Online Resource 1 Text:

Chronologies

We used weak prior distributions of sediment accumulation and segment autocorrelation parameters to inform the age-depth models (Table 2). We constrained sediment accumulation rates to a gamma distribution with a mean of 10 (yr cm^{-1}) and a shape (i.e., variance) parameter of 1, and assumed low, positive autocorrelation between discrete 0.5 cm core sections with a memory parameter of 0.1 and memory strength (variance) parameter of 10. We identified depths in each core where distinct changes in a combination of sediment type, stratigraphy, ^{14}C dates, and/or charcoal concentration suggested abrupt down-core transitions to high or nearly instantaneous sediment accumulation rates. We modeled these points of transition using the hiatus functionality in Bacon with a mean length prior of 1 yr, although we do not interpret the transitions themselves as hiatuses.

Bacon uses an MCMC routine to generate thousands of potential distributions of sediment accumulation and sample autocorrelation, and fits age-depth models based on these parameters to dated samples. The estimated (interpolated) age of the core in continuous 0.25-cm segments is derived from the 50^{th} percentile of the simulated ages, and 90% confidence intervals are derived from the 5^{th} and 95^{th} percentiles.

Tree Demography Records

Records from Duffy (2006) were collected in transects along the Nowitna River, each containing five "nodes." Within each node, cross-sections from 3-6 of the largest trees were collected from five plots at the corners and center of a square with 100 m sides. Species were identified in the field, and where multiple species cohorts were present, samples were collected from each species. Cross-sections were sanded and annual rings were counted under a 10-40x stereomicroscope. Pith dates for each sample were estimated from annual ring counts, but were

not cross-dated. Records collected in 2015 were taken from variable-radius plots adjacent to sampled lakes. Exact plot locations were randomly located within representative forest patches, and sized such that 20 or more adult trees were sampled. In total, 66 tree cores from three plots were collected, and species were identified in the field. Cores were sanded and annual rings were counted as with the cross sections, but all tree-core samples were visually and statistically cross dated with the computer program COFECHA (Grissino-Mayer 2001).

Table S1. Radiometric dates (^{14}C and ^{210}Pb) from all lakes. Asterisks (*) after lab ID indicate dates not used in the age-depth model, mainly bulk ^{14}C dates which were deemed systematically older than ^{14}C dates based on macrofossils from nearby sediment depths.

Site code	Top depth (cm)	Bottom depth (cm)	Material	^{14}C or ^{210}Pb activity	^{14}C age or ^{210}Pb activity st. dev.	Age (cal yr BP)	Age 5th	Age 95th	Lab ID
BB15	0.00	0.50	bulk sediment	2.9753	0.1964	-65.00	-71.02	-58.98	Flett-75911
BB15	0.50	1.00	bulk sediment	5.0651	0.2537	-62.35	-68.59	-56.11	Flett-75912
BB15	1.00	1.50	bulk sediment	3.6862	0.1906	-54.12	-61.26	-46.99	Flett-75913
BB15	1.50	2.00	bulk sediment	3.2887	0.2267	-48.48	-56.44	-40.53	Flett-75914
BB15	2.00	2.50	bulk sediment	2.1192	0.1446	-41.90	-50.99	-32.81	Flett-75915
BB15	2.00	2.50	bulk sediment	1.3187	0.0398	-	-	-	Flett-75915*
BB15	3.50	4.00	bulk sediment	2.2746	0.1511	-26.94	-39.87	-14.01	Flett-75918
BB15	4.00	4.50	bulk sediment	1.4966	0.1808	-19.05	-34.85	-3.25	Flett-75919
BB15	5.00	6.00	bulk sediment	1.8436	0.1397	-11.87	-30.56	6.82	Flett-75921
BB15	6.00	7.00	bulk sediment	1.7069	0.1509	8.91	-20.78	38.61	Flett-75922
BB15	7.00	8.00	bulk sediment	1.3622	0.1632	58.28	-36.14	152.71	Flett-75923*
BB15	8.00	9.00	bulk sediment	1.2045	0.1213	-	-	-	Flett-75924*
BB15	9.00	10.00	bulk sediment	1.1596	0.1126	-	-	-	Flett-75925*
BB15	9.00	10.00	bulk sediment	1.1130	0.0371	-	-	-	Flett-75925*
BB15	14.00	15.00	bulk sediment	1.5079	0.1234	-	-	-	Flett-75930*
BB15	31.75	32.00	wood macrofossil	0.9795	0.0036	178.00	5.00	281.00	CAMS-175825
BB15	39.50	39.75	bulk sediment	0.3299	0.0012	10036.00	9919.00	10176.00	CAMS-176589*
BB15	60.00	60.25	wood macrofossil	0.9817	0.0041	152.00	8.00	278.00	CAMS-175826
BB15	72.00	72.25	wood macrofossil	0.8782	0.0030	952.00	926.00	1042.00	CAMS-175827
BB15	91.25	91.50	wood macrofossil	0.9809	0.0035	173.00	7.00	278.00	CAMS-175828

DU15	0.00	0.75	bulk sediment	14.2798	0.5899	-65.00	-66.86	-63.14	Flett-75931
DU15	1.25	1.75	bulk sediment	11.8882	0.4025	-56.80	-58.87	-54.73	Flett-75933
DU15	2.50	3.25	bulk sediment	12.2693	0.4961	-48.17	-50.60	-45.74	Flett-75935
DU15	2.50	3.25	bulk sediment	1.2595	0.0400	-	-	-	Flett-75935*
DU15	3.25	3.75	bulk sediment	10.8727	0.4196	-42.95	-45.65	-40.25	Flett-75936
DU15	3.75	4.25	bulk sediment	5.9687	0.3280	-37.77	-40.79	-34.74	Flett-75937
DU15	4.25	4.75	bulk sediment	4.8331	0.2980	-33.66	-36.97	-30.35	Flett-75938
DU15	4.75	5.25	bulk sediment	4.3575	0.2734	-30.07	-33.66	-26.49	Flett-75939
DU15	5.25	5.75	bulk sediment	3.1513	0.2199	-25.41	-29.39	-21.43	Flett-75940
DU15	5.75	6.75	bulk sediment	2.8402	0.2034	-21.96	-26.26	-17.67	Flett-75941
DU15	7.75	8.75	bulk sediment	2.9789	0.2531	-5.86	-11.47	-0.26	Flett-75943
DU15	9.75	10.75	bulk sediment	2.7243	0.2509	18.72	10.80	26.64	Flett-75945
DU15	11.75	12.75	bulk sediment	2.1053	0.2042	54.83	39.59	70.07	Flett-75947*
DU15	13.75	15.00	bulk sediment	1.4379	0.2030	-	-	-	Flett-75949*
DU15	13.75	15.00	bulk sediment	1.3232	0.0400	-	-	-	Flett-75949*
DU15	50.00	50.25	wood macrofossil	0.0935	0.0006	22916.00	22768.00	23034.00	CAMS-175829
DU15	55.75	56.00	bulk sediment	0.2805	0.0011	11786.00	11922.00	12038.00	CAMS-176590*
DU15	73.75	74.00	wood macrofossil	0.0835	0.0006	24006.00	23882.00	24128.03	CAMS-175830
DU15	106.50	106.75	wood macrofossil	0.0771	0.0006	24783.00	24551.00	25031.00	CAMS-175831
DU15	111.00	111.25	wood macrofossil	0.0784	0.0006	24546.00	24396.00	24856.00	CAMS-175832
MA15	0.00	0.50	bulk sediment	19.2996	0.5822	-65.00	-67.11	-62.89	Flett-77259
MA15	0.50	1.00	bulk sediment	19.4721	0.6275	-55.21	-57.58	-52.85	Flett-77260
MA15	1.00	1.50	bulk sediment	14.0752	0.4909	-41.48	-44.35	-38.61	Flett-77261
MA15	1.50	2.00	bulk sediment	9.8065	0.3865	-25.48	-29.29	-21.67	Flett-77262

MA15	2.00	2.50	bulk sediment	6.5494	0.3677	-9.18	-14.55	-3.81	Flett-77263
MA15	2.50	3.00	bulk sediment	4.7233	0.2818	7.99	0.30	15.69	Flett-77264
MA15	3.00	3.50	bulk sediment	2.7286	0.1968	26.18	14.61	37.76	Flett-77265
MA15	3.50	4.00	bulk sediment	2.4020	0.1792	38.23	23.81	52.65	Flett-77266
MA15	4.00	4.50	bulk sediment	2.9280	0.2283	51.21	33.21	69.21	Flett-77267
MA15	4.50	5.00	bulk sediment	1.7636	0.1658	98.21	45.58	150.85	Flett-77268*
MA15	5.00	6.00	bulk sediment	1.2095	0.1451	-	-	-	Flett-77269*
MA15	5.00	6.00	bulk sediment	0.9711	0.0337	-	-	-	Flett-77269*
MA15	9.00	10.00	bulk sediment	2.0659	0.1934	-	-	-	Flett-77273*
MA15	14.00	15.00	bulk sediment	1.1827	0.1582	-	-	-	Flett-77278*
MA15	14.00	15.00	bulk sediment	1.5298	0.0412	-	-	-	Flett-77278*
MA15	15.25	15.50	wood macrofossil	0.9627	0.0031	387.00	303.00	458.00	CAMS-176005
MA15	15.25	15.50	bulk sediment	0.4877	0.0018	6574.00	6497.00	6646.00	CAMS-176591*
MA15	21.25	22.00	wood macrofossil	0.9833	0.0050	136.00	10.00	276.00	CAMS-176006
MA15	66.50	66.75	wood macrofossil	0.9595	0.0035	387.00	311.00	476.00	CAMS-176007
NW15	0.00	0.50	bulk sediment	14.9582	0.8668	-65.00	-62.64	-67.36	Flett-77219
NW15	1.00	1.50	bulk sediment	15.9483	0.7607	-61.77	-59.30	-64.25	Flett-77221
NW15	2.00	2.50	bulk sediment	14.0353	0.7528	-57.96	-55.32	-60.60	Flett-77223
NW15	3.00	3.50	bulk sediment	1.6614	0.1745	-	-	-	Flett-77225*
NW15	3.50	4.00	bulk sediment	12.4801	0.6748	-52.29	-49.35	-55.22	Flett-77226
NW15	6.00	7.00	bulk sediment	9.2710	0.5594	-42.05	-38.41	-45.69	Flett-77230
NW15	10.00	11.00	bulk sediment	8.0172	0.4285	-21.24	-16.17	-26.30	Flett-77234
NW15	13.00	14.00	bulk sediment	1.3217	0.0687	-	-	-	Flett-77237*
NW15	14.00	15.00	bulk sediment	6.6813	0.4205	19.09	32.60	5.58	Flett-77238

NW15	19.00	20.00	bulk sediment	4.5611	0.2171	167.51	176.45	158.56	Flett-78515*
NW15	23.50	24.50	bulk sediment	6.0981	0.3346	-	-	-	Flett-78517*
NW15	25.50	26.50	bulk sediment	0.7275	0.0030	2705.00	2507.00	2747.00	CAMS-176228*
NW15	46.50	47.25	bulk sediment	0.5679	0.0165	5192.00	4571.00	5759.00	CAMS-176229*
NW15	72.75	74.25	concentrated charcoal	0.8571	0.0031	1195.00	1079.00	1263.00	CAMS-176230
SH15	0.00	0.50	bulk sediment	5.5858	0.3015	-65.00	-68.18	-61.82	Flett-77239
SH15	0.50	1.00	bulk sediment	8.6176	0.3667	-59.72	-63.09	-56.35	Flett-77240
SH15	1.00	1.50	bulk sediment	9.2358	0.3783	-49.31	-53.27	-45.35	Flett-77241
SH15	1.50	2.00	bulk sediment	6.1228	0.2767	-32.09	-37.69	-26.48	Flett-77242
SH15	2.00	2.50	bulk sediment	3.7203	0.2324	-13.72	-22.65	-4.79	Flett-77243
SH15	2.50	3.00	bulk sediment	2.7599	0.1888	1.49	-12.03	15.02	Flett-77244
SH15	3.00	3.50	bulk sediment	2.2555	0.1800	14.27	-5.24	33.77	Flett-77245
SH15	3.50	4.00	bulk sediment	1.7370	0.1415	24.68	-1.71	51.07	Flett-77246
SH15	3.50	4.00	bulk sediment	1.4222	0.0374	-	-	-	Flett-77246*
SH15	6.00	7.00	bulk sediment	1.5947	0.1372	52.72	-6.76	112.20	Flett-77250*
SH15	10.00	11.00	bulk sediment	1.2459	0.1151	-	-	-	Flett-77254*
SH15	10.00	11.00	bulk sediment	1.4033	0.0383	-	-	-	Flett-77254*
SH15	14.00	15.00	bulk sediment	1.4609	0.1581	-	-	-	Flett-77258
SH15	15.75	16.00	bulk sediment	0.7310	0.0026	2588.00	2496.00	2732.00	CAMS-176592*
SH15	25.75	26.00	concentrated charcoal	0.9302	0.0034	603.00	537.00	644.00	CAMS-176008
SH15	26.75	27.00	wood macrofossil	0.9389	0.0029	527.00	508.00	614.00	CAMS-176009
SH15	33.00	33.25	wood macrofossil	0.9478	0.0034	498.00	342.00	521.00	CAMS-176010
SH15	33.75	34.00	concentrated charcoal	0.9378	0.0034	531.00	511.00	619.00	CAMS-176011
SH15	40.00	40.25	concentrated charcoal	0.9324	0.0052	592.00	522.00	648.00	CAMS-176012

SH15	42.00	42.25	wood macrofossil	0.9476	0.0033	498.00	344.00	520.00	CAMS-176013
TL15	0.00	1.00	bulk sediment	6.9937	0.3242	-65.00	-67.65	-62.35	Flett-75970
TL15	1.00	2.00	bulk sediment	11.6154	0.3707	-54.52	-57.40	-51.64	Flett-75971
TL15	2.00	2.50	bulk sediment	7.5257	0.2707	-20.78	-25.61	-15.95	Flett-75972
TL15	2.50	3.00	bulk sediment	2.4663	0.1883	9.16	-1.36	19.68	Flett-75973
TL15	3.00	3.50	bulk sediment	1.5936	0.1536	35.20	15.14	55.26	Flett-75974
TL15	3.50	4.00	bulk sediment	1.0888	0.1206	65.85	23.11	108.58	Flett-75975
TL15	4.00	4.50	bulk sediment	1.0064	0.1108	94.36	20.69	168.02	Flett-75976
TL15	4.50	5.00	bulk sediment	0.6937	0.0923	-	-	-	Flett-75977*
TL15	7.00	8.00	bulk sediment	0.7313	0.0930	-	-	-	Flett-75980*
TL15	10.00	11.00	bulk sediment	1.0085	0.1074	-	-	-	Flett-75983*
TL15	14.00	15.00	bulk sediment	0.9544	0.0972	-	-	-	Flett-75987*
TL15	29.25	29.50	bulk sediment	0.4823	0.0022	6646.00	6551.00	6720.00	CAMS-176593*
TL15	68.25	68.50	wood macrofossil	0.9552	0.0034	437.00	322.00	496.00	CAMS-175833
UR15	0.00	0.50	bulk sediment	10.3464	0.4384	-65.00	-73.19	-56.81	Flett-77199
UR15	0.50	1.00	bulk sediment	6.3729	0.3080	-53.61	-63.57	-43.64	Flett-77200
UR15	1.00	1.50	bulk sediment	4.9635	0.2634	-45.88	-57.61	-34.15	Flett-77201
UR15	1.50	2.00	bulk sediment	6.5949	0.3382	-38.98	-52.80	-25.17	Flett-77202
UR15	2.00	2.50	bulk sediment	6.2717	0.3043	-25.32	-45.15	-5.48	Flett-77203
UR15	2.50	3.00	bulk sediment	2.8435	0.2099	-3.18	-41.03	34.67	Flett-77204
UR15	2.50	3.00	bulk sediment	1.3108	0.0386	-	-	-	Flett-77204*
UR15	3.00	3.50	bulk sediment	2.6720	0.2032	8.58	-45.31	62.47	Flett-77205
UR15	3.50	4.00	bulk sediment	1.3147	0.1553	30.31	-74.20	134.83	Flett-77206
UR15	4.00	4.50	bulk sediment	1.2320	0.1202	34.23	-83.13	151.59	Flett-77207

UR15	6.00	7.00	bulk sediment	1.3342	0.1531	51.54	-146.32	249.40	Flett-77210
UR15	10.00	11.00	bulk sediment	1.0823	0.1290	149.46	-2739.93	3038.86	Flett-77214*
UR15	12.50	12.75	wood macrofossil	0.9185	0.0035	651.00	565.00	680.00	CAMS-176598
UR15	14.00	15.00	bulk sediment	0.9530	0.1195	-	-	-	Flett-77218*
UR15	14.00	15.00	bulk sediment	0.8339	0.0352	-	-	-	Flett-77218*
UR15	29.00	29.25	bulk sediment	0.7070	0.0030	2883.00	2795.00	2964.00	CAMS-176594*
UR15	52.00	52.25	bulk sediment	0.4841	0.0017	6646.00	6551.00	6720.00	CAMS-176595*

Complete age-depth models corresponding core images for records presented in Chapter 1.

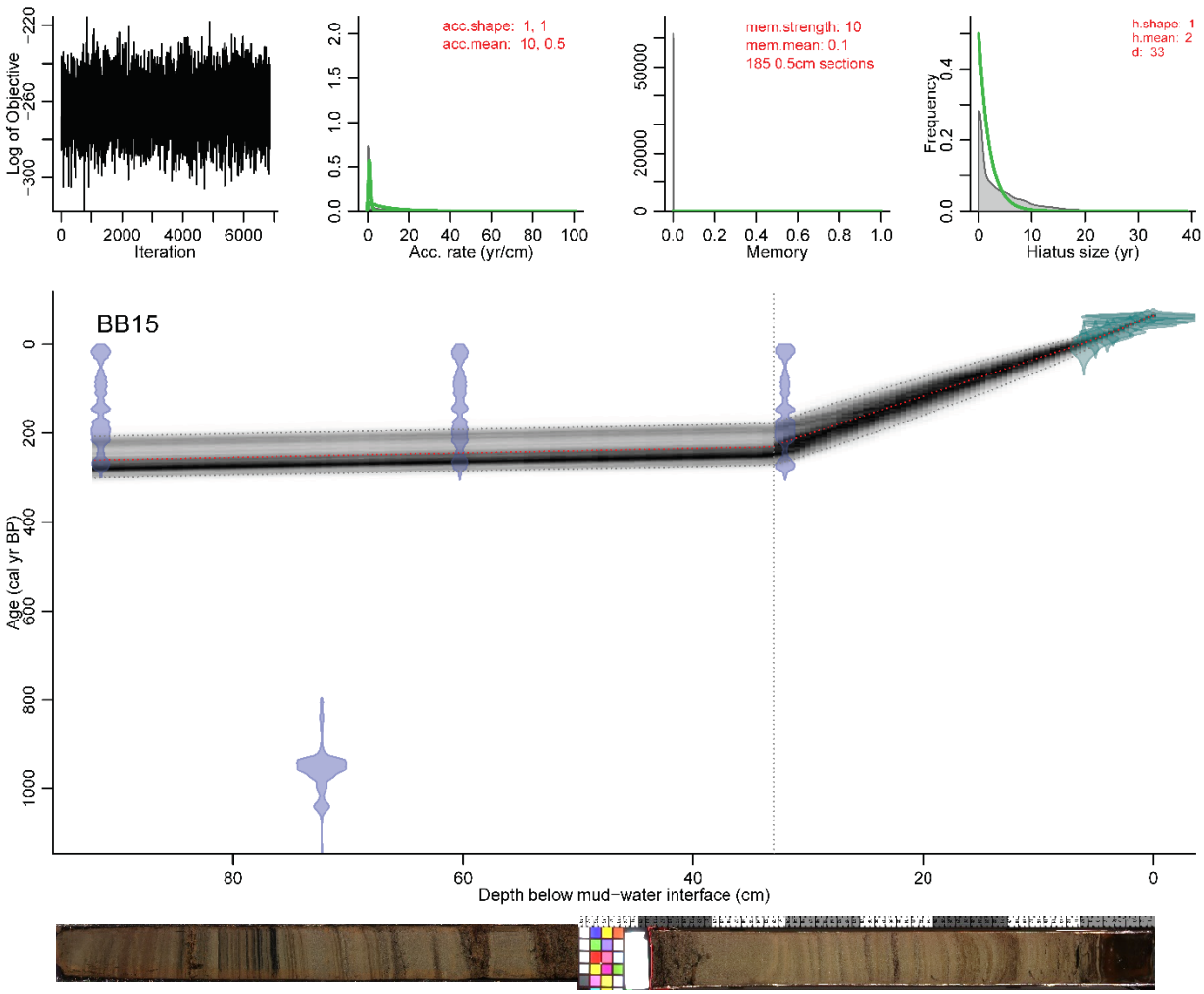

Figure 1. Buster Brown Lake (BB15) chronology and core. Hiatus depth is based on radiocarbon ages and distinct change laminated to unlaminated sediment at 32 cm core depth.

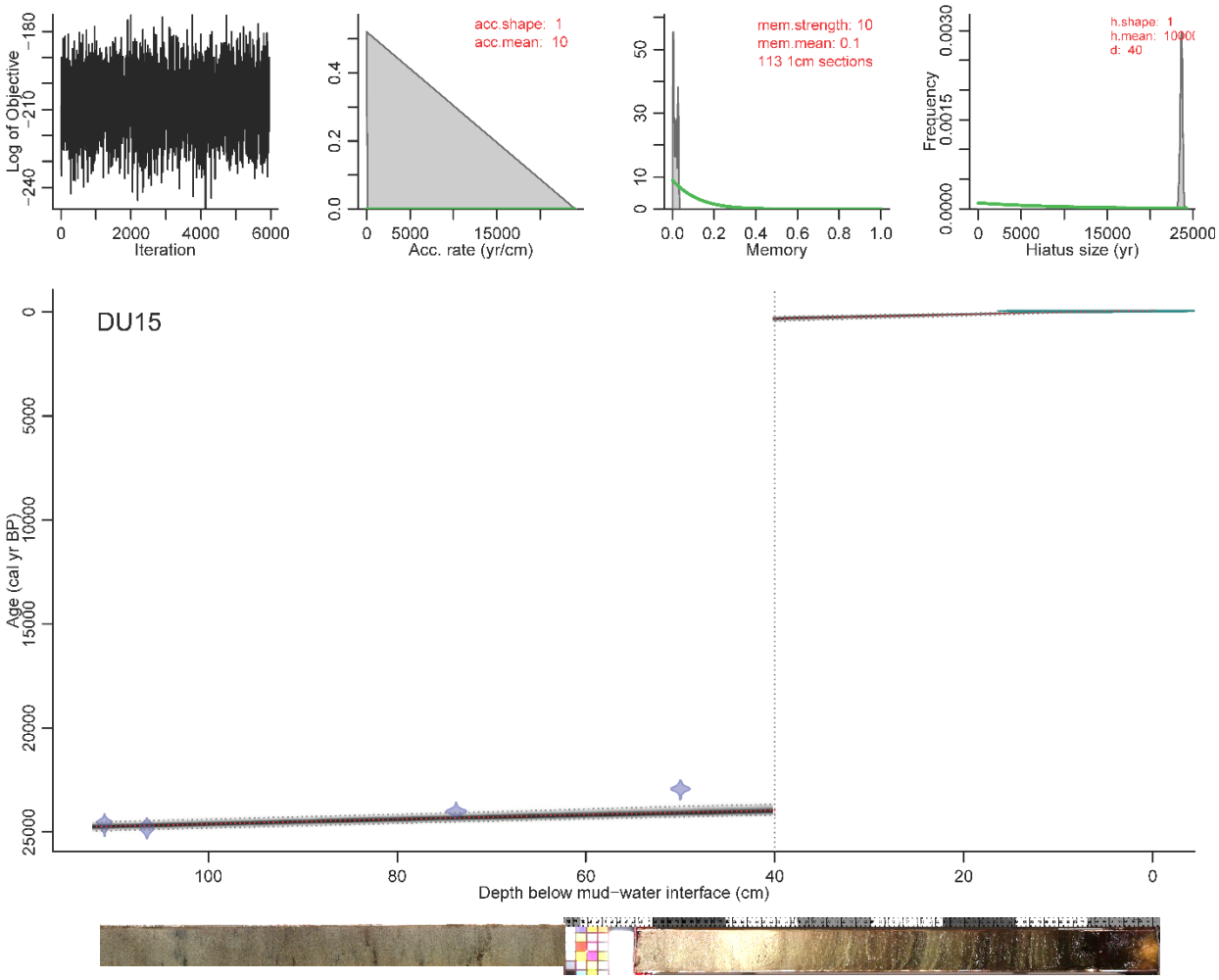

Figure 2. Duffy Lake (DU15) chronology and core. Hiatus depth is based on change from laminated to unlaminated sediment at 40 cm core depth.

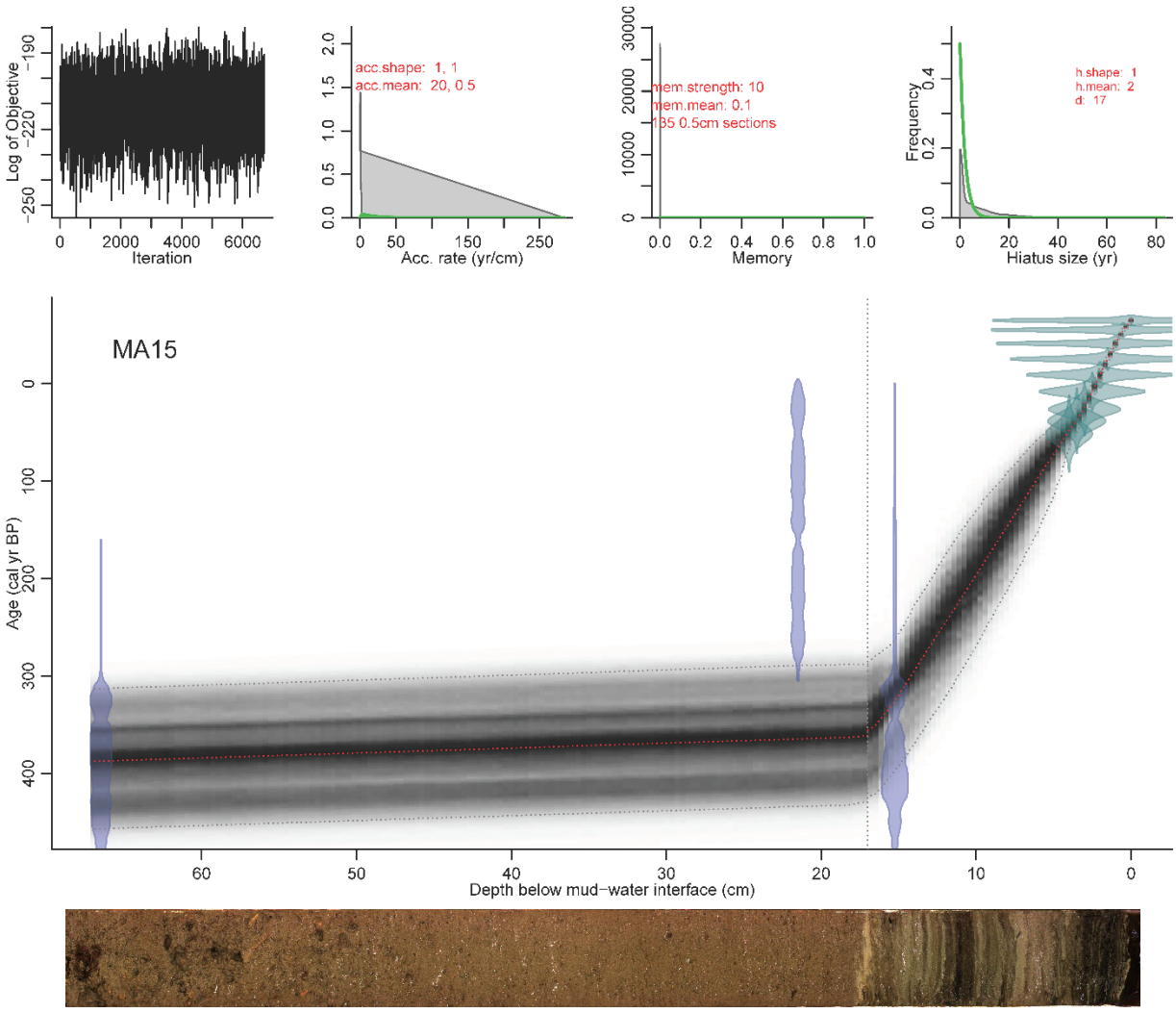

Figure 3. Macchiato Lake (MA15) chronology and core. Hiatus depth is based on radiocarbon ages and distinct change from laminated to unlaminated sediment at 16 cm core depth.

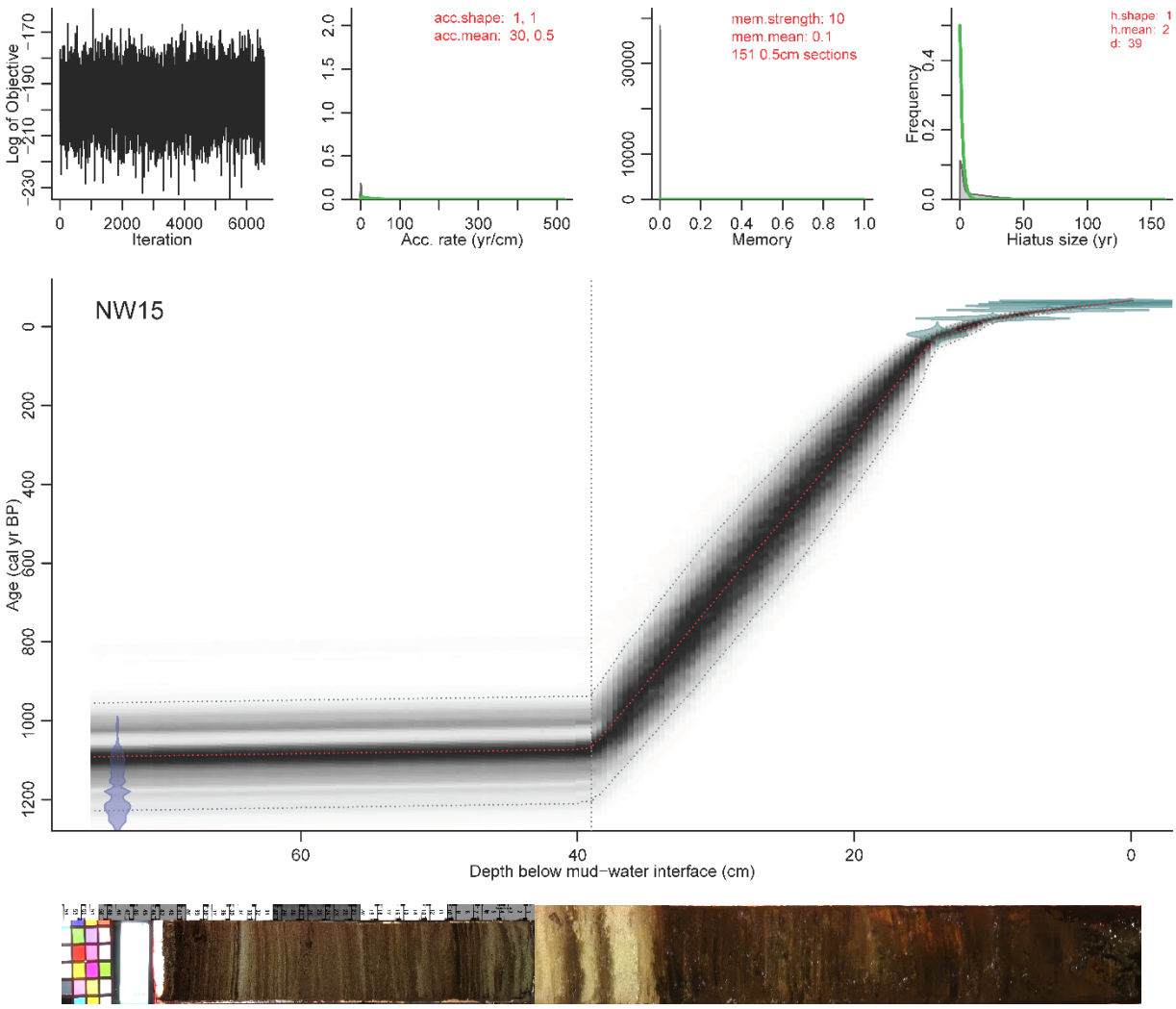

Figure 4. Nodwell Lake (NW15) chronology with hiatus at 39 cm based on change in charcoal concentration. This is the chronology presented in Chapter 1.

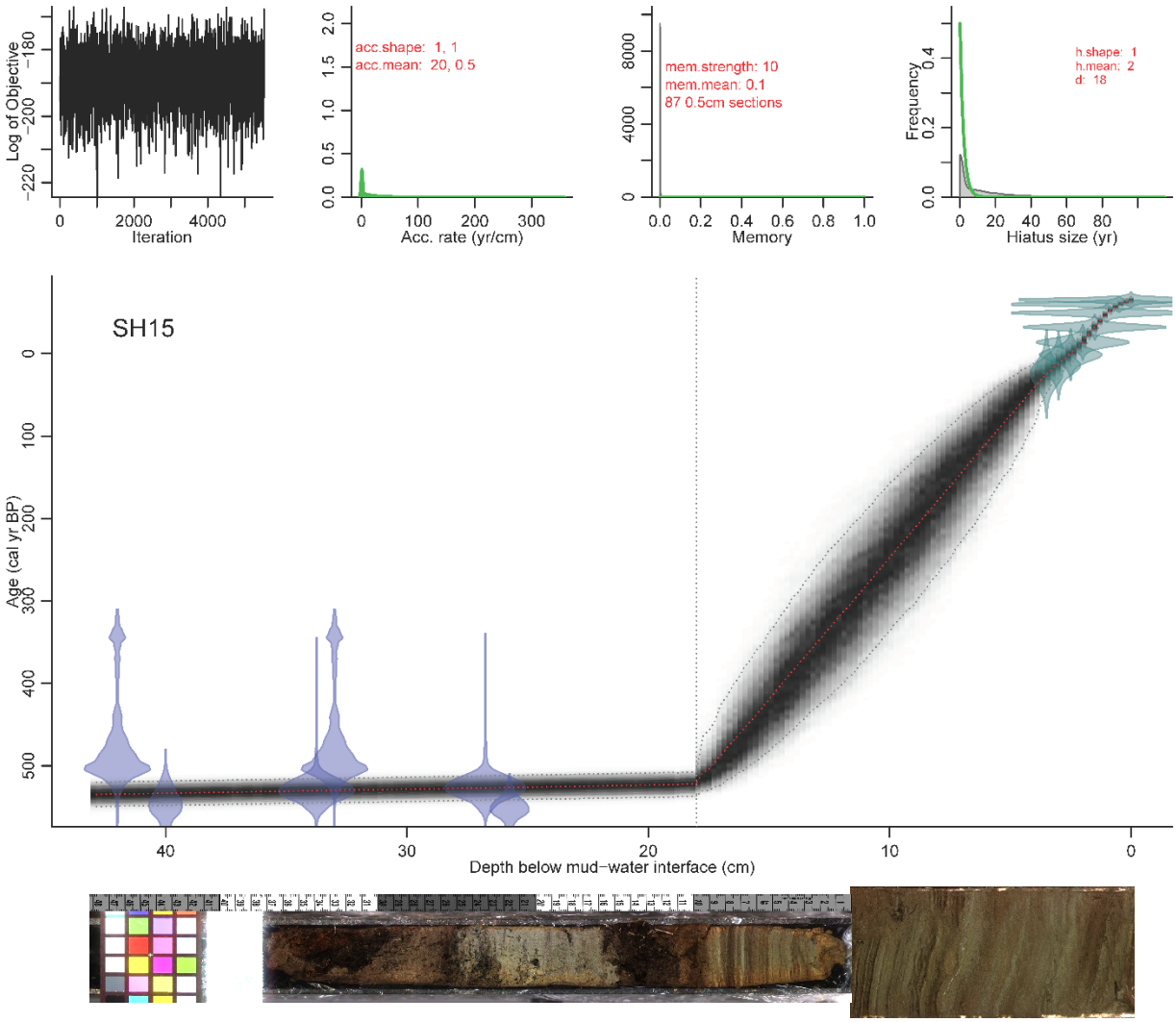

Figure 5. Shapiro Lake (SH15) chronology and core. Hiatus is based on distinct change from laminated to unlamented sediment at 18 cm core depth.

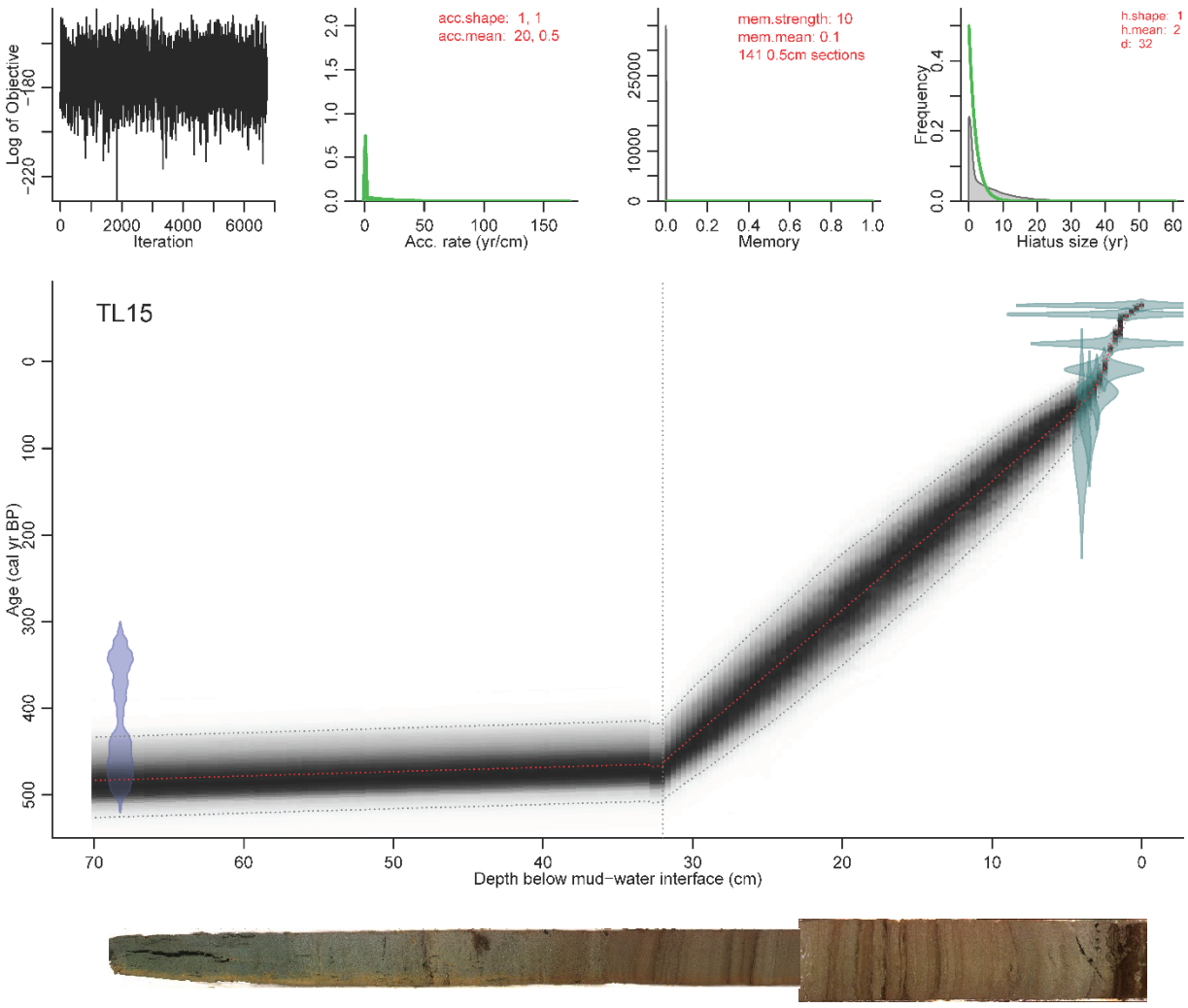

Figure 6. Three Lodge Lake (TL15) chronology and core. Hiatus is based on distinct change from laminated to unlamented sediment at 32 cm core depth.

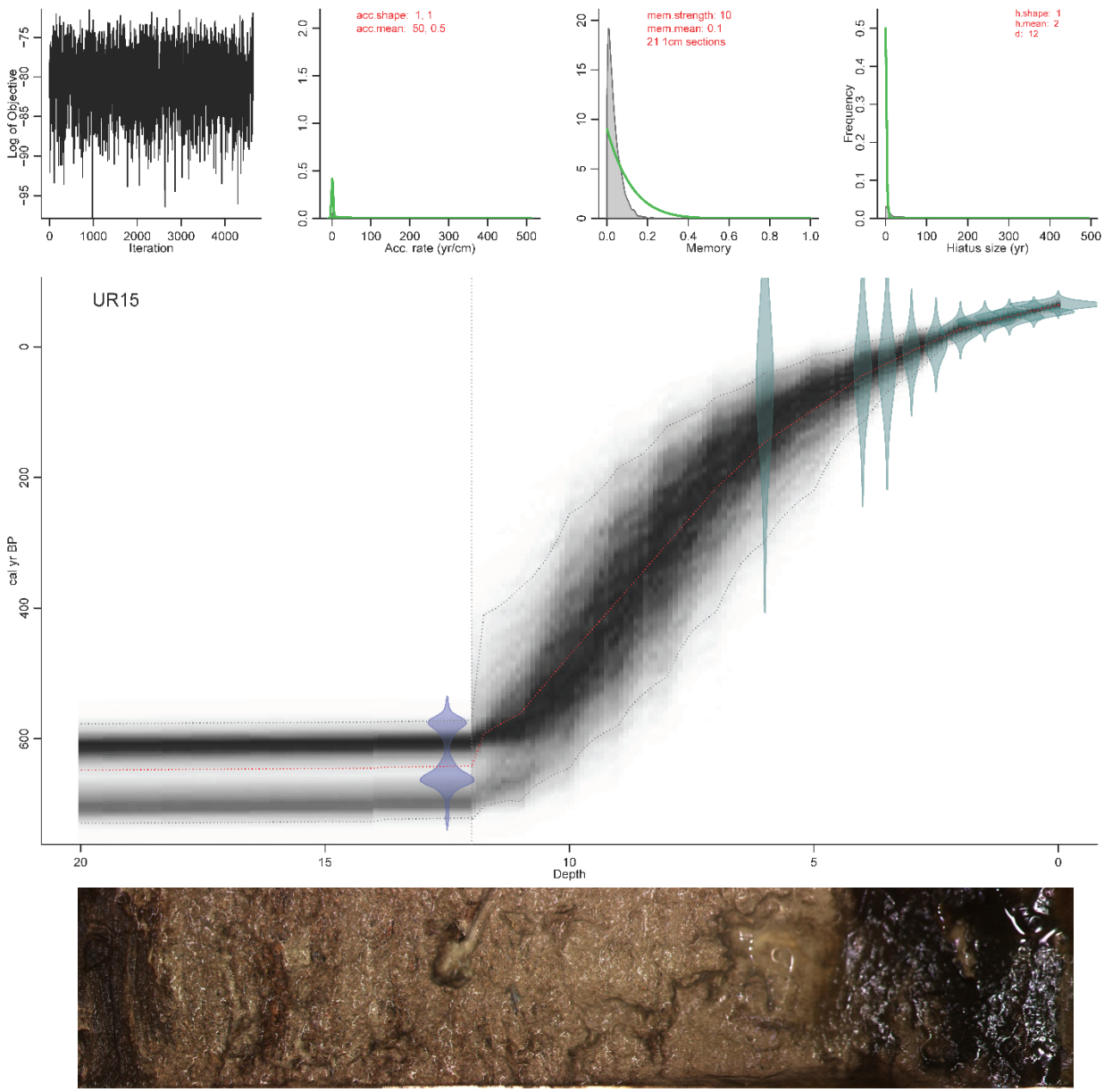

Figure 7. Ursa Lake (UR15) chronology and core. Hiatus is based on change in charcoal concentration at 12 cm core depth.