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20. Data Report: A Revised Composite Depth Record for Site 1077 Based on Magnetic Susceptibility and XRF Core Scanner (CORTEX) Data[1]

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INTRODUCTION

The composite depth scale for Holes 1077A and 1077B (Shipboard Scientific Party, 1998) contains imperfections between 115 and 155 meters composite depth (mcd). The spliced magnetic susceptibility record shows discrepancies when compared to the record of Site 1075 at 120–125 and 140–150 mcd (Ocean Drilling Program [ODP] Site 1077 scale) around marine isotope Stages 22 and 34, respectively. In addition, the offsets applied to transform the standard meters below seafloor (mbsf) depths into composite depths cause overlaps between cores of the same hole at the transitions between Cores 175-1077A-12H and 13H, 175-1077B-12H and 13H, and 175-1077B-13H and 14H. These overlaps are supported neither by visual investigation of the lithology in the core photographs (see "Site 1077 Core Descriptions and Photographs" in Wefer, Berger, Richter, et al., 1998) nor by the pollen and dinoflagellate content. For these reasons, we have reassessed the Site 1077 composite depth scale.

METHODS

Six cores from the depth intervals in question were scanned every 2 cm with an X-ray fluorescence (XRF) core scanner. The XRF scanner, CORTEX, was developed at the Netherlands Institute for Sea Research at Texel for elemental analyses of split sediment cores (Jansen et al., 1998).

[1]Jansen, J.H.F., and Dupont, L.M., 2001. Data report: A revised composite depth record for Site 1077 based on magnetic susceptibility and XRF core scanner (CORTEX) data. *In* Wefer, G., Berger, W.H., and Richter, C. (Eds.), *Proc. ODP, Sci. Results,* 175, 1–10 [Online]. Available from World Wide Web: <http://www-odp.tamu.edu/publications/175_SR/VOLUME/CHAPTERS/SR175_20.PDF>. [Cited YYYY-MM-DD]
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This instrument produces reliable counts for the elements K through Sr. Fe counts generally correlate well with magnetic susceptibility, but the hole-to-hole correlation with Fe is often more sensitive because the total Fe content is independent of the redox state of the sediment, which is not the case for the magnetic susceptibility.

RESULTS

The records of Cores 175-1077B-12H through 16H were correlated with the records of Cores 175-1077A-12H through 16H with the use of the time-series analysis program AnalySeries (Paillard, 1996). During the correlation, the distances between the data points within the cores from Hole 1077A were kept constant but the distances between the cores were allowed to vary. This operation resulted in a provisional depth scale (Fig. **F1**). The data of the cores from Hole 1077B were fit to the data obtained from cores from Hole 1077A, allowing downcore stretching and squeezing. The correlation was significantly improved by the use of the CORTEX scans. The Ca records provide extra tie points (Fig. **F2A**), and the Fe records occasionally proved to be more distinctive and comparable than the magnetic susceptibility records (Fig. **F2B**). The resulting correlation confirms the suspicion that there are more and larger gaps between the cores than originally recognized (Fig. **F1;** Table **T1**).

For the construction of the revised splice record, the tie points between Hole 1077A and Hole 1077B were left at the original positions if possible. Extra tie points had to be added near the transitions between Cores 175-1077A-12H, 13H, and 14H (Table **T2**). We applied only depth translations and abstained from magnification and reduction. Unfortunately, no junction could be detected between the records from Core 175-1077B-15H and Core 175-1077A-16H, which may indicate a (probably small) hiatus or gap between 150.60 and 150.82 meters revised composite depth (rmcd) (Fig. **F3**). This interval, however, may be represented by the core catcher sample of Core 175-1077B-15H. As a result of the additional adjustments, the revised composite depth record is 4.92 m longer than the original spliced record between 110 and 150 mbsf (Fig. **F4**). The revised offsets, rmcd scale, and new tie points are presented in Tables **T1** and **T2.**

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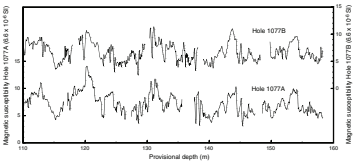
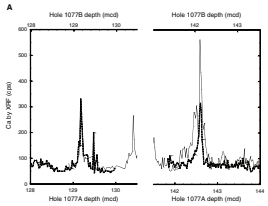
F1. Magnetic susceptibility records for provisional depths, p. 4.



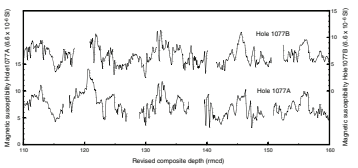
F2. XRF Ca and Fe, p. 5.



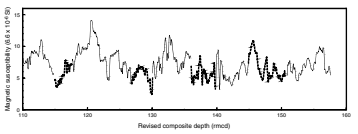
T1. Composite depth offsets, p. 9.

T2. Splice tie points, p. 10.

F3. Magnetic susceptibility record for composite section, p. 7.



F4. Spliced magnetic susceptibility record, p. 8.



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Jansen, J.H.F., Van der Gaast, S.J., Koster, B., and Vaars, A.J., 1998. CORTEX, a shipboard XRF-scanner for element analyses in split sediment cores. *Mar. Geol.,* 151:143–153.

Paillard, D., 1996. Macintosh program performs time-series analysis. *Eos,* 77:379.

Shipboard Scientific Party, 1998. Site 1077. *In* Wefer, G., Berger, W.H., and Richter, C., et al., *Proc. ODP, Init. Repts.,* 175: College Station, TX (Ocean Drilling Program), 115–141.

Wefer, G., Berger, W.H., Richter, C., et al., 1998. *Proc. ODP, Init. Repts.,* 175: College Station, TX (Ocean Drilling Program).

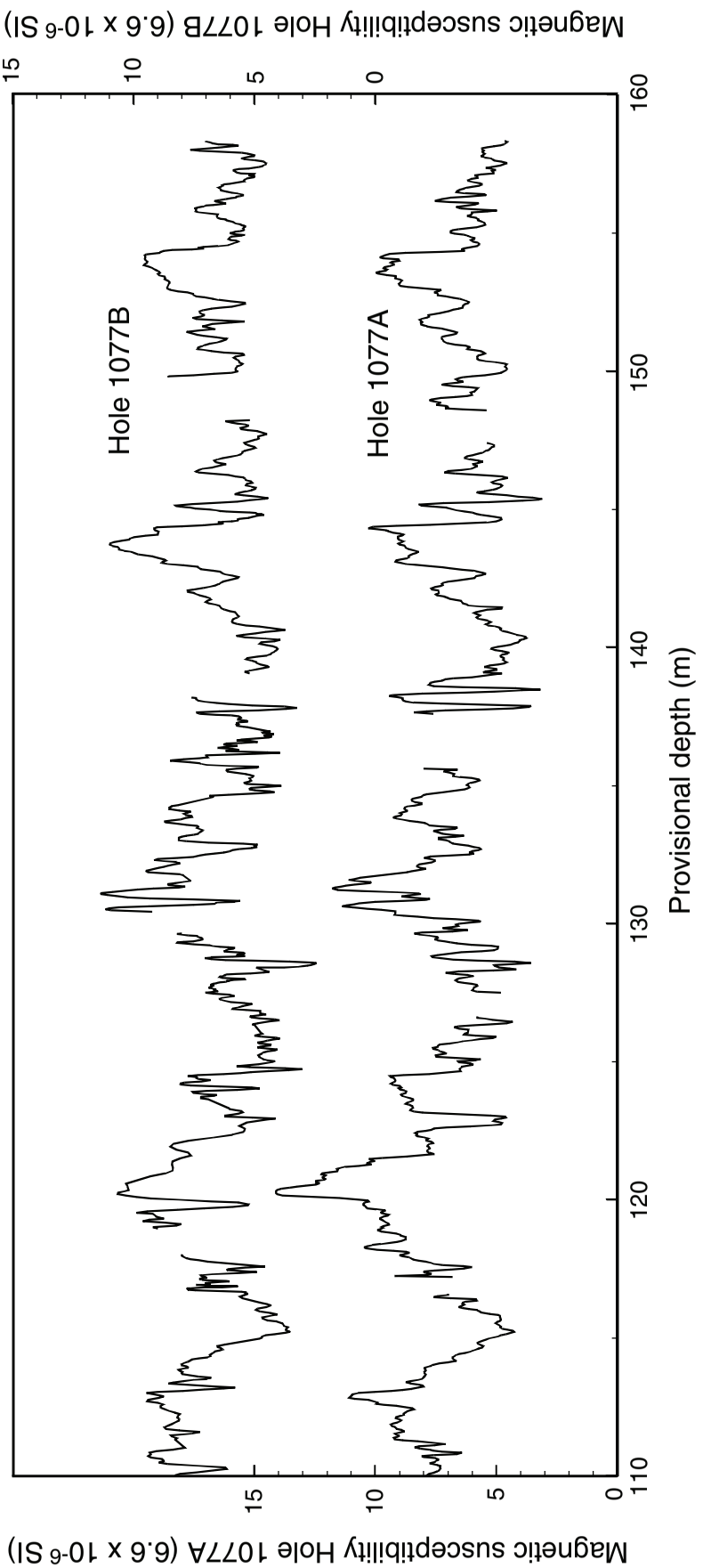


Figure F1. Intercorrelation of the magnetic susceptibility records for Holes 1077A and 1077B.

Figure F2. A. Details of CORTEX XRF Ca records. XRF counts are plotted for Holes 1077A (solid line) and 1077B (dashed line). (Continued on next page.)

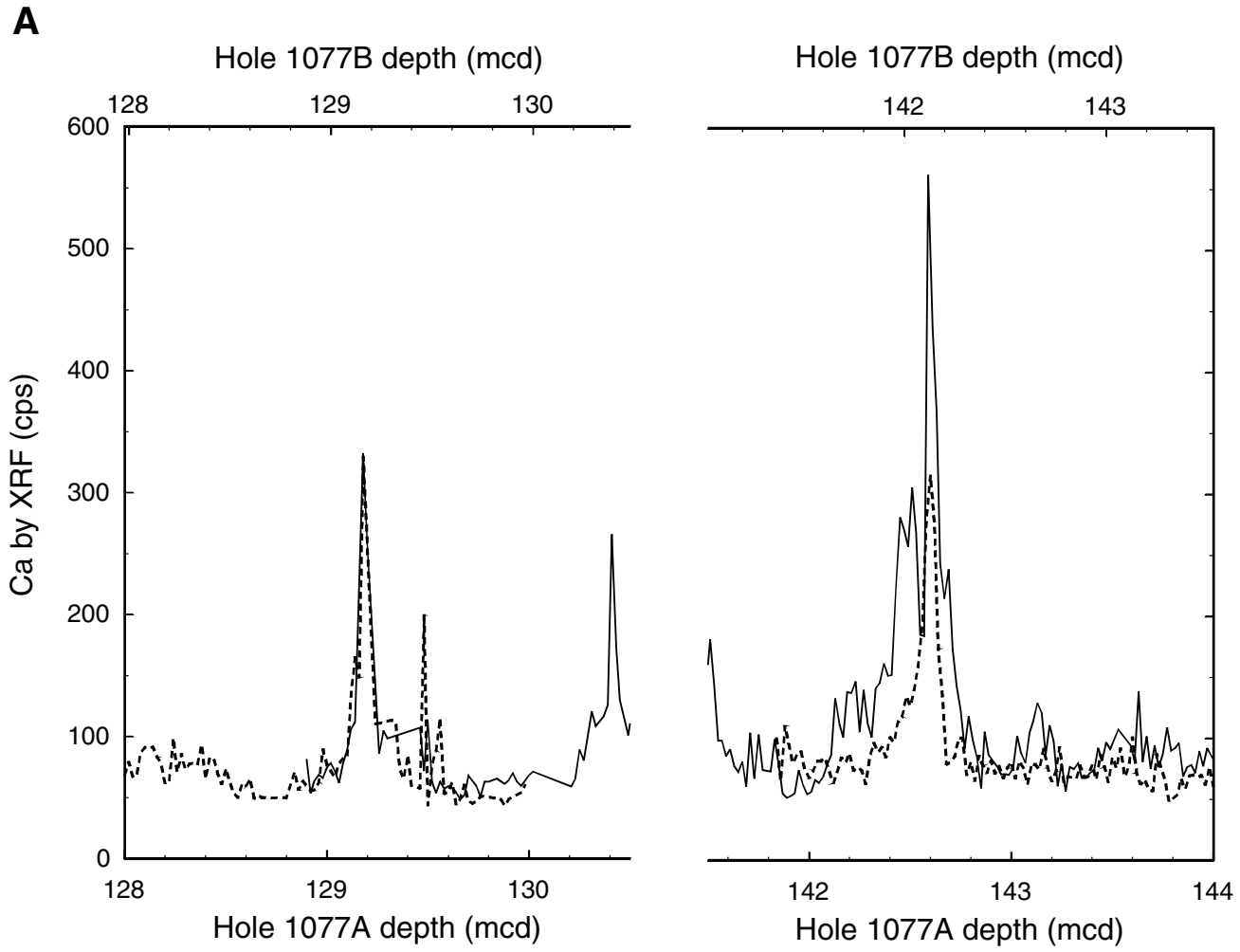
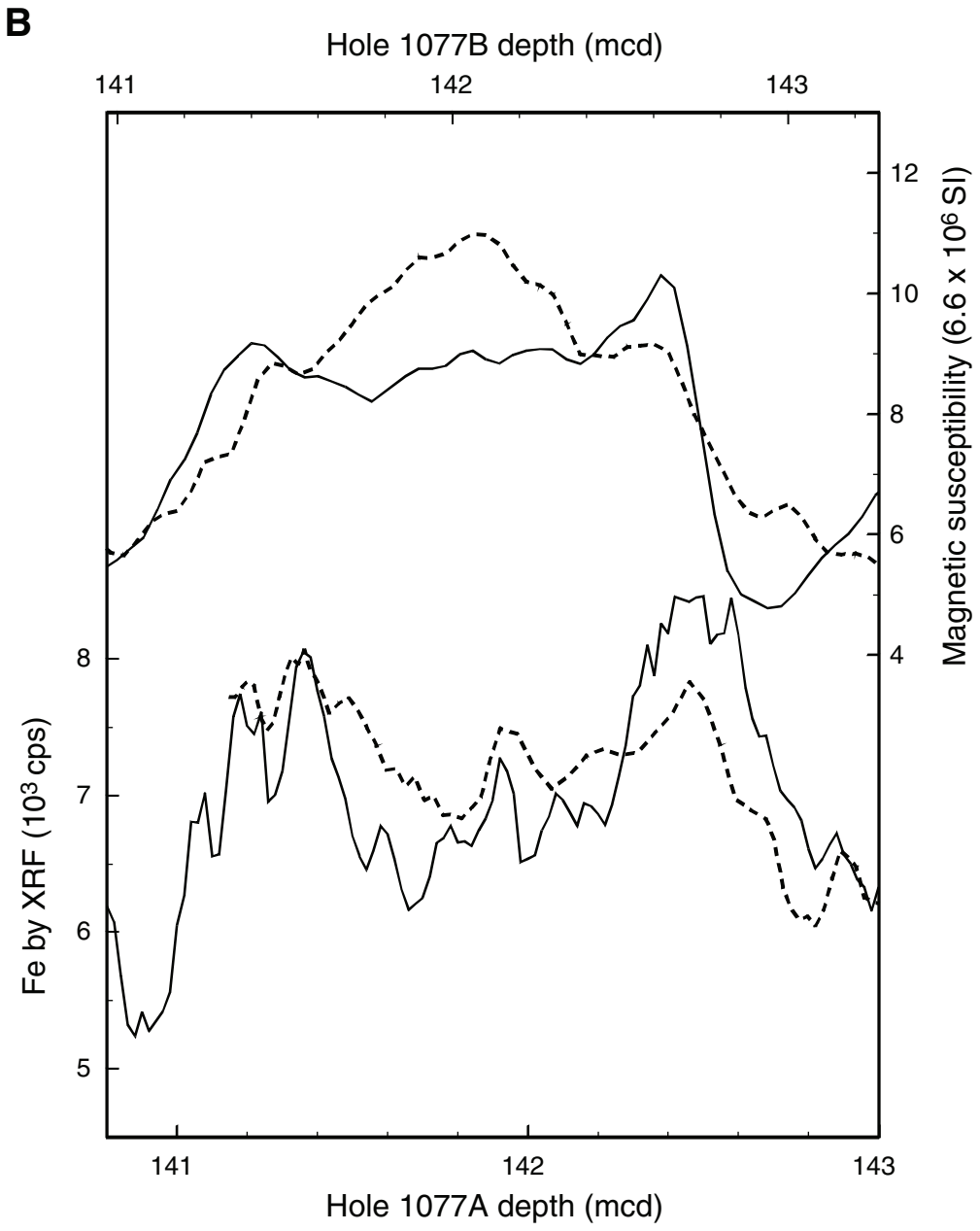


Figure F2 (continued). B. Details of CORTEX XRF Fe records. Fe records are plotted with the magnetic susceptibility records. Solid line = Hole 1077A, dashed line = Hole 1077B.



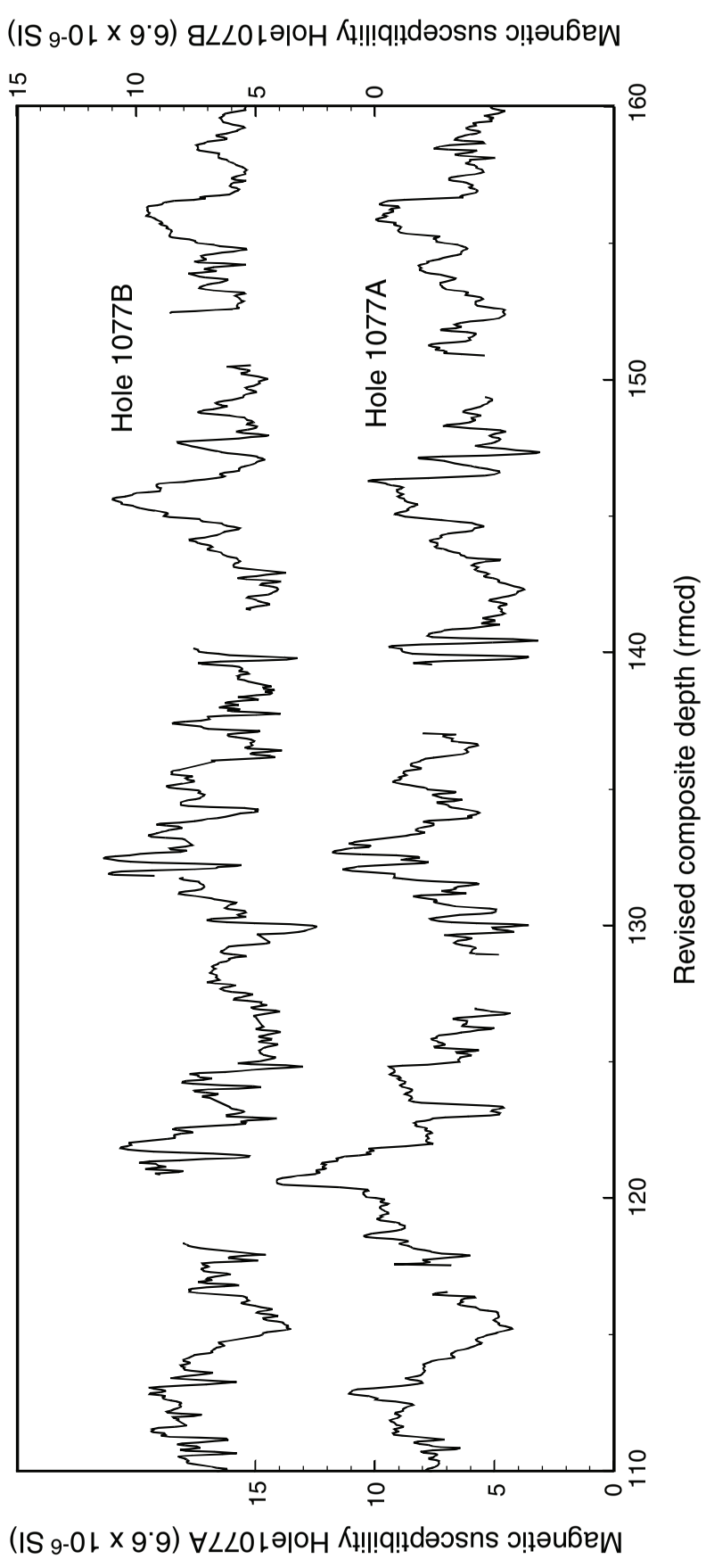


Figure F3. Composite section for Holes 1077A and 1077B of the interval between 110 and 160 revised mcd (rmcd). Magnetic susceptibility data are plotted for Holes 1077A and 1077B.

Figure F4. Spliced magnetic susceptibility record for the interval between 110 and 160 revised mcd (rmcd). Solid line = Hole 1077A, dashed line = Hole 1077B.

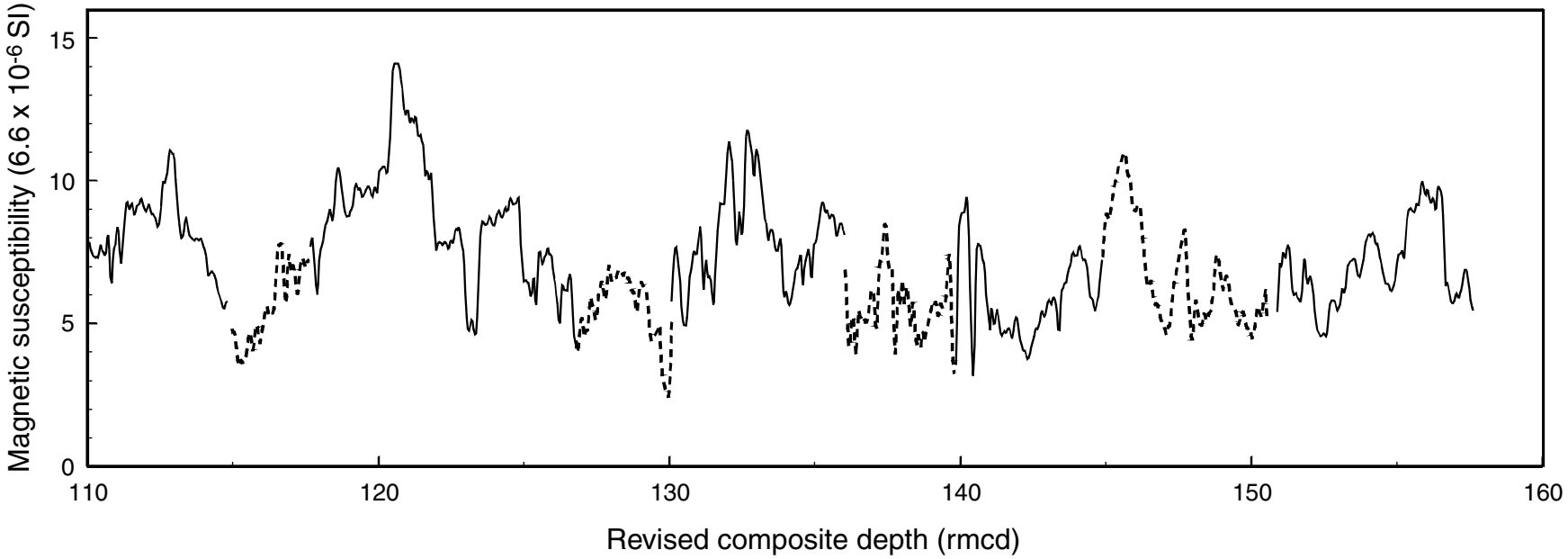


Table T1. Offsets applied to construct the revised composite depths to cores, Holes 1077A and 1077B.

Hole, core	Depth (mbsf)	Offset (m)	Revised composite depth (rmcd)	Offset to mcd (m)
175-1077A-				
12H	100.0	6.72	106.72	0.00
13H	109.5	7.96	117.46	1.24
14H	119.0	9.85	128.85	3.13
15H	128.5	10.99	139.49	3.67
16H	138.0	12.82	150.82	4.92
>16H				4.92
175-1077B-				
12H	100.6	8.08	108.68	0.24
13H	110.1	10.69	120.79	3.03
14H	119.6	11.78	131.38	2.94
15H	129.1	12.42	141.52	3.55
16H	138.6	13.76	152.36	4.92
>16H				4.92

Note: mcd = meters composite depth.

Table T2. Splice tie points used to create the continuous "spliced" stratigraphic sequence for Site 1077 for intervals deeper than 110 m rmcd.

Hole, core	Interval (m)	Depth (mbsf)	Revised composite depth (rmcd)	Offset (m)	Wether tied	Hole, core	Interval (m)	Depth (mbsf)	Revised composite depth (rmcd)	Offset (m)
175-						175-				
1077A-12H	8.10	108.10	114.82	6.72	Tied to	1077B-12H	6.29	106.89	114.97	8.08
1077B-12H	8.93	109.53	117.61	8.08	Tied to	1077A-13H	0.20	109.70	117.66	7.96
1077A-13H	9.32	118.82	126.78	7.96	Tied to	1077B-13H	6.01	116.11	126.80	10.69
1077B-13H	9.29	119.39	130.08	10.69	Tied to	1077A-14H	1.24	120.24	130.09	9.85
1077A-14H	7.18	126.18	136.03	9.85	Tied to	1077B-14H	4.67	124.27	136.05	11.78
1077B-14H	8.41	128.01	139.79	11.78	Tied to	1077A-15H	0.32	128.82	139.81	10.99
1077A-15H	5.38	133.88	144.87	10.99	Tied to	1077B-15H	3.40	132.50	144.89	12.39
1077B-15H	9.04	138.14	150.53	12.39	Tied to	1077A-16H	0.08	138.08	150.90	12.82