.18
8R-2	42–47	5.82	−24.02	0.08	0.60
8R-3	42–47	5.68	−25.43	0.05	0.60
9R-1	49–54	5.08	−24.84	0.06	0.58
9R-2	50–55	4.08	−24.83	0.12	1.14
9R-3	48–52	5.05	−24.72	0.10	1.17
9R-4	47–52	5.01	−24.04	0.10	1.07
9R-5	45–50	4.56	−24.54	0.05	0.60
9R-6	45–50	4.51	−24.61	0.07	0.67
10R-1	20–25	5.00	−24.69	0.04	0.52
10R-2	20–25	5.41	−23.12	0.06	0.72
10R-3	20–25	4.91	−23.46	0.05	0.93
10R-4	20–25	5.06	−25.56	0.01	0.27
11R-1	35–40	5.76	−25.10	0.05	0.52
11R-2	35–40	4.84	−24.30	0.08	0.45
11R-3	35–40	4.45	−24.82	0.07	0.78
11R-4	35–40	5.05	−23.31	0.05	0.45
11R-5	35–40	4.97	−23.71	0.13	1.18
11R-6	35–40	5.37	−23.63	0.07	0.64
11R-7	35–40	4.00	−24.39	0.08	1.20
12R-1	10–15	4.57	−24.19	0.08	0.98
12R-2	10–15	4.77	−23.88	0.06	0.77
13R-1	72–77	5.19	−23.72	0.07	0.62
13R-2	72–77	4.98	−23.41	0.07	0.72
13R-3	72–77	6.70	−23.60	0.09	1.02
13R-4	72–77	4.70	−25.41	0.10	0.93
13R-5	72–77	4.79	−27.37	0.09	0.95
13R-6	72–77	5.24	−24.10	0.09	0.78
14R-1	30–35	5.18	−24.31	0.10	0.71
14R-2	30–35	5.72	−24.34	0.10	1.13
14R-3	30–35	4.94	−25.17	0.10	0.90
14R-4	30–35	4.34	−24.40	0.08	1.04
14R-5	30–35	4.86	−24.24	0.07	1.59
15R-1	37–42	5.95	−24.97	0.09	0.83
15R-2	37–42	5.48	−25.11	0.12	1.02
15R-3	37–42	5.66	−24.69	0.17	0.73
15R-4	37–42	5.92	−24.82	0.18	0.82
15R-5	37–42	4.40	−24.93	0.08	0.93
15R-6	37–42	4.57	−24.35	0.11	1.27
16R-1	46–51	4.06	−24.44	0.15	0.87
16R-2	47–52	5.20	−25.27	0.09	1.12
16R-3	46–51	5.07	−25.25	0.10	1.80
17R-1	39–44	4.30	−24.85	0.04	0.38
17R-2	39–44	5.58	−26.26	0.11	1.49
17R-3	38–43	5.24	−24.64	0.09	0.88
17R-4	37–42	5.15	−25.59	0.11	1.05

Appendix (continued).

Core and section	Sample interval (cm)	$\delta^{15}N$	$\delta^{13}C$	N (%)	C (%)
645D-17R-5	37–42	5.11	−24.93	0.10	0.96
17R-7	35–40	5.28	−25.32	0.15	1.00
18R-1	38–44	5.35	−24.30	0.05	0.32
18R-2	38–44	5.09	−24.82	0.06	0.55
18R-3	38–44	5.25	−23.84	0.09	1.23
19R-1	37–42	4.68	−25.08	0.09	0.85
19R-2	37–42	4.91	−24.63	0.11	1.10
19R-3	33–39	5.39	−24.84	0.06	0.70
19R-4	35–40	4.73	−25.39	0.07	0.59
19R-5	37–42	5.28	−24.94	0.09	0.93
19R-6	37–42	5.58	−24.84	0.08	0.68
20R-1	24–29	4.88	−24.76	0.09	0.89
20R-2	11–16	5.02	−21.57	0.10	1.16
20R-3	13–18	3.59	−25.19	0.04	0.87
20R-4	19–20	4.28	−24.93	0.12	0.78
20R-5	22–27	5.07	−24.20	0.07	0.60
20R-6	16–21	4.14	−24.37	0.06	0.54
645E-2R-1	14–20	5.49	−24.76	0.05	0.58
4R-1	60–65	5.38	−24.62	0.08	0.88
4R-2	23–28	2.81	−24.84	0.11	0.68
4R-3	23–28	1.86	−24.69	0.08	0.78
4R-4	4–9	5.12	−25.33	0.08	0.84
6R-1	93–98	4.59	−24.22	0.08	0.91
6R-2	73–78	5.03	−25.25	0.07	0.82
6R-3	88–93	6.49	−24.62	0.10	1.39
6R-4	91–96	5.45	−25.17	0.13	1.44
6R-5	41–46	5.58	−25.29	0.08	0.68
6R-6	19–24	5.00	−25.75	0.20	1.24
7R-1	40–45	4.48	−25.51	0.37	0.70
7R-2	40–45	3.37	−25.70	0.37	0.78
7R-3	40–45	5.40	−24.62	0.14	1.42
7R-4	40–45	5.44	−24.05	0.22	1.34
7R-5	41–45	5.18	−24.29	0.13	1.37
8R-1	59–64	4.80	−23.97	0.13	1.79
8R-2	58–62	4.58	−24.38	0.08	0.76
8R-3	68–73	4.70	−24.81	0.10	0.88
8R-4	67–72	3.03	−25.31	0.09	0.84
8R-5	60–65	4.36	−23.93	0.11	1.64
8R-6	61–66	4.44	−23.83	0.15	1.96
9R-1	59–64	4.40	−23.73	0.06	0.94
9R-2	59–64	4.15	−24.19	0.12	1.61
9R-3	59–64	4.43	−24.21	0.08	0.90
9R-4	59–64	3.45	−24.78	0.09	0.90
9R-5	59–64	4.42	−23.34	0.09	1.07
9R-6	59–64	4.65	−23.25	0.11	1.50
10R-1	52–56	5.06	−25.34	0.07	0.59
10R-2	53–57	5.39	−25.54	0.10	0.95
10R-3	52–56	4.66	−25.01	0.08	1.36
11R-1	25–28	4.71	−24.85	0.09	0.84
11R-2	25–28	5.16	−24.64	0.08	0.68
11R-3	25–28	4.63	−25.61	0.09	1.22
11R-4	25–28	4.60	−24.77	0.10	1.19
11R-5	25–28	5.36	−24.48	0.09	1.21
11R-6	25–28	5.07	−24.49	0.09	0.82
12R-1	61–65	5.26	−24.84	0.19	1.02
12R-2	61–65	4.51	−23.81	0.07	0.94
12R-3	61–65	3.36	−24.96	0.11	0.86
12R-4	61–65	4.58	−24.43	0.08	0.69
12R-5	61–65	4.44	−23.73	0.07	0.94
13R-1	49–54	6.88	−25.10	0.05	0.63
13R-2	49–54	5.92	−24.75	0.12	0.89
13R-3	49–54	5.08	−23.56	0.02	0.43
13R-4	49–54	5.11	−25.40	0.11	0.52
13R-5	49–54	4.90	−24.31	0.13	2.03
13R-6	49–54	5.31	−25.01	0.08	0.95
14R-1	30–35	4.97	−24.10	0.16	0.89
14R-2	30–35	4.05	−24.62	0.08	0.99
14R-3	30–35	5.35	−24.87	0.14	0.87
14R-4	49–54	4.49	−24.16	0.09	0.67
14R-5	36–42	4.91	−24.69	0.09	1.22
14R-6	36–42	6.00	−24.10	0.22	1.39
14R-7	36–42	4.31	−24.05	0.08	1.04
15R-1	30–35	4.49	−24.78	0.08	0.80
15R-2	30–35	4.57	−24.89	0.04	0.43
15R-3	30–35	4.95	−25.20	0.10	0.98
15R-4	30–35	5.19	−25.31	0.15	1.70
15R-5	30–35	4.68	−24.71	0.11	1.28

Appendix (continued).

Core and section	Sample interval (cm)	$\delta^{15}N$	$\delta^{13}C$	N (%)	C (%)
645E-15R-6	30–35	4.41	−21.53	0.24	1.46
16R-2	38–42	4.49	−23.74	0.05	0.66
16R-4	87–92	5.54	−23.14	0.13	1.14
16R-7	52–57	4.48	−25.19	0.09	1.28
17R-1	33–38	5.64	−19.11	0.32	2.19
17R-2	34–38	4.63	−24.41	0.19	0.87
17R-3	34–39	5.23	−24.49	0.09	1.06
17R-4	34–38	4.48	−23.54	0.11	2.42
17R-5	34–39	4.43	−23.05	0.14	1.52
17R-6	34–38	4.86	−23.75	0.12	1.21
18R-1	31–36	3.45	−24.21	0.26	1.01
19R-1	50–55	3.45	−24.13	0.27	0.83
19R-2	54–59	4.44	−23.04	0.07	0.90
19R-3	49–54	4.63	−24.82	0.06	0.58
19R-4	49–54	4.85	−24.77	0.07	0.78
19R-5	51–56	4.43	−24.25	0.08	0.57
20R-1	40–45	4.79	−23.94	0.10	1.02
20R-2	40–45	3.78	−24.57	0.03	0.33
20R-3	40–45	4.28	−24.69	0.11	0.96
21R-1	55–60	5.21	−23.86	0.08	0.81
22R-1	57–62	6.06	−24.93	0.11	0.76
22R-2	56–61	5.51	−24.53	0.12	0.75
23R-1	22–27	4.49	−24.22	0.07	0.49
23R-2	22–27	3.71	−24.74	0.06	0.89
23R-3	22–27	4.54	−23.44	0.05	0.50
24R-1	26–31	4.57	−24.06	0.10	1.27
24R-2	26–31	4.39	−23.50	0.06	0.61
25R-1	38–43	5.47	−23.72	0.17	0.70
25R-2	38–43	5.80	−23.13	0.18	0.73
26R-1	98–102	1.84	−24.50	0.11	0.69
26R-2	98–102	5.88	−23.28	0.03	0.16
26R-3	98–102	4.75	−24.16	0.11	1.09
27R-1	83–87	4.89	−24.45	0.11	0.93
27R-2	80–84	4.69	−23.50	0.07	0.71
27R-3	81–85	4.64	−24.42	0.10	1.22
27R-4	81–85	4.56	−24.63	0.09	1.90
27R-5	81–85	4.69	−23.63	0.11	1.72
27R-6	80–84	4.87	−25.07	0.15	1.02
28R-1	53–57	4.24	−24.84	0.07	0.78
28R-2	53–57	4.84	−23.97	0.06	0.63
29R-1	28–32	4.50	−25.24	0.15	1.10
29R-2	30–34	4.80	−25.09	0.11	1.17
29R-3	30–34	4.66	−26.02	0.07	1.16
29R-4	30–34	4.64	−24.57	0.08	0.78
29R-5	30–34	4.52	−23.81	0.11	1.35
29R-6	30–34	4.82	−24.08	0.06	0.36
30R-1	66–70	4.67	−24.56	0.09	0.75
30R-2	32–36	4.90	−24.83	0.10	1.30
32R-1	47–51	4.53	−24.78	0.09	1.02
32R-2	47–51	4.94	−25.19	0.11	1.07
32R-3	47–51	4.61	−24.66	0.08	1.05
32R-4	47–51	3.92	−24.35	0.10	0.62
33R-1	44–48	5.05	−24.92	0.10	0.94
33R-2	44–48	5.62	−23.97	0.07	0.87
33R-3	44–48	4.92	−24.94	0.08	0.86
33R-4	44–48	5.16	−25.24	0.08	1.07
33R-5	44–48	5.50	−24.09	0.08	0.93
33R-6	44–48	5.57	−26.01	0.09	0.93
35R-1	44–48	2.98	−24.78	0.14	0.93
35R-2	43–47	4.70	−25.08	0.07	1.28
35R-3	44–48	7.97	−24.04	0.22	0.92
35R-4	43–47	5.33	−24.52	0.10	1.51
36R-1	20–26	5.71	−24.09	0.23	1.57
36R-2	20–26	6.44	−23.42	0.17	1.04
37R-1	25–30	4.52	−24.34	0.08	1.01
37R-2	20–23	5.02	−24.56	0.08	0.64
37R-3	20–25	5.75	−24.75	0.12	1.58
37R-4	20–25	4.63	−23.91	0.08	1.68
37R-5	20–25	5.72	−24.05	0.11	1.15
37R-6	20–25	5.01	−24.12	0.24	1.41
38R-1	98–103	4.59	−23.94	0.08	0.64
38R-2	98–103	4.64	−24.57	0.09	1.11
38R-3	98–103	5.35	−24.24	0.11	1.21
38R-4	98–103	4.95	−24.60	0.08	0.72
38R-5	98–103	4.79	−24.16	0.08	0.74
38R-6	98–103	5.01	−24.12	0.08	0.89
39R-1	84–87	4.93	−24.74	0.06	0.57
39R-2	84–87	5.17	−24.93	0.11	0.64

Appendix (continued).

Core and section	Sample interval (cm)	$\delta^{15}N$	$\delta^{13}C$	N (%)	C (%)
645E-39R-3	84–87	4.29	−25.12	0.09	0.84
39R-4	84–88	4.18	−24.92	0.12	1.10
39R-5	42–45	5.12	−24.81	0.11	1.11
40R-1	65–70	5.11	−23.63	0.13	2.03
40R-2	65–70	4.90	−24.73	0.13	1.70
40R-3	65–70	4.41	−24.29	0.14	1.29
40R-4	65–70	4.98	−24.10	0.05	1.07
40R-5	65–70	5.05	−25.01	0.11	1.20
40R-6	65–70	5.11	−24.71	0.11	1.60
41R-1	28–30	4.80	−24.12	0.09	1.89
41R-2	28–30	5.67	−23.65	0.11	2.50
41R-3	28–30	5.77	−24.51	0.14	1.69
41R-4	28–30	5.33	−23.60	0.10	1.49
41R-5	28–30	5.61	−24.09	0.11	1.92
41R-6	28–30	6.27	−24.11	0.15	1.78
42R-1	67–71	4.76	−23.87	0.10	1.42
42R-2	67–71	5.07	−24.14	0.11	1.11
42R-3	67–71	4.93	−23.99	0.10	0.90
42R-4	67–71	5.63	−24.31	0.08	0.80
42R-5	67–71	5.82	−24.65	0.21	0.91
42R-6	67–71	5.59	−25.34	0.11	1.06
43R-1	20–24	4.98	−23.89	0.15	1.59
43R-2	20–24	4.08	−23.74	0.14	3.18
43R-3	20–24	5.01	−23.98	0.11	1.47
43R-4	20–24	5.47	−24.08	0.15	2.38
43R-5	18–22	5.47	−23.63	0.15	1.37
43R-6	16–20	5.17	−23.79	0.06	1.64
43R-7	18–22	6.05	−24.54	0.07	2.12
44R-1	37–41	4.19	−23.96	0.10	1.41
44R-2	37–41	4.85	−24.10	0.16	2.09
44R-3	37–41	5.28	−24.13	0.04	0.95
44R-4	37–41	4.52	−24.70	0.07	1.47
44R-5	37–41	5.28	−24.50	0.13	2.23
44R-6	37–41	5.18	−24.10	0.13	1.71
45R-1	28–32	4.60	−24.25	0.10	1.61
45R-2	28–32	4.74	−23.80	0.11	1.36
45R-3	28–32	5.05	−24.28	0.12	1.73
45R-4	28–32	4.72	−24.73	0.16	2.03
45R-5	28–32	4.87	−23.81	0.10	1.22
46R-1	25–29	4.83	−24.43	0.10	1.30
46R-2	25–29	6.66	−23.85	0.28	1.47
46R-3	25–29	5.31	−24.55	0.09	1.25
46R-4	25–29	4.72	−25.09	0.12	1.48
48R-1	25–30	5.64	−24.02	0.17	1.00
48R-2	25–30	4.88	−24.31	0.08	1.08
48R-3	25–30	4.45	−24.46	0.08	0.96
48R-4	25–30	4.87	−24.13	0.07	0.65
49R-1	48–53	4.91	−23.66	0.09	1.46
49R-2	47–52	4.92	−23.23	0.09	1.13
49R-3	48–53	4.62	−23.76	0.08	0.91
49R-4	48–53	4.79	−24.42	0.17	1.89
49R-5	48–53	4.89	−24.49	0.16	2.47
49R-6	48–53	5.42	−23.30	0.09	1.58
50R-1	21–26	6.24	−24.08	0.15	1.83
50R-2	20–25	5.27	−26.01	0.13	2.39
50R-3	19–24	5.19	−23.90	0.13	3.77
50R-4	59–64	5.21	−24.06	0.07	1.51
50R-5	17–22	5.19	−24.33	0.13	2.28
51R-1	17–22	5.23	−23.99	0.13	1.99
51R-2	21–26	5.54	−23.71	0.13	2.04
52R-1	43–47	4.36	−24.88	0.11	2.59
52R-2	43–47	5.11	−25.63	0.15	2.40
52R-3	43–47	5.21	−24.39	0.11	2.63
52R-4	43–47	3.20	−23.79	0.14	1.01
52R-5	43–47	3.69	−23.33	0.20	2.71
53R-1	47–51	4.72	−23.63	0.08	1.03
53R-2	47–51	4.38	−24.30	0.12	1.33
53R-3	47–51	5.19	−23.38	0.11	1.70
53R-4	47–51	5.15	−23.20	0.11	2.06
53R-5	47–51	5.15	−24.09	0.11	3.20
53R-6	47–51	4.74	−23.61	0.08	1.07
54R-1	58–62	4.94	−23.50	0.14	1.57
54R-2	58–62	4.93	−24.49	0.18	2.15
54R-3	58–62	5.21	−24.24	0.13	2.24
54R-4	58–62	4.78	−23.35	0.11	1.25
54R-5	58–62	5.08	−23.33	0.12	1.82
54R-6	58–62	5.09	−23.42	0.11	1.91
55R-1	61–65	5.17	−23.41	0.12	1.55

Appendix (continued).

Core and section	Sample interval (cm)	$\delta^{15}N$	$\delta^{13}C$	N (%)	C (%)
645E-55R-2	61–65	4.32	−23.90	0.13	2.30
55R-3	61–65	5.71	−24.59	0.14	2.75
55R-4	62–66	5.03	−23.36	0.10	1.46
55R-5	62–66	4.45	−24.34	0.14	2.01
55R-6	61–66	4.90	−23.76	0.07	1.04
55R-7	61–66	4.73	−23.48	0.07	0.84
56R-1	24–28	4.72	−24.26	0.08	1.18
56R-2	24–28	3.89	−24.54	0.26	0.88
56R-3	24–28	5.76	−24.54	0.15	0.92
56R-4	24–28	3.03	−24.41	0.06	1.64
56R-5	24–28	4.52	−23.63	0.14	1.43
56R-6	24–48	4.77	−23.65	0.08	1.41
57R-1	38–43	3.95	−24.13	0.10	1.68
57R-2	38–43	4.34	−24.05	0.10	1.11
57R-3	38–43	4.90	−24.08	0.11	1.46
57R-4	38–43	5.84	−23.99	0.18	1.48
57R-5	38–43	4.36	−24.37	0.10	1.13
57R-6	38–43	5.03	−23.93	0.09	1.49
58R-1	34–39	5.50	−24.37	0.24	1.87
58R-2	33–37	4.96	−24.37	0.09	1.18
58R-3	32–36	5.06	−24.40	0.12	2.22
58R-4	29–33	5.27	−23.76	0.11	1.83
58R-5	29–33	5.17	−23.83	0.12	2.15
59R-1	15–20	4.84	−24.02	0.07	2.51
59R-2	15–20	5.42	−23.61	0.11	1.09
59R-3	15–20	4.85	−23.59	0.10	1.55
59R-4	15–20	5.01	−23.83	0.10	1.93
59R-5	15–20	5.22	−24.23	0.13	1.89
59R-6	15–20	4.92	−23.77	0.11	1.54
60R-1	15–18	4.76	−23.67	0.15	2.63
60R-2	15–18	4.94	−23.56	0.11	1.70
60R-3	113–116	4.06	−23.70	0.10	1.68
60R-4	15–18	4.36	−23.49	0.10	1.50
60R-5	16–19	5.10	−23.57	0.11	1.98
60R-6	58–61	4.84	−23.76	0.10	1.61
61R-1	79–83	4.54	−24.30	0.11	1.37
61R-2	79–83	6.73	−24.19	0.12	1.74
61R-3	79–83	5.10	−23.88	0.09	0.73
61R-4	79–83	3.15	−23.92	0.08	1.47
61R-5	79–83	4.46	−23.95	0.08	1.22
61R-6	79–83	4.55	−23.85	0.08	1.57
62R-1	28–32	4.68	−24.25	0.10	1.34
62R-2	28–32	5.28	−24.05	0.17	1.49
62R-3	25–29	2.56	−23.89	0.09	1.54
62R-4	28–32	6.93	−24.23	0.09	0.91
62R-5	28–32	5.64	−24.31	0.17	0.95
63R-1	29–33	4.66	−23.68	0.07	0.92
63R-2	29–33	5.08	−24.18	0.09	1.33
63R-3	29–33	3.53	−23.88	0.06	0.83
63R-4	29–33	4.50	−23.68	0.06	1.07
63R-5	29–33	4.62	−24.99	0.07	1.13
63R-6	29–33	4.99	−23.82	0.14	2.35
64R-1	28–32	4.75	−23.27	0.08	1.21
64R-2	28–32	4.81	−23.96	0.10	1.20
64R-3	28–32	6.27	−23.54	0.16	1.37
64R-4	28–32	5.03	−23.69	0.16	0.89
64R-5	28–32	4.15	−23.83	0.07	0.93
65R-1	25–30	4.80	−23.77	0.09	1.18
65R-2	25–30	4.78	−23.97	0.09	1.17
65R-3	25–30	4.67	−23.99	0.07	0.74
65R-4	25–30	4.97	−24.31	0.11	1.18
65R-5	25–30	4.56	−24.20	0.07	1.20
65R-6	25–30	5.88	−23.92	0.11	0.78
65R-7	25–30	4.95	−24.24	0.06	0.96
66R-1	32–34	4.36	−24.24	0.08	1.10
66R-2	32–36	4.37	−24.77	0.03	2.42
66R-3	32–36	4.27	−23.86	0.06	0.80
66R-4	32–36	4.48	−23.91	0.07	0.85
66R-5	27–29	5.63	−24.00	0.25	2.60
66R-6	40–44	4.31	−24.46	0.12	2.16
67R-1	22–27	2.77	−24.16	0.08	1.48
67R-2	22–27	4.41	−23.47	0.06	0.93
67R-3	23–28	4.28	−23.95	0.13	1.78
67R-4	18–23	5.25	−23.98	0.24	1.53
67R-5	20–25	3.54	−24.89	0.11	1.00
67R-6	20–25	4.93	−23.46	0.26	2.30
68R-1	35–40	4.78	−23.82	0.11	1.52

Appendix (continued).

Core and section	Sample interval (cm)	$\delta^{15}N$	$\delta^{13}C$	N (%)	C (%)
645E-68R-2	35–40	4.83	−23.92	0.08	1.33
68R-3	35–40	4.48	−23.83	0.07	0.93
68R-4	35–40	5.02	−25.62	0.09	1.32
68R-5	35–40	6.00	−24.27	0.11	0.95
68R-6	35–40	4.09	−24.28	0.04	0.77
69R-1	21–26	4.41	−23.75	0.08	1.29
69R-2	24–29	4.33	−25.62	0.09	1.33
69R-3	19–24	4.56	−23.80	0.07	0.98
69R-4	34–39	4.19	−23.80	0.07	0.65
69R-5	59–64	4.85	−23.80	0.11	1.70
69R-6	13–18	4.88	−23.73	0.11	1.89
70R-1	17–22	3.61	−23.07	0.05	0.39
70R-2	19–24	4.12	−23.66	0.09	1.11
70R-4	15–20	4.70	−23.87	0.09	1.21
70R-5	23–28	4.43	−23.76	0.05	1.24
71R-1	16–21	4.37	−24.30	0.06	0.80
71R-2	16–21	4.71	−24.36	0.10	1.90
71R-3	16–21	4.07	−24.56	0.08	1.62
71R-4	23–28	5.22	−23.92	0.21	1.37
72R-1	33–37	3.81	−26.26	0.09	0.94
72R-2	33–37	4.21	−24.34	0.08	0.95
72R-3	34–38	3.54	−23.90	0.08	1.71
72R-4	33–37	4.22	−24.50	0.10	0.94
72R-5	33–37	4.22	−23.89	0.07	0.49
72R-6	33–37	4.22	−24.48	0.10	0.82
73R-1	20–24	4.30	−24.31	0.08	1.24
73R-2	20–24	4.29	−24.21	0.07	0.71
73R-3	20–24	6.02	−23.86	0.15	0.78
73R-4	20–24	4.39	−25.07	0.11	1.69
73R-5	20–24	3.39	−24.95	0.07	0.60
74R-1	44–48	4.86	−24.18	0.08	0.84
74R-2	44–48	4.08	−23.91	0.07	0.56
74R-3	44–48	4.05	−24.15	0.06	0.69
74R-4	44–48	2.32	−24.50	0.18	0.60
74R-5	44–48	3.91	−23.87	0.07	0.35
74R-6	44–48	4.48	−23.85	0.07	0.68
75R-1	48–52	4.63	−24.47	0.13	0.69
75R-2	48–52	4.24	−24.76	0.06	0.43
75R-3	48–52	4.21	−25.20	0.08	0.88
75R-4	48–52	4.42	−24.88	0.08	0.97
76R-1	48–52	4.60	−24.50	0.08	0.96
76R-2	48–52	4.11	−24.18	0.09	0.50
76R-3	48–52	5.45	−25.21	0.17	1.83
76R-4	48–52	3.83	−24.08	0.09	0.69
76R-5	48–52	3.85	−26.04	0.08	0.74
76R-6	48–52	4.50	−25.33	0.13	1.69
77R-1	45–50	4.46	−24.68	0.08	0.70
77R-2	45–50	3.84	−24.62	0.09	0.74
77R-3	45–50	4.74	−24.19	0.07	0.42
77R-4	45–50	6.93	−24.88	0.16	0.80
77R-5	45–50	4.19	−20.83	0.11	0.90
78R-1	29–33	4.40	−24.65	0.11	1.13
78R-2	29–33	4.81	−24.21	0.06	0.64
78R-3	29–33	4.24	−24.31	0.11	0.87
78R-4	29–33	3.62	−24.37	0.05	0.49
78R-5	29–33	4.35	−25.43	0.11	1.66
78R-6	29–33	4.72	−24.88	0.11	1.25
645F-2H-1	9–10	6.17	−25.31	0.04	0.34
2H-1	30–31	4.86	−25.73	0.02	0.36
2H-1	52–53	4.94	−25.19	0.02	0.24
2H-1	70–71	5.77	−22.88	0.02	0.20
2H-1	87–88	6.47	−24.91	0.01	0.35
3H-1	4–5	4.82	−23.09	0.02	0.29
3H-1	21–22	5.05	−25.62	0.02	0.30
3H-1	39–40	4.82	−23.04	0.03	0.41
3H-1	59–60	6.33	−24.20	0.02	0.24
3H-1	80–81	8.28	−25.74	0.03	0.17
3H-1	100–101	4.24	−24.20	0.02	0.38
3H-1	119–120	3.61	−21.03	0.03	0.05
3H-1	142–143	6.37	−24.97	0.02	0.32
3H-2	10–11	7.52	−23.66	0.02	0.12
3H-2	30–31	4.29	−24.70	0.02	0.27
3H-2	50–51	7.17	−26.75	0.02	0.59
3H-2	70–71	4.53	−23.79	0.02	0.93
3H-2	91–93	5.79	−26.28	0.02	1.01
3H-2	110–111	10.69	−24.68	0.03	0.24
3H-2	129–130	4.76	−22.65	0.04	0.61
3H-2	146–147	3.87	−26.71	0.02	0.39

Appendix (continued).

Core and section	Sample interval (cm)	$\delta^{15}N$	$\delta^{13}C$	N (%)	C (%)
645F-3H-3	9–10	3.47	−25.16	0.03	0.89
3H-3	33–34	4.31	−24.15	0.03	0.38
3H-3	50–51	5.63	−25.99	0.02	0.24
3H-3	69–70	8.23	−26.64	0.01	0.51
3H-3	89–90	4.07	−25.51	0.03	0.72
3H-3	109–110	4.77	−26.12	0.06	0.35
3H-3	130–131	5.37	−21.52	0.02	0.68
3H-4	30–31	5.12	−26.74	0.03	0.65
3H-4	52–53	4.54	−24.35	0.03	0.56
3H-4	69–70	5.00	−25.15	0.03	0.45
3H-4	89–90	6.22	−25.52	0.03	0.42
3H-4	114–115	5.01	−25.84	0.04	0.42
3H-5	9–10	4.76	−25.52	0.04	0.97
3H-5	30–31	7.65	−26.39	0.03	0.49
3H-5	50–51	4.91	−26.33	0.05	1.20
3H-5	69–70	4.51	−23.07	0.03	0.31
3H-5	86–87	4.47	−25.55	0.03	0.40
3H-5	109–110	5.99	−26.23	0.02	0.35
3H-5	129–130	7.22	−26.18	0.03	0.32
645G-1H-1	9–10	9.20	−26.52	0.04	0.16
1H-1	28–29	7.44	−24.30	0.02	0.19
1H-1	49–50	8.84	−24.94	0.01	0.11
1H-1	69–70	5.80	−25.54	0.01	0.11
1H-1	93–94	5.28	−25.21	0.01	0.13
1H-2	3–4	6.16	−27.59	0.02	0.33
1H-2	20–21	5.76	−26.38	0.01	0.23
1H-2	40–41	5.13	−25.79	0.01	0.23
1H-2	59–60	4.76	−25.12	0.01	0.20
1H-2	80–81	4.45	−24.86	0.01	0.24
1H-2	99–100	5.54	−23.35	0.02	0.22
1H-2	119–120	7.29	−24.58	0.02	0.30
1H-2	138–139	3.34	−22.29	0.01	0.06
1H-3	3–4	8.63	−24.82	0.03	0.31
1H-3	20–21	7.36	−22.06	0.03	0.26
1H-3	39–40	5.64	−26.45	0.03	0.22
1H-3	59–60	7.10	−26.55	0.02	0.19
1H-3	79–80	6.61	−27.16	0.01	0.28
1H-3	99–100	7.58	−23.19	0.02	0.25
1H-3	120–121	10.03	−25.50	0.04	0.21
1H-4	10–11	5.71	−27.12	0.02	0.45
1H-4	28–29	8.42	−25.39	0.03	0.54
1H-4	48–49	6.31	−27.18	0.03	0.38
1H-4	69–70	5.35	−26.97	0.02	0.18
1H-4	89–90	6.24	−27.54	0.01	0.21
1H-4	109–110	5.39	−25.26	0.01	0.17
1H-4	129–130	3.05	−25.46	0.02	0.11
1H-4	146–147	5.69	−27.22	0.02	0.37
1H-5	3–4	3.60	−26.85	0.01	0.22
1H-5	20–21	7.38	−25.15	0.02	0.19
1H-5	41–42	7.01	−23.03	0.03	0.25
2H-1	58–59	4.42	−27.09	0.02	0.33
2H-1	79–80	4.47	−24.68	0.02	0.35
2H-1	100–101	7.36	−25.67	0.03	0.26
2H-1	120–121	4.84	−25.84	0.02	0.05
2H-1	140–141	7.97	−26.41	0.03	0.27
646A-1H-1	1–6	6.43	−23.03	0.13	0.92
1H-1	15–20	6.36	−25.51	0.03	0.16
1H-1	21–26	8.40	−22.07	0.08	0.37
1H-1	37–42	6.96	−22.00	0.04	0.41
1H-1	58–63	8.43	−23.82	0.04	0.36
1H-1	78–83	8.68	−23.30	0.09	0.34
1H-1	102–107	6.39	−23.92	0.05	0.34
1H-1	118–123	7.52	−24.43	0.03	0.24
1H-1	142–147	7.78	−24.98	0.05	0.32
1H-2	16–21	7.08	−24.48	0.04	0.38
1H-2	21–26	6.61	−22.77	0.03	0.27
1H-2	43–48	6.73	−24.68	0.04	0.24
1H-2	60–65	6.66	−23.78	0.02	0.18
1H-2	77–83	6.86	−23.90	0.03	0.24
1H-2	99–104	5.03	−22.68	0.05	0.18
1H-2	127–132	5.00	−24.55	0.02	0.17
1H-2	145–150	9.04	−23.73	0.03	0.22
1H-3	16–21	3.86	−24.28	0.02	0.19
1H-3	21–26	6.36	−23.43	0.03	0.20
1H-3	39–44	5.81	−27.68	0.03	0.13
1H-3	59–64	6.26	−24.87	0.03	0.30
1H-3	79–84	7.61	−25.45	0.05	0.34
1H-3	98–103	6.45	−23.80	0.05	0.30

Appendix (continued).

Core and section	Sample interval (cm)	$\delta^{15}N$	$\delta^{13}C$	N (%)	C (%)
646A-1H-3	118–123	6.88	−23.26	0.04	0.28
1H-3	129–134	5.53	−24.08	0.04	0.31
1H-4	2–6	7.78	−23.52	0.03	0.28
1H-4	17–23	6.84	−23.58	0.05	0.19
1H-4	37–42	6.33	−24.68	0.02	0.17
2H-1	4–5	5.35	−26.97	0.03	0.09
2H-1	24–25	6.08	−24.60	0.02	0.17
2H-1	44–45	6.02	−24.68	0.03	0.26
2H-1	51–56	6.44	−25.03	0.03	0.23
2H-1	64–65	9.47	−25.04	0.03	0.23
2H-1	87–88	4.72	−24.75	0.03	0.21
2H-1	107–108	6.06	−24.58	0.02	0.24
2H-1	128–129	6.61	−24.70	0.02	0.17
2H-1	144–145	5.52	−23.55	0.03	0.17
2H-2	8–9	5.99	−24.10	0.03	0.24
2H-2	24–25	6.74	−25.13	0.03	0.21
2H-2	44–45	6.48	−23.76	0.01	0.16
2H-2	51–56	6.71	−24.23	0.01	0.21
2H-2	63–64	6.18	−25.30	0.02	0.22
2H-2	89–90	6.10	−24.88	0.02	0.22
2H-2	107–108	4.81	−23.12	0.02	0.12
2H-2	129–130	6.48	−27.38	0.03	0.28
2H-2	144–145	6.40	−23.75	0.02	0.11
2H-3	9–10	6.54	−24.40	0.02	0.15
2H-3	23–24	5.65	−24.71	0.02	0.15
2H-3	41–42	6.31	−23.29	0.02	0.15
2H-3	51–56	6.40	−26.88	0.02	0.30
2H-3	63–65	5.96	−23.33	0.02	0.15
2H-3	90–91	6.13	−27.27	0.04	0.29
2H-3	107–108	9.38	−23.70	0.05	0.15
2H-3	129–130	8.48	−23.46	0.04	0.18
2H-3	146–147	6.46	−23.99	0.02	0.11
2H-4	8–9	5.76	−27.37	0.02	0.24
2H-4	23–24	6.41	−23.83	0.02	0.14
2H-4	40–41	6.69	−23.89	0.02	0.18
2H-4	51–56	6.16	−23.15	0.02	0.19
2H-4	62–63	4.58	−23.01	0.02	0.19
2H-4	87–88	7.19	−25.73	0.03	0.29
2H-4	107–108	7.40	−23.95	0.03	0.26
2H-4	128–129	6.36	−23.53	0.04	0.28
2H-4	146–147	5.55	−23.56	0.03	0.35
2H-5	9–10	6.42	−23.27	0.04	0.29
2H-5	23–24	6.14	−23.34	0.04	0.35
2H-5	40–41	5.91	−22.91	0.04	0.29
2H-5	53–58	7.08		0.05	
2H-5	63–64	5.48	−22.85	0.04	0.29
2H-5	82–83	5.71	−23.50	0.04	0.35
2H-5	103–104	6.72	−25.45	0.01	0.08
2H-6	9–10	6.25	−23.40	0.03	0.27
2H-6	24–25	6.85	−22.96	0.03	0.24
2H-6	41–42	7.53	−23.74	0.03	0.34
2H-6	64–65	7.22	−24.15	0.03	0.22
2H-6	83–84	7.72	−24.07	0.03	0.23
2H-6	98–99	7.71	−23.43	0.03	0.27
2H-6	119–120	8.90	−23.93	0.02	0.14
2H-6	145–146	5.68	−23.97	0.03	0.27
2H-7	15–16	7.14	−24.33	0.02	0.15
2H-7	35–36	8.52	−23.62	0.03	0.19
2H-7	57–58	9.81	−25.55	0.07	0.21
3H-1	28–29	8.16	−22.92	0.03	0.19
3H-1	53–54	5.84	−24.85	0.03	0.26
3H-1	60–65	6.01	−23.01	0.06	0.26
3H-1	73–74	6.62	−23.35	0.03	0.19
3H-1	90–91	5.53	−23.45	0.04	0.35
3H-1	112–113	7.31	−24.04	0.03	0.26
3H-1	133–134	6.18	−23.82	0.03	0.17
3H-2	4–5	7.45	−24.60	0.02	0.15
3H-2	22–23	8.24	−23.92	0.07	0.21
3H-2	41–42	7.03	−24.01	0.03	0.23
3H-2	60–65	6.19	−24.00	0.06	0.29
3H-2	71–72	5.58	−23.85	0.04	0.28
3H-2	87–88	5.24	−23.68	0.05	0.28
3H-2	113–114	8.71	−24.04	0.09	0.37
3H-2	140–141	7.15	−25.17	0.01	0.11
3H-3	3–4	11.48	−23.32	0.07	0.21
3H-3	21–22	6.15	−23.23	0.02	0.16
3H-3	41–42	7.08	−25.00	0.02	0.17
3H-3	60–65	6.18	−24.07	0.03	0.16

Appendix (continued).

Core and section	Sample interval (cm)	$\delta^{15}N$	$\delta^{13}C$	N (%)	C (%)
646A- 3H-3	79–80	6.89	−25.09	0.02	0.25
3H-3	101–102	8.08	−24.62	0.01	0.09
3H-3	121–122	7.04	−23.85	0.02	0.19
3H-3	145–146	6.27	−23.87	0.03	0.25
3H-4	17–18	6.90	−23.98	0.03	0.27
3H-4	40–41	8.66	−23.12	0.03	0.22
3H-4	60–65	8.71	−23.69	0.05	0.19
3H-4	77–78	6.64	−22.92	0.03	0.20
3H-4	101–102	6.89	−26.58	0.02	0.22
3H-4	120–121	6.38	−25.04	0.03	0.20
3H-5	12–13	6.65	−24.15	0.03	0.25
3H-5	30–31	6.28	−23.90	0.02	0.17
3H-5	52–53	7.05	−24.62	0.03	0.18
3H-5	54–59	5.17	−22.88	0.03	0.18
3H-5	74–75	8.17	−23.54	0.02	0.11
3H-6	4–5	6.89	−25.33	0.02	0.15
3H-6	22–23	6.18	−23.79	0.02	0.14
4H-1	35–40	5.19	−27.45	0.02	0.09
4H-2	32–37	4.71	−25.93	0.02	0.07
4H-3	35–40	4.71	−26.39	0.02	0.10
4H-4	35–40	5.27	−25.93	0.03	0.07
4H-5	35–40	5.18	−23.35	0.04	0.38
4H-6	35–40	5.93	−23.85	0.03	0.20
5H-1	82–87	5.26	−23.39	0.03	0.30
5H-2	30–35	5.88	−23.21	0.02	0.19
5H-3	30–35	4.59	−25.97	0.05	0.39
5H-4	30–35	4.57	−25.40	0.03	0.27
5H-5	30–35	6.25	−23.15	0.03	0.21
5H-6	30–35	5.26	−23.17	0.03	0.21
6H-1	20–27	9.11	−24.24	0.07	0.18
6H-1	38–43	3.03	−24.37	0.03	0.23
6H-1	46–52	8.78	−24.25	0.05	0.22
6H-1	60–66	7.81	−24.28	0.05	0.15
6H-1	79–85	10.37	−26.26	0.04	0.16
6H-1	100–106	8.89	−24.49	0.06	0.20
6H-1	115–121	9.16	−24.16	0.07	0.29
6H-1	140–146	7.05	−24.85	0.07	0.28
6H-2	18–23	6.63	−24.94	0.05	0.47
6H-2	44–50	7.48	−24.18	0.06	0.20
6H-2	60–65	7.55	−25.15	0.05	0.20
6H-2	77–82	7.60	−24.69	0.06	0.64
6H-2	100–106	6.30	−24.69	0.07	0.28
6H-2	121–127	9.38	−24.38	0.06	0.19
6H-2	138–144	3.56	−24.75	0.04	0.10
6H-3	18–24	7.81	−24.47	0.07	0.21
6H-3	38–42	3.98	−24.39	0.04	0.29
6H-3	43–48	8.95	−24.24	0.07	0.22
6H-3	59–64	6.36	−24.40	0.06	0.26
6H-3	76–80	9.69	−26.05	0.11	0.41
6H-3	96–102	6.80	−24.19	0.06	0.28
6H-3	122–128	6.00	−24.43	0.09	0.42
6H-3	140–145	8.26	−24.01	0.06	0.14
6H-4	20–26	9.44	−25.12	0.10	0.30
6H-4	39–44	5.50	−23.76	0.03	0.22
6H-4	44–50	8.68	−24.23	0.08	0.27
6H-4	59–65	9.87	−25.00	0.08	0.23
6H-4	80–86	9.91	−23.89	0.06	0.17
6H-4	101–108	10.76	−25.25	0.06	0.21
6H-4	121–127	8.79	−24.05	0.05	0.17
6H-4	141–147	11.13	−24.76	0.06	0.29
6H-5	21–28	10.26	−25.36	0.07	0.26
6H-5	30–35	6.16	−24.01	0.04	0.29
6H-5	42–48	8.27	−24.06	0.06	0.26
6H-5	64–70	10.29	−25.72	0.02	0.08
6H-5	80–86	8.79	−24.21	0.06	0.19
6H-5	102–108	8.87	−24.10	0.05	0.32
6H-5	121–128	8.10	−23.84	0.05	0.32
6H-5	141–148	7.63	−24.76	0.06	0.34
6H-6	20–26	4.00	−25.20	0.14	0.15
6H-6	41–47	8.20	−25.14	0.06	0.37
6H-6	60–67	10.29	−23.72	0.08	0.19
6H-6	80–87	8.03	−24.39	0.06	0.26
6H-6	100–106	6.47	−25.27	0.04	0.56
6H-6	38–43	5.35	−23.14	0.02	0.17
6H-6	120–126	5.64	−24.03	0.06	0.26
6H-6	139–145	8.15	−24.15	0.04	0.32
6H-7	20–26	7.93	−25.50	0.07	0.24

Appendix (continued).

Core and section	Sample interval (cm)	$\delta^{15}N$	$\delta^{13}C$	N (%)	C (%)
646A-6H-7	14–19	5.50	−23.70	0.05	0.42
7H-1	19–23	5.95	−24.02	0.04	0.34
7H-2	19–23	5.65	−24.17	0.03	0.19
7H-3	19–23	6.61	−24.42	0.04	0.19
7H-4	19–23	6.00	−24.37	0.03	0.21
7H-5	19–23	6.12	−24.20	0.02	0.15
7H-6	19–23	5.80	−24.46	0.03	0.14
7H-7	19–23	5.38	−24.02	0.04	0.24
8H-1	25–30	5.72	−24.47	0.03	0.28
8H-2	25–30	5.62	−24.66	0.02	0.17
8H-3	25–30	5.32	−23.35	0.02	0.14
8H-4	35–40	5.15	−24.38	0.04	0.25
8H-5	25–30	5.30	−23.56	0.06	0.17
9H-1	103–108	5.32	−23.36	0.02	0.08
9H-2	104–110	5.37	−27.28	0.03	0.41
9H-3	104–110	5.29	−23.51	0.05	0.38
9H-4	104–110	4.61	−26.20	0.03	0.26
9H-5	105–111	6.43	−24.40	0.02	0.15
10H-1	15–20	9.14	−23.43	0.07	0.20
10H-2	15–20	5.16	−24.04	0.04	0.36
10H-3	15–20	5.16	−25.33	0.02	0.21
10H-4	15–20	6.51	−22.83	0.03	0.30
10H-5	15–20	5.75	−23.48	0.03	0.16
11H-2	18–23	3.94	−23.98	0.04	0.39
11H-1	18–23	4.71	−23.78	0.04	0.36
11H-2	18–23	5.82	−24.03	0.02	0.11
11H-3	18–23	4.56	−24.14	0.04	0.33
11H-4	18–23	4.11	−24.01	0.04	0.37
11H-5	18–23	5.45	−23.29	0.02	0.11
646B-1H-1	1–3	5.86	−24.23	0.04	0.34
1H-1	18–20	7.05	−24.81	0.05	0.49
1H-1	36–38	5.53	−24.80	0.06	0.59
1H-1	58–60	5.62	−23.05	0.05	0.33
1H-1	78–80	5.40	−23.29	0.03	0.17
1H-1	100–101	5.62	−24.01	0.03	0.20
1H-1	119–120	8.08	−24.24	0.03	0.19
1H-1	141–142	6.36	−22.50	0.01	0.09
1H-2	11–12	7.17	−24.16	0.03	0.22
1H-2	30–31	7.71	−24.59	0.03	0.33
1H-2	50–51	9.82	−22.85	0.08	0.31
1H-2	70–71	6.09	−26.23	0.02	0.15
1H-2	90–91	5.64	−22.03	0.03	0.19
1H-2	110–111	6.63	−22.66	0.03	0.22
1H-2	130–131	5.94	−23.44	0.03	0.27
1H-2	146–148	6.34	−22.62	0.03	0.25
1H-2	148–149	5.66	−23.23	0.04	0.22
1H-3	20–21	6.68	−23.11	0.03	0.21
1H-3	39–40	6.39	−22.99	0.05	0.30
1H-3	60–61	6.40	−23.21	0.03	0.21
1H-3	80–81	5.71	−23.73	0.03	0.52
1H-3	100–101	6.24	−24.76	0.03	0.34
1H-3	121–122	5.33	−23.31	0.04	0.15
1H-3	140–141	6.54	−23.63	0.02	0.12
1H-4	9–10	3.78	−24.33	0.03	0.31
1H-4	29–30	5.55	−23.66	0.02	0.13
1H-4	49–50	5.32	−26.55	0.02	0.27
1H-4	69–70	4.97	−23.48	0.03	0.25
1H-4	89–90	4.28	−24.94	0.04	0.23
1H-4	109–110	5.38	−22.88	0.06	0.24
1H-4	129–130	6.62	−22.91	0.05	0.39
1H-5	3–4	6.89	−24.09	0.04	0.36
1H-5	20–21	7.04	−22.90	0.02	0.19
1H-5	39–40	5.97	−23.20	0.03	0.26
1H-5	59–60	4.85	−22.58	0.03	0.21
1H-5	79–80	7.12	−23.09	0.03	0.20
1H-5	99–100	6.29	−26.32	0.03	0.38
2H-3	4–5	6.74	−26.93	0.01	0.28
2H-3	21–22	6.18	−23.13	0.02	0.16
1H-5	120–121	7.61	−23.87	0.04	0.33
2H-3	39–40	5.72	−23.22	0.03	0.28
1H-5	139–140	7.22	−23.05	0.03	0.17
2H-3	59–60	6.97	−23.69	0.04	0.27
1H-6	9–10	4.02	−22.75	0.04	0.27
2H-3	79–80	5.94	−23.32	0.04	0.32
1H-6	29–30	5.73	−22.93	0.04	0.27
2H-3	100–101	3.83	−23.87	0.05	0.41
1H-6	50–51	3.41	−22.61	0.03	0.26

Appendix (continued).

Core and section	Sample interval (cm)	$\delta^{15}N$	$\delta^{13}C$	N (%)	C (%)
646B-2H-3	120–121	5.86	−23.74	0.05	0.56
1H-6	70–71	5.00	−22.32	0.04	0.29
2H-3	140–141	6.24	−25.06	0.02	0.11
1H-6	90–91	6.52	−23.34	0.03	0.28
1H-6	130–131	10.31	−24.25	0.04	0.13
2H-4	39–40	6.44	−23.83	0.02	0.15
2H-4	60–61	5.82	−24.44	0.03	0.19
1H-7	9–10	4.96	−23.13	0.02	0.13
2H-4	79–80	6.33	−24.05	0.03	0.12
2H-4	100–101	6.40	−24.66	0.03	0.29
2H-4	110–111	4.49	−24.16	0.03	0.73
2H-4	137–138	5.99	−23.91	0.04	0.31
2H-5	3–4	7.41	−24.39	0.07	0.22
2H-5	20–21	8.11	−24.48	0.03	0.22
2H-5	60–61	6.11	−24.19	0.02	0.21
2H-5	39–40	6.17	−24.48	0.03	0.26
2H-5	80–81	5.43	−25.75	0.02	0.34
2H-5	100–101	6.05	−23.76	0.03	0.22
2H-5	120–121	6.26	−22.47	0.02	0.13
2H-5	140–141	5.99	−26.92	0.02	0.27
2H-6	7–8	6.09	−23.88	0.03	0.22
2H-6	30–31	7.41	−23.52	0.02	0.13
2H-6	50–51	5.99	−25.37	0.01	0.14
2H-6	64–65	6.80	−25.17	0.02	0.20
3H-1	19–20	8.41	−23.06	0.03	0.20
3H-1	39–40	4.14	−22.20	0.05	0.22
3H-1	59–60	6.19	−23.00	0.02	0.16
3H-1	79–80	5.63	−22.88	0.03	0.22
3H-1	99–100	5.15	−22.74	0.04	0.31
3H-1	119–120	5.50	−23.44	0.02	0.18
3H-1	139–140	6.09	−23.28	0.02	0.44
3H-2	8–9	4.97	−23.06	0.04	0.32
3H-2	29–30	6.00	−23.27	0.02	0.41
3H-2	48–49	5.40	−23.10	0.04	0.34
3H-2	69–70	7.04	−23.07	0.04	0.28
3H-2	88–89	6.26	−23.43	0.03	0.27
3H-2	109–110	6.32	−22.45	0.03	0.02
3H-2	128–129	6.44	−23.40	0.03	0.25
3H-2	145–146	8.64	−23.69	0.07	0.30
3H-3	12–13	6.60	−24.11	0.03	0.30
3H-3	29–30	5.39	−24.20	0.08	0.36
3H-3	49–50	5.81	−23.89	0.04	0.24
3H-3	69–70	5.60	−24.02	0.03	0.37
3H-3	90–91	8.03	−23.42	0.02	0.15
3H-3	109–110	9.00	−24.74	0.03	0.21
3H-3	129–130	7.57	−24.61	0.03	0.25
3H-3	147–148	6.84	−24.21	0.03	0.23
3H-4	7–8	8.42	−24.13	0.05	0.27
3H-4	28–29	6.05	−23.72	0.02	0.19
3H-4	48–49	5.75	−23.23	0.03	0.23
3H-4	68–69	6.28	−23.02	0.02	0.16
3H-4	88–89	7.97	−25.12	0.03	0.15
3H-4	109–110	8.17	−24.86	0.06	0.22
3H-4	128–129	6.63	−23.56	0.02	0.20
3H-4	147–148	8.79	−23.78	0.06	0.23
3H-5	10–11	6.07	−23.44	0.03	0.22
3H-5	29–30	5.53	−25.16	0.02	1.18
3H-5	50–51	6.69	−24.23	0.03	0.18
3H-5	90–91	5.80	−24.23	0.02	0.20
3H-5	109–110	6.74	−24.03	0.04	0.23
3H-6	2–3	7.51	−24.23	0.04	0.26
3H-6	19–20	5.14	−24.81	0.05	0.38
3H-6	39–40	6.61	−24.36	0.05	0.43
3H-6	61–62	5.59	−26.11	0.03	0.41
3H-6	74–75	7.85	−26.01	0.02	0.39
3H-6	91–92	5.48	−23.04	0.02	0.23
3H-6	109–110	7.39	−23.64	0.03	0.17
3H-6	131–132	6.69	−24.02	0.02	0.13
3H-6	147–148	7.78	−25.54	0.02	0.14
3H-7	9–10	5.72	−23.53	0.02	0.13
3H-7	29–30	6.01	−23.37	0.02	0.10
4H-1	6–7	4.96	−25.96	0.02	0.27
4H-1	26–27	5.43	−23.86	0.02	0.22
4H-1	46–47	5.89	−23.59	0.03	0.22
4H-1	66–67	5.10	−23.61	0.02	0.15
4H-1	86–87	6.08	−23.31	0.02	0.18
4H-1	106–107	8.88	−23.59	0.02	0.12
4H-1	126–127	5.58	−24.54	0.03	0.18

Appendix (continued).

Core and section	Sample interval (cm)	$\delta^{15}N$	$\delta^{13}C$	N (%)	C (%)
646B-4H-1	144–145	6.26	−26.02	0.02	0.28
4H-2	18–19	6.88	−26.06	0.02	0.22
4H-2	38–39	5.94	−23.90	0.02	0.08
4H-2	58–59	8.17	−24.26	0.05	0.23
4H-2	79–80	6.19	−23.81	0.02	0.15
4H-2	99–100	5.63	−23.55	0.02	0.20
4H-2	119–120	9.44	−24.05	0.03	0.22
4H-2	139–140	5.56	−24.11	0.02	0.17
4H-3	18–19	6.16	−24.65	0.06	0.34
4H-3	38–39	6.15	−24.52	0.02	0.14
4H-3	58–59	6.26	−23.90	0.02	0.14
4H-3	79–80	8.84	−23.76	0.02	0.15
4H-3	99–100	7.29	−23.90	0.02	0.17
4H-3	119–120	5.23	−24.64	0.02	0.18
4H-3	139–140	6.92	−26.56	0.02	0.18
4H-4	18–19	6.59	−23.48	0.02	0.10
4H-4	38–39	7.08	−23.86	0.02	0.16
4H-4	58–59	4.89	−24.34	0.02	0.28
4H-4	79–80	5.93	−24.37	0.03	0.43
4H-4	99–100	6.77	−23.86	0.02	0.47
4H-4	119–120	6.93	−24.76	0.02	0.19
4H-4	139–140	4.63	−27.54	0.03	0.06
4H-5	18–19	5.19	−23.72	0.03	0.21
12H-1	75–80	5.93	−25.62	0.02	0.19
12H-2	75–80	5.09	−25.04	0.01	0.20
12H-3	75–80	4.56	−25.52	0.04	0.45
12H-4	75–80	9.69	−25.63	0.06	0.30
12H-5	20–25	7.16	−27.37	0.02	0.31
13H-1	20–25	4.00	−26.16	0.04	0.46
13H-2	20–25	6.22	−27.37	0.08	0.38
13H-3	20–25	5.90	−23.68	0.03	0.15
13H-4	20–25	7.47	−24.92	0.03	0.36
13H-5	20–25	5.68	−25.29	0.03	0.27
14H-1	35–40	6.31	−25.14	0.03	0.23
14H-2	35–40	4.38	−23.44	0.05	0.17
14H-2	35–40	9.26	−24.68	0.06	0.32
14H-3	35–40	5.45	−24.65	0.04	0.49
14H-4	35–40	6.69	−24.69	0.04	0.27
14H-5	35–40	4.98	−25.28	0.03	0.19
14H-6	35–40	5.74	−23.87	0.04	0.38
18X-1	40–45	5.59	−24.45	0.04	0.33
18X-2	28–33	7.83	−25.29	0.04	0.22
18X-3	28–33	6.23	−25.00	0.04	0.30
20X-1	27–32	6.56	−24.82	0.03	0.21
20X-2	27–32	5.44	−25.40	0.05	0.39
20X-3	27–32	5.02	−25.33	0.10	0.48
20X-4	27–32	4.82	−25.08	0.05	0.36
20X-5	27–32	7.67	−23.43	0.06	0.26
20X-6	27–32	4.40	−25.89	0.04	0.30
21X-1	17–22	6.44	−24.69	0.07	0.57
21X-2	17–22	4.70	−23.74	0.05	0.42
21X-3	17–22	5.03	−24.18	0.04	0.37
21X-4	17–22	4.05	−23.84	0.06	0.54
21X-5	17–22	5.50	−23.30	0.04	0.26
22X-1	65–70	4.10	−23.89	0.03	0.58
22X-2	64–69	4.72	−23.71	0.02	0.58
22X-3	65–70	4.76	−24.25	0.02	0.14
22X-4	64–69	4.72	−23.11	0.02	0.11
22X-6	64–69	5.66	−23.15	0.02	0.12
22X-7	5–10	4.11	−23.94	0.03	0.22
23X-2	35–40	8.14	−24.75	0.10	0.54
26X-1	39–44	6.63	−23.74	0.04	0.35
26X-2	39–44	4.61	−23.58	0.05	0.39
26X-3	39–44	6.35	−23.07	0.04	0.29
26X-4	39–44	9.58	−23.78	0.10	0.33
26X-5	39–44	4.54	−24.17	0.04	0.40
29X-1	40–45	4.66	−24.08	0.04	0.37
29X-2	40–45	4.48	−24.87	0.04	0.41
29X-3	40–45	3.61	−23.88	0.03	0.39
29X-4	40–45	4.53	−24.61	0.05	0.40
29X-5	40–45	4.75	−23.76	0.05	0.30
29X-6	40–45	5.41	−23.87	0.02	0.21
30X-1	39–44	7.64	−24.32	0.04	0.31
30X-2	39–44	4.50	−25.21	0.04	0.33
30X-3	39–44	5.25	−23.78	0.06	0.39
30X-4	39–44	5.26	−23.77	0.04	0.32
30X-5	39–44	5.33	−23.21	0.04	0.41
30X-6	39–44	5.62	−24.52	0.04	0.40

Appendix (continued).

Core and section	Sample interval (cm)	$\delta^{15}N$	$\delta^{13}C$	N (%)	C (%)
646B-31X-1	27–32	3.90	−23.48	0.05	0.29
31X-2	27–32	5.51	−23.86	0.04	0.28
31X-3	27–32	4.45	−23.52	0.05	0.33
31X-4	27–32	5.17	−23.48	0.04	0.40
31X-5	27–32	3.96	−23.06	0.04	0.35
31X-6	27–32	4.97	−24.33	0.03	0.39
32X-1	18–23	3.83	−23.41	0.05	0.35
32X-2	18–23	5.89	−23.71	0.06	0.48
32X-3	18–23	7.13	−23.94	0.12	0.42
32X-4	18–23	5.35	−23.18	0.06	0.43
32X-5	27–23	4.99	−23.35	0.06	0.43
32X-6	27–23	3.71	−23.63	0.04	0.48
33X-1	25–30	4.33	−23.34	0.07	0.49
33X-2	25–30	6.17	−23.80	0.10	0.48
33X-3	25–30	6.37	−25.30	0.05	0.57
33X-4	25–30	5.03	−26.15	0.04	0.36
33X-5	25–30	5.08	−24.25	0.10	0.42
35X-1	22–28	6.14	−23.34	0.06	0.44
35X-2	23–28	5.30	−23.84	0.03	0.28
36X-2	71–76	3.54	−23.55	0.04	0.29
36X-3	8–13	5.34	−24.08	0.04	0.41
36X-4	53–55	4.75	−23.68	0.05	0.33
36X-5	14–17	6.86	−23.89	0.13	0.39
36X-6	114–119	6.01	−24.16	0.04	0.34
36X-7	1–3	6.74	−27.10	0.04	0.09
37X-1	30–35	7.10	−24.43	0.06	0.27
37X-2	30–35	3.90	−23.80	0.07	0.33
37X-3	30–35	6.40	−23.64	0.07	0.34
37X-4	30–35	5.36	−24.16	0.04	0.29
37X-5	30–35	6.84	−24.44	0.04	0.23
37X-6	30–35	4.17	−24.49	0.05	0.31
37X-7	24–29	5.80	−23.84	0.04	0.28
38X-1	58–61	3.98	−23.63	0.03	0.22
38X-2	58–61	5.01	−25.42	0.03	0.39
38X-3	53–56	5.15	−23.78	0.04	0.30
38X-4	58–61	7.60	−25.50	0.11	0.28
38X-5	57–60	4.61	−23.28	0.04	0.22
39X-1	19–24	5.42	−22.06	0.02	0.31
39X-2	19–24	5.62	−23.07	0.03	0.23
39X-3	19–24	4.68	−24.57	0.04	0.27
39X-4	19–24	6.53	−24.23	0.08	0.49
39X-5	19–24	5.06	−22.71	0.04	0.30
39X-6	19–24	5.33	−23.59	0.04	0.23
40X-1	21–26	5.38	−23.14	0.03	0.26
40X-2	21–26	6.73	−23.88	0.04	0.31
40X-3	21–26	5.54	−25.02	0.03	0.34
40X-4	21–26	6.30	−24.00	0.03	0.27
40X-5	21–26	4.64	−23.71	0.04	0.51
40X-6	21–26	6.78	−23.66	0.03	0.30
40X-7	17–22	6.12	−23.49	0.03	0.22
41X-2	26–30	5.33	−24.01	0.04	0.32
41X-3	27–31	4.10	−23.13	0.04	0.26
41X-4	19–23	4.43	−24.03	0.04	0.29
41X-5	27–31	5.67	−24.17	0.04	0.25
41X-6	27–31	4.83	−24.08	0.03	0.52
42X-1	16–21	6.51	−26.95	0.10	0.61
42X-2	9–14	5.09	−23.51	0.06	0.27
42X-3	9–14	4.71	−23.83	0.05	0.34
42X-4	9–14	5.26	−26.74	0.04	0.28
42X-5	8–14	4.23	−26.59	0.05	0.09
42X-6	17–22	4.44	−23.71	0.04	0.30
43X-3	111–116	3.61	−24.58	0.04	0.37
46X-2	64–67	6.59	−25.28	0.04	0.34
49X-2	23–28	4.91	−24.72	0.06	0.59
50X-1	72–77	4.69	−24.08	0.04	0.28
50X-3	0–5	4.90	−23.75	0.03	0.25
51X-1	107–112	5.31	−24.14	0.05	0.36
56X-1	7–10	5.14	−23.84	0.03	0.17
56X-2	17–20	4.84	−24.48	0.05	0.29
56X-3	20–23	4.75	−23.49	0.06	0.24
61X-1	100–103	5.54	−23.85	0.05	0.43
62X-1	66–70	4.85	−23.73	0.05	0.07
62X-2	19–23	5.15	−23.20	0.05	0.27
62X-4	6–10	4.99	−25.78	0.07	0.12
62X-5	18–20	3.58	−23.91	0.04	0.27
63X-1	46–50	6.66	−24.78	0.08	0.18
63X-2	54–56	5.38	−24.32	0.09	0.28
63X-3	14–16	4.78	−24.14	0.05	0.38

Appendix (continued).

Core and section	Sample interval (cm)	$\delta^{15}N$	$\delta^{13}C$	N (%)	C (%)
646B-65X-1	40–44	5.76	−23.87	0.04	0.28
65X-2	54–59	4.97	−24.03	0.04	0.28
65X-3	5–8	4.34	−23.88	0.04	0.30
65X-4	7–11	4.88	−24.84	0.04	0.42
65X-5	88–93	5.16	−24.12	0.03	0.31
66X-1	11–15	4.74	−24.93	0.03	0.05
67X-1	16–17	5.97	−24.89	0.09	0.54
67X-2	7–8	5.49	−24.09	0.10	0.35
67X-3	15–16	5.77	−24.57	0.14	0.47
67X-4	4–5	4.91	−23.53	0.06	0.28
67X-5	17–18	5.60	−25.21	0.05	0.34
67X-6	25–26	6.67	−23.97	0.07	0.23
68X-1	30–35	4.76	−24.41	0.05	0.27
68X-2	1–6	6.57	−24.48	0.06	0.32
68X-3	8–13	4.65	−25.83	0.04	0.30
68X-4	11–13	6.41	−25.73	0.11	0.38
69X-1	47–52	2.34	−24.50	0.04	0.28
71X-1	43–48	4.47	−23.79	0.05	0.19
71X-2	43–48	5.56	−24.46	0.04	0.41
71X-3	43–48	4.03	−23.50	0.04	0.31
71X-4	51–56	7.60	−25.17	0.09	0.30
71X-5	30–35	4.85	−25.53	0.04	0.24
71X-6	11–16	4.88	−24.81	0.06	0.29
72X-1	40–43	4.63	−23.65	0.04	0.28
72X-2	37–40	6.65	−26.18	0.07	0.20
73X-1	83–87	4.67	−22.91	0.04	0.39
74X-1	44–45	7.64	−24.18	0.06	0.15
74X-2	20–24	5.09	−25.04	0.03	0.25
74X-4	0–1	4.82	−24.67	0.04	0.26
75X-1	52–53	6.22	−24.06	0.05	0.21
75X-1	53–56	6.04	−24.75	0.10	0.42
75X-2	21–22	5.33	−24.42	0.08	0.24
75X-3	21–22	5.09	−23.64	0.03	0.18
75X-4	66–70	4.82	−23.93	0.04	0.33
76X-3	3–4	4.18	−24.09	0.08	0.98
77X-4	68–73	7.28	−23.75	0.11	0.19
78X-5	12–16	4.41	−24.14	0.04	0.33
79X-1	14–18	4.97	−24.85	0.03	0.23
79X-2	19–25	7.55	−23.94	0.07	0.15
647A-1R-1	58–64	6.66	−22.68	0.03	0.15
1R-2	63–69	7.83	−23.91	0.02	0.15
1R-6	82–88	9.29	−23.65	0.02	0.14
2R-1	7–12	8.69	−26.01	0.04	0.08
4R-1	92–96	6.31	−25.70	0.03	0.06
4R-2	69–74	5.73	−24.83	0.02	0.23
4R-3	36–41	4.93	−24.07	0.03	0.25
4R-4	43–48	8.51	−24.12	0.03	0.27
4R-5	86–91	5.75	−24.53	0.02	0.22
6R-1	43–48	6.57	−25.23	0.09	0.57
6R-2	43–48	6.18	−23.89	0.02	0.20
6R-3	43–48	3.78	−24.44	0.03	0.16
6R-4	43–48	8.32	−24.94	0.02	0.12
6R-5	43–48	4.56	−24.39	0.02	0.19
6R-6	43–48	6.55	−24.23	0.05	0.20
7R-1	3–8	4.97	−24.40	0.03	0.25
7R-2	3–8	6.08	−24.33	0.03	0.23
7R-3	3–8	5.11	−24.28	0.03	0.20
7R-4	3–8	5.60	−25.63	0.01	0.18
7R-5	3–8	5.33	−24.34	0.02	0.17
7R-6	3–8	5.02	−25.78	0.02	0.15
8R-1	21–26	5.17	−24.77	0.02	0.16
8R-2	21–26	4.50	−25.61	0.02	0.40
8R-3	21–26	9.30	−24.08	0.02	0.21
9R-1	15–20	3.73	−24.06	0.03	0.26
9R-2	15–20	3.54	−25.72	0.03	0.07
9R-3	15–20	7.47	−25.58	0.06	0.22
10R-1	9–14	4.77	−25.00	0.03	0.16
10R-2	9–14	4.63	−26.70	0.04	0.28
10R-3	9–14	2.48	−24.54	0.03	0.12
10R-4	9–14	4.88	−24.51	0.03	0.15
11R-1	29–34	5.59	−24.73	0.07	0.30
11R-2	29–34	5.74	−24.76	0.04	0.31
11R-3	29–34	5.11	−25.00	0.05	0.33
11R-4	29–34	2.24	−26.58	0.02	0.06
12R-1	33–38	6.22	−24.07	0.03	0.24
12R-2	33–38	5.45	−24.49	0.07	0.63
12R-3	33–38	4.08	−24.75	0.05	0.46
12R-4	28–33	3.94	−23.98	0.11	0.54

Appendix (continued).

Core and section	Sample interval (cm)	$\delta^{15}N$	$\delta^{13}C$	N (%)	C (%)
647A-13R-1	16–21	5.03	−24.62	0.03	0.07
13R-2	16–21	4.48	−26.09	0.02	0.10
13R-3	16–21	5.09	−24.03	0.01	0.09
13R-4	16–21	7.27	−24.82	0.02	0.10
13R-5	16–21	4.48	−25.37	0.02	0.13
14R-1	26–32	6.61	−27.16	0.02	0.09
14R-2	28–33	3.81	−24.62	0.02	0.12
14R-3	26–31	4.87	−26.27	0.02	0.15
15R-1	20–26	3.59	−25.72	0.03	0.27
15R-2	19–25	7.53	−24.96	0.06	0.46
15R-3	18–24	4.10	−25.33	0.06	0.43
16R-1	34–40	3.78	−24.97	0.05	0.27
16R-2	32–38	3.83	−26.66	0.04	0.33
18R-1	15–20	4.56	−24.77	0.02	0.21
18R-2	15–20	7.22	−26.03	0.03	0.07
647B-1H-1	20–26	6.63	−24.19	0.02	0.19
1H-1	40–46	6.30	−23.19	0.02	0.21
1H-1	60–66	6.21	−23.84	0.02	0.19
1H-1	80–86	5.44	−26.15	0.02	0.11
1H-1	100–106	9.40	−24.94	0.04	0.12
1H-1	120–126	6.33	−23.33	0.02	0.18
1H-1	140–146	6.02	−23.78	0.04	0.31
1H-2	20–26	6.76	−19.83	0.03	0.21
1H-2	40–46	7.29	−23.61	0.08	0.27
1H-2	60–66	6.12	−24.56	0.02	0.17
1H-2	80–86	7.30	−23.55	0.05	0.27
1H-2	100–106	6.33	−24.60	0.02	0.21
1H-2	120–126	7.18	−23.92	0.03	0.29
1H-2	140–146	5.38	−24.01	0.03	0.19
1H-3	20–26	5.66	−25.24	0.02	0.20
1H-3	40–46	7.74	−24.13	0.05	0.18
1H-3	60–66	4.51	−23.98	0.02	0.14
1H-3	80–86	6.01	−23.60	0.02	0.15
1H-3	100–106	8.22	−24.93	0.03	0.24
1H-3	120–126	4.58	−27.31	0.02	0.12
1H-3	140–146	9.18	−24.56	0.05	0.20
1H-4	20–26	5.59	−22.19	0.02	0.26
1H-4	40–46	9.93	−25.06	0.02	0.16
1H-4	60–66	9.29	−24.49	0.03	0.17
1H-4	80–86	7.18	−26.24	0.07	0.14
1H-4	100–106	6.58	−24.50	0.05	0.14
1H-4	120–126	7.13	−24.90	0.03	0.16
1H-4	140–146	7.66	−23.75	0.02	0.31
1H-5	40–46	7.46	−25.38	0.02	0.29
1H-5	60–66	5.66	−24.22	0.04	0.22
2H-1	20–26	9.52	−25.07	0.06	0.21
2H-1	40–46	8.08	−25.56	0.04	0.22
2H-1	60–66	7.25	−25.81	0.02	0.09
2H-1	80–86	9.56	−23.90	0.04	0.42
2H-1	100–106	8.49	−27.62	0.02	0.11
2H-1	119–125	6.92	−23.95	0.02	0.20
2H-1	140–146	6.23	−24.08	0.03	0.26
2H-2	20–26	7.20	−24.21	0.08	0.24
2H-2	40–46	7.31	−24.42	0.10	0.39
2H-2	60–66	3.26	−24.49	0.03	0.39
2H-2	80–86	8.24	−24.98	0.05	0.19
2H-2	100–106	8.10	−24.52	0.06	0.11
2H-2	120–126	6.97	−24.14	0.09	0.49
2H-2	140–146	6.61	−24.38	0.12	0.48
2H-3	19–25	5.52	−22.87	0.01	0.30
2H-3	40–46	4.68	−24.13	0.02	0.23
2H-3	60–66	8.23	−23.89	0.03	0.20
2H-3	80–86	8.08	−23.20	0.05	0.15
2H-3	100–106	8.88	−24.23	0.02	0.38
2H-3	120–126	7.58	−25.44	0.02	0.10
2H-3	138–144	9.95	−24.37	0.07	0.13
2H-4	20–25	8.66	−25.31	0.05	0.24
2H-4	40–45	10.19	−24.97	0.05	0.44
2H-4	60–65	6.96	−25.24	0.02	0.13
2H-4	80–85	6.66	−25.98	0.02	0.11
2H-4	100–105	6.19	−23.45	0.02	0.35
2H-4	120–125	6.15	−24.34	0.02	0.13
2H-4	140–145	9.75	−25.43	0.06	0.27
2H-5	20–25	5.28	−23.29	0.04	0.50
2H-5	40–45	9.60	−25.87	0.02	0.03
2H-5	60–65	10.05	−24.73	0.09	0.41
2H-5	80–8	8.62	−23.10	0.05	0.24
2H-5	100–105	6.07	−24.22	0.02	0.47

Appendix (continued).

Core and section	Sample interval (cm)	$\delta^{15}N$	$\delta^{13}C$	N (%)	C (%)
647B-2H-5	120–125	8.05	−23.90	0.05	0.33
2H-5	140–145	5.30	−25.35	0.02	0.04
2H-6	20–25	9.55	−24.98	0.02	0.12
2H-6	40–45	5.71	−24.31	0.02	0.45
2H-6	60–65	7.95	−25.23	0.02	0.05
2H-6	80–85	5.27	−23.61	0.02	0.17
2H-6	100–105	8.57	−24.04	0.05	0.36
2H-6	120–125	8.78	−24.07	0.04	0.31
2H-6	140–145	9.56	−24.17	0.02	0.17
2H-7	20–25	7.30	−22.27	0.04	0.18
2H-7	40–45	3.93	−24.40	0.01	0.16
2H-7	60–65	8.72	−24.51	0.02	0.38
2H-7	80–85	6.97	−24.24	0.02	0.15
3H-1	80–85	5.28	−24.36	0.02	0.16
3H-1	100–105	9.04	−25.45	0.06	0.19
3H-1	120–125	9.16	−25.23	0.02	0.11
3H-1	140–145	3.80	−24.24	0.01	0.33
3H-2	20–25	2.77	−24.45	0.04	0.17
3H-2	40–45	7.97	−25.26	0.08	0.09
3H-2	60–65	8.47	−23.09	0.02	0.09
3H-2	80–85	7.40	−25.93	0.03	0.05
3H-2	100–105	11.51	−26.74	0.02	0.20
3H-2	120–125	11.72	−24.86	0.04	0.25
3H-2	140–145	4.79	−26.31	0.01	0.29
3H-3	20–25	9.55	−25.18	0.08	0.34
3H-3	40–45	6.48	−24.32	0.09	0.52
3H-3	60–65	5.11	−25.06	0.02	0.32
3H-3	80–85	6.31	−25.09	0.02	0.19
3H-3	100–105	2.15	−23.98	0.03	0.19
3H-3	120–125	5.87	−24.27	0.02	0.20
3H-3	140–145	5.60	−26.72	0.01	0.01
3H-4	20–25	7.36	−23.61	0.02	0.35
3H-4	40–45	6.11	−26.72	0.02	0.53
3H-4	60–65	7.56	−22.09	0.02	0.03
3H-4	80–85	7.54	−23.00	0.05	0.48
3H-4	100–105	6.97	−25.22	0.04	0.34
3H-4	120–125	5.56	−24.11	0.02	0.27
3H-4	140–145	4.32	−23.88	0.03	0.83
3H-5	20–25	4.50	−23.48	0.02	0.30
3H-5	40–45	6.30	−24.71	0.05	0.44
3H-5	60–65	9.43	−26.13	0.04	0.39
3H-5	83–88	6.47	−24.49	0.03	0.20
3H-5	100–105	7.25	−25.34	0.02	0.46
3H-5	120–125	4.71	−24.14	0.02	1.01
3H-5	140–145	3.08	−29.74	0.06	0.14
3H-6	20–25	7.02	−25.63	0.02	0.47
3H-6	40–45	7.28	−25.34	0.01	0.37
3H-6	60–65	7.73	−24.15	0.02	0.19
3H-6	80–85	5.89	−23.70	0.02	0.34
3H-6	100–105	8.16	−25.16	0.02	0.27
3H-6	120–125	5.09	−23.92	0.02	0.26
3H-6	140–145	6.51	−24.65	0.02	0.30
3H-7	20–25	8.95	−24.22	0.03	0.23
3H-7	40–45	9.01	−25.11	0.04	0.18
4H-1	20–25	6.96	−25.08	0.02	0.33
4H-1	40–45	5.89	−24.91	0.06	0.32
4H-1	60–65	3.66	−24.52	0.02	0.22
4H-1	80–85	5.66	−25.01	0.04	0.54
4H-1	100–105	6.14	−24.37	0.03	0.29
4H-1	120–125	3.44	−24.51	0.04	0.32
4H-1	140–145	8.00	−24.41	0.03	0.20
4H-2	20–25	7.33	−23.95	0.02	0.13
4H-2	40–45	2.21	−24.51	0.09	0.18
4H-2	60–65	5.62	−25.02	0.04	0.21
4H-2	80–85	8.12	−24.52	0.02	0.06
4H-2	100–105	9.60	−24.41	0.04	0.18
4H-2	120–125	10.59	−26.40	0.11	0.36
4H-2	140–145	8.68	−25.53	0.06	0.41
4H-3	20–25	8.86	−23.63	0.02	0.21
4H-3	40–45	3.61	−25.43	0.03	0.31
4H-3	60–65	5.90	−25.43	0.03	0.75
4H-3	80–85	6.92	−24.86	0.04	0.22
4H-3	100–105	4.94	−25.28	0.03	0.20
4H-3	120–125	3.89	−23.56	0.04	0.15
4H-3	140–145	5.77	−23.96	0.04	0.23
4H-4	20–25	4.92	−25.70	0.03	0.47
4H-4	40–45	5.18	−23.92	0.04	0.27
4H-4	60–65	7.65	−26.12	0.05	0.66

Appendix (continued).

Core and section	Sample interval (cm)	$\delta^{15}N$	$\delta^{13}C$	N (%)	C (%)
647B-4H-4	80–85	5.33	−24.72	0.04	0.80
4H-4	100–105	7.88	−24.26	0.04	0.24
4H-4	120–125	7.60	−24.02	0.04	0.20
4H-4	140–145	7.91	−23.81	0.04	0.18
4H-5	20–25	7.96	−25.58	0.02	0.12
4H-5	40–45	8.55	−25.11	0.03	0.15
4H-5	60–65	8.38	−24.90	0.02	0.15
4H-5	80–85	5.58	−25.20	0.06	0.63
4H-5	100–105	8.62	−24.02	0.03	0.09
4H-5	120–125	4.84	−24.12	0.05	0.23
4H-5	140–145	7.62	−24.93	0.07	0.27
4H-6	20–25	7.61	−25.91	0.03	0.17
4H-6	40–45	5.00	−23.59	0.03	0.13
4H-6	60–65	7.37	−24.88	0.03	0.09
4H-6	80–85	7.71	−25.11	0.02	0.10
4H-6	100–120	10.52	−25.49	0.03	0.11
4H-6	120–125	4.28	−26.04	0.02	0.10
4H-6	140–145	10.39	−24.68	0.03	1.05
4H-7	20–25	11.97	−27.29	0.04	0.49
4H-7	40–45	4.66	−26.42	0.03	0.28
5H-2	20–25	5.32	−24.26	0.04	0.40
5H-2	40–45	5.98	−25.03	0.13	0.46
5H-2	60–65	6.24	−25.65	0.04	0.25
5H-2	80–85	6.83	−24.39	0.04	0.16
5H-2	100–105	9.11	−27.66	0.04	0.20
5H-2	120–125	5.57	−22.80	0.10	0.25
5H-2	140–145	4.71	−24.69	0.06	0.31
5H-3	20–25	7.34	−27.20	0.03	0.16
5H-3	40–45	8.73	−25.59	0.06	0.24
5H-3	60–65	8.55	−26.50	0.05	0.20
5H-3	80–85	6.75	−24.40	0.03	0.20
5H-3	100–105	7.29	−24.59	0.02	0.22
5H-3	120–125	7.69	−24.50	0.03	0.46
5H-3	140–145	5.47	−25.15	0.05	0.14
5H-4	20–25	8.65	−25.04	0.05	0.16
5H-4	40–45	8.81	−25.58	0.04	0.33
5H-4	60–65	2.18	−25.89	0.02	0.19
5H-4	80–85	10.73	−24.53	0.05	0.32
5H-4	100–105	9.32	−24.69	0.04	0.10
5H-4	120–125	6.07	−23.64	0.05	0.45
5H-4	140–145	5.60	−25.50	0.05	0.32
5H-5	20–25	6.31	−25.42	0.06	0.20
5H-5	40–45	5.76	−24.64	0.07	0.23
5H-5	60–65	7.00	−24.39	0.04	0.15
5H-5	80–85	5.75	−26.29	0.10	0.68
5H-5	100–105	8.10	−24.78	0.08	0.37
5H-5	120–125	4.91	−24.69	0.06	0.34

Appendix (continued).

Core and section	Sample interval (cm)	$\delta^{15}N$	$\delta^{13}C$	N (%)	C (%)
5H-5	140–145	8.04	−24.55	0.05	0.19
5H-6	20–25	10.73	−26.07	0.05	0.40
5H-6	40–45	10.59	−25.18	0.05	0.39
5H-6	60–65	7.48	−24.37	0.02	0.21
5H-6	80–85	6.95	−24.28	0.05	0.25
5H-6	100–105	6.22	−23.71	0.08	0.49
5H-7	25–30	4.94	−23.79	0.06	0.21
6H-1	100–105	9.49	−24.74	0.06	0.26
6H-1	120–125	9.12	−24.75	0.05	0.30
6H-1	140–145	9.97	−25.10	0.08	0.47
6H-2	20–25	11.65	−25.35	0.05	0.35
6H-2	40–45	11.01	−25.51	0.07	0.31
6H-2	60–65	5.32	−26.31	0.03	0.44
6H-2	80–85	9.85	−26.80	0.07	0.47
6H-2	100–105	10.49	−26.14	0.04	0.32
6H-2	120–125	12.74	−27.51	0.08	0.39
6H-2	140–145	9.78	−25.67	0.02	0.23
6H-3	20–25	11.05	−24.62	0.06	0.49
6H-3	40–45	9.34	−23.99	0.04	0.30
6H-3	60–65	11.46	−26.58	0.06	0.06
6H-3	100–105	7.12	−24.54	0.06	0.16
6H-3	120–125	5.84	−24.81	0.07	0.36
6H-3	140–145	7.74	−24.87	0.08	0.34
6H-4	20–25	8.97	−23.89	0.06	0.63
6H-4	40–45	6.33	−25.56	0.04	0.23
6H-4	60–65	6.23	−24.54	0.06	0.21
6H-4	80–85	6.21	−25.03	0.04	0.24
6H-4	100–105	6.28	−24.11	0.06	0.26
6H-4	120–125	7.92	−24.98	0.05	0.24
6H-4	140–145	2.44	−25.07	0.16	0.32
6H-5	20–25	4.37	−25.42	0.06	0.25
647B-6H-5	40–45	7.07	−24.16	0.07	0.34
6H-5	60–65	7.75	−23.95	0.06	0.19
6H-5	80–85	6.11	−24.78	0.08	0.42
6H-5	100–105	6.50	−25.43	0.11	0.66
6H-5	120–125	8.08	−23.66	0.07	0.26
6H-5	140–145	6.61	−24.60	0.02	0.25
6H-6	20–25	7.60	−23.68	0.05	0.27
6H-6	40–45	9.89	−24.83	0.06	0.20
6H-6	60–65	6.33	−23.93	0.04	0.18
6H-6	80–85	7.52	−24.50	0.04	0.34
6H-6	100–105	7.43	−25.26	0.06	0.40
6H-6	120–125	8.29	−25.55	0.08	0.16
6H-6	140–145	9.19	−24.46	0.03	0.14
6H-7	20–25	7.28	−25.04	0.06	0.28
6H-7	40–45	8.38	−24.57	0.02	0.35