

Table S2. Clumped isotope data

Sample	Height (m)*	$\delta^{13}\text{C}$ (‰)**	$\delta^{18}\text{O}$ (‰)**	Δ_{47} (‰)	S.E. (‰)	Δ_{48} (‰)	Ave. Δ_{47} (‰) [§]	T (°C)	$\delta^{18}\text{O}_{\text{ssw}}$ (‰) [†]
HB-109	5	-9.81	-10.95	0.627	0.010	0.45	0.628 ± 0.001	19 ± 3	-9.6
		-9.69	-10.84	0.629	0.009	-0.01			
		-9.54	-10.64	0.627	0.006	0.41			
HB-18	25	-6.36	-5.33	0.630	0.011	0.58	0.627 ± 0.001	19 ± 3	-3.9
		-6.59	-5.35	0.625	0.009	0.24			
		-6.57	-5.22	0.627	0.009	0.02			
HB-128	35	-5.54	-5.03	0.608	0.010	0.52	0.594 ± 0.010	29 ± 3	-1.4
		-5.53	-4.93	0.606	0.008	0.01			
		-5.51	-4.91	0.570	0.009	0.24			
HB-129	45	-6.20	-4.72	0.624	0.009	0.56	0.611 ± 0.009	24 ± 3	-2.2
		-6.22	-4.72	0.599	0.009	0.39			
HB-30	50	-5.90	-5.23	0.583	0.010	0.30	0.582 ± 0.001	34 ± 3	-0.9
		-5.90	-5.21	0.581	0.010	0.27			
D-20	60	-6.34	-4.72	0.603	0.009	0.28	0.591 ± 0.008	31 ± 3	-0.9
		-6.34	-4.76	0.570	0.007	0.22			
		-6.15	-4.60	0.600	0.008	0.32			
HB-47	65	-5.83	-5.02	0.594	0.010	0.33	0.607 ± 0.014	25 ± 4	-2.2
		-5.83	-5.03	0.633	0.009	0.85			
		-5.65	-4.91	0.634	0.010	0.26			
		-5.78	-4.83	0.566	0.007	0.04			
HB-162	80	-8.23	-7.43	0.603	0.008	0.44	0.605 ± 0.015	26 ± 4	-4.7
		-8.26	-7.48	0.638	0.009	-0.02			
		-8.29	-7.46	0.575	0.010	0.32			
HB-81	95	-7.46	-11.83	0.578	0.010	0.15	0.613 ± 0.011	23 ± 3	-9.6
		-7.48	-11.82	0.609	0.008	0.44			
		-7.37	-11.78	0.631	0.009	0.17			
		-7.44	-11.65	0.634	0.009	0.19			
HB-187	115	-6.91	-7.95	0.612	0.010	0.74	0.609 ± 0.011	25 ± 3	-5.4
		-6.81	-7.94	0.631	0.008	0.04			
		-6.89	-7.88	0.585	0.008	0.20			
129-A		-5.60	-5.14	0.629	0.009	0.13	0.621 ± 0.005	21 ± 3	-3.4
		-5.59	-5.25	0.626	0.009	0.01			
		-5.67	-5.24	0.609	0.009	0.03			
129-B		-5.59	-4.84	0.620	0.008	-0.11	0.618 ± 0.001	22 ± 3	-2.8
		-5.62	-4.88	0.617	0.009	-0.02			
187-A		-6.81	-8.91	0.647	0.008	0.00	0.631 ± 0.009	18 ± 3	-7.8
		-6.79	-8.93	0.609	0.007	-0.07			
		-6.83	-8.78	0.636	0.010	0.15			
187-B		-6.71	-8.83	0.619	0.007	-0.10	0.624 ± 0.003	20 ± 3	-7.1
		-6.72	-8.59	0.629	0.008	0.09			

Standards	# runs	$\delta^{13}\text{C}$ (‰)* ‡	$\delta^{18}\text{O}$ (‰)* ‡	Δ_{47} (‰) ‡	S.D. (‰)	S.E. (‰)	ARF statistics reported in Table S3 for 3 different analysis periods: January - February 2015 March - April 2015 March 2017
ETH-2	15	-10.16	-18.78	0.213	0.029	0.007	
NBS-19	9	2.04	-2.16	0.340	0.023	0.008	
C64	175	-2.05	-15.69	0.546	0.026	0.002	
COR	105	-2.22	-4.50	0.643	0.026	0.003	

* Height refers to stratigraphic height in HB sections, "peak EECO" defined as ~40 - 90m (Figure 4; Hyland and Sheldon, 2013; Hyland et al., 2017).

** Measured versus Vienna Pee Dee Belemnite (VPDB).

† Calculated soil source water (ssw) composition versus Vienna standard mean ocean water (VSMOW), based on fractionation factor of Kim and O'Neil (1997).

§ Average of Δ_{47} measurements with no acid fractionation correction applied (e.g., Kelson et al., 2017).

‡ Values represent average for standard analyses during combined sample analysis periods (January 2015 - March 2017).

T₁ Temperatures calculated using inorganic calcite calibration of Kelson et al. (2017), including uncertainty (analytical S.E.) for each sample except where lower than long term S.E. of standards (0.01; ±2°C).