

26. DATA REPORT: X-RADIOGRAPHY OF SELECTED, PREDOMINANTLY VARVED INTERVALS AT HOLE 893A¹

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INTRODUCTION

The predominantly varved sediments of the uppermost 3.5 m of Core 146-893A-1H cover a depth range of Santa Barbara Basin (SBB) sediment that is accessible by Kasten coring and other gravity coring techniques. These sediments previously have been the focus of many paleoceanographic studies (reviewed by Lange et al., in press). This sediment interval gains additional value when it can be stratigraphically matched against other paleoceanographic records from nearby sites. This study provides a preliminary framework for later, more detailed correlation among other SBB sites.

High-resolution paleoclimatic reconstruction based on varve records requires accurate age-assignment of varves (e.g., Baumgartner et al., 1991). Annual resolution over at least the past 1,000 years permits cross-correlation and detailed comparisons with other available paleoclimatic time series, with comparably high resolution provided by ice cores, tree rings, coral bands, and other varve series (Baumgartner et al., 1989; Lange et al., in press). X-radiography of sediment slabs is an efficient way to document the sedimentological aspect and structure variation of varved sediment (Soutar et al., 1982). Most of the SBB varve record of this millennium has already been described in detail (Soutar and Crill, 1977; Schimmelmann et al., 1990, 1992; Lange et al., in press). In addition, older sediments reaching back over the past 2,000 years have been X-radiographed by R. Byrne et al. (unpubl. data), T. Baumgartner, and A. Soutar (pers. comm., 1993). Furthermore, in August of 1993 we retrieved from the central SBB fresh sediment material, which extends to approximately 200 A.D.

The main objective of this study is to provide unambiguous anchor dates for the topmost sediment of Hole 893A. This is accomplished by illustrating cross-correlations between X-radiographs from selected intervals of Hole 893A with X-radiographic records from earlier core material. We also provide a detailed description of the varve stratigraphy, including clarity of the boundaries on the X-radiographs and the presence of nonlaminated intervals interrupting the varve sequences.

MATERIALS AND METHODS

We obtained 32 sediment slabs from selected intervals of the upper 24 m of Hole 893A (Section 146-893-1H-1 through 3H-6; Table 1). This upper sequence (Subunit IA; Shore-based Scientific Party, 1994) contains mainly olive gray (5Y 4/2) diatom nannofossil clayey silt and diatom nannofossil silty clay. It is characterized by the pres-

ence of variably preserved laminations throughout, intercalated with thin horizons of homogenous sediment. A prominent, notably thicker, nonlaminated interval extends from 17.5 to 20.5 mbsf.

Slabbing Procedure

The slabbing procedure followed the technique described by Schimmelmann et al. (1990), which uses anodic charging to produce a lubricating layer of hydrogen gas on a metallic slabbing device to assist in slicing the sediment. Intervals for slabbing were chosen after the surface of the working halfcore had been scraped with an anodically charged metal blade to expose sedimentary features such as varves and boundaries with nonlaminated sediment intervals. The slabs measured 15–20 cm in length, 5 cm in width, and were cut to a uniform thickness of 1 cm for optimal results from the X-radiography.

Sediment slabs were wrapped in clear polyethylene film to prevent desiccation. Slab orientation and archive number were marked by attaching a unique symbol (made from bent copper wire) at one end of each slab. The X-radiographic images of the copper wire symbols proved to be reliable identifiers. The slabs were stored in plastic containers in a dark cold room.

X-radiography

X-radiography of sediment slabs was used for documenting the sediment structure, for varve-counting, and for developing the cross-correlations with previously collected SBB cores. A modified medical X-ray unit with a 40-kV head at the Scripps Institution of Oceanography was employed for this work. We exposed 8 × 10-in. Kodak Industrex M film for 80 to 120 seconds, depending on the overall water content of a particular slab. Each slab was X-radiographed repeatedly at slightly different angles to provide the best resolution of varve boundaries. The ragged longitudinal margin of the X-radiographic images of Hole 893A slabs in Figures 1–3 indicates the area of contact with the core liner of the working halfcore where material had broken loose and adhered to the liner during extraction of the slab. A complete set of X-radiograph contact prints and negatives is kept on file at the Geological Research Division, Scripps Institution of Oceanography.

RESULTS

A dark band on an X-radiograph contact print indicates strong absorption of X-rays because of the relatively higher density of terrigenous mineral content of a particular sediment layer. Such mineral-rich subannual laminae have been identified with winter to early spring deposition (Emery and Hülsemann, 1962; Soutar and Crill, 1977; Reimers et al., 1990); more porous subannual laminae, relatively poor in minerals, correspond to increased summer deposition of biogenous material and appear lighter in the X-radiograph contact print. The dark and light laminae pairs have been shown to represent

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Table 1. Summary of sediment slab samples of Hole 893A, including a general description of the dominant structures.

Core, section, interval (cm)	Depth (mbsf)	Volume (cm ³)	Slab #	Comments
146-893A-				
1H-1, 65-80	0.65	45	1*	Partially laminated
1H-1, 100-115	1.00	45	2*	Well laminated
1H-1, 115-130	1.15	45	3	Partially laminated
1H-1, 130-150	1.30	60	4	Laminated, 1 gray layer
1H-2, 0-15	1.50	45	5	Laminated, 1 gray layer
1H-2, 16-31	1.66	45	6	Partially laminated
1H-2, 31-46	1.81	45	7*	Well laminated
1H-2, 46-62	1.96	45	8	Laminated, 1 gray layer
1H-2, 62-77	2.12	45	9	Partially laminated
1H-2, 78-93	2.28	45	10	Partially laminated
1H-2, 93-109	2.43	48	11	Weakly laminated
1H-2, 109-124	2.59	45	12*	Laminated, 1 gray layer
1H-2, 124-139	2.74	45	13	Laminated
1H-2, 139-152	2.89	39	14	Weakly laminated
1H-3, 67-82	3.69	45	15	Well laminated
1H-4, 67-82	5.19	45	16	Partially laminated
1H-5, 10-25	6.12	45	17	Partially laminated
2H-1, 26-41	6.76	45	18	Partially laminated
2H-1, 130-145	7.80	45	19	Partially laminated
2H-2, 95-110	8.99	45	20*	Partially laminated, w/ shell
2H-3, 5-20	9.59	45	21	Partially laminated
2H-4, 1-16	11.06	45	22	Partially laminated
2H-4, 130-150	12.35	60	23*	Partially laminated
2H-6, 128-143	15.33	45	24	Laminated, w/ shell
2H-7, 1-16	15.56	45	25	Partially laminated
2H-7, 37-52	15.92	45	26	Partially laminated
3H-1, 54-69	16.54	45	27	Laminated
3H-1, 129-144	17.29	45	28	Laminated
3H-2, 1-16	17.51	45	29	Partially laminated
3H-4, 101-116	21.51	45	30	Laminated
3H-5, 90-105	22.90	45	31*	Partially laminated
3H-6, 1-21	23.51	60	32	Partially laminated

Note: * indicates slabs presented in Table 2.

single years of deposition (Soutar and Crill, 1977), and are regarded as annual varves.

Contact prints with highest resolution were selected for visual inspection and description of the sediment structure. Varves and other distinct layers were counted from bottom to top of a slab on each print and the varve thickness was measured using a hand lens with an integrated scale (graduated to 0.1 mm). Where possible, the varve thickness was obtained from the mean of two measurements taken near the left and right margins of an X-radiograph. Out of the 32 slabs (Table 1), we selected seven to be presented here. Table 2 provides detailed description of the stratigraphic character of the 7 slabs, including the quality of definition of varve boundaries. X-radiograph contact prints in Figures 1-3 display the sediment structure. Slabs from Sections 146-893-1H-1 and 1H-2, were correlated with corresponding intervals of the existing SBB varve chronologies of Lange et al. (in press; "SABA COMPOSITE" in Fig. 1) and Byrne et al. (unpubl. data; "CORE P-2" in Fig. 2), respectively. No previous chronology exists to match slabs 20, 23, and 31 presented in Figure 3. In Figures 1 and 2 the visual correlations are based on the comparison and matching of distinct stratigraphic patterns of varve sequences that can be identified from each slab. The cross-correlation of varve records within the 18th and 17th centuries (Fig. 1) offers reliable dating to within ± 10 years, whereas the dating of older varve records in Figure 2 is considered to be less accurate.

We infer that about 30 cm of the unconsolidated sediment closest to the sediment/water interface (with water contents ranging between 80 to 95 wt%; Schimmelmann et al., 1990) were lost in the coring process. The topmost recovered sediment from Hole 893A was a sludge that did not permit subsampling. However, at about 50-cm depth in Section 146-893-1H-1, below an obviously laminated, albeit physically disturbed sediment interval, we observed an articulated pelecypod, *Macoma leptonoidea*, which we believe to be associated with a *Macoma* shell layer in the SBB. This layer is typically located at 55 to 60 cm below the seafloor and dates back to 1840 A.D.

(Schimmelmann et al., 1992). In Section 146-893-1H-1 the occurrence of the *Macoma* shell bed is also spaced properly with regard to the distinct non-varved olive layer dated at 1738 A.D. (Lange et al., in press) that is visible at the bottom of our topmost slab 1 (Fig. 1A) and which comprises the first stratigraphic unit in the sequence of slab 1 (Table 2).

SUMMARY

In addition to a detailed description of the varve stratigraphy, we present X-radiographic and other evidence for reliable cross-correlations of selected varved intervals of Sections 1H-1 through 1H-3 with previously established and dated SBB varve records. The find of a diagnostic *Macoma* shell bed near the top of Section 1H-1 suggests that Hole 893A lost about 30 cm of unconsolidated sediment below the 1992 sediment/water interface during the coring process. The general state of compaction and dewatering of the sediment of Section 1H-1 also implies that it derives from about 65 cm below the 1992 seafloor. Hole 893A provides a useful varve record with ages as young as the late 18th century.

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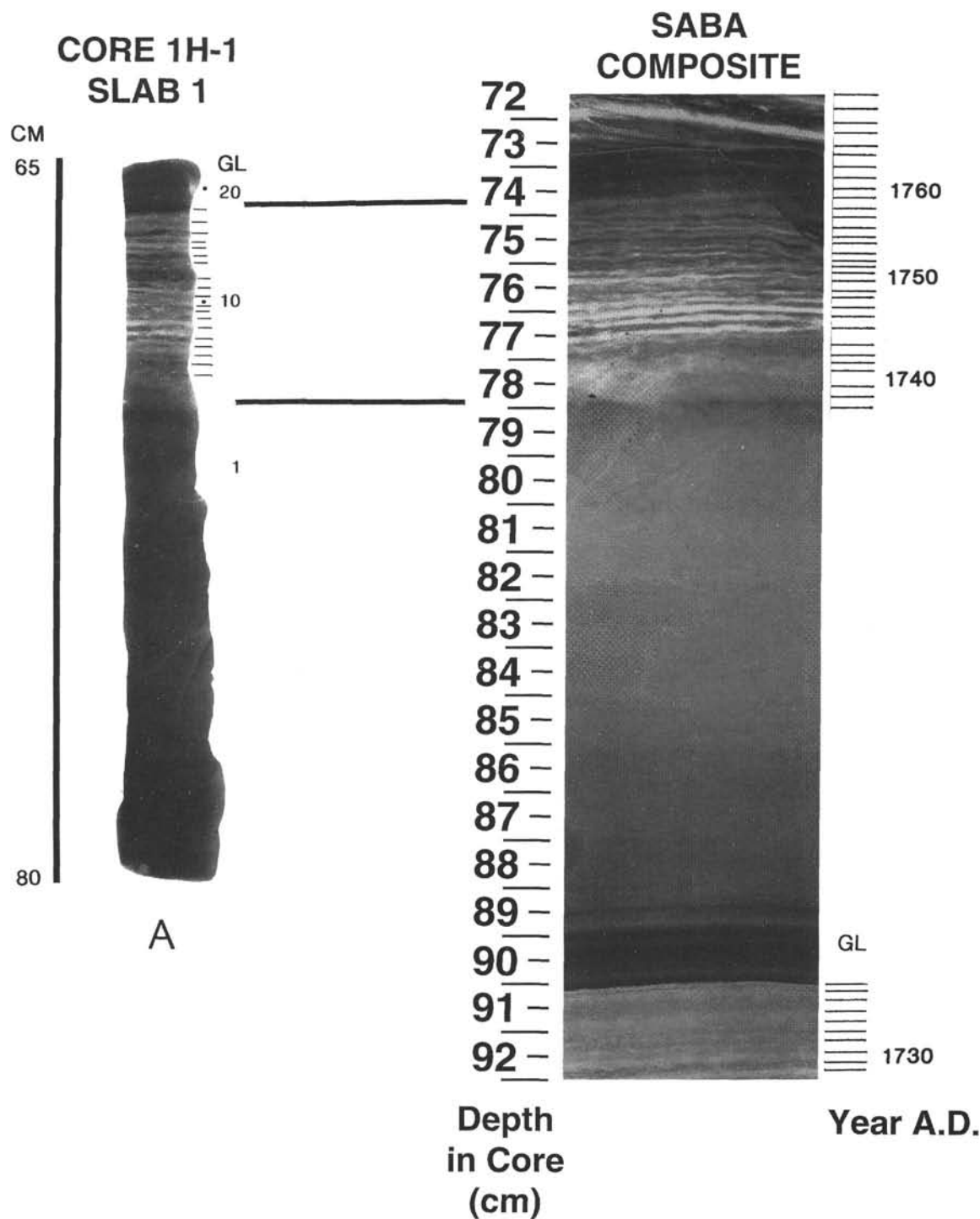


Figure 1. X-radiograph contact prints of (A) slab 1, Sample 146-893A-1H-1, 65–80 cm, and (B) slab 2, Sample 146-893A-1H-1, 100–115 cm, are shown beside comparable sections of previously dated Santa Barbara Basin varve records. The “SABA COMPOSITE” X-radiograph varve chronology was obtained from nearby Santa Barbara Basin locations (Lange et al., in press). Distinct sediment layers (varves, bioturbated layers, turbidites, and intervals with unresolved or missing lamination) are numbered sequentially from bottom to top of slabs of Section 146-983A-1H-1, with their boundaries indicated by tickmarks at one side of X-radiograph contact prints (see also Table 2). Layers #10, 20, 30, etc., are additionally identified by dots between tickmarks. The vertical length of slabs and the corresponding depth intervals within each section (Table 1) are indicated by black bars for the 893A slabs. A scale indicating cm below seafloor is given for each SABA COMPOSITE slab. Correlation lines indicate the inferred correspondence between the 893A and SABA cores. GL = gray layer of terrigenous redeposited sediment, probably a turbidite (Thornton, 1986), overlain by a non-varved olive layer dated 1738 A.D.

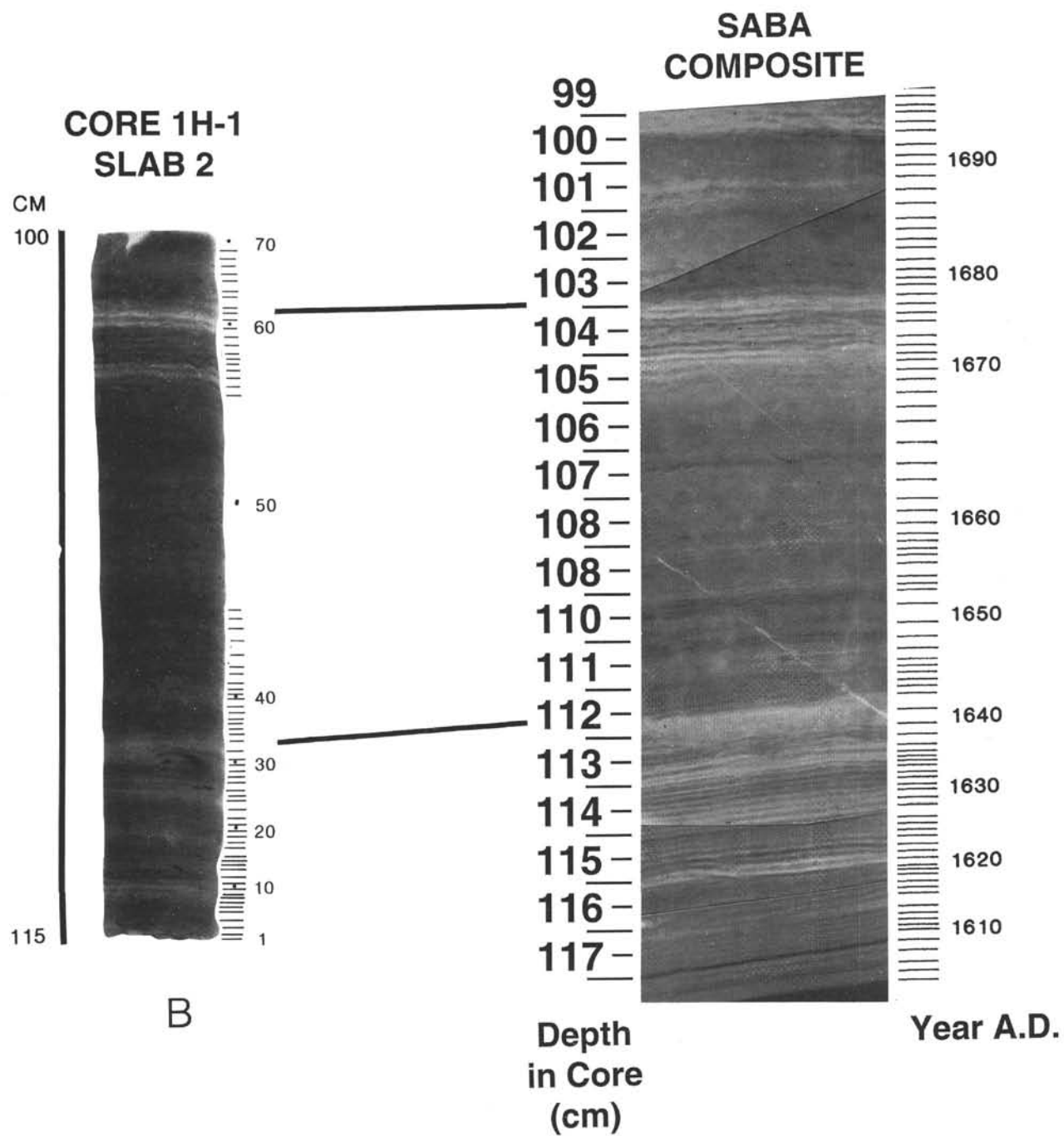


Figure 1 (continued).

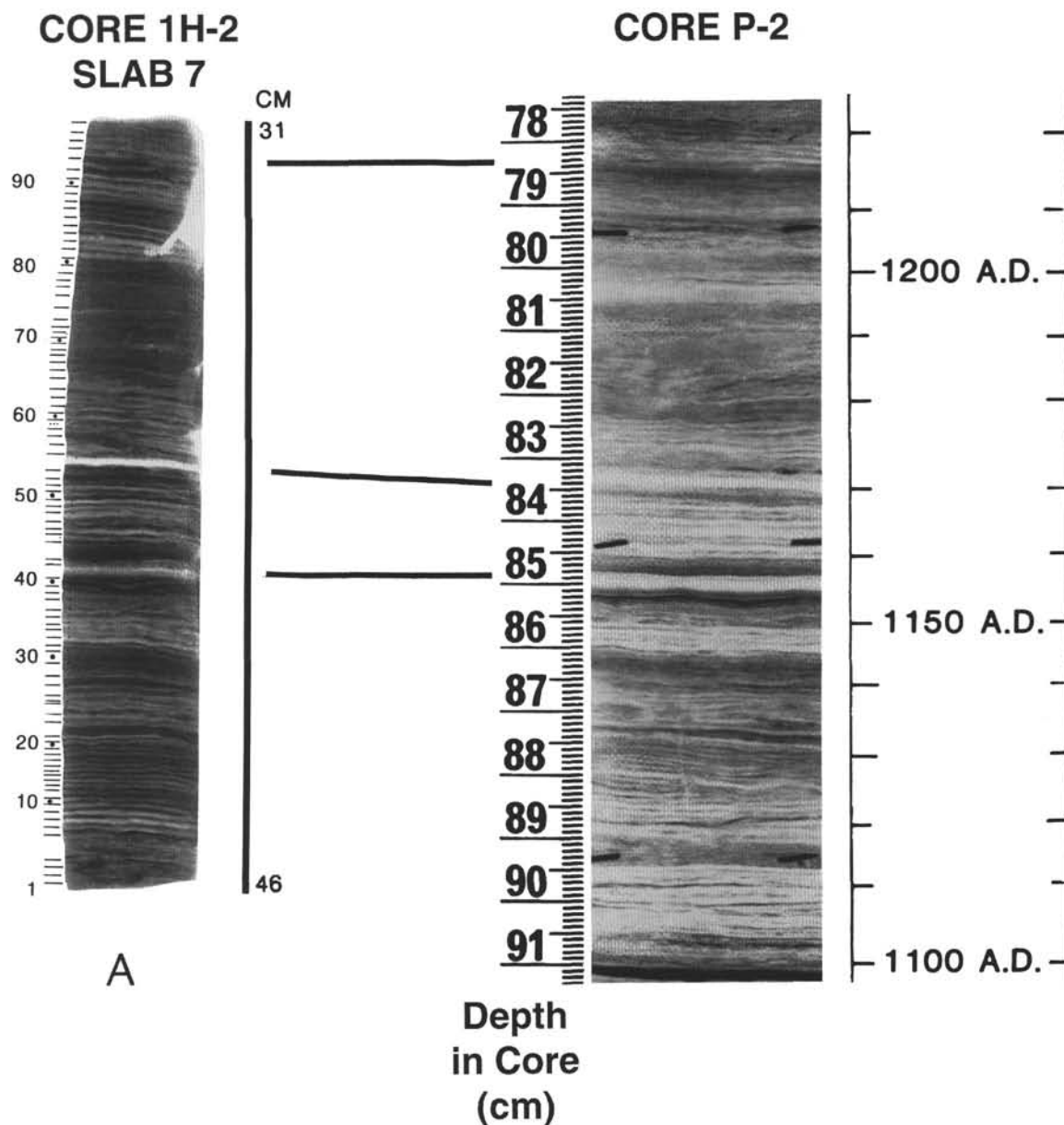


Figure 2. X-radiograph contact prints of (A) slab 7, Sample 146-893A-1H-2, 31–46 cm, and (B) slab 12, Sample 146-893A-1H-2, 109–124 cm, are shown beside comparable sections of previously dated Santa Barbara Basin varve records at a nearby location (Core P-2; 34°14'N, 120°00'W; dates are approximate). Prints and data from Core P-2 are courtesy of Roger Byrne, UC Berkeley (pers. comm., 1992). Correlation lines indicate the inferred correspondence between slabs of 893A and P-2 core. For additional explanations, see Figure 1 caption.

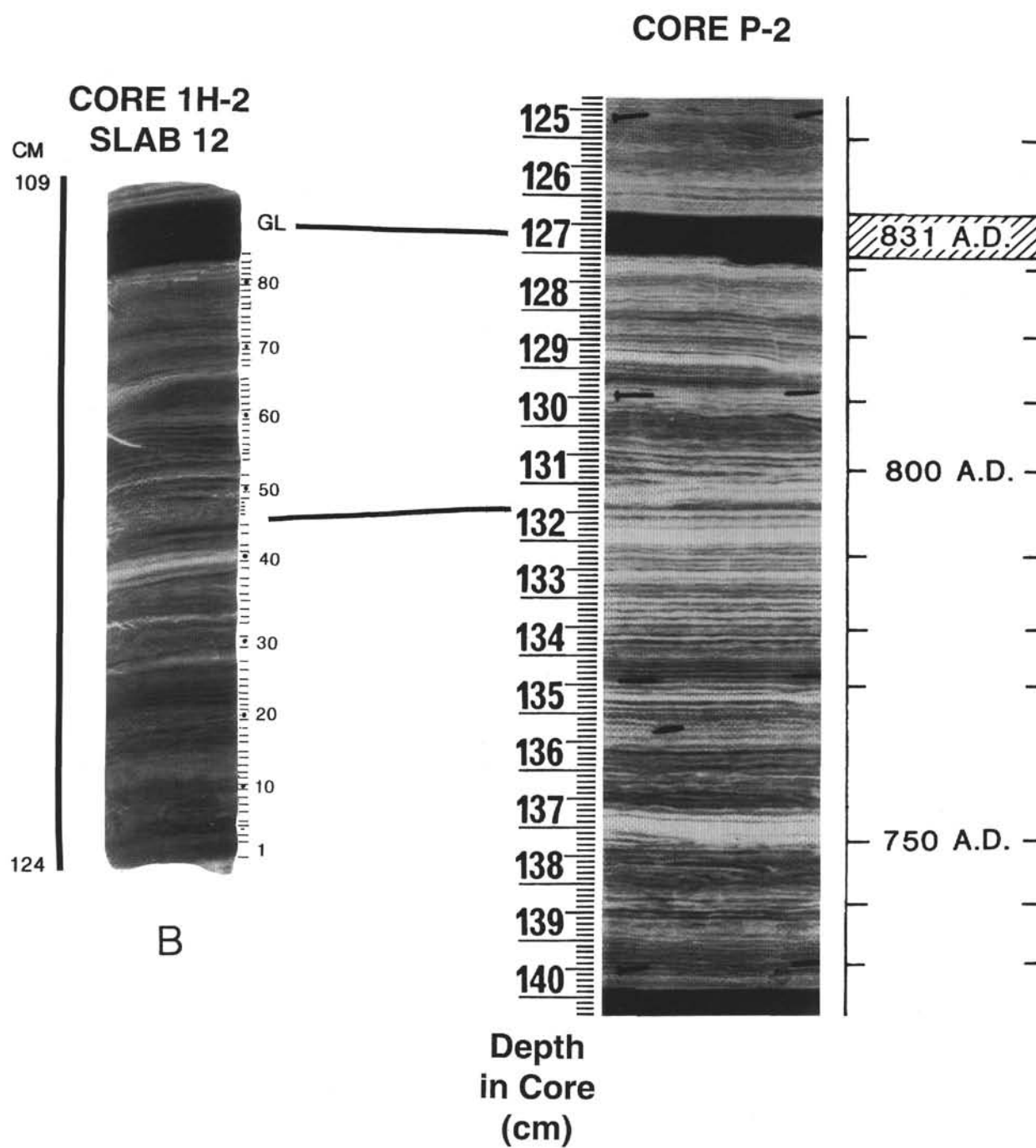


Figure 2 (continued).

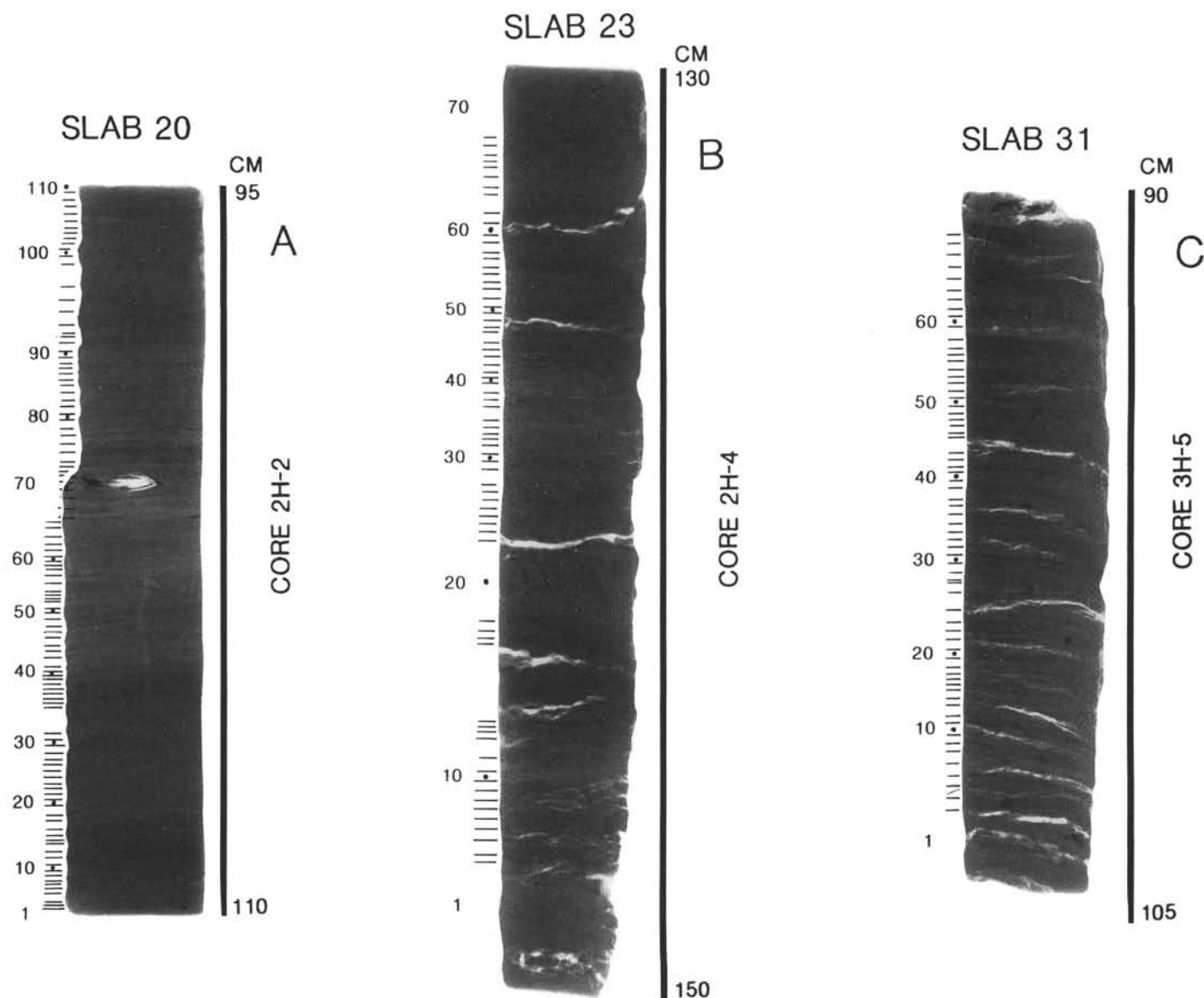


Figure 3. X-radiograph contact prints of (A) slab 20, Sample 146-893A-2H-2, 95–110 cm, (B) slab 23, Sample 146-893A-2H-4, 130–150 cm, and (C) slab 31, Sample 146-893A-3H-5, 90–105 cm. Note the articulated shell in slab 20. Intervals with unresolved lamination are present in slab 23 (“layers” 1, 16, 20, and 70) and in slab 31 (“layers” 1 and 69; see Tables 1 and 2 for details). White uneven fissures in slabs 23 and 31 indicate voids generated by methane expansion upon core decompression. For additional explanations, see Figure 1 caption.

Table 2. Stratigraphic character of the Hole 893A sediment slabs 1, 2, 7, 12, 20, 23, and 31, including the clarity of the definition of varve boundaries.

Slab #	Core, section, interval (cm)	“Varve” unit	Comments	Relative thickness (mm)			
				Left	Right	Center	Mean
146-893A-							
1	1H-1, 65–80	1	Nonlaminated sequence	104.0	104.0		104.0
1	1H-1, 65–80	2	Varve boundaries unclear	2.0	2.2		2.1
1	1H-1, 65–80	3	Varve boundaries unclear	2.0	2.0		2.0
1	1H-1, 65–80	4	Well defined varve	1.5	1.5		1.5
1	1H-1, 65–80	5	Well defined varve	2.0	1.8		1.9
1	1H-1, 65–80	6	Well defined varve	1.9	1.9		1.9
1	1H-1, 65–80	7	Well defined varve	2.1	2.0		2.1
1	1H-1, 65–80	8	Well defined varve	1.6	1.9		1.8
1	1H-1, 65–80	9	Well defined varve	2.0	1.5		1.8
1	1H-1, 65–80	10	Well defined varve	2.0	2.0		2.0
1	1H-1, 65–80	11	Well defined varve	1.5	1.8		1.7
1	1H-1, 65–80	12	Well defined varve	1.2	1.5		1.4
1	1H-1, 65–80	13	Well defined varve	3.2	3.0		3.1
1	1H-1, 65–80	14	Well defined varve	1.2	1.8		1.5
1	1H-1, 65–80	15	Well defined varve	2.0	1.8		1.9
1	1H-1, 65–80	16	Well defined varve	1.3	1.3		1.3
1	1H-1, 65–80	17	Well defined varve	1.2	1.7		1.5
1	1H-1, 65–80	18	Well defined varve	2.0	2.0		2.0
1	1H-1, 65–80	19	Well defined varve	2.0	2.5		2.3
1	1H-1, 65–80	20	Nonlaminated, gray layer	11.1	11.0		11.1
2	1H-1, 100–115	1	Well defined varve	1.0	1.0		1.0
2	1H-1, 100–115	2	Well defined varve	1.0	1.0		1.0
2	1H-1, 100–115	3	Well defined varve			1.0	
2	1H-1, 100–115	4	Well defined varve	1.1	1.1		1.1
2	1H-1, 100–115	5	Well defined varve	1.2	2.0		1.6
2	1H-1, 100–115	6	Well defined varve	1.0	1.0		1.0
2	1H-1, 100–115	7	Well defined varve	1.0	1.0		1.0
2	1H-1, 100–115	8	Well defined varve	1.0	1.0		1.0
2	1H-1, 100–115	9	Varve boundaries unclear			2.0	
2	1H-1, 100–115	10	Varve boundaries unclear			1.0	
2	1H-1, 100–115	11	Varve boundaries unclear			0.9	
2	1H-1, 100–115	12	Varve boundaries unclear		1.8		
2	1H-1, 100–115	13	Varve boundaries unclear		1.0		
2	1H-1, 100–115	14	Varve boundaries unclear		1.0		
2	1H-1, 100–115	15	Varve boundaries unclear		1.0		
2	1H-1, 100–115	16	Varve boundaries unclear			1.8	
2	1H-1, 100–115	17	Varve boundaries unclear			1.8	
2	1H-1, 100–115	18	Varve boundaries unclear			1.0	
2	1H-1, 100–115	19	Varve boundaries unclear		1.1		
2	1H-1, 100–115	20	Varve boundaries unclear	1.2	1.2		1.2
2	1H-1, 100–115	21	Varve boundaries unclear	1.1	1.2		1.2
2	1H-1, 100–115	22	Unclear, two varves?			2.0	
2	1H-1, 100–115	23	Well defined varve	0.9	0.9		0.9
2	1H-1, 100–115	24	Well defined varve	0.9	0.9		0.9
2	1H-1, 100–115	25	Well defined varve	1.5	1.5		1.5
2	1H-1, 100–115	26	Well defined varve	1.0	1.0		1.0
2	1H-1, 100–115	27	Well defined varve	0.9	0.9		0.9
2	1H-1, 100–115	28	Well defined varve	1.1	1.1		1.1
2	1H-1, 100–115	29	Varve boundaries unclear		1.0		
2	1H-1, 100–115	30	Varve boundaries unclear		1.8		
2	1H-1, 100–115	31	Varve boundaries unclear		1.8		
2	1H-1, 100–115	32	Varve boundaries unclear	1.0	1.0		1.0
2	1H-1, 100–115	33	Varve boundaries unclear	1.0	1.0		1.0
2	1H-1, 100–115	34	Varve boundaries unclear			1.5	
2	1H-1, 100–115	35	Partial varve, not continuous		1.1		
2	1H-1, 100–115	36	Partial varve, not continuous			1.0	
2	1H-1, 100–115	37	Varve boundaries unclear			1.2	
2	1H-1, 100–115	38	Varve boundaries unclear			0.9	
2	1H-1, 100–115	39	Varve boundaries unclear			1.2	
2	1H-1, 100–115	40	Varve boundaries unclear			0.9	
2	1H-1, 100–115	41	Varve boundaries unclear			0.9	
2	1H-1, 100–115	42	Varve boundaries unclear			0.8	
2	1H-1, 100–115	43	Varve boundaries unclear			1.2	
2	1H-1, 100–115	44	Varve boundaries unclear	1.1			
2	1H-1, 100–115	45	Seems bioturbated			2.5	
2	1H-1, 100–115	46	Seems bioturbated			3.5	
2	1H-1, 100–115	47	Seems bioturbated			1.8	
2	1H-1, 100–115	48	Seems bioturbated			2.0	
2	1H-1, 100–115	49	Varve boundaries unclear			2.0	
2	1H-1, 100–115	50	Nonlaminated sequence	45.0	44.5		44.8
2	1H-1, 100–115	51	Varve boundaries unclear	1.5	1.5		1.5
2	1H-1, 100–115	52	Varve boundaries unclear	1.1	1.3		1.2
2	1H-1, 100–115	53	Well defined varve	1.1	1.3		1.2
2	1H-1, 100–115	54	Well defined varve	1.2	1.2		1.2
2	1H-1, 100–115	55	Well defined varve	1.3	1.2		1.3
2	1H-1, 100–115	56	Well defined varve	1.5	1.0		1.3
2	1H-1, 100–115	57	Well defined varve	1.1	1.1		1.1
2	1H-1, 100–115	58	Well defined varve	1.2	1.2		1.2
2	1H-1, 100–115	59	Well defined varve	1.5	1.5		1.5
2	1H-1, 100–115	60	Well defined varve	1.5	1.5		1.5
2	1H-1, 100–115	61	Well defined varve	1.1	1.2		1.2
2	1H-1, 100–115	62	Well defined varve	0.5	0.8		0.7
2	1H-1, 100–115	63	Well defined varve	2.8	1.9		2.4
2	1H-1, 100–115	64	Varve boundaries unclear			2.0	
2	1H-1, 100–115	65	Varve boundaries unclear			2.0	
2	1H-1, 100–115	66	Varve boundaries unclear			2.0	
2	1H-1, 100–115	67	Varve boundaries unclear			1.3	

Table 2 (continued).

Slab #	Core, section, interval (cm)	"Varve" unit	Comments	Relative thickness (mm)			
				Left	Right	Center	Mean
2	IH-1, 100-115	68	Varve boundaries unclear			1.0	
2	IH-1, 100-115	69	Varve boundaries unclear			5.0	
7	IH-2, 31-46	1	Partial varve, not continuous	1.3			
7	IH-2, 31-46	2	Varve boundaries unclear	1.6	1.6		1.6
7	IH-2, 31-46	3	Varve boundaries unclear	1.4	1.3		1.4
7	IH-2, 31-46	4	Varve boundaries unclear	2.7	1.3		2.0
7	IH-2, 31-46	5	Varve boundaries unclear	3.0	4.5		3.8
7	IH-2, 31-46	6	Well defined varve	1.6	1.6		1.6
7	IH-2, 31-46	7	Well defined varve	1.3	1.4		1.4
7	IH-2, 31-46	8	Well defined varve	1.7	1.4		1.6
7	IH-2, 31-46	9	Well defined varve	1.4	1.4		1.4
7	IH-2, 31-46	10	Well defined varve	1.4	1.5		1.5
7	IH-2, 31-46	11	Well defined varve	1.5	1.1		1.3
7	IH-2, 31-46	12	Well defined varve	1.4	1.0		1.2
7	IH-2, 31-46	13	Well defined varve	1.0	1.0		1.0
7	IH-2, 31-46	14	Well defined varve	1.0	1.5		1.3
7	IH-2, 31-46	15	Well defined varve	1.0	1.0		1.0
7	IH-2, 31-46	16	Well defined varve	1.0	1.0		1.0
7	IH-2, 31-46	17	Well defined varve	1.0	1.0		1.0
7	IH-2, 31-46	18	Well defined varve	1.1	1.3		1.2
7	IH-2, 31-46	19	Well defined varve	1.0	0.9		1.0
7	IH-2, 31-46	20	Well defined varve	1.1	2.1		1.6
7	IH-2, 31-46	21	Partial varve, not continuous	1.1			
7	IH-2, 31-46	22	Well defined varve	2.4	2.5		2.5
7	IH-2, 31-46	23	Well defined varve	1.5	1.4		1.5
7	IH-2, 31-46	24	Well defined varve	1.5	1.3		1.4
7	IH-2, 31-46	25	Well defined varve	1.3	1.0		1.2
7	IH-2, 31-46	26	Well defined varve	1.1	1.3		1.2
7	IH-2, 31-46	27	Well defined varve	1.2	1.2		1.2
7	IH-2, 31-46	28	Well defined varve	2.9	2.5		2.7
7	IH-2, 31-46	29	Well defined varve	1.9	1.5		1.7
7	IH-2, 31-46	30	Well defined varve	2.0	3.2		2.6
7	IH-2, 31-46	31	Well defined varve	1.1	1.3		1.2
7	IH-2, 31-46	32	Well defined varve	1.7	1.7		1.7
7	IH-2, 31-46	33	Well defined varve	1.3	1.0		1.2
7	IH-2, 31-46	34	Well defined varve	0.9	1.1		1.0
7	IH-2, 31-46	35	Well defined varve	1.3	1.6		1.5
7	IH-2, 31-46	36	Well defined varve	1.8	1.6		1.7
7	IH-2, 31-46	37	Well defined varve	1.2	1.6		1.4
7	IH-2, 31-46	38	Well defined varve	2.0	1.7		1.9
7	IH-2, 31-46	39	Well defined varve	1.0	1.2		1.1
7	IH-2, 31-46	40	Well defined varve	1.1	1.0		1.1
7	IH-2, 31-46	41	Unclear, two varves?	2.4	2.4		2.4
7	IH-2, 31-46	42	Well defined varve	1.3	2.0		1.7
7	IH-2, 31-46	43	Thin gray layer	3.5	2.5		3.0
7	IH-2, 31-46	44	Well defined varve	1.3	1.2		1.3
7	IH-2, 31-46	45	Well defined varve	1.2	1.1		1.2
7	IH-2, 31-46	46	Well defined varve	1.5	1.7		1.6
7	IH-2, 31-46	47	Well defined varve	1.3	1.4		1.4
7	IH-2, 31-46	48	Well defined varve	1.1	1.0		1.1
7	IH-2, 31-46	49	Well defined varve	1.1	1.4		1.3
7	IH-2, 31-46	50	Well defined varve	1.6	1.6		1.6
7	IH-2, 31-46	51	Well defined varve	1.5	1.4		1.5
7	IH-2, 31-46	52	Well defined varve	1.0	1.0		1.0
7	IH-2, 31-46	53	Well defined varve	1.7	1.6		1.7
7	IH-2, 31-46	54	Well defined varve	2.8	2.6		2.7
7	IH-2, 31-46	55	Well defined varve	1.6	1.0		1.3
7	IH-2, 31-46	56	Partial varve, not continuous	0.9			
7	IH-2, 31-46	57	Varve boundaries unclear	1.6	1.3		1.5
7	IH-2, 31-46	58	Partial varve, not continuous		1.4		
7	IH-2, 31-46	59	Varve boundaries unclear	1.6	1.7		1.7
7	IH-2, 31-46	60	Well defined varve	1.5	1.3		1.4
7	IH-2, 31-46	61	Well defined varve	1.2	1.7		1.5
7	IH-2, 31-46	62	Well defined varve	1.6	1.3		1.5
7	IH-2, 31-46	63	Well defined varve	1.7	1.7		1.7
7	IH-2, 31-46	64	Well defined varve	2.0	2.0		2.0
7	IH-2, 31-46	65	Well defined varve	1.8	1.0		1.4
7	IH-2, 31-46	66	Well defined varve	1.1	0.9		1.0
7	IH-2, 31-46	67	Well defined varve	1.0	1.5		1.3
7	IH-2, 31-46	68	Well defined varve	1.4	2.6		2.0
7	IH-2, 31-46	69	Varve boundaries unclear		1.2		
7	IH-2, 31-46	70	Varve boundaries unclear		1.3		
7	IH-2, 31-46	71	Varve boundaries unclear		1.2		
7	IH-2, 31-46	72	Varve boundaries unclear		1.6		
7	IH-2, 31-46	73	Varve boundaries unclear		2.0		
7	IH-2, 31-46	74	Varve boundaries unclear	1.7	2.2		2.0
7	IH-2, 31-46	75	Varve boundaries unclear	2.4			
7	IH-2, 31-46	76	Varve boundaries unclear	1.8			
7	IH-2, 31-46	77	Well defined varve	1.0	1.1		1.1
7	IH-2, 31-46	78	Well defined varve	1.3	1.1		1.2
7	IH-2, 31-46	79	Well defined varve	1.2	1.5		1.4
7	IH-2, 31-46	80	Well defined varve	1.2	1.1		1.2
7	IH-2, 31-46	81	Well defined varve	1.6	1.4		1.5
7	IH-2, 31-46	82	Well defined varve	1.2	1.0		1.1
7	IH-2, 31-46	83	Well defined varve	1.7	1.5		1.6
7	IH-2, 31-46	84	Partial varve, not continuous	1.3			0.7
7	IH-2, 31-46	85	Well defined varve	1.8	1.7		1.8
7	IH-2, 31-46	86	Well defined varve	1.5	1.7		1.6

Table 2 (continued).

Slab #	Core, section, interval (cm)	"Varve" unit	Comments	Relative thickness (mm)			
				Left	Right	Center	Mean
7	1H-2, 31-46	87	Well defined varve	1.0	1.7		1.4
7	1H-2, 31-46	88	Well defined varve	1.8	1.8		1.8
7	1H-2, 31-46	89	Well defined varve	1.7	1.4		1.6
7	1H-2, 31-46	90	Well defined varve	1.1	1.5		1.3
7	1H-2, 31-46	91	Well defined varve	1.6	1.8		1.7
7	1H-2, 31-46	92	Well defined varve	2.0	2.5		2.3
7	1H-2, 31-46	93	Well defined varve	2.2	2.0		2.1
7	1H-2, 31-46	94	Well defined varve	1.5	1.5		1.5
7	1H-2, 31-46	95	Well defined varve	1.1	1.2		1.2
7	1H-2, 31-46	96	Well defined varve	2.0	1.4		1.7
7	1H-2, 31-46	97	Well defined varve	1.5	1.3		1.4
12	1H-2, 109-124	1	Varve boundaries unclear	1.6	3.4		2.5
12	1H-2, 109-124	2	Varve boundaries unclear	1.0	1.3		1.2
12	1H-2, 109-124	3	Varve boundaries unclear	1.0	1.4		1.2
12	1H-2, 109-124	4	Varve boundaries unclear	1.6	0.5		1.1
12	1H-2, 109-124	5	Varve boundaries unclear	1.0	0.8		0.9
12	1H-2, 109-124	6	Varve boundaries unclear			2.0	
12	1H-2, 109-124	7	Varve boundaries unclear			1.0	
12	1H-2, 109-124	8	Varve boundaries unclear			1.0	
12	1H-2, 109-124	9	Varve boundaries unclear			1.4	
12	1H-2, 109-124	10	Varve boundaries unclear			1.0	
12	1H-2, 109-124	11	Varve boundaries unclear			1.0	
12	1H-2, 109-124	12	Varve boundaries unclear			1.6	
12	1H-2, 109-124	13	Varve boundaries unclear			1.1	
12	1H-2, 109-124	14	Varve boundaries unclear			1.3	
12	1H-2, 109-124	15	Varve boundaries unclear	1.5	1.1		1.3
12	1H-2, 109-124	16	Varve boundaries unclear	1.2	2.1		1.7
12	1H-2, 109-124	17	Well defined varve	1.3	1.3		1.3
12	1H-2, 109-124	18	Varve boundaries unclear	1.0	1.0		1.0
12	1H-2, 109-124	19	Partial varve, not continuous		2.1		
12	1H-2, 109-124	20	Varve boundaries unclear	2.2	1.5		1.9
12	1H-2, 109-124	21	Partial varve, not continuous	1.0			
12	1H-2, 109-124	22	Varve boundaries unclear		0.8		
12	1H-2, 109-124	23	Varve boundaries unclear		1.1		
12	1H-2, 109-124	24	Well defined varve			1.1	
12	1H-2, 109-124	25	Well defined varve			0.9	
12	1H-2, 109-124	26	Well defined varve			1.2	
12	1H-2, 109-124	27	Well defined varve			2.2	
12	1H-2, 109-124	28	Well defined varve			1.1	
12	1H-2, 109-124	29	Well defined varve	2.8	3.2		3.0
12	1H-2, 109-124	30	Well defined varve		2.1		
12	1H-2, 109-124	31	Well defined varve		2.8		
12	1H-2, 109-124	32	Well defined varve		1.4		
12	1H-2, 109-124	33	Well defined varve		2.2		
12	1H-2, 109-124	34	Well defined varve		1.5		
12	1H-2, 109-124	35	Well defined varve		1.5		
12	1H-2, 109-124	36	Well defined varve		1.4		
12	1H-2, 109-124	37	Well defined varve		1.7		
12	1H-2, 109-124	38	Well defined varve		1.7		
12	1H-2, 109-124	39	Well defined varve	2.0	1.3		1.7
12	1H-2, 109-124	40	Well defined varve	1.8	2.2		2.0
12	1H-2, 109-124	41	Well defined varve	1.7	1.3		1.5
12	1H-2, 109-124	42	Well defined varve	1.0	2.4		1.7
12	1H-2, 109-124	43	Well defined varve	2.1	1.8		2.0
12	1H-2, 109-124	44	Varve boundaries unclear		1.6		
12	1H-2, 109-124	45	Varve boundaries unclear		0.8		
12	1H-2, 109-124	46	Varve boundaries unclear		0.9		
12	1H-2, 109-124	47	Varve boundaries unclear		0.6		
12	1H-2, 109-124	48	Varve boundaries unclear		1.2		
12	1H-2, 109-124	49	Partial varve, not continuous		1.4		
12	1H-2, 109-124	50	Well defined varve	1.5	1.3		1.4
12	1H-2, 109-124	51	Well defined varve	1.3	1.5		1.4
12	1H-2, 109-124	52	Varve boundaries unclear	2.5	3.4		3.0
12	1H-2, 109-124	53	Well defined varve	2.2	1.4		1.8
12	1H-2, 109-124	54	Well defined varve	1.0	1.0		1.0
12	1H-2, 109-124	55	Well defined varve	1.4	1.1		1.3
12	1H-2, 109-124	56	Well defined varve	1.0	1.4		1.2
12	1H-2, 109-124	57	Well defined varve	1.3	1.2		1.3
12	1H-2, 109-124	58	Well defined varve	1.3	1.5		1.4
12	1H-2, 109-124	59	Well defined varve	1.2	1.0		1.1
12	1H-2, 109-124	60A	Well defined varve	1.3	1.2		1.3
12	1H-2, 109-124	60B	Partial varve, not continuous		0.7		
12	1H-2, 109-124	61	Partial varve, not continuous		1.0		
12	1H-2, 109-124	62	Partial varve, not continuous		1.2		
12	1H-2, 109-124	63	Varve boundaries unclear			1.7	
12	1H-2, 109-124	64	Varve boundaries unclear			1.0	
12	1H-2, 109-124	65	Varve boundaries unclear			1.0	
12	1H-2, 109-124	66	Varve boundaries unclear			2.0	
12	1H-2, 109-124	67	Well defined varve			0.9	
12	1H-2, 109-124	68	Well defined varve			1.0	
12	1H-2, 109-124	69	Well defined varve			1.5	
12	1H-2, 109-124	70	Well defined varve			0.9	
12	1H-2, 109-124	71	Well defined varve			2.2	
12	1H-2, 109-124	72	Well defined varve			1.0	
12	1H-2, 109-124	73	Well defined varve			1.4	
12	1H-2, 109-124	74	Well defined varve			1.1	
12	1H-2, 109-124	75	Well defined varve			1.5	
12	1H-2, 109-124	76	Well defined varve			1.0	

Table 2 (continued).

Slab #	Core, section, interval (cm)	"Varve" unit	Comments	Relative thickness (mm)			
				Left	Right	Center	Mean
12	1H-2, 109-124	77	Well defined varve			1.1	
12	1H-2, 109-124	78	Well defined varve			1.2	
12	1H-2, 109-124	79	Partial varve, not continuous		0.9		
12	1H-2, 109-124	80	Well defined varve			1.3	
12	1H-2, 109-124	81	Well defined varve			0.9	
12	1H-2, 109-124	82	Well defined varve			1.1	
12	1H-2, 109-124	83	Well defined varve			1.1	
12	1H-2, 109-124	84	Well defined varve			1.6	
12	1H-2, 109-124	85	Nonlaminated, gray layer	13.0	13.0		13.0
12	1H-2, 109-124	86	Well defined varve	0.9	1.2		1.1
12	1H-2, 109-124	87	Well defined varve	1.4	1.2		1.3
12	1H-2, 109-124	88	Well defined varve	1.1	1.9		1.5
20	2H-2, 95-110	1	Varve boundaries unclear			1.4	
20	2H-2, 95-110	2	Varve boundaries unclear			0.9	
20	2H-2, 95-110	3	Varve boundaries unclear			0.6	
20	2H-2, 95-110	4	Varve boundaries unclear			1.3	
20	2H-2, 95-110	5	Well defined varve		1.0		
20	2H-2, 95-110	6	Well defined varve		1.0		
20	2H-2, 95-110	7	Well defined varve		0.6		
20	2H-2, 95-110	8	Well defined varve		1.1		
20	2H-2, 95-110	9	Well defined varve		1.1		
20	2H-2, 95-110	10	Well defined varve		1.2		
20	2H-2, 95-110	11	Well defined varve		1.2		
20	2H-2, 95-110	12	Well defined varve		1.2		
20	2H-2, 95-110	13	Well defined varve			1.6	
20	2H-2, 95-110	14	Partial varve, not continuous	1.5			
20	2H-2, 95-110	15	Well defined varve			1.0	
20	2H-2, 95-110	16	Well defined varve			1.0	
20	2H-2, 95-110	17	Well defined varve			1.4	
20	2H-2, 95-110	18	Well defined varve			1.4	
20	2H-2, 95-110	19	Well defined varve	1.0	2.2		1.6
20	2H-2, 95-110	20	Well defined varve	1.2	1.0		1.1
20	2H-2, 95-110	21	Varve boundaries unclear			1.3	
20	2H-2, 95-110	22	Varve boundaries unclear			1.3	
20	2H-2, 95-110	23	Varve boundaries unclear			1.1	
20	2H-2, 95-110	24	Varve boundaries unclear			1.1	
20	2H-2, 95-110	25	Varve boundaries unclear			1.1	
20	2H-2, 95-110	26	Varve boundaries unclear			1.2	
20	2H-2, 95-110	27	Varve boundaries unclear			1.1	
20	2H-2, 95-110	28	Varve boundaries unclear			1.2	
20	2H-2, 95-110	29	Varve boundaries unclear			1.3	
20	2H-2, 95-110	30	Varve boundaries unclear			0.9	
20	2H-2, 95-110	31	Varve boundaries unclear			1.2	
20	2H-2, 95-110	32	Nonlaminated interval	5.9	5.5		5.7
20	2H-2, 95-110	33	Partial varve, not continuous		0.9		
20	2H-2, 95-110	34	Well defined varve	0.9	1.0		1.0
20	2H-2, 95-110	35	Well defined varve	1.2	0.9		1.1
20	2H-2, 95-110	36	Well defined varve			0.7	
20	2H-2, 95-110	37	Well defined varve			0.8	
20	2H-2, 95-110	38	Well defined varve			0.8	
20	2H-2, 95-110	39	Well defined varve			0.8	
20	2H-2, 95-110	40	Well defined varve			0.8	
20	2H-2, 95-110	41	Well defined varve			0.9	
20	2H-2, 95-110	42	Well defined varve			1.3	
20	2H-2, 95-110	43	Well defined varve			1.0	
20	2H-2, 95-110	44	Well defined varve			1.8	
20	2H-2, 95-110	45	Well defined varve	1.1	1.5		1.3
20	2H-2, 95-110	46	Well defined varve			1.4	
20	2H-2, 95-110	47	Well defined varve			1.4	
20	2H-2, 95-110	48	Well defined varve			1.7	
20	2H-2, 95-110	49	Well defined varve			1.2	
20	2H-2, 95-110	50	Partial varve, not continuous	1.5			
20	2H-2, 95-110	51	Varve boundaries unclear	0.7	1.1		0.9
20	2H-2, 95-110	52	Partial varve, not continuous		0.8		
20	2H-2, 95-110	53	Partial varve, not continuous	2.4	1.0		1.7
20	2H-2, 95-110	54	Varve boundaries unclear				
20	2H-2, 95-110	55	Varve boundaries unclear			1.5	
20	2H-2, 95-110	56	With pteropod			2.5	
20	2H-2, 95-110	57	Varve boundaries unclear			1.1	
20	2H-2, 95-110	58	Varve boundaries unclear			0.8	
20	2H-2, 95-110	59	Varve boundaries unclear			0.7	
20	2H-2, 95-110	60	Varve boundaries unclear			1.1	
20	2H-2, 95-110	61	Varve boundaries unclear			1.2	
20	2H-2, 95-110	62	Varve boundaries unclear			1.1	
20	2H-2, 95-110	63	Varve boundaries unclear			2.0	
20	2H-2, 95-110	64	Varve boundaries unclear			2.4	
20	2H-2, 95-110	65	Varve boundaries unclear	1.0	2.5		1.8
20	2H-2, 95-110	66	Partial varve, not continuous	0.8			
20	2H-2, 95-110	67	Partial varve, not continuous		1.5		
20	2H-2, 95-110	68	Well defined varve	2.6	1.9		2.3
20	2H-2, 95-110	69	Well defined varve	1.7	1.7		1.7
20	2H-2, 95-110	70	Well defined varve	1.5	1.5		1.5
20	2H-2, 95-110	71	Well defined varve		1.1		
20	2H-2, 95-110	72	Well defined varve		1.0		
20	2H-2, 95-110	73	Well defined varve		0.7		
20	2H-2, 95-110	74	Well defined varve			0.8	
20	2H-2, 95-110	75	Well defined varve	2.1	2.0		2.1
20	2H-2, 95-110	76	Well defined varve	2.0	2.0		2.0
20	2H-2, 95-110	77	Well defined varve	2.2	1.6		1.9
20	2H-2, 95-110	78	Well defined varve	1.3	1.1		1.2

Table 2 (continued).

Slab #	Core, section, interval (cm)	"Varve" unit	Comments	Relative thickness (mm)			
				Left	Right	Center	Mean
20	2H-2, 95-110	79	Well defined varve			1.9	
20	2H-2, 95-110	80	Well defined varve			1.1	
20	2H-2, 95-110	81	Well defined varve	1.6	1.1		1.4
20	2H-2, 95-110	82	Well defined varve			1.0	
20	2H-2, 95-110	83	Varve boundaries unclear			1.5	
20	2H-2, 95-110	84	Varve boundaries unclear			1.5	
20	2H-2, 95-110	85	Well defined varve	1.2	1.0		1.1
20	2H-2, 95-110	86	Well defined varve	1.3	1.2		1.3
20	2H-2, 95-110	87	Well defined varve	1.0	1.2		1.1
20	2H-2, 95-110	88	Well defined varve	0.8	0.8		0.8
20	2H-2, 95-110	89	Varve boundaries unclear			1.4	
20	2H-2, 95-110	90	Varve boundaries unclear			1.0	
20	2H-2, 95-110	91	Varve boundaries unclear			1.7	
20	2H-2, 95-110	92	Varve boundaries unclear		2.4		
20	2H-2, 95-110	93	Varve boundaries unclear		1.4		
20	2H-2, 95-110	94	Varve boundaries unclear		1.5		
20	2H-2, 95-110	95	Varve boundaries unclear			2.7	
20	2H-2, 95-110	96	Varve boundaries unclear			2.5	
20	2H-2, 95-110	97	Varve boundaries unclear			3.0	
20	2H-2, 95-110	98	Varve boundaries unclear			4.5	
20	2H-2, 95-110	99	Varve boundaries unclear			1.7	
20	2H-2, 95-110	100	Well defined varve			1.3	
20	2H-2, 95-110	101	Well defined varve			1.1	
20	2H-2, 95-110	102	Well defined varve			1.1	
20	2H-2, 95-110	103	Well defined varve			1.0	
20	2H-2, 95-110	104	Well defined varve			1.4	
20	2H-2, 95-110	105	Well defined varve			1.0	
20	2H-2, 95-110	106	Well defined varve			1.4	
20	2H-2, 95-110	107	Well defined varve			1.5	
20	2H-2, 95-110	108	Well defined varve			1.2	
20	2H-2, 95-110	109	Well defined varve			1.2	
20	2H-2, 95-110	110	Well defined varve			1.8	
23	2H-4, 130-150	1	Nonlaminated sequence	27.0	28.0		27.5
23	2H-4, 130-150	2	Varve boundaries unclear	1.3			
23	2H-4, 130-150	3	Varve boundaries unclear	2.6			
23	2H-4, 130-150	4	Varve boundaries unclear	2.6			
23	2H-4, 130-150	5	Varve boundaries unclear	2.2			
23	2H-4, 130-150	6	Varve boundaries unclear	1.7			
23	2H-4, 130-150	7	Varve boundaries unclear	1.8			
23	2H-4, 130-150	8	Varve boundaries unclear	1.7			
23	2H-4, 130-150	9	Varve boundaries unclear	2.1			
23	2H-4, 130-150	10	Varve boundaries unclear	1.5			
23	2H-4, 130-150	11	Varve boundaries unclear	3.2			
23	2H-4, 130-150	12	Varve boundaries unclear	4.0			
23	2H-4, 130-150	13	Varve boundaries unclear	1.2			
23	2H-4, 130-150	14	Varve boundaries unclear	0.9			
23	2H-4, 130-150	15	Varve boundaries unclear	1.2			
23	2H-4, 130-150	16	Nonlaminated sequence	16.0			
23	2H-4, 130-150	17	Varve boundaries unclear	1.1			
23	2H-4, 130-150	18	Varve boundaries unclear	1.1			
23	2H-4, 130-150	19	Varve boundaries unclear	2.0			
23	2H-4, 130-150	20	Nonlaminated sequence	16.5	19.0		17.8
23	2H-4, 130-150	21	Varve boundaries unclear	1.5			
23	2H-4, 130-150	22	Varve boundaries unclear	1.6			
23	2H-4, 130-150	23	Varve boundaries unclear	1.8			
23	2H-4, 130-150	24	Varve boundaries unclear	1.2			
23	2H-4, 130-150	25	Varve boundaries unclear	1.5			
23	2H-4, 130-150	26	Varve boundaries unclear	1.2			
23	2H-4, 130-150	27	Varve boundaries unclear	1.6			
23	2H-4, 130-150	28	Varve boundaries unclear	3.1			
23	2H-4, 130-150	29	Varve boundaries unclear	1.4			
23	2H-4, 130-150	30	Varve boundaries unclear	1.6			
23	2H-4, 130-150	31	Varve boundaries unclear	1.5			
23	2H-4, 130-150	32	Varve boundaries unclear	1.3			
23	2H-4, 130-150	33	Varve boundaries unclear	1.4			
23	2H-4, 130-150	34	Varve boundaries unclear	0.9			
23	2H-4, 130-150	35	Well defined varve	1.3			
23	2H-4, 130-150	36	Well defined varve	3.0			
23	2H-4, 130-150	37	Well defined varve			1.6	
23	2H-4, 130-150	38	Well defined varve			1.6	
23	2H-4, 130-150	39	Well defined varve			1.7	
23	2H-4, 130-150	40	Well defined varve			1.6	
23	2H-4, 130-150	41	Well defined varve			0.9	
23	2H-4, 130-150	42	Well defined varve			1.4	
23	2H-4, 130-150	43	Well defined varve			1.3	
23	2H-4, 130-150	44	Well defined varve			1.2	
23	2H-4, 130-150	45	Well defined varve			1.2	
23	2H-4, 130-150	46	Well defined varve			1.7	
23	2H-4, 130-150	47	Well defined varve			1.4	
23	2H-4, 130-150	48	Varve boundaries unclear			1.7	
23	2H-4, 130-150	49	Varve boundaries unclear			2.0	
23	2H-4, 130-150	50	Well defined varve	1.3			
23	2H-4, 130-150	51	Well defined varve	1.6			
23	2H-4, 130-150	52	Well defined varve	2.4			
23	2H-4, 130-150	53	Well defined varve	1.0			
23	2H-4, 130-150	54	Well defined varve	1.5			
23	2H-4, 130-150	55	Well defined varve	1.6			
23	2H-4, 130-150	56	Well defined varve	1.7			
23	2H-4, 130-150	57	Well defined varve	1.1			
23	2H-4, 130-150	58	Well defined varve	2.2			

Table 2 (continued).

Slab #	Core, section, interval (cm)	"Varve" unit	Comments	Relative thickness (mm)			
				Left	Right	Center	Mean
23	2H-4, 130-150	59	Well defined varve	1.5			
23	2H-4, 130-150	60	Varve boundaries unclear	2.0			
23	2H-4, 130-150	61	Varve boundaries unclear	2.3			
23	2H-4, 130-150	62	Could be 2 varves, unclear	4.0			
23	2H-4, 130-150	63	Well defined varve	1.2			
23	2H-4, 130-150	64	Well defined varve	2.0			
23	2H-4, 130-150	65	Well defined varve	2.0			
23	2H-4, 130-150	66	Well defined varve	1.3			
23	2H-4, 130-150	67	Well defined varve	1.5			
23	2H-4, 130-150	68	Well defined varve	1.5			
23	2H-4, 130-150	69	Well defined varve	1.9			
23	2H-4, 130-150	70	Nonlaminated sequence	16.0	13.5		14.8
31	3H-5, 90-105	1	Nonlaminated sequence	15.0	13.0		14.0
31	3H-5, 90-105	2	Well defined varve	2.1	1.5		1.8
31	3H-5, 90-105	3	Partial varve, not continuous		5.0		
31	3H-5, 90-105	4	Partial varve, not continuous	2.6			
31	3H-5, 90-105	5	Partial varve, not continuous	2.0			
31	3H-5, 90-105	6	Well defined varve	2.0	2.5		2.3
31	3H-5, 90-105	7	Well defined varve	2.4	2.4		2.4
31	3H-5, 90-105	8	Well defined varve	2.0	1.3		1.7
31	3H-5, 90-105	9	Varve boundaries unclear	3.6	1.1		2.4
31	3H-5, 90-105	10	Well defined varve	0.4	2.1		1.3
31	3H-5, 90-105	11	Varve boundaries unclear	1.8	2.0		1.9
31	3H-5, 90-105	12	Varve boundaries unclear	2.0	1.6		1.8
31	3H-5, 90-105	13	Well defined varve	1.2	1.5		1.4
31	3H-5, 90-105	14	Varve boundaries unclear	1.9	2.1		2.0
31	3H-5, 90-105	15	Varve boundaries unclear	0.8	3.1		2.0
31	3H-5, 90-105	16	Varve boundaries unclear	1.2	1.0		1.1
31	3H-5, 90-105	17	Varve boundaries unclear	1.0	1.2		1.1
31	3H-5, 90-105	18	Varve boundaries unclear	1.2	1.4		1.3
31	3H-5, 90-105	19	Varve boundaries unclear	1.6	0.5		1.1
31	3H-5, 90-105	20	Varve boundaries unclear	1.5	1.5		1.5
31	3H-5, 90-105	21	Varve boundaries unclear	1.5	1.3		1.4
31	3H-5, 90-105	22	Well defined varve	1.7	1.3		1.5
31	3H-5, 90-105	23	Well defined varve	1.3	1.2		1.3
31	3H-5, 90-105	24	Well defined varve	1.9	2.0		2.0
31	3H-5, 90-105	25	Nonlaminated sequence	4.4	4.7		4.6
31	3H-5, 90-105	26	Partial varve, not continuous	1.6			
31	3H-5, 90-105	27	Varve boundaries unclear	1.6	2.5		2.1
31	3H-5, 90-105	28	Partial varve, not continuous		1.9		
31	3H-5, 90-105	29	Varve boundaries unclear	2.4	1.5		2.0
31	3H-5, 90-105	30	Varve boundaries unclear	1.3	0.9		1.1
31	3H-5, 90-105	31	Varve boundaries unclear			1.5	
31	3H-5, 90-105	32	Varve boundaries unclear			1.1	
31	3H-5, 90-105	33	Varve boundaries unclear			2.1	
31	3H-5, 90-105	34	Varve boundaries unclear			1.4	
31	3H-5, 90-105	35	Varve boundaries unclear			1.5	
31	3H-5, 90-105	36	Varve boundaries unclear			1.6	
31	3H-5, 90-105	37	Varve boundaries unclear			0.8	
31	3H-5, 90-105	38	Varve boundaries unclear			1.6	
31	3H-5, 90-105	39	Varve boundaries unclear			1.5	
31	3H-5, 90-105	40	Varve boundaries unclear			1.5	
31	3H-5, 90-105	41	Varve boundaries unclear			1.5	
31	3H-5, 90-105	42	Varve boundaries unclear			1.4	
31	3H-5, 90-105	43	Varve boundaries unclear			1.5	
31	3H-5, 90-105	44	Varve boundaries unclear	2.9	1.7		2.3
31	3H-5, 90-105	45	Varve boundaries unclear			1.2	
31	3H-5, 90-105	46	Varve boundaries unclear			1.1	
31	3H-5, 90-105	47	Varve boundaries unclear			1.4	
31	3H-5, 90-105	48	Varve boundaries unclear			0.9	
31	3H-5, 90-105	49	Varve boundaries unclear			1.2	
31	3H-5, 90-105	50	Varve boundaries unclear			1.7	
31	3H-5, 90-105	51	Varve boundaries unclear	1.2	2.3		1.8
31	3H-5, 90-105	52	Partial varve, not continuous	1.7			
31	3H-5, 90-105	53	Partial varve, not continuous	1.1			
31	3H-5, 90-105	54	Varve boundaries unclear	1.2	0.8		1.0
31	3H-5, 90-105	55	Varve boundaries unclear			1.6	
31	3H-5, 90-105	56	Varve boundaries unclear			1.6	
31	3H-5, 90-105	57	Varve boundaries unclear			1.2	
31	3H-5, 90-105	58	Varve boundaries unclear			2.0	
31	3H-5, 90-105	59	Nonlaminated sequence	2.9	4.8		3.9
31	3H-5, 90-105	60	Partial varve, not continuous	1.6			
31	3H-5, 90-105	61	Varve boundaries unclear	1.8	1.3		1.6
31	3H-5, 90-105	62	Varve boundaries unclear	1.6	2.2		1.9
31	3H-5, 90-105	63	Varve boundaries unclear			1.6	
31	3H-5, 90-105	64	Varve boundaries unclear			2.5	
31	3H-5, 90-105	65	Varve boundaries unclear	2.2	1.7		2.0
31	3H-5, 90-105	66	Varve boundaries unclear			2.3	
31	3H-5, 90-105	67	Varve boundaries unclear			2.0	
31	3H-5, 90-105	68	Varve boundaries unclear			2.9	
31	3H-5, 90-105	69	Nonlaminated sequence	8.4	7.0		7.7

Notes: Numbers were assigned sequentially from bottom to top for each varve, and for each nonlaminated interval. The thickness of each varved and non-laminated unit is reported preferentially as a mean of two measurements taken near the left and right margins of an X-radiographic image. In some cases, the limited resolution of an X-radiograph image made it necessary to take a single measurement near the center.