Shackleton, N.J., Curry, W.B., Richter, C., and Bralower, T.J. (Eds.), 1997
Proceedings of the Ocean Drilling Program, Scientific Results, Vol. 154

26. ^{10}Be AND ^{9}Be CONCENTRATIONS IN THE DEEP SEA SEDIMENTS AT SITE 925, CEARA RISE, IN THE WESTERN EQUATORIAL ATLANTIC: IMPLICATION OF ^{10}Be FLUX CHANGE[1]

M. Murayama,[2] H. Nagai,[3] M. Imamura,[4] S. Hatori,[5] K. Kobayashi,[5] and A. Taira[6]

ABSTRACT

The variations of ^{10}Be and ^{9}Be flux over 7 Ma were studied at Site 925 on the Ceara Rise in the equatorial Atlantic. Age-corrected ^{10}Be fluxes range from 50 to 270 × 10^7 atoms/cm^2 k.y. with an average value of over 100 × 10^7 atoms/cm^2 k.y. The relation of the age-corrected ^{10}Be flux to the ^{9}Be flux shows a positive correlation, suggesting the ^{10}Be is associated with the terrigenous fractions. However, despite the fact that the concentration of ^{10}Be derived from the Amazon drainage area should be expected to be much lower than that in the marine sediments, the fluxes of ^{10}Be show high values. This result indicates that the ^{10}Be in the ocean was scavenged by suspended materials like fine-grained clays in the process of transportation from the Amazon drainage area. The variations of both Be fluxes over the last 7 Ma in this area may result from local or regional change in the inputs of Amazon-derived terrigenous sediments.

INTRODUCTION

The detailed ^{10}Be and ^{9}Be content record in marine sediments has been investigated as a potential geochronological tool (Tanaka and Inoue 1979; Bourles et al., 1989, Beets et al., 1991) and as a proxy monitor of variations in solar activity and geomagnetic field intensity (Raisebeck et al., 1979, 1985; Ku et al., 1985; Raisebeck and Yiou 1988; Henken-Mellies et al., 1990; Kent and Schneider, 1995). Furthermore, the radionuclide ^{10}Be (half life = 1.5 × 10^6 yr) has also been used in flux studies as a geochemical and a sedimentological tracer (Brown 1987; Sharma et al., 1987). Studies of ^{10}Be flux have provided opportunities to understand its behavior, its residence time in the ocean (Kusakabe et al., 1982, 1987), and some processes of removal of ^{10}Be to the sediments (i.e., boundary scavenging [Anderson et al., 1990; Lao et al., 1992a, 1992b, 1993; Frank et al., 1994]). The variation of ^{10}Be concentration in ocean sediment is controlled by several factors. The major potential factors are changes in the accumulation rates of sediment, the boundary scavenging effect, and the atmospheric ^{10}Be production.

On the other hand, the stable isotope ^{9}Be has been used as a normalization of ^{10}Be concentration in the sea water and the ocean sediments. The ^{9}Be in the ocean sediments is originally derived from terrigenous input from the continents (e.g., Sharma et al., 1987, Brown et al., 1992) and hydrothermal activities (Bourles et al., 1991).

Our primary goal in this study was to assess the long-term variation of ^{10}Be flux and to estimate the changes in the ^{10}Be sources on the Ceara Rise in the equatorial Atlantic. The sediments deposited in this region consist mainly of calcareous ooze with a varying amount of clay (Curry, Shackleton, Richter, et al., 1995). In particular, the sediments after 4.5 Ma are characterized by a steady increase in clay content. Therefore, the ^{10}Be flux and the ^{10}Be/^{9}Be ratio would appear to be influenced by lateral terrigenous input from the Amazon drainage area.

MATERIALS AND METHODS

Site 925 is located at 4°12.248′N, 43°29.349′W, at a water depth of 3041 m on the uppermost part of the Ceara Rise off the coast of South America and the Amazon fan (Fig. 1). Analyzed samples were taken at approximately 10-m intervals from the upper 19 cores of Hole 925B. Sediment samples for ^{10}Be and ^{9}Be contents were prepared using the following procedures.

About 3 g of wet sediment was washed with pure water and then dried at 80°C for one night. The dried sediments were weighed before and after removal of carbonates using 2-N HCl. After leaching carbonate fractions, however, these supernatant liquids have a possibility of containing Be, as pointed out by some reports (Bourles et al.,1989, Henken-Mellies et al., 1990, Robinson et al., 1995). Therefore, the supernatant liquids were also used for ^{10}Be analysis by Accelerator Mass Spectrometry (AMS) and ^{9}Be analysis by Inductively Coupled Plasma Mass Spectrometry (ICP-MS). The amounts of ^{10}Be and ^{9}Be content in the sediment were obtained from the non-carbonate fraction and the supernatant liquid, respectively.

The non-carbonate fractions were added to 0.2 mg of Be carrier and were dissolved using a mixture of concentrated HNO_3 and 46% HF in 25-mL Teflon bombs at 140°C for 14 hr For ^{9}Be analysis in non-carbonate fractions by Inductively Coupled Plasma Atomic Emission Spectrometry (ICP-AES), almost the same amount of sediment was treated and dissolved using the same procedure as for AMS, but without adding a Be carrier. Further purification for AMS was made using a cation exchange column (Dowex 50W-X8) and an anion exchange column (MCI-GEL CA08P). Eluted Be fractions were evaporated to near dryness and were diluted with pure water. They were added to distilled ammonia water to precipitate Be as $Be(OH)_2$. After washing the precipitates twice with pure water, the precipitates were moved into small quartz beakers, and were dried on a hot plate. The samples were then placed in an electric furnace and temperatures were ramped to 900°C to convert the material to BeO. They were mixed with a fourfold amount of Ag powder and were pressed into 1 mm diameter holes of the AMS sample holders.

AMS measurements were performed on the 5UD Pelletron at the University of Tokyo. The standard samples for AMS were prepared from 4.98 × 10^{-10} stock solution originally supplied by ICN Co.,

[1]Shackleton, N.J., Curry, W.B., Richter, C., and Bralower, T.J. (Eds.), 1997. *Proc. ODP, Sci. Results,* 154: College Station, TX (Ocean Drilling Program).

[2]Graduate School of Environmental Earth Science, Hokkaido University, Sapporo 060, Japan. murayama@eoas.hokudai.ac.jp
[3]Department of Chemistry, College of Humanities and Science, Nihon University, Tokyo 156, Japan.
[4]Institute for Nuclear Study, University of Tokyo, Tokyo 188, Japan.
[5]Micro Analysis Laboratory, Tandem Accelerator Research Center for Nuclear Science and Technology, University of Tokyo, Tokyo 113, Japan.
[6]Ocean Research Institute, University of Tokyo, Tokyo 164, Japan.

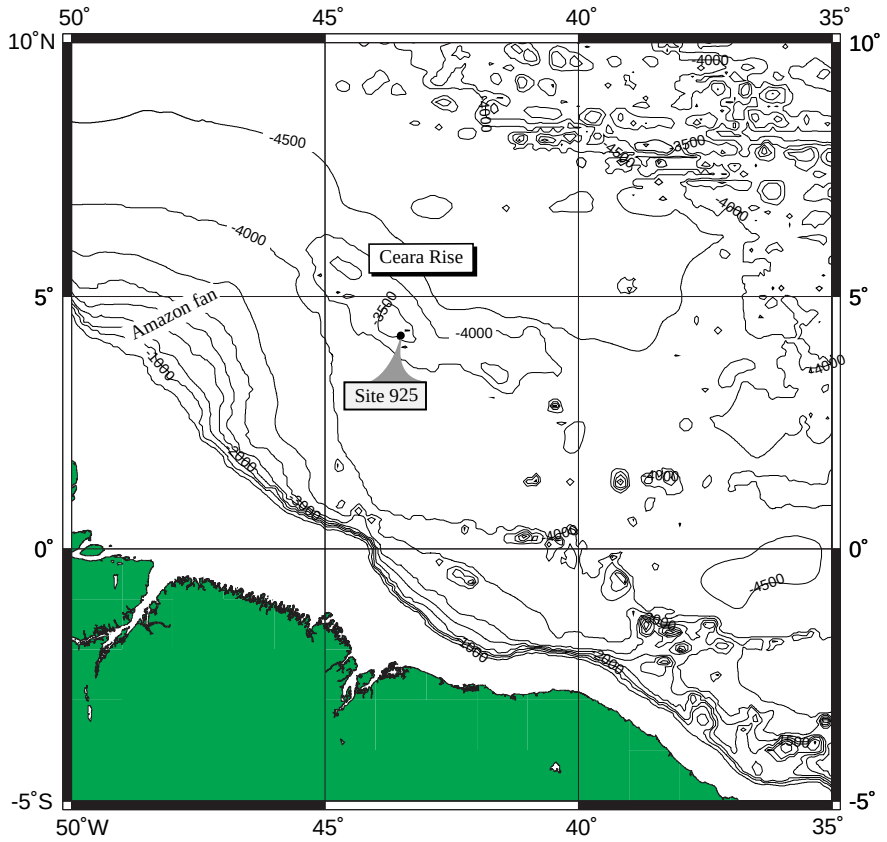

Figure 1. Location map showing Site 925 on the Ceara Rise in the equatorial Atlantic.

which had already been proven to produce a very good agreement in the $^{10}Be/^{9}Be$ ratio with the NIST standard. The reproducibility in $^{10}Be/^{9}Be$ of repeated measurements of several standard samples was 2%–4% (1σ).

Carbonate contents of each sample were determined using the carbonate bomb method (Müller and Gastner 1971).

RESULTS AND DISCUSSION

All data analyzed are presented in Table 1. For this site, detailed sample ages were based on biostratigraphic age datums (Curry, Shackleton, Richter, et al., 1995) and correlating part of astronomical tuning oxygen isotope record (0–2.5 Ma, Bickert et al., Chapter 16, this volume and 2.5–5 Ma, Tiedemann and Franz, this volume) with the SPECMAP oxygen isotope master curve (Imbrie et al., 1984), compared with the magnetic susceptibility and color reflectance record (Curry, Shackleton, Richter, et al., 1995).

In Figure 2, the ^{10}Be concentrations are plotted against the meters composite depth (mcd) in Hole 925B. The ^{10}Be concentration appears to decrease with an approximately linear trend on a logarithmic scale.

Age-corrected ^{10}Be flux and ^{9}Be flux were calculated according to the following relationships:

Age-corrected ^{10}Be flux (10^7 atoms/cm^2 k.y.) = dry bulk density (g/cm^3) × age-corrected ^{10}Be concentration (10^7 atoms/g total) × linear sedimentation rate (cm/k.y.),

and

^{9}Be flux (10^{16} atoms/cm^2 k.y.) = dry bulk density (g/cm^3) × ^{9}Be concentration (10^{16} atoms/g total) × linear sedimentation rate (cm/k.y.).

The fluxes of ^{10}Be range from about 50 to 270 × 10^7 atoms/cm^2 k.y., as shown in Figure 3. The average flux of ^{10}Be amounts to over 100 × 10^7 atoms/cm^2 k.y. The high values of fluxes (250 to 270 × 10^7 atoms/cm^2 k.y.) occurred abruptly after 1 Ma. The variation of ^{10}Be fluxes seems to have an almost same trend compared with that of ^{9}Be fluxes (Fig. 3).

In Figure 4, a plot of ^{10}Be flux against ^{9}Be flux shows a positive correlation, indicating that the ^{10}Be in the sediments was associated with the ^{9}Be. This result suggests that the ^{10}Be was mainly derived from the terrigenous fractions from the Amazon drainage area. Furthermore, as shown in Figure 5, this suggestion is supported by the relationship between the ^{10}Be and ^{9}Be flux ratio and the ^{9}Be concentration, which has a nearly constant trend.

The ^{10}Be in the sediments is either coming with or scavenged by the terrigenous fractions like fine-grained clays in the process of transportation from the Amazon drainage area. However, the concentration of ^{10}Be in the Amazon-derived terrigenous sediments should be expected to be much lower than that in the marine sediments (Kusakabe et al., 1991). Against this expectation, the fluxes of ^{10}Be show relatively high values (see Fig. 3). In particular, as the clay content was increased abruptly after 2 Ma, the increase in the fluxes of ^{10}Be occurred synchronously. Hence, there is almost no change in the ratio of ^{10}Be and ^{9}Be fluxes. All the variability in the ^{10}Be flux over the last 7 Ma at this site can be explained in terms of scavenging by the fluctuating input of terrigenous materials.

It is well known that the variation of ^{10}Be concentration in ocean sediment is also controlled by the ^{10}Be production rate in the atmosphere. Measurements of ^{10}Be profiles in the deep-sea sediments across geomagnetic reversals have shown that the ^{10}Be production rate was influenced by variations in the geomagnetic intensity (Raisbeck et al., 1979, 1985; Ku et al., 1985; Eisenhauer et al., 1987; Henken-Mellies et al., 1990; Kent and Schneider, 1995). Thus, the data of ^{10}Be flux variation in the sediments also includes the effect of changes in ^{10}Be production rate in the atmosphere. Unfortunately, we

Table 1. Result of analyses and flux estimates from Hole 925B cores.

Section	Depth (mcd)	Age (Ma)	^{10}Be content (10^7 atoms/g bulk)	Age-corrected ^{10}Be content (10^7 atoms/g bulk)	^{9}Be content (10^{16} atoms/g bulk)	$^{10}Be_{(Age\text{-}corrected)}/^{9}Be$ ($\times 10^{-9}$)	Age-corrected ^{10}Be flux (10^7atoms/cm^2 k.y.)	$CaCO_3$ (%)	DBD (g/cm^3)	LSR (cm/k.y.)
1H-1	1.10	0.02	68.89 ± 2.48	69.66 ± 2.51	18.52 ± 0.58	3.76 ± 0.18	226.84 ± 8.17	29.64	0.70	4.63
2H-5	11.54	0.29	85.29 ± 3.54	97.58 ± 4.05	19.24 ± 0.11	5.07 ± 0.21	273.09 ± 11.34	28.50	0.77	3.64
3H-5	23.26	0.60	65.65 ± 2.84	86.54 ± 3.74	16.50 ± 0.15	5.25 ± 0.23	261.26 ± 11.28	27.58	0.97	3.10
4H-5	34.10	0.97	36.22 ± 1.58	56.78 ± 2.48	22.60 ± 0.10	2.51 ± 0.11	144.46 ± 6.30	43.87	0.93	2.73
5H-6	44.74	1.33	— ± —	— ± —	23.23 ± 0.11	— ± —	— ± —	36.61	1.04	2.88
6H-6	54.01	1.66	17.25 ± 1.07	37.08 ± 2.30	8.13 ± 0.05	4.56 ± 0.28	108.87 ± 6.76	55.53	1.01	2.90
7H-6	64.94	2.02	16.72 ± 0.91	42.51 ± 2.31	8.22 ± 0.03	5.17 ± 0.28	129.20 ± 7.03	67.59	1.08	2.82
8H-6	74.21	2.30	13.77 ± 0.85	39.77 ± 2.45	9.64 ± 0.07	4.13 ± 0.26	148.86 ± 9.17	62.49	1.09	3.44
9H-7	85.68	2.68	11.98 ± 0.74	41.23 ± 2.56	8.13 ± 0.04	5.07 ± 0.32	117.52 ± 7.29	66.87	1.06	2.70
10H-6	94.88	2.97	11.00 ± 0.95	43.41 ± 3.76	7.76 ± 0.11	5.60 ± 0.49	141.35 ± 12.23	63.50	1.10	2.95
11H-7	108.59	3.33	8.96 ± 0.75	41.78 ± 3.51	7.98 ± 0.26	5.24 ± 0.47	124.74 ± 10.47	66.33	1.05	2.84
12H-7	119.00	3.69	6.17 ± 0.56	33.97 ± 3.10	10.01 ± 0.08	3.39 ± 0.31	96.25 ± 8.78	56.02	1.07	2.65
13H-7	130.42	4.06	5.74 ± 0.52	37.46 ± 3.38	10.19 ± 0.02	3.68 ± 0.33	103.42 ± 9.32	61.38	1.07	2.58
14H-7	140.17	4.37	4.22 ± 0.60	31.75 ± 4.52	9.89 ± 0.05	3.21 ± 0.46	108.67 ± 15.46	64.98	1.11	3.09
15H-4	146.15	4.64	3.85 ± 0.61	32.83 ± 5.19	N.D.	— ± —	65.28 ± 10.31	62.91	1.08	1.84
15H-6	149.90	4.78	4.24 ± 0.26	38.73 ± 2.49	8.96 ± 0.09	4.33 ± 0.27	106.53 ± 6.61	64.39	1.08	2.55
16H-6	160.92	5.30	2.90 ± 0.42	33.69 ± 4.92	4.16 ± 0.05	8.09 ± 1.18	71.31 ± 10.41	75.42	1.16	1.83
17H-7	171.77	5.75	2.17 ± 0.86	30.86 ± 12.26	6.86 ± 0.27	4.50 ± 1.80	81.69 ± 32.45	70.33	1.14	2.32
18H-7	182.69	6.14	3.21 ± 0.19	54.85 ± 3.26	12.99 ± 0.11	4.22 ± 0.25	147.14 ± 8.75	51.69	1.13	2.37
19H-7	192.62	6.55	2.54 ± 0.31	52.20 ± 6.39	9.35 ± 0.08	5.58 ± 0.68	147.72 ± 18.08	68.04	1.19	2.37

Notes: Age control is based on biostratigraphic datums (shipboard Scientific Party, 1995) and oxygen isotope stratigraphy (0–2.5 Ma, Bickert et al., Chapter 16, this volume, and 2.5–5.0 Ma, Tiedemann and Franz, this volume). The error for each measurement shows 1σ standard deviation of the mean. ^{10}Be flux was calculated from dry bulk density (DBD), age-corrected ^{10}Be concentration, and linear sedimentation rate (LSR) as mentioned in text.

cannot remove this effect in our data. However, the long-term fluctuations of ^{10}Be concentrations from atmospheric production have been estimated to be no more than ±25%–30% in many reports (Tanaka and Inoue 1979; Southon et al., 1987; Lao et al., 1992a, 1992b). Therefore, the fluctuation does not have a source effect over the long-time span in this study.

Considering the lithological data (Curry, Shackleton, Richter, et al., 1995), the variation of ^{9}Be fluxes, and the carbonate content of the samples, the non-carbonate phase in the samples is increased towards the top of the hole. Thus, the variations of ^{10}Be flux and ^{9}Be flux in the sediments over 7 Ma on the shallowest top of Ceara Rise can be explained by local or regional change in the terrigenous supply from the Amazon drainage area.

CONCLUSION

Based on age-corrected ^{10}Be and ^{9}Be flux profiles and the variation of ^{10}Be and ^{9}Be flux ratio, we observed a trend for the upper 200 m of Hole 925B, 3041 m, at the Ceara Rise in the equatorial Atlantic. We can mention at least the following conclusions from the present study.

1. The ^{10}Be flux range from 50 to 270×10^7 atoms/cm^2 k.y. with an average over 100×10^7 atoms/cm^2 k.y.
2. The high values of ^{10}Be flux and ^{9}Be flux after 2 Ma reflect remarkably an increased terrigenous input from the Amazon drainage area. Hence, its ratios of ^{10}Be and ^{9}Be flux have no changes.
3. The sediments over 7 Ma on the shallowest top of Ceara Rise are influenced by the effect of scavenging by the terrigenous fractions rather than that of the global changes in ^{10}Be production rate in the atmosphere.

ACKNOWLEDGMENTS

We thank Drs. T. Oba, M. Minagawa, H. Narita, and N. Ahagon for their various experimental suggestions and scientific discussion. We also thank Dr. N.J. Shackleton and two anonymous reviewers for their critical reading and constructive comments. The authors sincerely thank Shigemichi Sakata, Jun Dohi, and Kazuhiro Hayashi for sample preparation. This study was partly supported by funds provided by JSPS Research Fellowships for Young Scientists (No.4172) and the Japanese Ministry of Education, Culture and Science (Grant-in-Aid for Scientific Research (B) No.06453011).

REFERENCES

Anderson, R.F., Lao, Y., Broecker, W.S., Trumbore, S.E., Hofmann, H.J., and Wolfli, W., 1990. Boundary scavenging in the Pacific Ocean: a comparison of ^{10}Be and ^{231}Pa. *Earth Planet. Sci. Lett.*, 96:287–304.

Beets, C.J., Klaver, G.T., Kroon, D., van der Borg, K., and de Jong, A.F.M., 1991. ^{10}Be contents of late Cenozoic sediments from Sites 720, 722, and 728 in the western Arabian Sea. *In* Prell, W.L., Niitsuma, N., et al., *Proc. ODP, Sci. Results*, 117: College Station, TX (Ocean Drilling Program), 455–458.

Bourles, D.L., Raisbeck, G.M., Brown, E.T., Yiou, F., and Edmond, J.M., 1991. Beryllium isotope systematics of submarine hydrothermal sediments. *Earth Planet. Sci. Lett.*, 105:141–153.

Bourles, D.L., Raisbeck, G.M., and Yiou, F., 1989. ^{10}Be and ^{9}Be in marine sediments and their potential for dating. *Geochim. Cosmochim. Acta*, 53:443–452.

Brown, E.T., Measures, C.I., Edmond, J.M., Bourles, D.L., Raisbeck, G.M., and Yiou, F., 1992. Continental inputs of beryllium to the oceans. *Earth Planet. Sci. Lett.*, 114:101–111.

Brown, L., 1987. ^{10}Be as a tracer of erosion and sediment transport. *Chem. Geol.* 65:189–196.

Curry, W.B., Shackleton, N.J., Richter, C., et al., 1995. *Proc. ODP, Init. Repts.*, 154: College Station, TX (Ocean Drilling Program).

Eisenhauer, A., Mangini, A., Segl, M., Beer, J., Bonani, G., Suter, M., and Wolfli, W., 1987. High resolution ^{10}Be and ^{230}Th profiles in DSDP Site 580. *Nucl. Instrum. Methods Phys. Res.* (Sect. B), 29:326–331.

Frank, M., Eckhardt, J.-D., Eisenhauer, A., Kubik, P.W., Dittrich-Hannen, B., Segl, M., and Mangini, A., 1994. Beryllium 10, thorium 230, and protactinium 231 in Galapagos microplate sediments: implications of hydrothermal activity and paleoproductivity changes during the last 100,000 years. *Paleoceanography*, 9:559–578.

Henken-Mellies, W.U., Beer, J., Heller, F., Hsu, K.J., Shen, C., Bonani, G., Hofmann, H.J., Suter, M., and Wolfli, W., 1990. ^{10}Be and ^{9}Be in South Atlantic DSDP Site 519: relation to geomagnetic reversals and to sediment composition. *Earth Planet. Sci. Lett.*, 98:267–276.

Imbrie, J., Hays, J.D., Martinson, D.G., McIntyre, A., Mix, A.C., Morley, J.J., Pisias, N.G., Prell, W.L., and Shackleton, N.J., 1984. The orbital theory of Pleistocene climate: support from a revised chronology of the marine ^{18}O record. *In* Berger, A., Imbrie, J., Hays, J., Kukla, G., and Saltzman, B. (Eds.), *Milankovitch and Climate* (Pt. 1), NATO ASI Ser. C, Math Phys. Sci., 126: Dordrecht (D. Reidel), 269–305.

Kent, D.V., and Schneider, D.A., 1995. Correlation of paleointensity variation records in the Brunhes/Matuyama polarity transition interval. *Earth Planet. Sci. Lett.*, 129:135−144.

Ku, T.L., Southon, J.R., Vogel, J.S., Liang, Z.C., Kusakabe, M., and Nelson, D.E., 1985. ^{10}Be distributions in Deep Sea Drilling Project Site 576 and Site 578 sediments studied by accelerator mass spectrometer. *In* Heath, G.R. and Burckle, L.H., et al., *Init. Repts. DSDP*, 86:Washington (U.S. Govt. Printing Office), 539−546.

Kusakabe, M., Ku, T.L., Southon, J.R., Liu, S., Vogel, J.S., Nelson, D.E., Nakaya, S.I., and Cusimano, G.L., 1991. Be isotope in rivers/estuaries and their oceanic budgets. *Earth Planet. Sci. Lett.*, 102:265−276.

Kusakabe, M., Ku, T.L., Southon, J.R., Vogel, J.S., Nelson, D.E., Measures, C.I., and Nozaki, Y., 1987. The distribution of ^{10}Be and ^{9}Be in ocean water. *Nucl. Instrum. Methods Phys. Res.* (Sect. B), 29:306−310.

Kusakabe, M., Ku, T.L., Southon, J.R., Vogel, J.S., Nelson, D.E., and Richard, G., 1982. Beryllium-10 profiles in sea water. *Nature*, 299:712−714.

Lao, Y., Anderson, R.F., Broecker, W.S., Trumbore, S.E., Hofmann, H.J., and Wolfli, W., 1992a. Increased production of cosmogenic ^{10}Be during the last glacial maximum. *Nature*, 357:576−578.

————, 1992b. Transport and burial rates of ^{10}Be and ^{231}Pa in the Pacific ocean during the Holocene period. *Earth Planet. Sci. Lett.*, 113:173−189.

————, 1993. Particulate fluxes of ^{230}Th, ^{231}Pa and ^{10}Be in the northeastern Pacific ocean. *Earth Planet. Sci. Lett.*, 57:205−217.

Müller, G., and Gastner, M., 1971. The "Karbonat-Bombe", a simple device for the determination of the carbonate content in sediments, soils and other materials. *Neues Jahrb. Mineral. Monatsh.*, 10:466−469.

Raisbeck, G.M., Yiou, F., Fruneau, M., Loiseaux, J.M., Lieuvin, M., Ravel, J.C., and Hays, J.D., 1979. A search in a marine sediment core for ^{10}Be concentration variations during a geomagnetic field reversal. *Geophys. Res. Lett.*, 6:717−719.

Raisbeck, G.M., Yiou, F., and Bourles, D., 1985. Evidence for an increase in cosmogenic ^{10}Be during a geomagnetic reversal. *Nature*, 315:315−317.

Raisbeck, G.M., and Yiou, F., 1988. ^{10}Be as a proxy indicator of variations in solar activity and geomagnetic field intensity during the last 10,000 years. *In* Stephenson, F.R. and Wolfendale, A.W. (Eds.), *Secular Solar and Geomagnetic Variations in theLast 10,000 Years:* Dordrecht (Kluwer), 287−296.

Robinson, C., Raisbeck, G.M., Yiou, F. and Lehman, B., 1995. The relationship between ^{10}Be and geomagnetic field strength records in the central North Atlantic sediments during the last 80 ka. *Earth Planet. Sci. Lett.*, 136:551−557.

Sharma, P., Mahannah, P., Moore, W.S., Ku, T.L., and Southon, J.R., 1987. Transport of ^{10}Be and ^{9}Be in the ocean. *Earth Planet. Sci. Lett.*, 86:69–76.

Southon, J.R., Ku, T.L., Nelson, D.E., Reyss, J.L., Duplessy, J.C., and Vogel, J.S., 1987. ^{10}Be in a deep-sea core: implications regarding ^{10}Be production changes over the past 420Ka. *Earth Planet. Sci. Lett.*, 85:356−364.

Tanaka, S., and Inoue, T., 1979. ^{10}Be dating of north Pacific sediment cores up to 2.5 million years B. P. *Earth Planet. Sci. Lett.*, 45:181−187.

Date of initial receipt: 5 December 1995
Date of acceptance: 16 August 1996
Ms 154SR-126

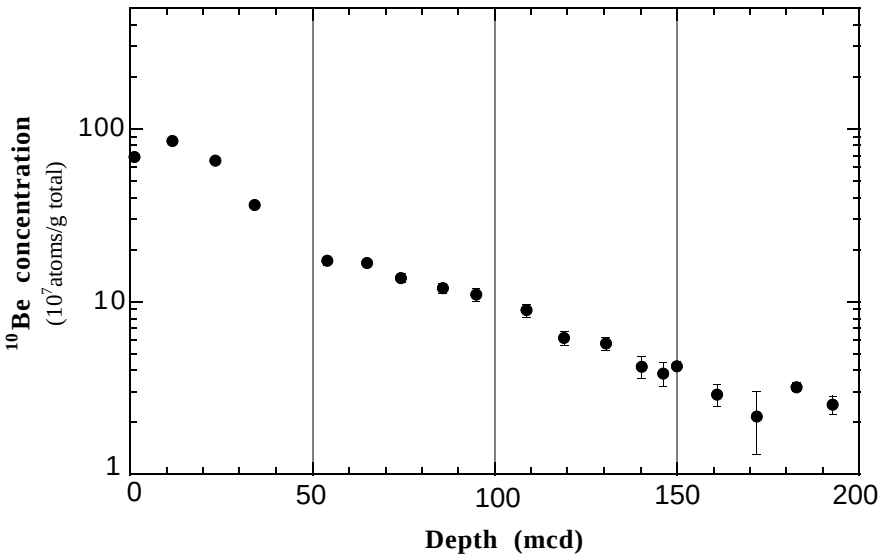

Figure 2. ^{10}Be concentrations in bulk sediments are plotted against meters composite depth (mcd) in Hole 925B.

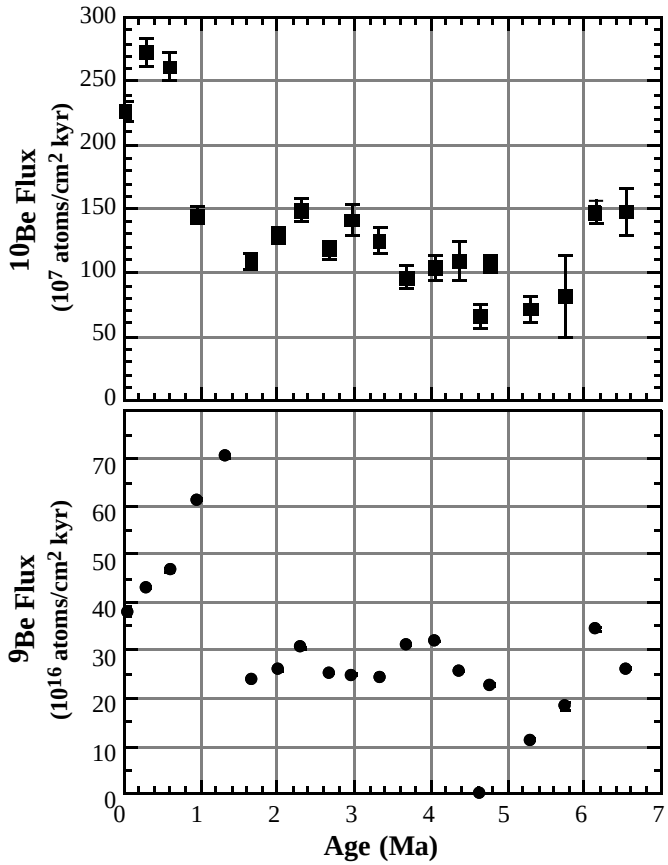

Figure 3. Age-corrected ^{10}Be flux and ^{9}Be flux as a function of age (Ma).

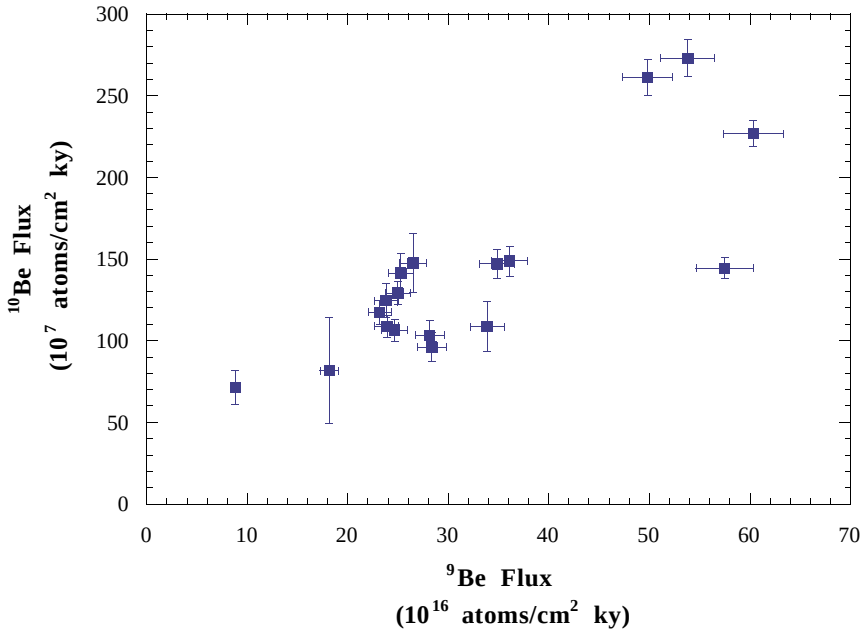

Figure 4. ^{10}Be flux vs. ^{9}Be flux.

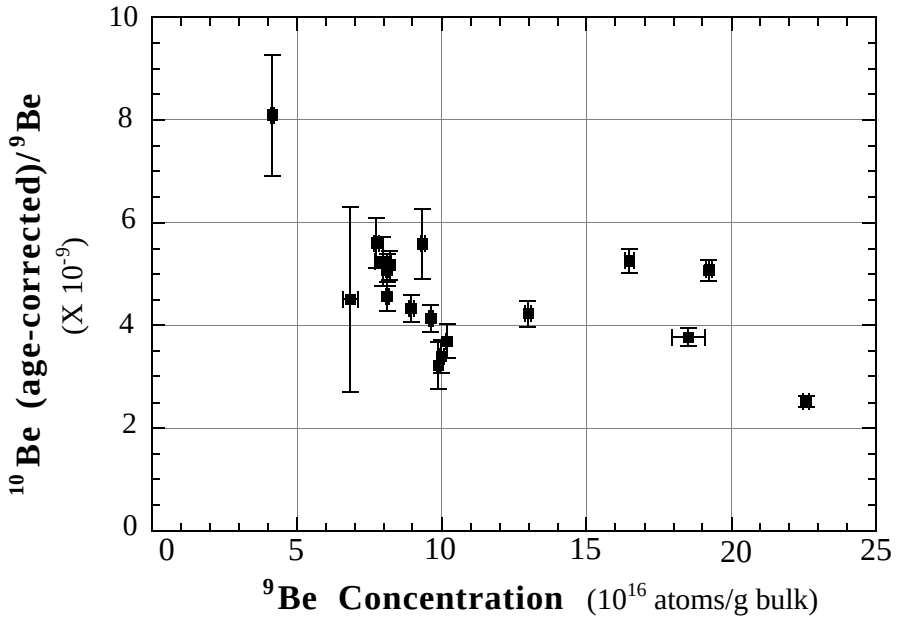

Figure 5. ^{10}Be flux/^{9}Be flux as a function of ^{9}Be concentration.

Previous Chapter Table of Contents Next Chapter