

Table S4 p CO₂ estimate by carbon isotope of pedogenic carbonates from the Lower Jurassic Ziliujing Fm at the Shaping section, Ya'an of Sichuan

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Mem	Calcrete	BK	BK	Depth	Age	$\delta^{13}\text{C}$	$\delta^{12}\text{O}$	$\delta^{12}\text{O}_c$	$\delta^{13}\text{C}_c$	$\delta^{13}\text{C}_s$	$\delta^{13}\text{C}_{sc}$	$\delta^{13}\text{C}_r$	$\delta^{13}\text{C}_a$	$p\text{CO}_2$	$p\text{CO}_2$	$p\text{CO}_2$	$p\text{CO}_2$
-ber	sample	(cm)	(cm)	(m)	(Ma)												
Zhengzhuchong	J1Z-01-01A	170	30	4.5	198.8	-7.93	-12.65	-12.81	-7.81	-16.79	-16.64	-26.93	-7.51	1423	1645	1262	1316
	J1Z-01-01B					-7.70	-12.97										
	J1z-02-001A	120	100	6.5	198.6	-7.87	-12.98	-12.60	-8.10	-17.08	-16.93	-26.97	-7.55	1325	1535	1176	1228
	J1z-02-001B					-8.24	-12.31										
	J1z-02-002A	30	25	7.3	198.5	-7.71	-12.61	-12.80	-7.80	-16.78	-16.63	-27.18	-7.74	1488	1762	1353	1410
	J1z-02-002B					-7.81	-13.08										
	J1Z-02-01A	90	60	9.8	198.2	-7.50	-13.22	-12.95	-7.37	-16.35	-16.20	-27.62	-8.14	1774	2211	1702	1769
	J1Z-02-01B					-7.24	-12.68										
	J1z-02-02A	120	100	12.7	197.8	-7.41	-13.26	-13.10	-7.40	-16.38	-16.23	-27.52	-8.05	1736	2139	1646	1711
	J1z-02-02B					-7.40	-12.86										
	J1Z-03-01A	76	56	16.3	197.4	-6.89	-10.60	-11.31	-6.90	-15.88	-15.74	-27.37	-7.91	1922	2347	1809	1878
	J1Z-03-01B					-6.91	-12.02										
	J1Z-04-01A	70	40	31.7	195.6	-6.67	-11.46	-12.02	-6.27	-15.25	-15.11	-26.70	-7.30	2048	2336	1803	1869
	J1Z-04-01B					-5.87	-12.59										
	J1Z-05-01B	45	10	39.6	194.7	-6.11	-11.07	-11.35	-5.83	-14.81	-14.68	-26.50	-7.12	2228	2493	1926	1994
	J1z-05-01C					-5.54	-11.64										
	J1Z-05-02B	63	45	45.5	194.0	-5.09	-12.83	-12.01	-5.87	-14.85	-14.72	-26.05	-6.71	2070	2200	1699	1760
	J1z-05-02C					-6.65	-11.20										
	J1z-06-01A	15	12	56.7	192.7	-6.58	-12.58	-12.80	-6.40	-15.38	-15.24	-26.03	-6.69	1792	1901	1465	1520
	J1z-06-01B					-6.32	-13.02										
	J1z-07-01A	20	15	69.8	191.2	-5.86	-12.48	-12.80	-6.10	-15.08	-14.95	-26.57	-7.18	2100	2364	1825	1891
	J1z-07-01B					-6.39	-13.19										
DYM	J1Z-08-01A	50	30	84.7	190.4	-6.06	-12.41	-12.89	-6.11	-15.09	-14.96	-27.48	-8.01	2361	2967	2291	2374
	J1Z-08-01B					-6.16	-13.38										
	J1Z-10-01A	135	35	89.5	190.1	-6.73	-13.21	-12.91	-7.18	-16.16	-16.02	-27.39	-7.93	1799	2193	1689	1754
	J1Z-10-01B					-7.64	-12.61										
	J1Z-10-02A	50	20	94.4	189.9	-7.54	-13.51	-12.17	-7.86	-16.84	-16.69	-27.08	-7.65	1441	1689	1296	1351
	J1Z-10-02B					-8.57	-11.41										
	J1z-10-02C					-7.47	-11.60										
	J1z-11-01A	70	60	106.7	189.3	-7.07	-12.63	-12.60	-7.10	-16.08	-15.94	-26.35	-6.98	1562	1711	1316	1369
	J1z-11-02A	75	65	111.7	189.1	-7.47	-12.69	-12.60	-7.60	-16.58	-16.43	-25.98	-6.65	1268	1344	1030	1075
	J1z-11-02B					-7.65	-12.55										
	J1Z-12-01A	30	10	148.9	187.4	-8.43	-11.52	-12.68	-8.08	-17.06	-16.91	-26.15	-6.80	1138	1226	937	981
	J1Z-12-01B					-7.72	-13.85										
	J1Z-14-01A	42	10	176.1	186.1	-7.72	-13.83	-13.78	-7.35	-16.33	-16.18	-26.45	-7.07	1484	1641	1261	1313
	J1Z-14-01B					-6.98	-13.74										
	J1Z-14-02A	110	45	187.3	185.6	-6.32	-13.34	-13.00	-5.98	-14.96	-14.83	-25.88	-6.55	1960	2045	1578	1636
	J1Z-14-02B					-5.63	-12.67										
	J1z-15-01A	120	110	194.3	185.3	-6.99	-13.33	-12.80	-7.00	-15.98	-15.84	-25.75	-6.44	1446	1496	1149	1197
	J1z-15-01B					-7.09	-12.30										
Ma'anshan	J1Z-16-01A	62	12	213.7	184.4	-5.98	-12.07	-12.00	-5.54	-14.52	-14.39	-25.97	-6.64	2233	2351	1818	1881
	J1z-16-01C					-5.10	-11.98										
	J1Z-18-01A	66	32	252.7	182.6	-3.41	-5.18	-5.55	-3.52	-12.50	-12.39	-25.10	-5.85	3463	3218	2498	2574
	J1Z-18-01B					-3.62	-5.93										
	J1Z-19-01A	120	80	272.3	181.9	-6.08	-12.67	-12.59	-6.09	-15.07	-14.94	-24.50	-5.30	1499	1368	1052	1094
	J1Z-19-01B					-6.11	-12.50										
	J1Z-20-01A	83	49	294.3	181.0	-5.47	-10.66	-10.37	-5.63	-14.61	-14.48	-27.00	-7.57	2500	2982	2305	2386
	J1Z-20-01B					-5.80	-10.07										
	J1Z-22-01A	32	5	324.5	179.9	-4.09	-7.68	-7.43	-4.14	-13.12	-13.00	-25.80	-6.48	3170	3262	2529	2610
	J1Z-22-01B					-4.20	-7.17										
Da'anzhai	J1z-23-01A	32	5	334.8	179.5	-7.58	-11.84	-11.70	-8.00	-16.98	-16.83	-26.90	-7.48	1345	1548	1187	1239
	J1z-23-01B					-8.33	-11.58										

Notes:

- 1 DYM, Dongyuemiao Member
 - 3 BK thickness (cm)
 - 4 Sample depth (cm) to BK base
 - 5 Sample depth (m) to the log base
 - 6 Rough age (Ma) arranged by thickness distribution confined by the members in Table 1. Stage boundary age refers to [Cohen et al. \(2019\)](#)
 - 9 Mean oxygen isotope value of two or three measurements for the same calcrete sample
 - 10 Mean carbon isotope value of two or three measurements for the same calcrete sample
 - 11 Carbon-isotope value of calcrete calibrated with $-8.98\text{‰} + \delta^{13}\text{C}_c$ ([Ekart et al., 1999](#))
 - 12 Carbon-isotope value of calcrete calibrated at 25°C with $(\delta^{13}\text{C}_c + 1000) / ((11.98 - 0.12 \cdot T) / 1000 + 1) - 1000$ ([Romanek et al., 1992](#))
 - 13 Carbon-isotope value of organic matters cited from references. Details refer to text
 - 14 Atmospheric carbon isotope calculated by $(\delta^{13}\text{C}_r + 18.67) / 1.1$ ([Arens et al., 2000](#))
 - 15 Atmospheric carbon dioxide estimated with $S(z) = 2500$; $\delta^{13}\text{C}_s = \text{column } 12$; $\delta^{13}\text{C}_r = \text{column } 13$; $\delta^{13}\text{C}_a = -6.5\text{‰}$ at $T = 25^\circ\text{C}$
 - 16 Atmospheric carbon dioxide estimated with $S(z) = 2500$; $\delta^{13}\text{C}_s = \text{column } 12$; $\delta^{13}\text{C}_r = \text{column } 13$; $\delta^{13}\text{C}_a = \text{column } 14$
 - 17 Atmospheric carbon dioxide estimated with $S(z) = 2000$; $\delta^{13}\text{C}_s = \text{column } 11$; $\delta^{13}\text{C}_r = \text{column } 13$; $\delta^{13}\text{C}_a = \text{column } 14$
 - 18 Atmospheric carbon dioxide estimated with $S(z) = 2000$; $\delta^{13}\text{C}_s = \text{column } 12$; $\delta^{13}\text{C}_r = \text{column } 13$; $\delta^{13}\text{C}_a = \text{column } 14$
- Crossed data are invalable.

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