

## Supplementary Information to “Reinforcing the North Atlantic backbone: revision and extension of the composite splice at ODP Site 982”

This supplemental file contains the Supplementary Tables 2 and 6 and Figures 1-3 that were referred to in the main manuscript. Additionally, the captions are included for Supplementary Tables 1, 3-5 and 7, which will be stored on PANGAEA. All Supplementary Tables are also included as supplementary excel file to this publication. All composite core photos, including a spliced composite core image, will be available as supplementary information on PANGAEA.

### SUPPLEMENTARY TABLES 2 and 6

Species	Abbr.	$\delta^{18}\text{O}$ offset	$\delta^{13}\text{C}$ offset	Source
<i>Cibicidoides mundulus</i>	CMUND	0.64	0.00	Shackleton et al., 1995
<i>Cibicidoides wuellerstorfi</i>	CWUE	0.64	0.00	Shackleton et al., 1984

**Supplementary Table 2.** Species specific offsets (Shackleton et al., 1984, 1995) used to correct the raw isotopic data in Supplementary Table 3 to equilibrium.

Biohorizon (from Site 982 a)	Type	Top and Bottom Sample ID, mbsf rmcd a		mid Depth rmcd (m)	GTS2012 Age b (Ma)
		TOP 321-U1337	BOTTOM 321-U1337		
LO P. lacunosa	Nannofossil	B-2H-2-W 124 8.24 9.56	B-1H-4-W 10 4.6 4.6	10.41	0.44
FO Gephyrocapsa spp. C/D	Nannofossil	B-3H-3-W 65 18.65 20.81	B-3H-4-W 10 19.6 21.76	21.28	0.61
LO C. macintyreii	Nannofossil	B-4H-2-W 124 27.24 30.32	B-4H-3-W 110 28.6 31.68	31.00	1.60
FO Gr. inflata	Planktonic foraminifera	A-4H-9-W 10.5 36.99 39.49	A-5H-9-W 17.5 46.54 50.47	45.91	2.10
LO D. surculus T	Nannofossil	B-7H-1-W 18 53.18 58.95	B-7H-2-W 18 54.68 60.45	59.70	2.49
LO D. tamalis T	Nannofossil	A-7H-5-W 18 61.88 69.85	A-7H-6-W 18 63.38 71.35	70.60	2.80
LO Gr. cf. crassula T	Planktonic foraminifera	A-8H-9-W 12 74.97 83.75	A-9H-9-W 23 83.61 93.44	88.59	3.29
LO A. primus T	Nannofossil	A-14H-3-W 10 125.3 141.02	A-14H-4-W 10 126.8 142.52	141.77	4.50
LO D. quinqueramus	Nannofossil	A-18H-4-W 10 164.8 184.15	A-18H-5-W 10 166.3 185.65	184.90	5.59
d. to s. N. atlantica	Planktonic foraminifera	B-26H-3-W 20 236.7 263.59	B-26H-4-W 20 238.2 265.09	264.34	6.99
FO D. surculus	Nannofossil	B-26H-9-W 19 242.95 269.84	B-27X-9-W 18.5 249.49 277.91	273.87	7.79
FO N. acostaensis	Planktonic foraminifera	B-35X-9-W 35.5 323.06 352.73	B-36X-1-W 19 326.49 356.16	354.44	9.83
LO Gr. mayeri	Planktonic foraminifera	B-35X-9-W 35.5 323.06 352.73	B-36X-1-W 19 326.49 356.16	354.44	10.46
LO C. miopelagicus	Nannofossil	B-41X-2-W 10 376.1 405.77	B-41X-3-W 10 377.6 407.27	406.52	10.97
LO C. floridanus	Nannofossil	B-49X-1-W 10 451.5 481.17	B-49X-2-W 10 453 482.67	481.92	11.85
LO S. heteromorphus	Nannofossil	B-47X-9-W 45.5 438.66 468.33	B-48X-9-W 38.5 450.14 479.81	474.07	13.53
FO O. suturalis	Planktonic foraminifera	B-53X-9-W 35 498.62 528.29	B-54X-1-W 41 499.71 529.38	528.83	15.10
LO C. dissimilis	Planktonic foraminifera	B-57X-9-W 34 535.72 565.39	B-58X-9-W 30.5 541.59 571.26	568.32	17.54
FO S. heteromorphus	Nannofossil	B-60X-9-W 33.5 561.18 590.85	B-61X-9-W 29.5 570.22 599.89	595.37	17.71
LO S. belemnus	Nannofossil	B-60X-9-W 33.5 561.18 590.85	B-61X-1-W 10 566.8 596.47	593.66	17.95
Polynomial age model c		Age = (21.007 * depth) + (2.6974 * depth^2) + (-0.11423 * depth^3)			
a		Site 982 report (Shipboard scientific party Leg 162, 1997)			
b		Hilgen et al., 2012			

**Supplementary Table 6.** Initially, first-order age model based on a 3<sup>rd</sup> order polynomial fit through 20 shipboard nannofossil and planktonic foraminiferal datums updated to the ages from (Hilgen et al., 2012).

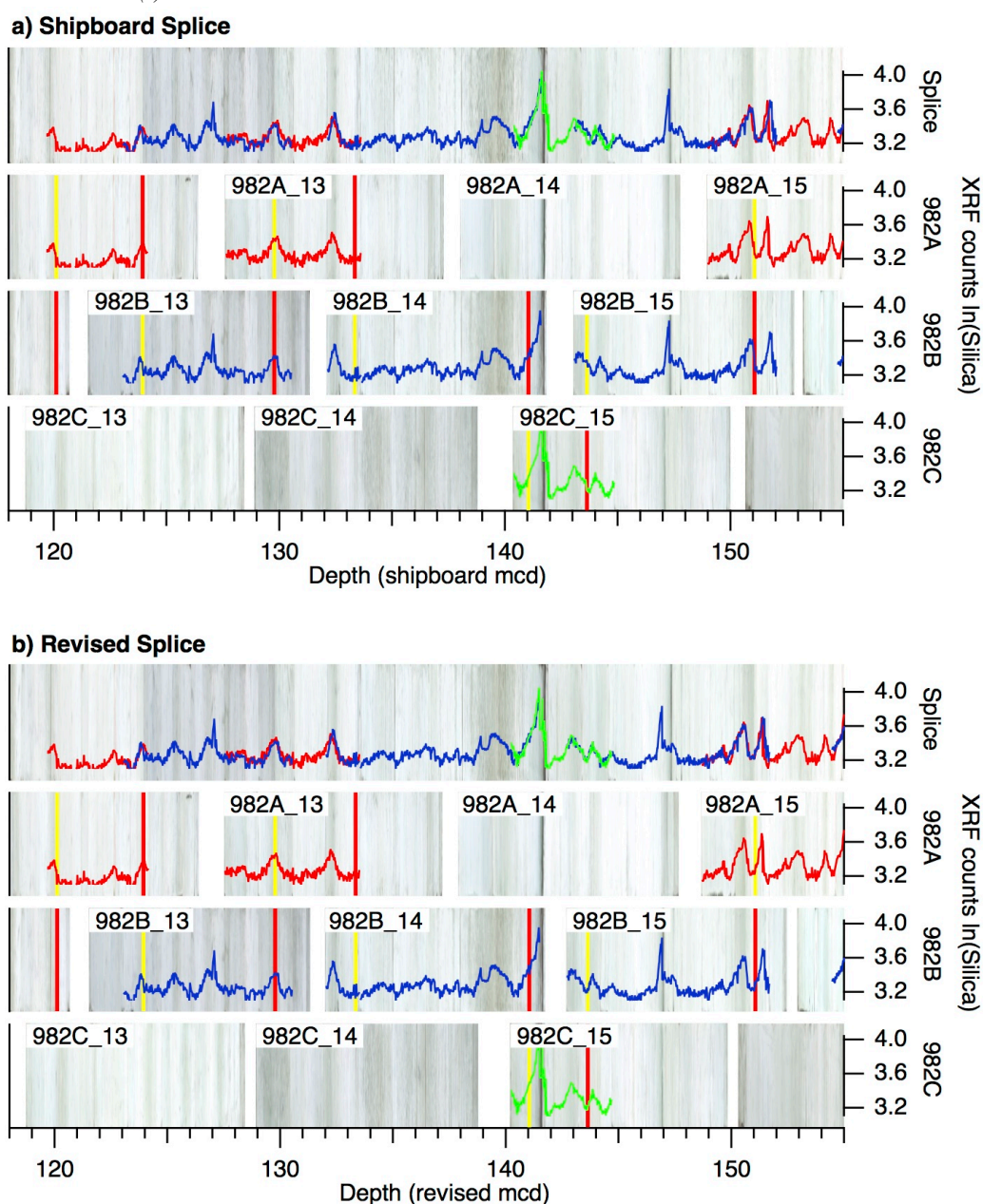
### COMPOSITE CORE IMAGES

The composite core images generated in CODD are available on PANGAEA as both IGOR Binary Files (.ibw) and JPEG images.

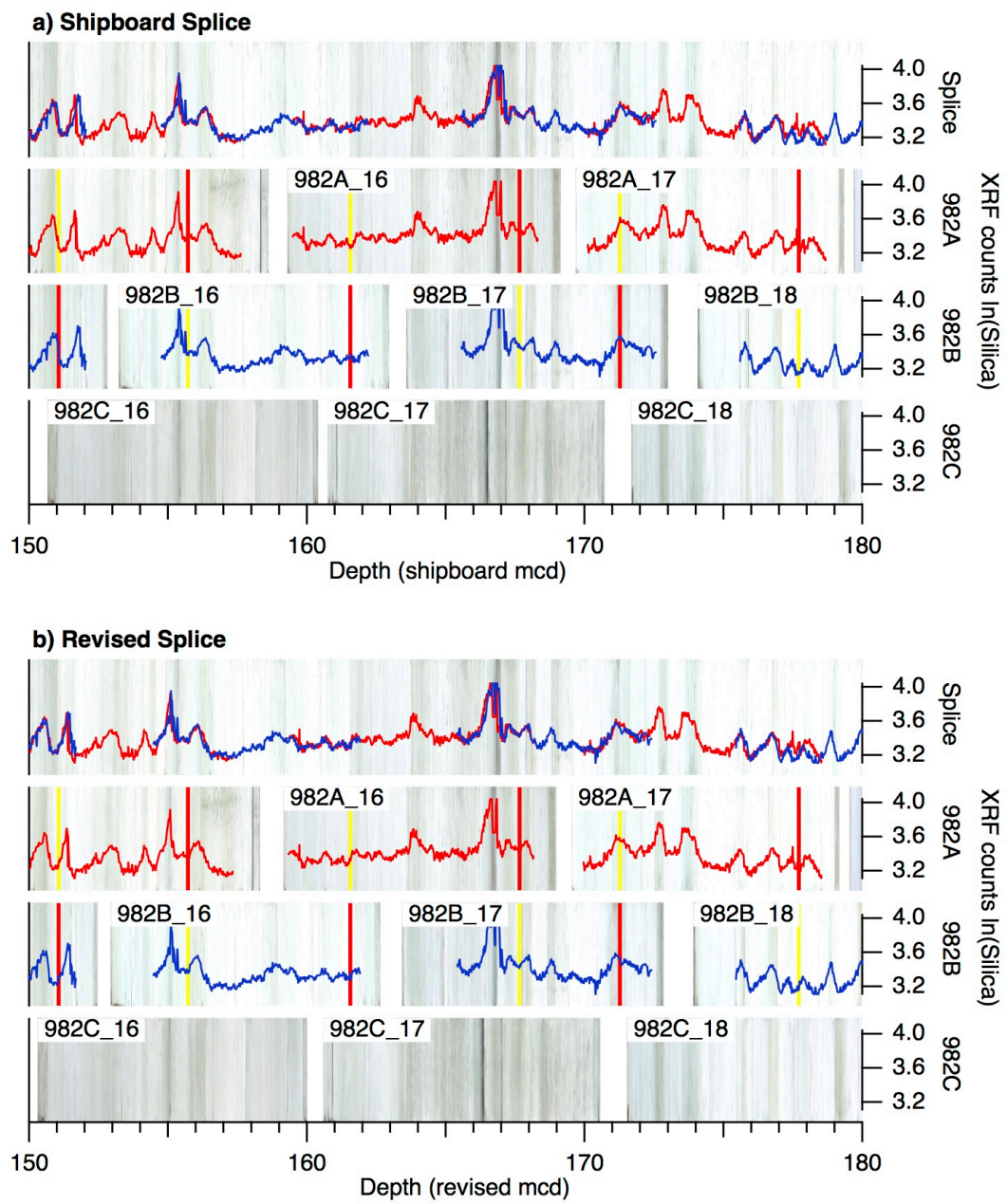
## SUPPLEMENTARY FIGURES 1-3

**Supplementary Figure 1.** Panels showing a) the shipboard composite splice and b) the revised splice between 120 and 290 m revised composite depth (rmcd) in ~30 m intervals (Panels 1-6). Each panel consists of the composite core images of the Site 982 splice and Holes 982A, 982B and 982C, with the XRF ln(Silica counts). Tie point locations are shown by yellow (upper tie point within a core) and red (lower tie point within a core) lines.

*Panel 1: 118-155 (r)mcd.*



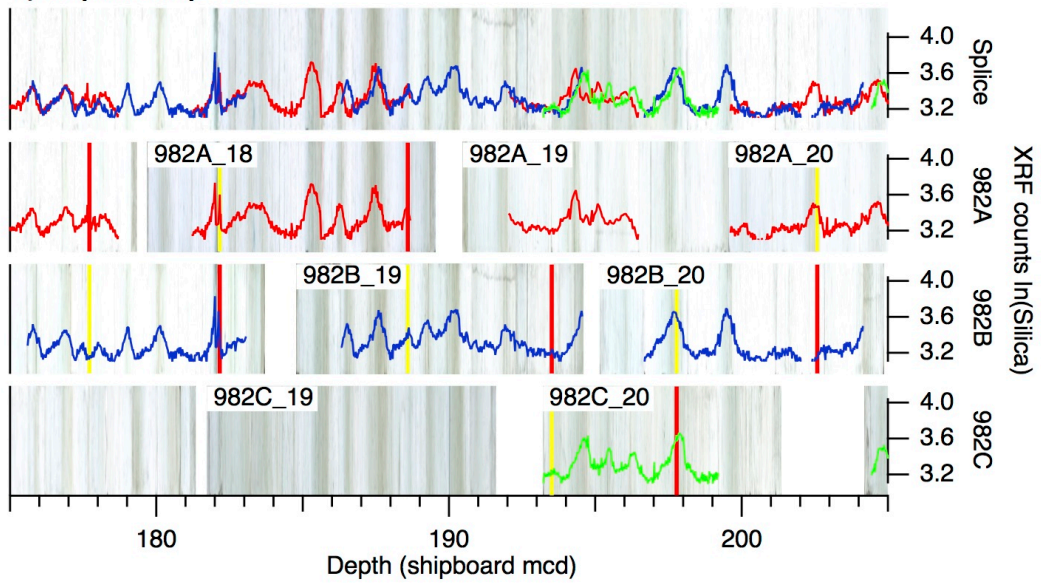
Panel 2: 150-180 (r)mcd.



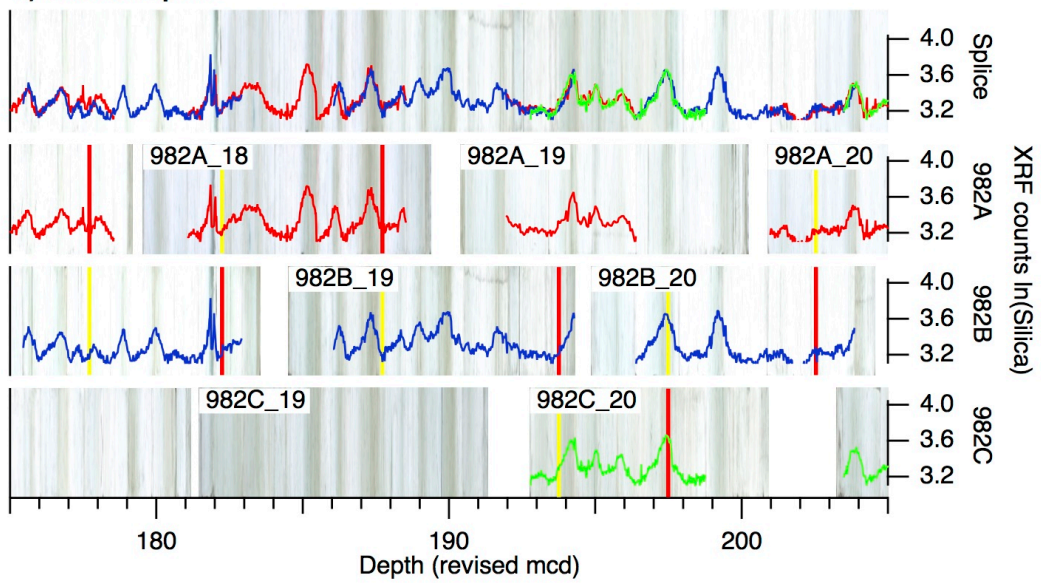


Panel 3: 175-205 (r)mcd.

**a) Shipboard Splice**

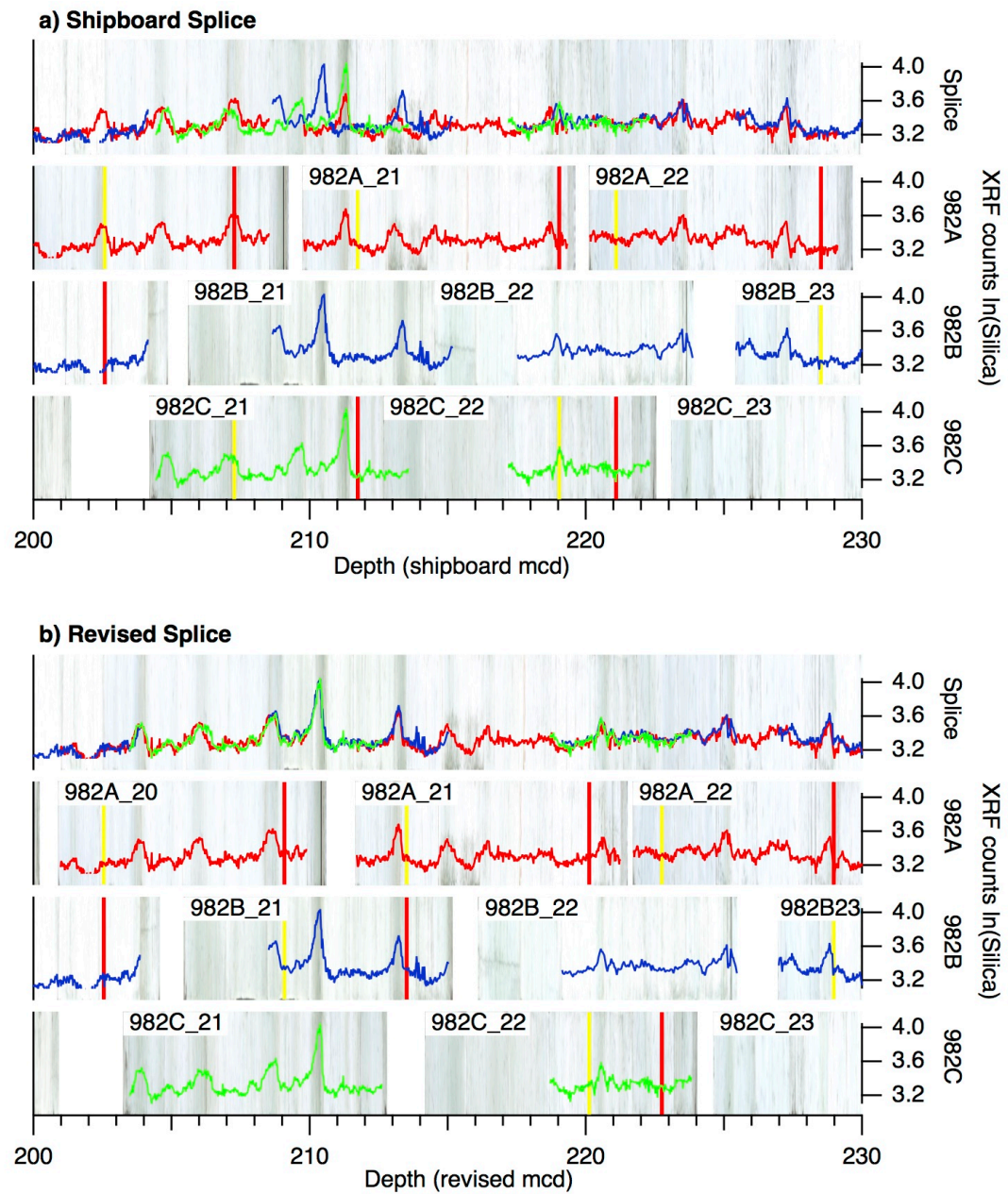


**b) Revised Splice**



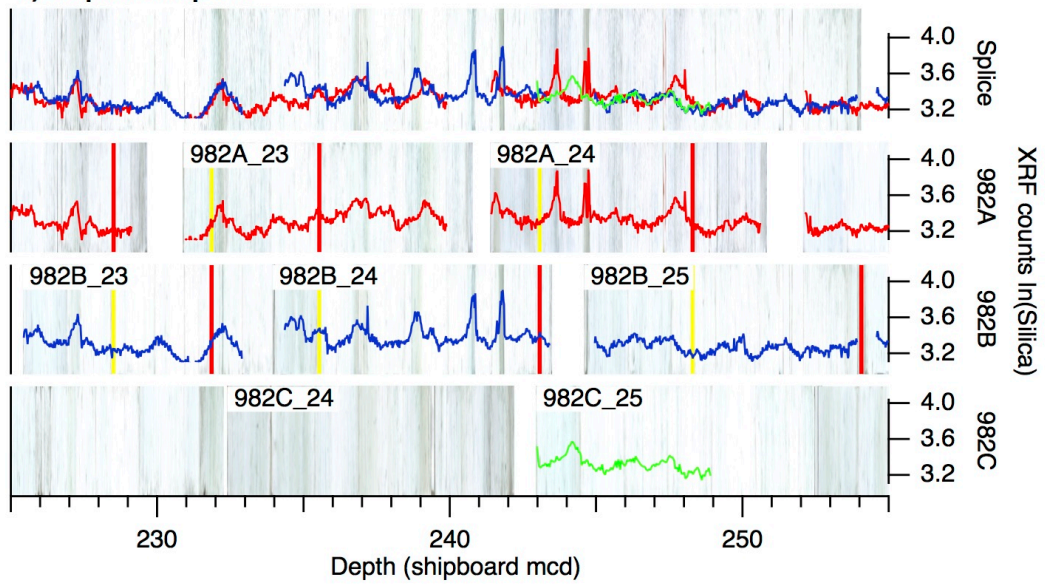


Panel 4: 200-230 (r)mcd.

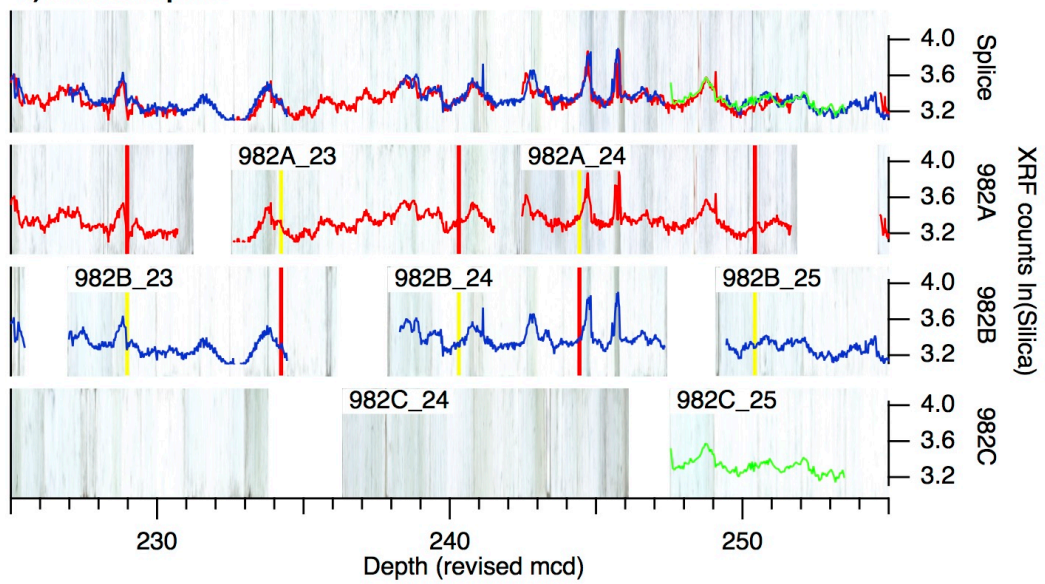


Panel 5: 225-255 (r)mcd.

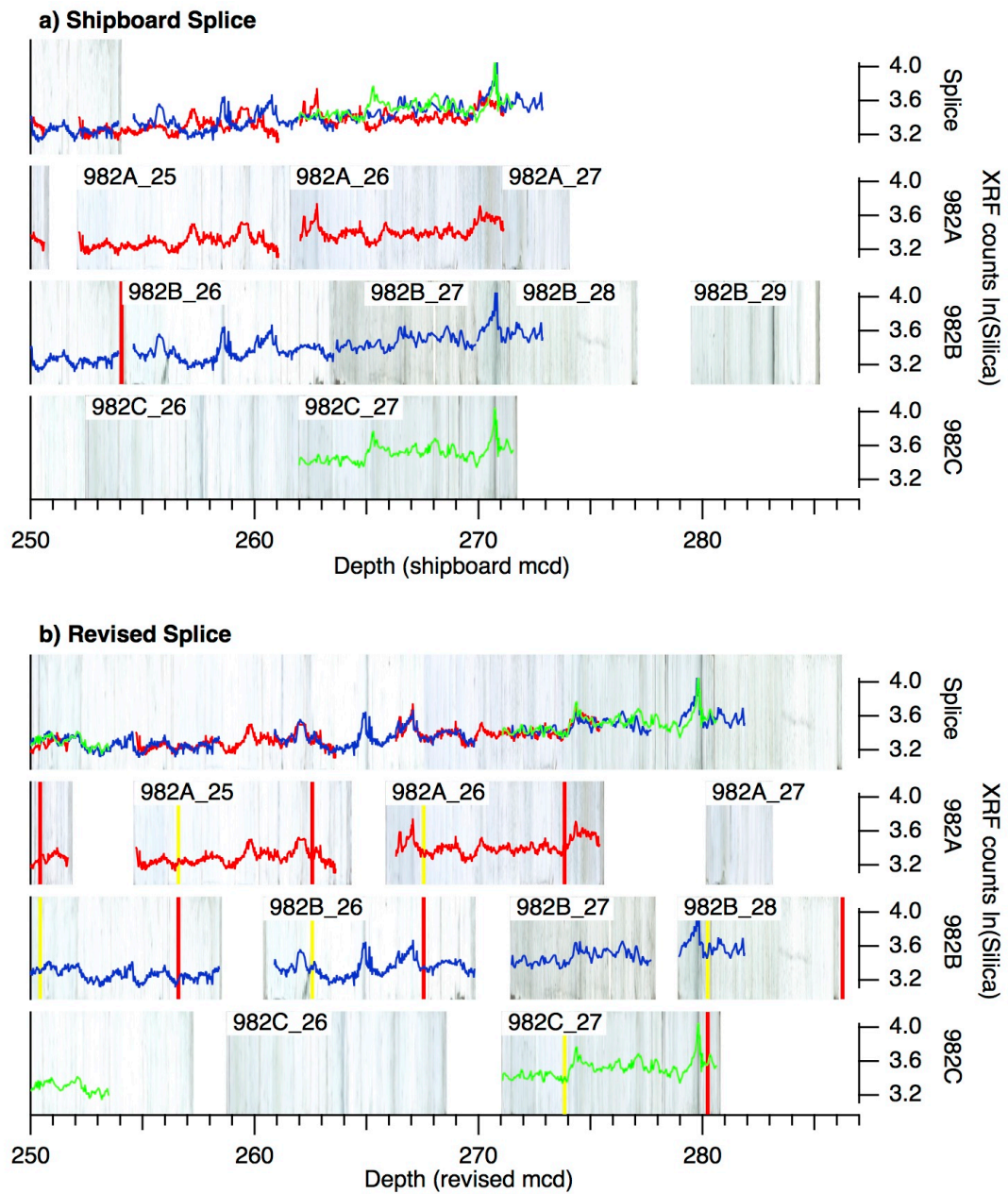
**a) Shipboard Splice**



**b) Revised Splice**



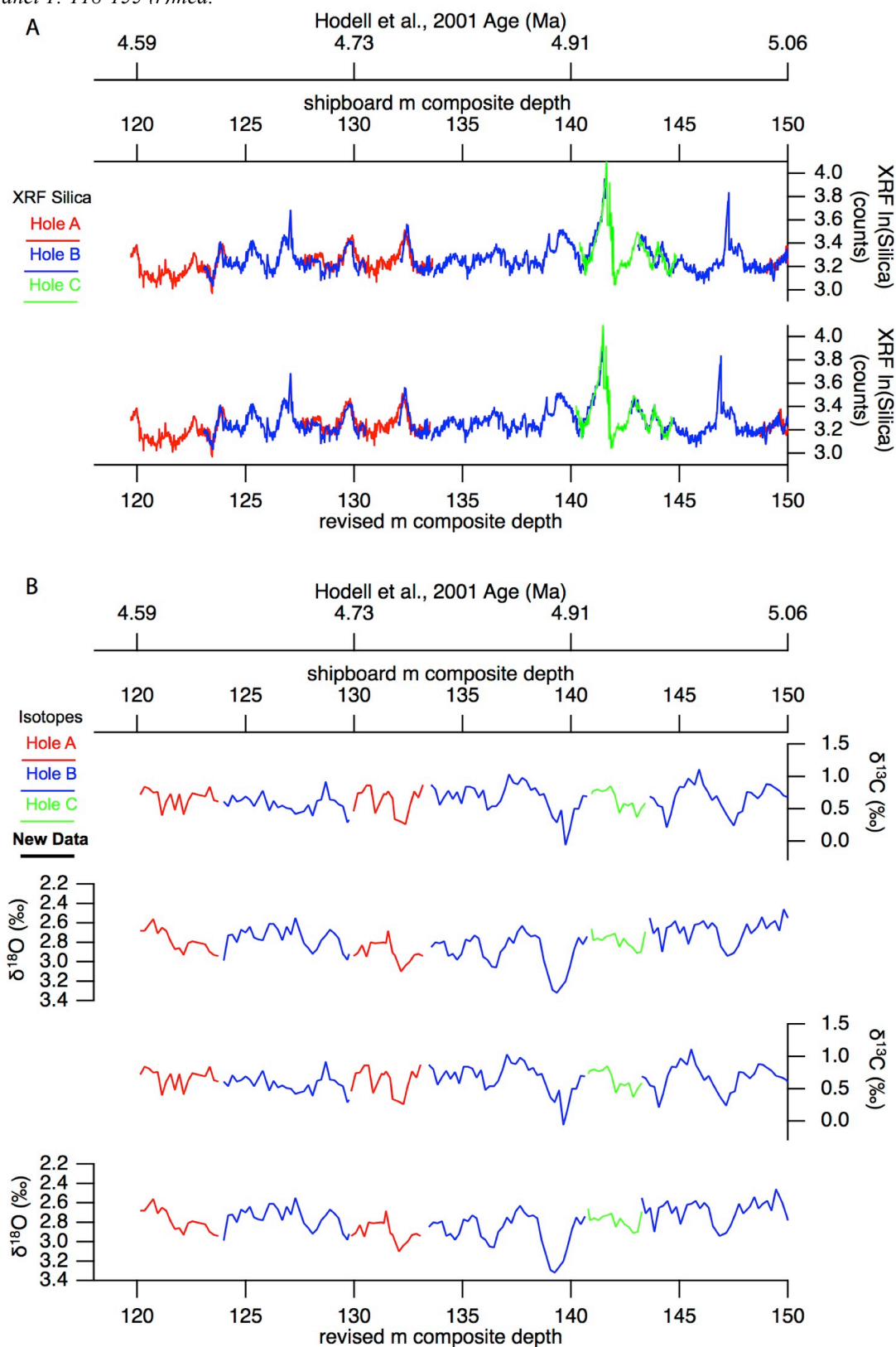
Panel 6: 250-287 (r)mcd.



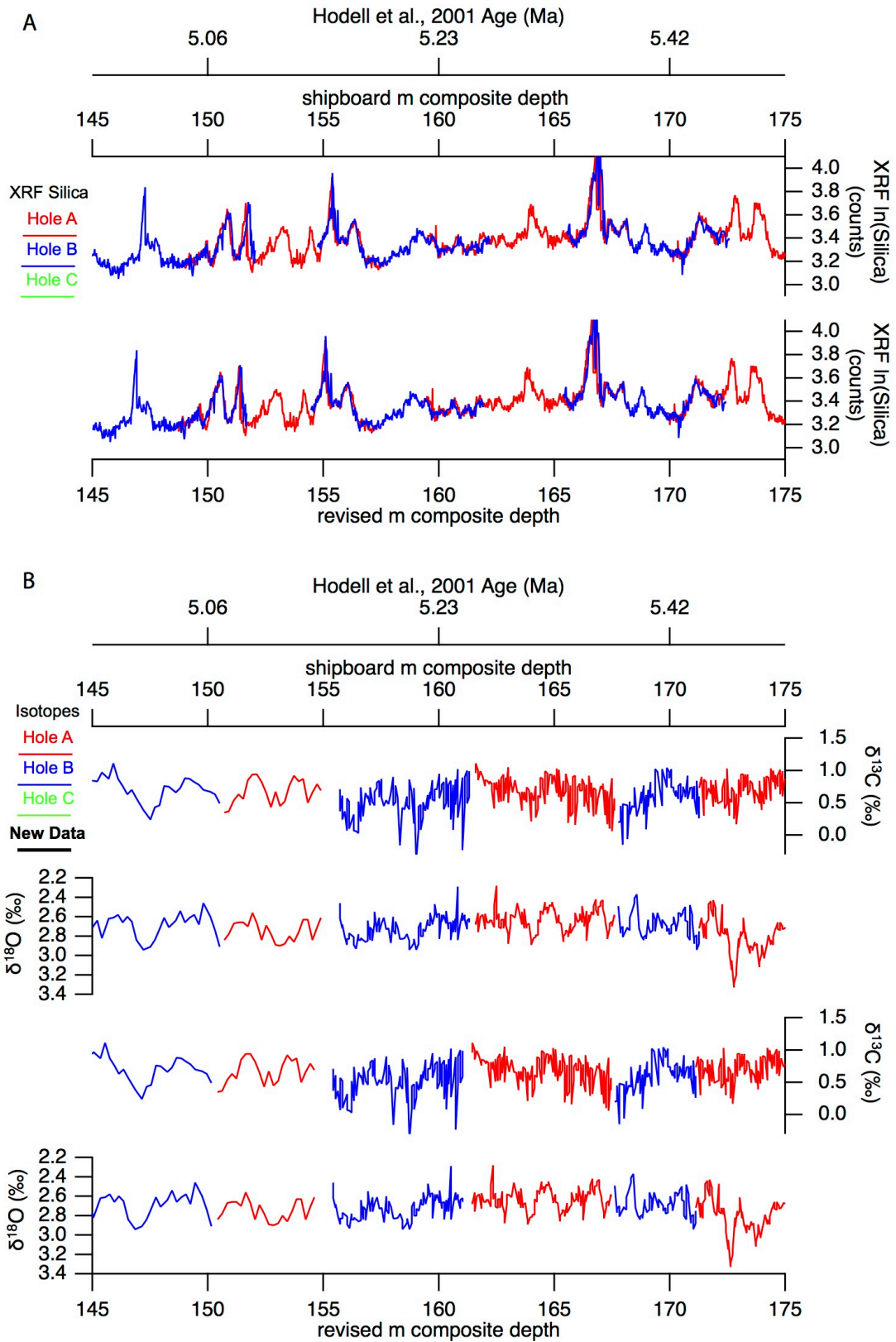


**Supplementary Figure 2.** a) Site 982 XRF In(Silica) on the shipboard composite depth with the Hodell et al. (2001) age on the top axis, and on the revised composite depth on the bottom axis. b) Site 982 stable isotope  $\delta^{13}\text{C}$  and  $\delta^{18}\text{O}$  records published in Hodell et al. (2001) on the shipboard composite depth and age on the top axis. On the bottom axis, the published stable isotope data is plotted on the revised composite depth, together with the new stable isotope data (black lines) produced in this study. The splice is shown from 120-300 m revised composite depth (rmcd) over 7 panels at  $\sim 30$  m intervals.

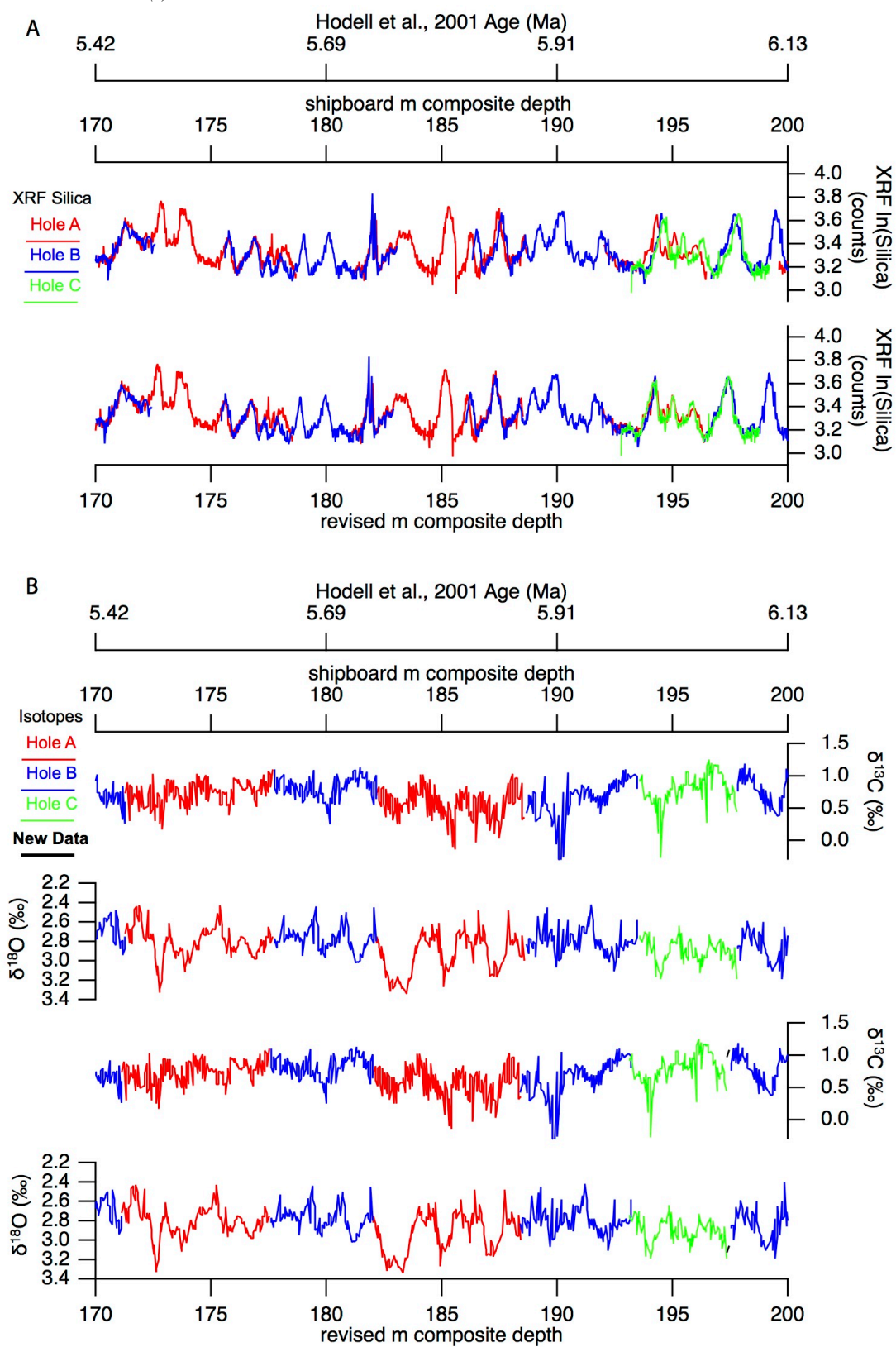
Panel 1: 118-155 (r)mcd.



Panel 2: 145-175 (r)mcd.

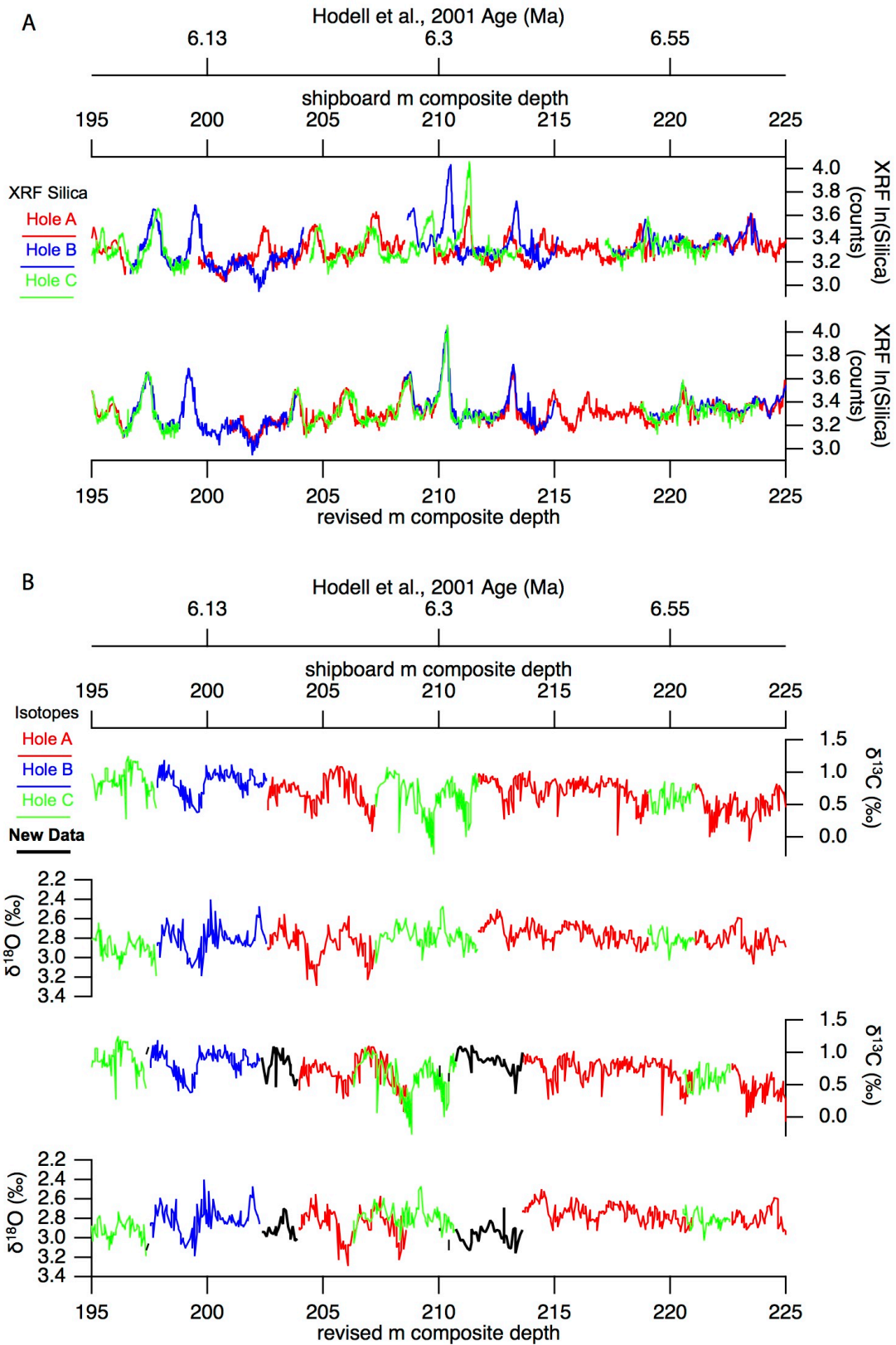


Panel 3: 170-200 (r)mcd.

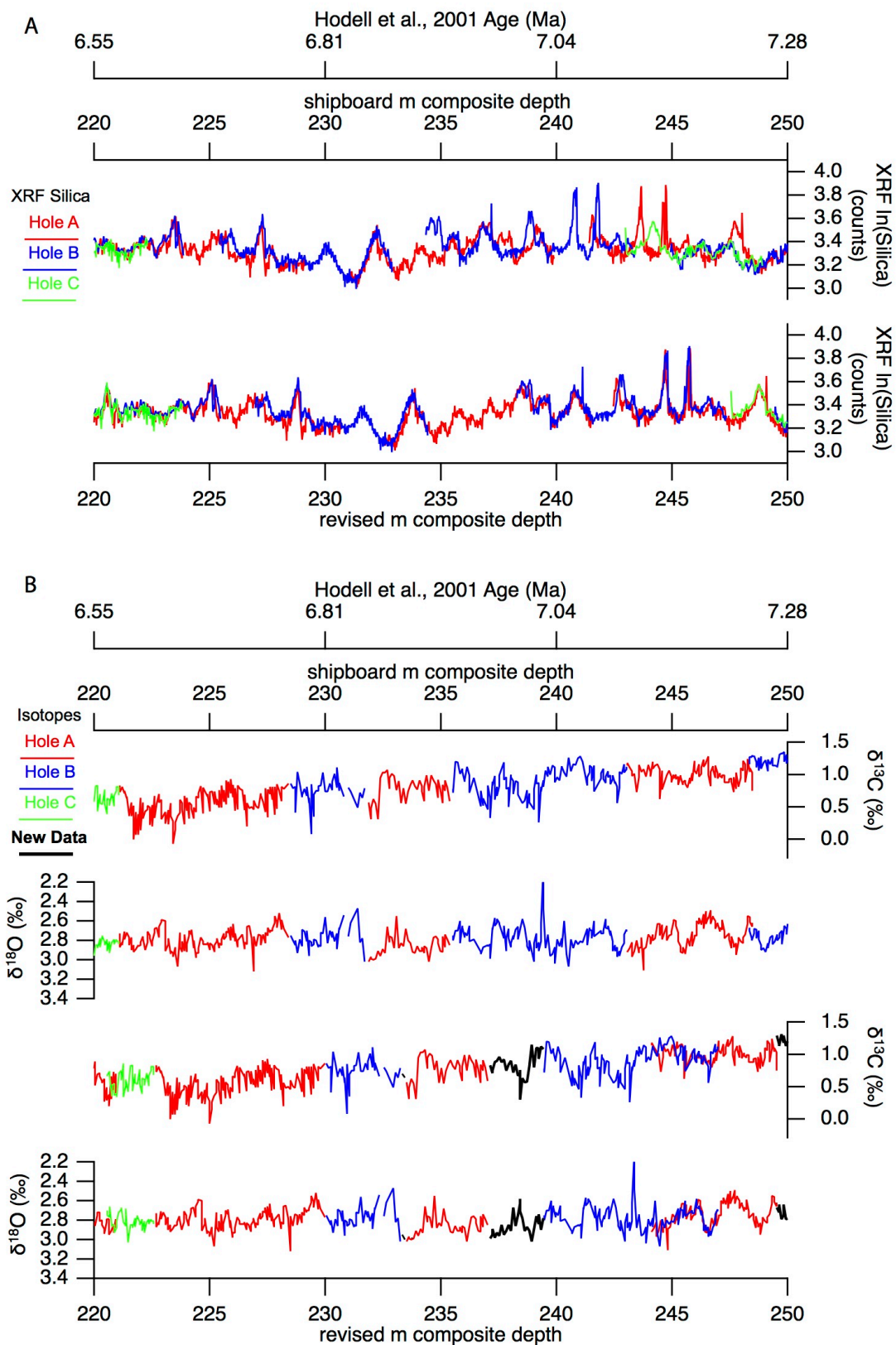




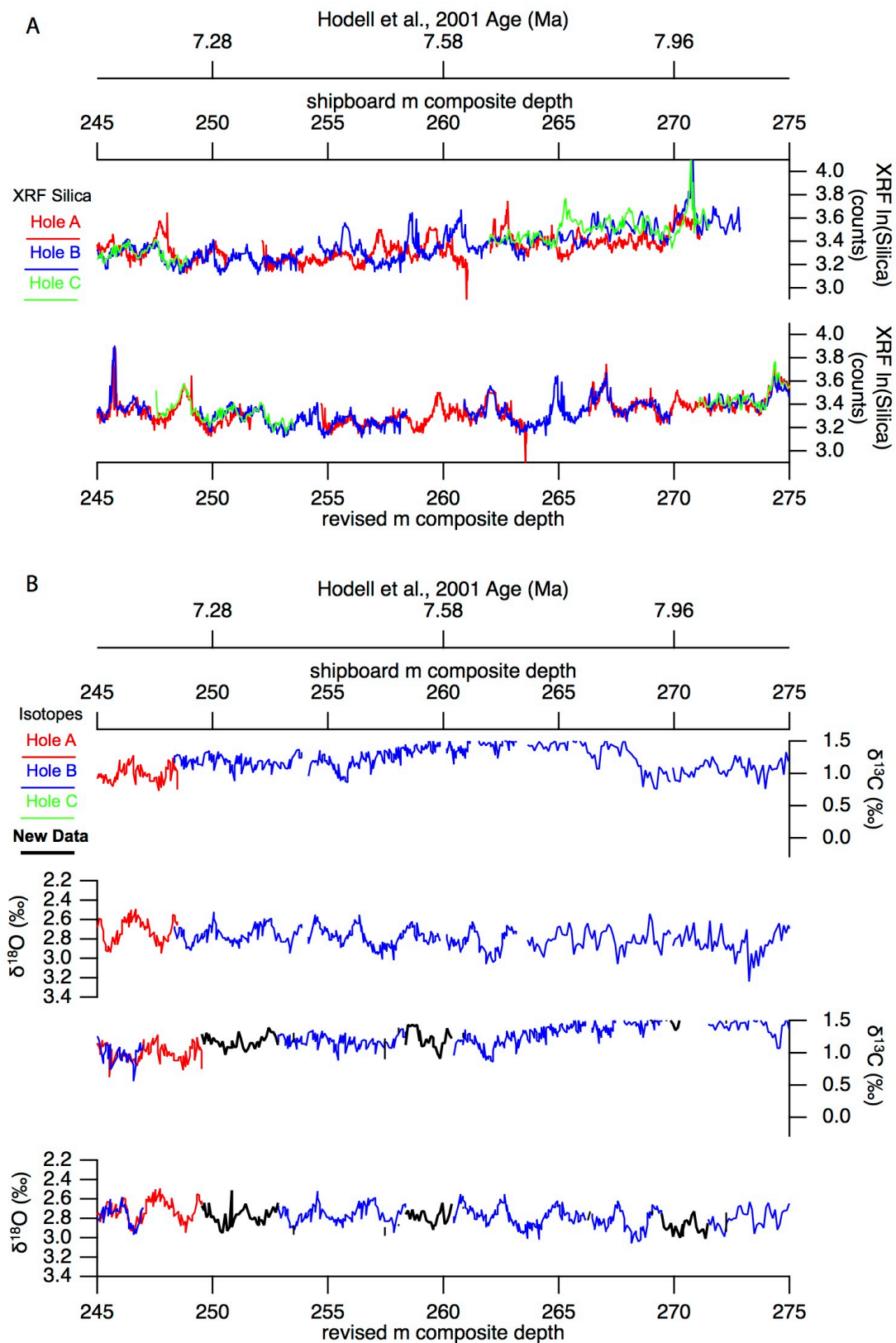
Panel 4: 195-225 (r)mcd.



Panel 5: 220-250 (r)mcd.

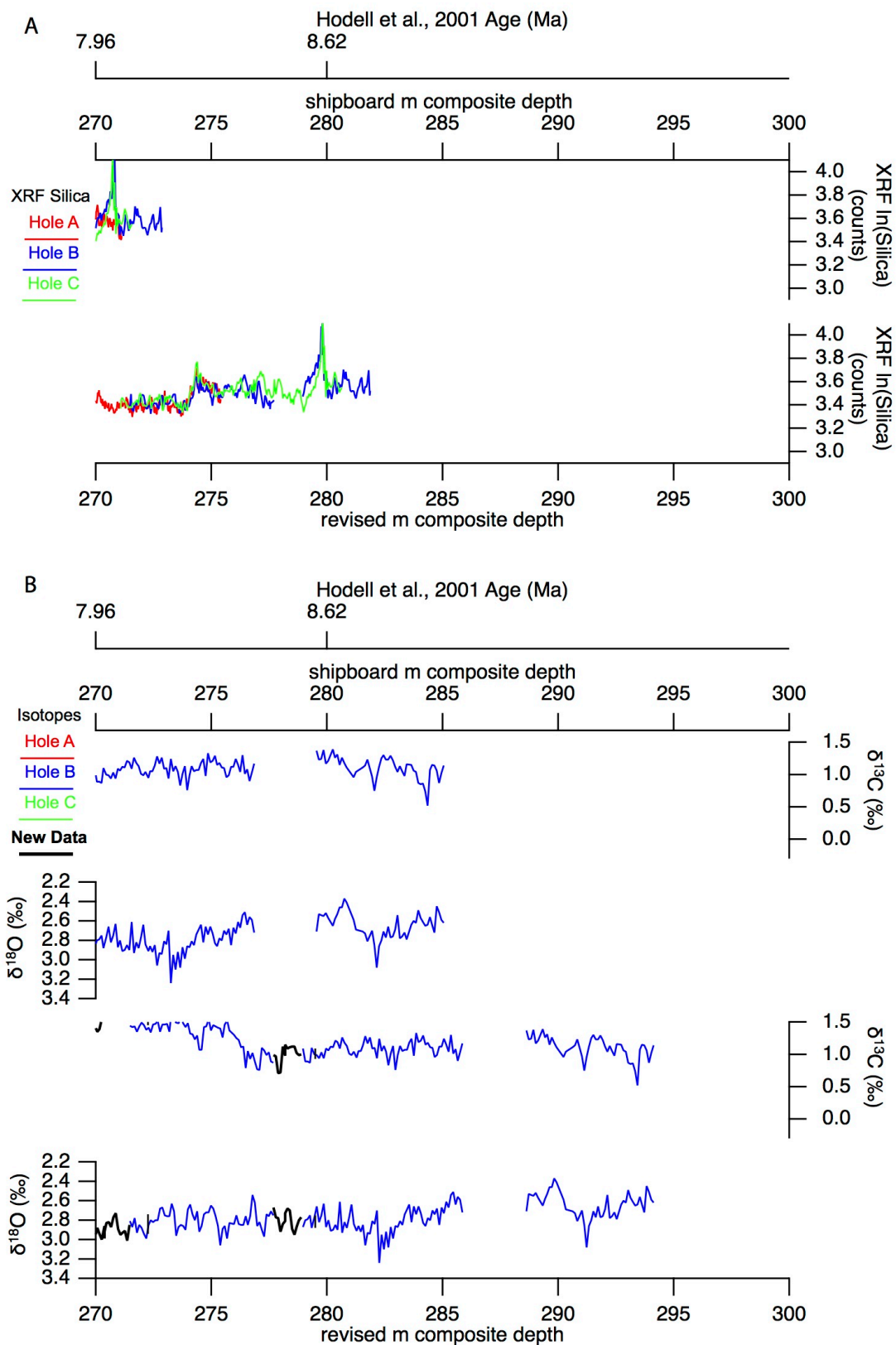


Panel 6: 245-275 (r)mcd.

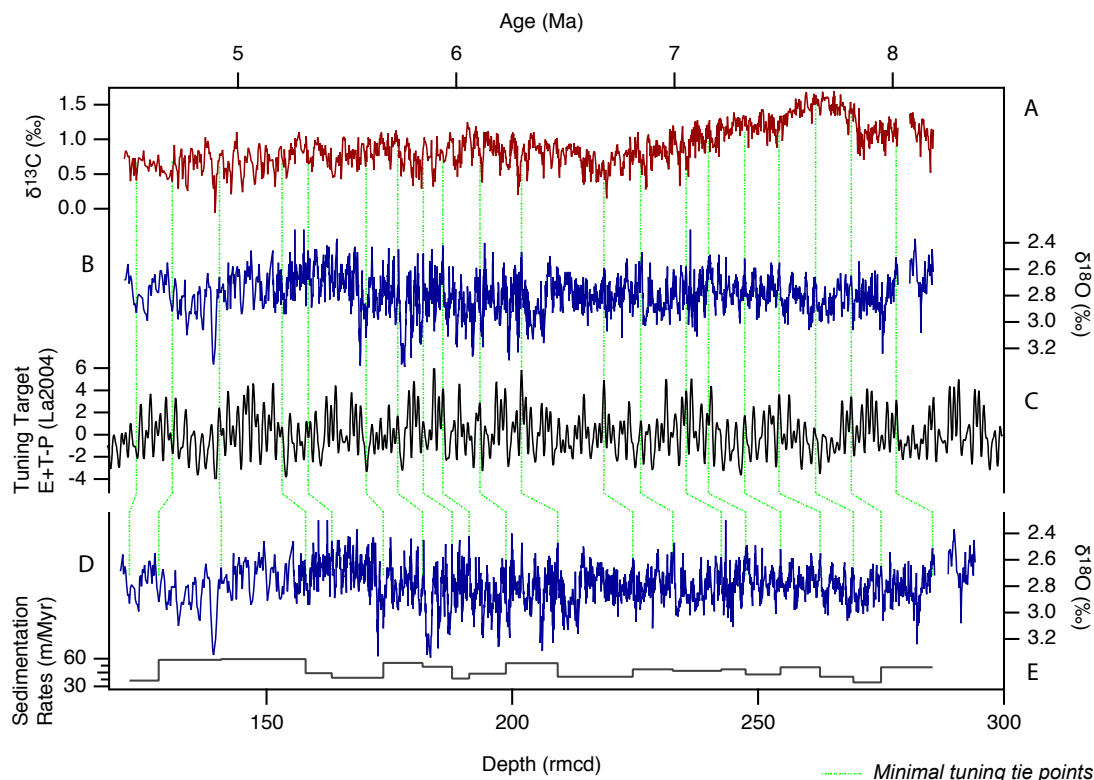




Panel 7: 270-300 (r)mcd.



**Supplementary Figure 3.** Minimally-tuned astrochronology for Site 982, with minimal tuning tie points indicated in green. A: Benthic foraminiferal  $\delta^{13}\text{C}$  on age (in ‰ versus VPDB). B: Benthic foraminiferal  $\delta^{18}\text{O}$  on age (in ‰ versus VPDB). C: Eccentricity+Tilt-Precession tuning target (E+T-P) from Laskar et al. (2004) D: Benthic foraminiferal  $\delta^{18}\text{O}$  (in ‰ versus VPDB) on depth rmcd. E: Fine-tuned sedimentation rates (in m/Myr) on depth rmcd.



### CAPTIONS FOR ADDITIONAL SUPPLEMENTARY TABLES AVAILABLE IN THE SUPPLEMENTARY INFORMATION.

**Supplementary Table 1 (Pangaea).** Hole specific and splice XRF core scanning Zirconium, Silica and In(Si) for Site 982.

**Supplementary Table 3 (Pangaea).** Site 982 raw and corrected isotope data.

**Supplementary Table 4 (Pangaea).** Site 982 revised offset tables for Holes A-D.

**Supplementary Table 5 (Pangaea).** Site 982 revised splice tie and interval tables.

**Supplementary Table 7 (Pangaea).** Minimal and fine tuning tie points for the U1337 astronomical age model.