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4. Summary of Revised Age Assignments for ODP Leg 180[1]

Kyoma Takahashi,[2] Giuseppe Cortese,[3] Gina M. Frost,[4] Stefania Gerbaudo,[5] Andrew M. Goodliffe,[6] Naoto Ishikawa,[7] Klas S. Lackschewitz,[8] Russell C.B. Perembo,[9] Johanna M. Resig,[6] William G. Siesser,[10] Brian Taylor,[6] and Massimiliano Testa[5]

ABSTRACT

Based on revised and newly obtained age assignments, sediment accumulation rates and sedimentation curves were recalculated and redrawn, respectively, for Ocean Drilling Program Sites 1109, 1115, and 1118.

REVISION OF AGE ASSIGNMENTS

Several planktonic foraminifer datum points were revised by Resig et al. (in press). Similarly, slight corrections for several magnetic chron and subchron boundaries have also been made (G. Frost, pers. comm., 2000). Moreover, Lackschewitz et al. (in press) measured $^{40}Ar/^{39}Ar$ ages for fallout tephra layers and volcaniclastic deposits in the sedimentary successions at Sites 1109, 1115, and 1118. Seismic correlation between Sites 1109 and 1118 were made by **Goodliffe et al.** (this volume).

The sedimentation rates were recalculated based on the revised and newly obtained age assignments mentioned above at Sites 1109, 1115, and 1118 (Figs. **F1, F2, F3,** respectively). Based on these calculations, sedimentation curves were correlated between sites (Fig. **F4**).

Testa et al. (this volume) found several radiolarian datum levels from Holes 1108B, 1110A, 1111A, 1112A, and 1115B. Newly obtained maximum ages for select Quaternary samples from Sites 1108, 1110–1112, and 1115 are listed in Table **T1.** For each sample, the actual age may be equal to or younger than the age of the radiolarian zone indicated.

[1]Takahashi, K., Cortese, G., Frost, G.M., Gerbaudo, S., Goodliffe, A.M., Ishikawa, N., Lackschewitz, K.S., Perembo, R.C.B., Resig, J.M., Siesser, W.G., Taylor, B., and Testa, M., 2001. Summary of revised age assignments for ODP Leg 180. *In* Huchon, P., Taylor, B., and Klaus, A. (Eds.), *Proc. ODP, Sci. Results,* 180, 1–13 [Online]. Available from World Wide Web: <http://www-odp. tamu.edu/publications/180_SR/VOLUME/CHAPTERS/152.PDF>. [Cited YYYY-MM-DD]
[2]Interactive Research Center of Science, Tokyo Institute of Technology, Ookayama, Tokyo 152-8551, Japan. **kyoma-180@ep.sci.hokudai.ac.jp**
[3]Alfred Wegener Institute for Polar and Marine Research Columbusstrasse, PO Box 120161, 27515 Bremerhaven, Germany.
[4]Central Oregon College Science Department, 2600 Northwest College Way, Bend OR 97702, USA.
[5]Dipartimento di Scienze della Terra, Università degli Studi di Genova, Corso Europa, 26, Genova 16132, Italy.
[6]School of Ocean and Earth Science and Technology, University of Hawaii at Manoa, 2525 Correa Road, Honolulu HI 96822-2285, USA.
[7]School of Earth Sciences, Kyoto University, Sakyo-ku, Kyoto 606-8501, Japan.
[8]Universität Bremen, FB 5 Geowissenschaften, Postfach 330440, 28334 Bremen, Germany.
[9]Department of Geology, University of Papua New Guinea, Box 414, University PO, Papua New Guinea.
[10]Department of Geology, Vanderbilt University, Box 46 Station B, Nashville TN 37235, USA.

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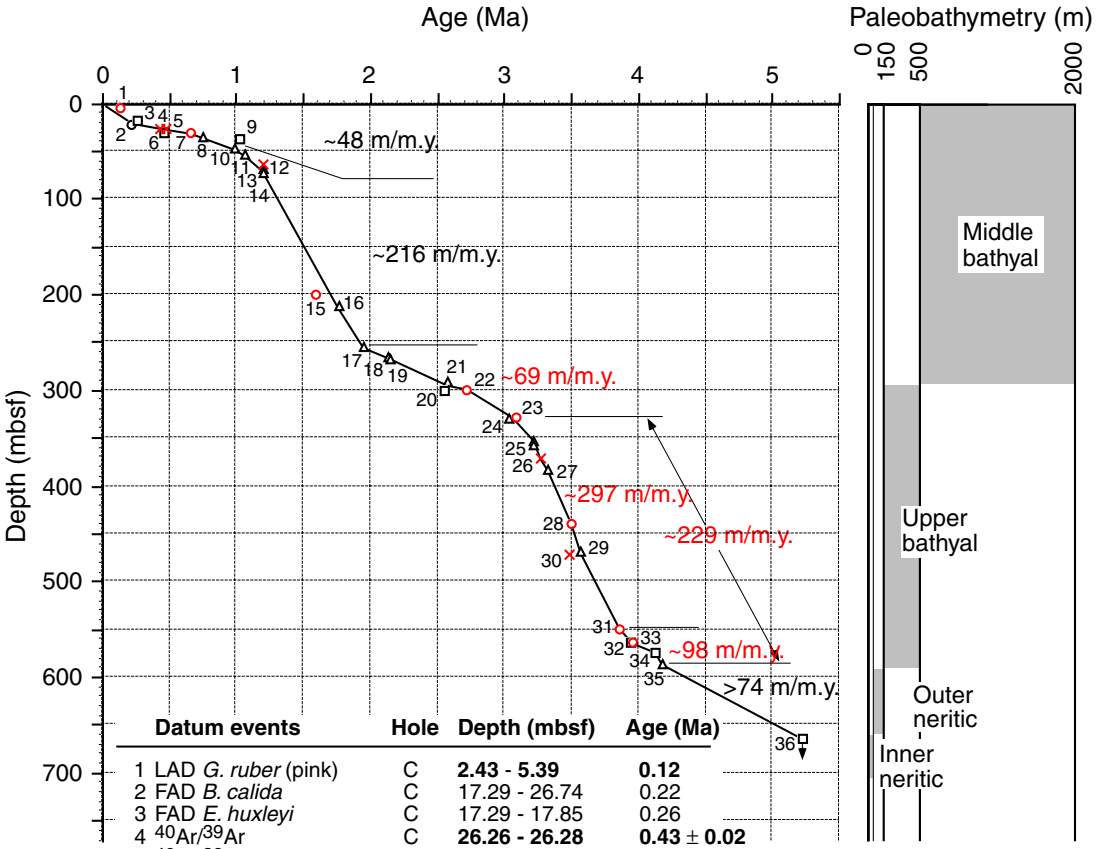
Figure F1. Age-depth relationship at Site 1109 based on nannofossil (squares) and planktonic foraminiferal (circles) datum levels, $^{40}Ar/^{39}Ar$ age (crosses), and magnetic chron and subchron boundaries (triangles), as a revision of fig. F63 in Shipboard Scientific Party (1999b) and paleobathymetry (right column) based on benthic foraminifers. Sediment accumulation rates are estimated in meters per million years. Revised and newly obtained age assignments are shown by red symbols. The numbers plotted near symbols correspond to numbers in the left column of the datum table. LAD = last appearance datum, FAD = first appearance datum, LCO = last common occurrence, FCO = first common occurrence, S/D = sinistral to dextral coiling change. (**Figure shown on next page.**)

Figure F1 (continued).

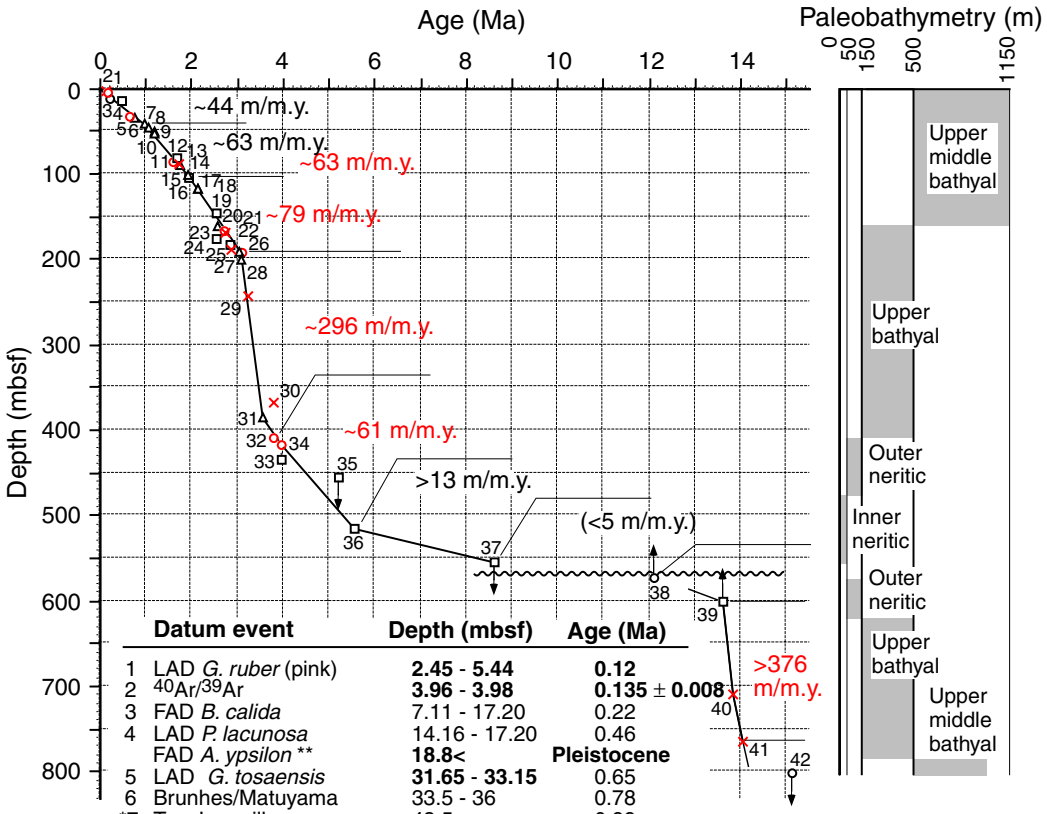


Datum events	Hole	Depth (mbsf)	Age (Ma)
1 LAD *G. ruber* (pink)	C	**2.43 - 5.39**	**0.12**
2 FAD *B. calida*	C	17.29 - 26.74	0.22
3 FAD *E. huxleyi*	C	17.29 - 17.85	0.26
4 $^{40}Ar/^{39}Ar$	C	**26.26 - 26.28**	**0.43 ± 0.02**
5 $^{40}Ar/^{39}Ar$	C	**26.51 - 25.53**	**0.48 ± 0.04**
6 LAD *P. lacunosa*	C	29.58 - 31.95	0.46
7 LAD *G. tosaensis*	C	**32.50 - 32.62**	0.65
8 Brunhes/Matuyama	C	36	0.78
9 FAD *G. omega*	C	36.42 - 36.85	1.02
*10 Top Jaramillo	C	47.5 - 48.0	0.99
11 Bottom Jaramillo	C	53.5 - 54.0	1.07
12 $^{40}Ar/^{39}Ar$	C	**62.9 - 62.92**	**1.21 ± 0.16**
13 Top Cobb	C	70.5	1.201
14 Bottom Cobb	C	74	1.211
15 LAD *G. fistulosus*	C	**199.87 - 208.51**	**1.6**
16 Top Olduvai	C	213	1.77
*17 Bottom Olduvai	C	255	1.95
18 Top Reunion	C	266	2.14
19 Bottom Reunion	C	269	2.15
20 LAD *D. surculus*	C	294.81 - 304.36	2.55
21 Matuyama/Gauss	C	291	2.58
22 FAD *G. truncatulinoides*	C	**295.75 - 297.23**	**2.7**
*23 LAD *D. altispira*	C	**330.85 - 333.83**	3.09
*24 Top Kaena	C	331	3.04
25 Top Mammoth	C	355	3.22
	D	358	3.22
26 $^{40}Ar/^{39}Ar$	D	**371.6 - 372.2**	**3.27 ± 0.03**
27 Bottom Mammoth	D	384.5	3.33
28 LAD *G. margaritae*	D	**442.08 444.49**	**3.50**
29 Gauss/Gilbert	D	470	3.58
30 $^{40}Ar/^{39}Ar$	D	**471.5 - 471.9**	**3.49 ± 0.09**
*31 FAD *G. crassaformis*	D	**548.80 - 551.00**	**3.8**
32 LCO *R. pseudoumbilicus*	D	562.51 - 562.71	3.94
33 S/D *Pulleniatina*	D	**562.71 - 566.55**	3.95
34 FCO *D. asymmetricus*	D	571.66 - 578.42	4.13
*35 Top C3n	D	587	4.18
*36 FAD *C. rugosus*	D	>664.29	5.23

* datum level used in sedimentation rate calculation
Revised and newly obtained age assignments are expressed in bold.

Figure F2. Age-depth relationship at Site 1115 based on nannofossil (squares) and planktonic foraminiferal (circles) datum levels, $^{40}Ar/^{39}Ar$ age (crosses), and magnetic chron and subchron boundaries (triangles), as a revision of fig. F37 in Shipboard Scientific Party (1999c) and paleobathymetry (right column) based on benthic foraminifers. Sediment accumulation rates are estimated in meters per million years. Revised and newly obtained age assignments are shown by red symbols. The numbers plotted near symbols correspond to numbers in the left column of the datum table. LAD = last appearance datum, FAD = first appearance datum, LCO = last common occurrence, S/D = sinistral to dextral coiling change. (**Figure shown on next page.**)

Figure F2 (continued).

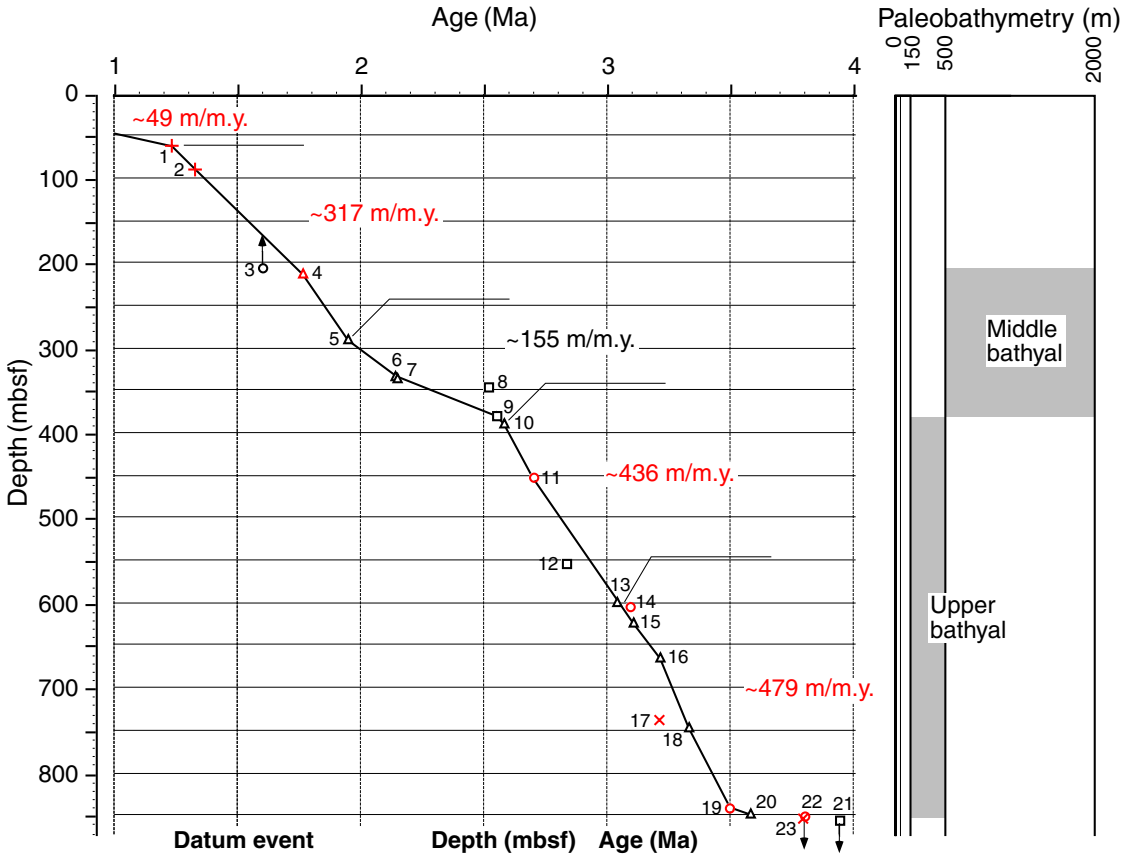


	Datum event	Depth (mbsf)	Age (Ma)
1	LAD *G. ruber* (pink)	**2.45 - 5.44**	**0.12**
2	$^{40}Ar/^{39}Ar$	**3.96 - 3.98**	**0.135 ± 0.008**
3	FAD *B. calida*	7.11 - 17.20	0.22
4	LAD *P. lacunosa*	14.16 - 17.20	0.46
	FAD *A. ypsilon* **	**18.8<**	**Pleistocene**
5	LAD *G. tosaensis*	**31.65 - 33.15**	0.65
6	Brunhes/Matuyama	33.5 - 36	0.78
*7	Top Jaramillo	43.5	0.99
8	Bottom Jaramillo	47	1.07
9	Top Cobb	53	1.201
10	Bottom Cobb	54.5	1.211
11	LAD *G. fistulosus*	86.65 - 88.35	1.6
11	LAD *C. macintyrei*	82.15 - 82.80	1.67
13	$^{40}Ar/^{39}Ar$	**88.30 - 88.32**	**1.71 ± 0.06**
14	Top Olduvai	90.5	1.77
*15	Bottom Olduvai	102.5 - 103.5	1.95
*16	LAD *D. brouweri*	103.16 - 106.16	1.95
17	Top Reunion	118	2.14
18	Bottom Reunion	119.5	2.15
19	LAD *D. pentaradiatus*	144.13 - 147.15	2.52
20	Matuyama/Gauss	162	2.581
21	FAD *G. truncatulinoides*	**166.15 - 169.16**	**2.7**
22	$^{40}Ar/^{39}Ar$	**169.3 - 169.32**	**2.77 ± 0.04**
23	LAD *D. surculus*	175.65 - 178.63	2.55
24	LAD *D. tamalis*	178.63 - 188.15	2.83
25	$^{40}Ar/^{39}Ar$	**189.62 - 189.64**	**2.84 ± 0.03**
*26	LAD *D. altispira*	**190.15 - 193.15**	3.09
*27	Top Kaena	192.50	3.04
28	Bottom Kaena	202	3.11
29	$^{40}Ar/^{39}Ar$	**243.42 - 243.44**	**3.23 ± 0.08**
30	$^{40}Ar/^{39}Ar$	**367.9 - 368.6**	**3.78 ± 0.16**
31	Gauss/Gilbert	386.00 - 387.00	3.58
*32	FAD *G. crassaformis*	**407.31 - 412.07**	**3.8**
33	LCO *R. pseudoumbilicus*	428.65 - 439.01	3.94
34	S/D *Pulleniatina*	**412.07 - 425.81**	3.95
35	FAD *C. rugosus*	456.04<	5.23
*36	LAD *D. quinqueramus*	514.29 - 516.37	5.54
*37	FAD *D. quinqueramus*	555.29<	8.6
*38	LAD *G. praemenardii*	<572.27	>12.1
*39	LAD *S. heteromorphus*	<600.11	13.6
40	$^{40}Ar/^{39}Ar$	**709.7 - 712.9**	**13.84 ± 0.02**
*41	$^{40}Ar/^{39}Ar$	**765.4 - 771.8**	**14.04 ± 0.03**
42	FAD *O. suturalis*	802.14<	15.1

* datum level used in sedimentation rate calculation
Revised and newly obtained age assignments are expressed in bold.
** specimen with pecularities pointed out by Nigrini (1971)

Figure F3. Age-depth relationship at Site 1118 based on nannofossil (squares) and planktonic foraminiferal (circles) datum levels, $^{40}Ar/^{39}Ar$ age (crosses), magnetic chron and subchron boundaries (triangles), and seismic correlation with Site 1109 (pluses), as a revision of fig. F54 in Shipboard Scientific Party (1999d) and paleobathymetry (right column) based on benthic foraminifers. Sediment accumulation rates are estimated in meters per million years. Revised and newly obtained age assignments are shown by red symbols. The numbers plotted near the symbols correspond to numbers in the left column of the datum table. LAD = last appearance datum, FAD = first appearance datum, LCO = last common occurrence. (**Figure shown on next page.**)

Figure F3 (continued).



Datum event	Depth (mbsf)	Age (Ma)
*1 seismic layer 79 ms (= Site 1109 102 ms)	**60.83**	**1.23** (Site 1109 79.63 mbsf)
2 seismic layer 113 ms (= Site 1109 130 ms)	**87.53**	**1.32** (Site 1109 102.08 mbsf)
3 LAD *G. fistulosus*	<205.00	1.6
4 Top Olduvai	**210.42**	**1.77**
*5 Bottom Olduvai	288.0	1.95
6 Top Reunion	332.0	2.14
7 Bottom Reunion	334.5	2.15
8 LAD *D. pentaradiatus*	339.87 - 348.87	2.52
*9 LAD *D. surculus*	374.47 - 384.20	2.55
*10 Matuyama/Gauss	387.5	2.581
11 FAD *G. truncatulinoides*	**449.93** - **456.85**	**2.7**
12 LAD *D. tamalis*	549.75 - 556.95	2.83
*13 Top Kaena	599.0	3.04
*14 LAD *D. altispira*	**597.72** - 608.20	3.09
15 Bottom Kaena	623.0	3.11
16 Top Mammoth	662.5	3.22
17 $^{40}Ar/^{39}Ar$	**734.9** - **737.7**	**3.21** ± **0.08**
18 Bottom Mammoth	744.5	3.33
19 LAD *G. margaritae*	**835.32** - **840.54**	**3.5**
*20 Gauss/Gilbert	846.0 - 849.5	3.58
21 LCO *R. pseudoumbilicus*	>853.15	3.94
22 FAD *G. crassaformis*	>849.30	**3.8**
23 $^{40}Ar/^{39}Ar$	**850.7** - **855.0**	**3.79** ± **0.01**

* datum level used in sedimentation rate calculation
Revised and newly obtained age assignments are expressed in bold.

Figure F4. Sedimentation curves at Sites 1115 (black line), 1109 (red line), 1118 (green line), 1108 (solid line, upper right), 1114 (dashed line, upper right), and 1116 (dotted line, upper right) based on nannofossil (squares), planktonic foraminifer (circles), and radiolarian (diamonds) datum levels, magnetic chron and subchron boundaries (triangles), $^{40}Ar/^{39}Ar$ age (crosses), seismic correlation (pluses), and lithostratigraphic correlation (stars), as a revision of fig. F10 in Shipboard Scientific Party (1999a). Symbols with arrows indicate that the actual datum points can be above or below and older or younger than indicated by the symbols. Wavy lines denote unconformities. Shown below are average sedimentation rates in meters per million years calculated for intervals separated by vertical lines and paleobathymetry based on benthic foraminifers at Sites 1115, 1109, and 1118. Broken lines indicate uncertainty in the placement of paleodepth boundaries. (**Figure shown on next page.**)

Figure F4 (continued).

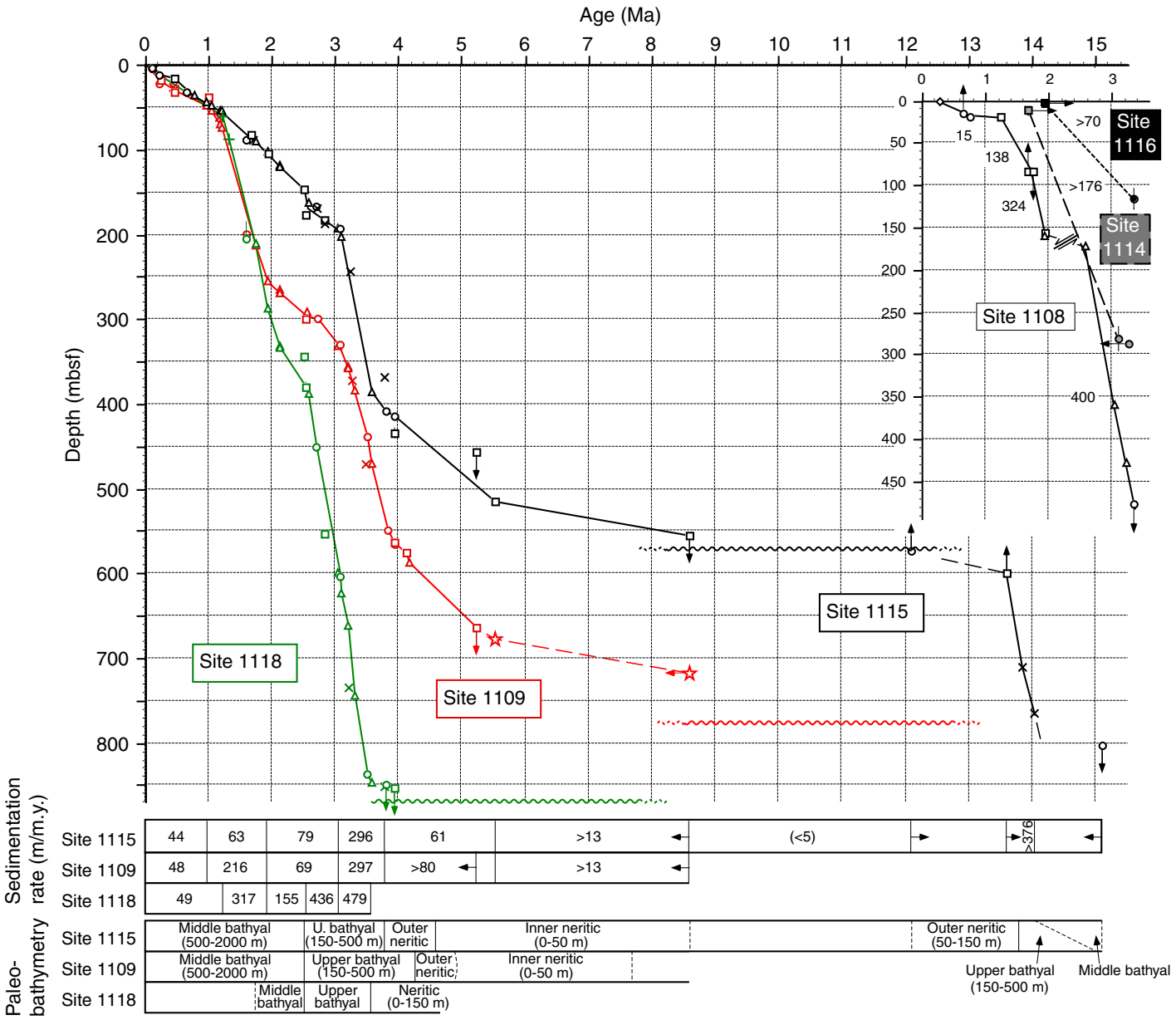


Table T1. Maximum possible ages of select samples from Sites 1108, 1110, 1111, 1112, and 1115 based on radiolarians.

Biozones (Sanfilippo and Nigrini, 1998)		Basal Zone Age (Ma)			Sample											
		(Johnson et al., 1989)	(Caulet et al., 1993)	(Shackleton et al., 1995)	1108B-1R-1, 10-12 cm	1110A-1H-2, 77-79 cm	1110A-2H-1, 58-62 cm	1111A-11R-1, 44-46 cm	1111A-14R-1, 60-62 cm	1111A-14R-3, 62-64 cm	1111A-15R-1, 38-40 cm	1111A-16R-1, 5-7 cm	1112A-1R-1, 100-101 cm	1115B-1H-1, 5-7 cm	1115B-2H-4, 145-147 cm	1115B 3H-2, 58-60 cm
RN 17 - *Buccinosphaera invaginata*	Taxon-Range Zone	0.18														
RN 16 - *Collosphaera tuberosa*	Interval Zone		0.42	0.42												
RN 15 - *Stylatractus universus*	Concurrent Range Zone		0.47	0.61	x	x	x	x	x	x				x		
RN 14 - *Amphyropalum ypsilon*	Interval Zone		1.10	1.12												
RN 13 - *Anthocyrtidium angulare*	Interval Zone		1.65	1.74							x	x	x		x	x

CHAPTER NOTES*

N1. 19 February 2002—Lackschewitz, K., Bogaard, P.V.D., and Mertz, D.F., 2001. $^{40}Ar/^{39}Ar$ ages of fallout tephra layers and volcaniclastic deposits in the sedimentary succession of the western Woodlark Basin, Papua New Guinea: the marine record of Miocene–Pleistocene volcanism. *In* Wilson, R.C.L., Whitmarsh, R.B., Taylor, B., and Froitzheim, N. (Eds.), *Non-volcanic Rifting of Continental Margins: Evidence from Land and Sea,* Spec. Publ.—Geol. Soc. London, 187:373–388.

N2. 19 February 2002—Resig, J.M., Frost, G.M., Ishikawa, N., and Perembo, R.C.B., 2001. Micropaleontologic and paleomagnetic approaches to stratigraphic anomalies in rift basins: ODP Site 1109, Woodlark Basin. *In* Wilson, R.C.L., Whitmarsh, R.B., Taylor, B., and Froitzheim, N. (Eds.), *Non-volcanic Rifting of Continental Margins: Evidence from Land and Sea,* Spec. Publ.—Geol. Soc. London, 187:389–404.

*Dates reflect file corrections or revisions.