

Supplementary files

Heterogeneous lithification across a legacy coastal slag bank: the creation of new sedimentary rock from anthropogenic material

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Sample	T ₁	T _m	T ₂	Weight loss (%)	Weight loss (mg)
W5A	619	636.5	654	1.25	0.10
W5B	630	645.5	661	1.1	0.12
W5C	719	757	795	0.8	0.05
W5 Average	656	679.67	703.33	1.05	0.09
W6A	641	659.5	678	1.35	0.29
W6B	681	729	777	0.25	0.04
W6C	709	735	761	1.5	0.25
W6 Average	677	707.83	738.67	1.03	0.20
W7A	619	637	655	1.8	0.08
W7B	651	669.5	688	2.25	0.35
W7C	630	652	674	1.75	0.20
W7 Average	633.33	652.83	672.33	1.93	0.21
W8A	642	659	676	2	0.25
W8B	643	661	679	1.5	0.30
W8C	600	644	688	3.25	0.38
W8 Average	628.33	654.67	681	2.25	0.31
W9A	666	701.5	737	8.25	1.92
W9B	671	703	735	8.65	1.84
W9C	670	694	718	5.75	1.11
W9 Average	669	699.5	730	7.55	1.62
W13A	681	716	751	11.24	2.37
W13B	673	711	749	12	2.46
W13C	678	704.5	731	9.5	2.01
W13 Average	677.33	710.50	743.67	10.91	2.28
W15A	679	704	729	5.75	0.83
W15B	687	714	741	11.625	1.35
W15C	672	696.5	721	8.625	0.64
W15 Average	679.33	704.83	730.33	8.67	0.94
W18A	703	732	761	13.7	1.78
W18B	689	722.5	756	16.05	1.48
W18C	695	727	759	15.5	1.82
W18 Average	695.67	727.17	758.67	15.08	1.69
W20A	681	705.5	730	6.2	0.66
W20B	653	693.5	729	4.75	0.65
W20C	708	734.5	761	10	1.58
W20 Average	680.67	711.17	740	6.98	0.96
W23A	670	699.5	729	9.2	1.60
W23B	679	712	745	11.5	2.10
W23C	663	695.5	728	9.05	2.86
W23 Average	670.67	702.33	734	9.92	2.19

Table S1. Carbonate content quantified from TGA using the modified TGA-DTG interpretation (Chaing & Pan, 2017).



Figure S1: (A) W5. (B) W6. (C) W7. (D) W8. (E) W9. (F) W13. (G) W15. (H) W18. (I) W20. (J) W23.

Date	Standard	$\delta^{13}\text{C}$ (‰)	$\delta^{18}\text{O}$ (‰)
2/27/2023	IAEA 603	12.97775815	20.54339476
2/27/2023	IAEA 603	13.00348211	20.60782091
2/27/2023	IAEA 603	13.06966162	20.64525514
2/27/2023	IAEA 603	13.02267199	20.77991801
2/27/2023	IAEA 603	12.9096681	20.52222113
2/27/2023	IAEA 603	12.9808917	20.68999666
2/27/2023	IAEA 603	12.92204301	20.59483911
2/27/2023	IAEA 603	12.96110717	20.52352149
2/27/2023	IAEA 603	12.96949081	20.65376779
2/27/2023	IAEA 603	13.02605384	20.70186766
2/27/2023	IAEA 603	12.95520927	20.59279234
2/27/2023	IAEA 603	12.80346756	20.68604457
2/27/2023	IAEA 603	12.93610905	20.57588457
2/27/2023	IAEA 603	12.94323844	20.62901371
2/27/2023	IAEA 603	12.97511946	20.60279122
2/27/2023	IAEA 603	12.96840206	20.71494907
2/27/2023	IAEA 603	12.89175004	20.52935187
2/27/2023	IAEA 603	13.00597317	20.63430964
2/27/2023	IAEA 603	12.96793523	20.54859016
2/27/2023	IAEA 603	13.01262379	20.49217551
4/4/2023	IAEA 603	12.99	20.52
4/4/2023	IAEA 603	13.05	20.46
4/4/2023	IAEA 603	12.92	20.54
4/4/2023	IAEA 603	13.03	20.41
4/4/2023	IAEA 603	13.11	20.51
4/4/2023	IAEA 603	12.98	20.50
4/4/2023	IAEA 603	13.07	20.57
4/4/2023	IAEA 603	13.10	20.48
4/4/2023	IAEA 603	13.06	20.49
4/4/2023	IAEA 603	13.14	20.68
4/5/2023	IAEA 603	13.12	20.51
4/5/2023	IAEA 603	13.08	20.45
4/5/2023	IAEA 603	13.18	20.44
4/5/2023	IAEA 603	13.16	20.58
4/5/2023	IAEA 603	13.12	20.63
4/5/2023	IAEA 603	13.26	20.56
4/5/2023	IAEA 603	13.16	20.54
4/5/2023	IAEA 603	13.19	20.53
4/5/2023	IAEA 603	13.08	20.46
4/5/2023	IAEA 603	13.15	20.51
	Average	13.03	20.57
	1SD	0.10	0.08

Table S2A. Testing analytical uncertainties.

Date	Standard	$\delta^{13}\text{C}$ (‰)	$\delta^{18}\text{O}$ (‰)
4/4/2023	ISOANALYTICAL R022	-17.69	0.01
4/4/2023	ISOANALYTICAL R022	-17.77	-0.01
4/4/2023	ISOANALYTICAL R022	-17.88	-0.20
4/5/2023	ISOANALYTICAL R022	-17.83	0.05
4/5/2023	ISOANALYTICAL R022	-17.90	0.05
4/5/2023	ISOANALYTICAL R022	-17.90	-0.06
Average		-17.83	-0.02
1SD		0.09	0.09

Table S2B. Testing calibration linearity at more depleted carbon values.

Date	Standard	Certified $\delta^{13}\text{C}$ (‰)	Measured $\delta^{13}\text{C}$ (‰)	Certified $\delta^{18}\text{O}$ (‰)	Measured $\delta^{18}\text{O}$ (‰)
2/27/2023	IAEA 603	2.46	12.97775815	-2.37	20.54339476
2/27/2023	IAEA 603	2.46	13.00348211	-2.37	20.60782091
2/27/2023	IAEA 603	2.46	13.06966162	-2.37	20.64525514
2/27/2023	IAEA 603	2.46	13.02267199	-2.37	20.77991801
2/27/2023	IAEA 603	2.46	12.9096681	-2.37	20.52222113
2/27/2023	IAEA 603	2.46	12.9808917	-2.37	20.68999666
2/27/2023	IAEA 603	2.46	12.92204301	-2.37	20.59483911
2/27/2023	IAEA 603	2.46	12.96110717	-2.37	20.52352149
2/27/2023	IAEA 603	2.46	12.96949081	-2.37	20.65376779
2/27/2023	IAEA 603	2.46	13.02605384	-2.37	20.70186766
2/27/2023	IAEA 603	2.46	12.95520927	-2.37	20.59279234
2/27/2023	IAEA 603	2.46	12.80346756	-2.37	20.68604457
2/27/2023	IAEA 603	2.46	12.93610905	-2.37	20.57588457
2/27/2023	IAEA 603	2.46	12.94323844	-2.37	20.62901371
2/27/2023	IAEA 603	2.46	12.97511946	-2.37	20.60279122
2/27/2023	IAEA 603	2.46	12.96840206	-2.37	20.71494907
2/27/2023	IAEA 603	2.46	12.89175004	-2.37	20.52935187
2/27/2023	IAEA 603	2.46	13.00597317	-2.37	20.63430964
2/27/2023	IAEA 603	2.46	12.96793523	-2.37	20.54859016
2/27/2023	IAEA 603	2.46	13.01262379	-2.37	20.49217551
2/27/2023	NBS 18	-5	5.531045034	-23	-0.541641052
2/27/2023	NBS 18	-5	5.560047935	-23	-0.295359399
2/27/2023	NBS 18	-5	5.402942807	-23	-0.589383774
2/27/2023	NBS 18	-5	5.442760803	-23	-0.28771636
2/27/2023	NBS 18	-5	5.550675694	-23	-0.410905537
2/27/2023	NBS 18	-5	5.58065619	-23	-0.404499604
2/27/2023	NBS 18	-5	5.463465324	-23	-0.479521689
2/27/2023	NBS 18	-5	5.513011086	-23	-0.574467517
2/27/2023	NBS 18	-5	5.545814645	-23	-0.448647268
2/27/2023	NBS 18	-5	5.40375865	-23	-0.518550838
2/27/2023	ISOANALYTICAL R022	-28.63		-22.69	
2/27/2023	ISOANALYTICAL R022	-28.63		-22.69	
2/27/2023	ISOANALYTICAL R022	-28.63		-22.69	
4/4/2023	IAEA 603	2.46	12.99	-2.37	20.52
4/4/2023	IAEA 603	2.46	13.05	-2.37	20.46
4/4/2023	IAEA 603	2.46	12.92	-2.37	20.54
4/4/2023	IAEA 603	2.46	13.03	-2.37	20.41
4/4/2023	IAEA 603	2.46	13.11	-2.37	20.51
4/4/2023	IAEA 603	2.46	12.98	-2.37	20.5
4/4/2023	IAEA 603	2.46	13.07	-2.37	20.57
4/4/2023	IAEA 603	2.46	13.1	-2.37	20.48
4/4/2023	IAEA 603	2.46	13.06	-2.37	20.49
4/4/2023	IAEA 603	2.46	13.14	-2.37	20.68
4/5/2023	IAEA 603	2.46	13.12	-2.37	20.51
4/5/2023	IAEA 603	2.46	13.08	-2.37	20.45
4/5/2023	IAEA 603	2.46	13.18	-2.37	20.44
4/5/2023	IAEA 603	2.46	13.16	-2.37	20.58
4/5/2023	IAEA 603	2.46	13.12	-2.37	20.63
4/5/2023	IAEA 603	2.46	13.26	-2.37	20.56
4/5/2023	IAEA 603	2.46	13.16	-2.37	20.54
4/5/2023	IAEA 603	2.46	13.19	-2.37	20.53
4/5/2023	IAEA 603	2.46	13.08	-2.37	20.46
4/5/2023	IAEA 603	2.46	13.15	-2.37	20.51
4/4/2023	NBS 18	-5	5.4	-23	-0.51
4/4/2023	NBS 18	-5	5.57	-23	-0.55
4/4/2023	NBS 18	-5	5.48	-23	-0.81
4/4/2023	NBS 18	-5	5.51	-23	-0.55

4/4/2023	NBS 18	-5	5.69	-23	-0.47
4/4/2023	NBS 18	-5	5.49	-23	-0.69
4/4/2023	NBS 18	-5	5.72	-23	-0.63
4/4/2023	NBS 18	-5	5.53	-23	-0.85
4/4/2023	NBS 18	-5	5.55	-23	-0.74
4/5/2023	NBS 18	-5	5.69	-23	-0.47
4/5/2023	NBS 18	-5	5.65	-23	-0.42
4/5/2023	NBS 18	-5	5.58	-23	-0.71
4/5/2023	NBS 18	-5	5.66	-23	-0.47
4/5/2023	NBS 18	-5	5.58	-23	-0.69
4/4/2023	ISOANALYTICAL R022	-28.63	-17.69	-22.69	0.01
4/4/2023	ISOANALYTICAL R022	-28.63	-17.77	-22.69	-0.01
4/4/2023	ISOANALYTICAL R022	-28.63	-17.88	-22.69	-0.2
4/5/2023	ISOANALYTICAL R022	-28.63	-17.83	-22.69	0.05
4/5/2023	ISOANALYTICAL R022	-28.63	-17.9	-22.69	0.05
4/5/2023	ISOANALYTICAL R022	-28.63	-17.9	-22.69	-0.06

Table S2C. Calibration standards.

Date	Sample	Uncalibrated $\delta^{13}\text{C}$ (‰)	$\delta^{13}\text{C}$ (‰) V-PDB	Uncalibrated $\delta^{18}\text{O}$ (‰)	$\delta^{18}\text{O}$ (‰) V-PDB
2/27/2023	JM21_W13A	-3.23	-13.72	15.95	-6.94
2/27/2023	JM21_W13B	-4.04	-14.53	15.6	-7.28
	Average		-14.13		-7.11
	1SD		0.57		0.24
2/27/2023	JM21_W15A	-0.58	-11.08	11.2	-11.58
2/27/2023	JM21_W15B	-0.44	-10.94	11.26	-11.53
2/27/2023	JM21_W15C	-1.68	-12.17	12.14	-10.67
	Average		-11.4		-11.26
	1SD		0.68		0.51
2/27/2023	JM21_W18B	4.24	-6.25	15.3	-7.57
2/27/2023	JM21_W18C	3.92	-6.58	15.15	-7.72
	Average		-6.42		-7.65
	1SD		0.23		0.11
2/27/2023	JM21_W20A	-4.64	-15.13	12.86	-9.96
2/27/2023	JM21_W20B	-1.45	-11.94	13.14	-9.69
2/27/2023	JM21_W20C	-4.63	-15.12	13.17	-9.66
	Average		-14.07		-9.77
	1SD		1.84		0.17
4/4/2023	JM21_W5 A 800UG.raw	3.27	-7.29	18.99	-3.86
4/4/2023	JM21_W5 B 800UG.raw	2.31	-8.24	18.95	-3.9
4/4/2023	JM21-W5 C 600UG.raw	2.03	-8.52	17.92	-4.9
	Average		-8.02		-4.22
	1SD		0.64		0.59
4/4/2023	JM21_W7 600UG A.raw	-12.31	-22.75	12.51	-10.19
4/4/2023	JM21_W7 600UG B.raw	-12.25	-22.69	12.96	-9.75
4/4/2023	JM21_W7 600UG C.raw	-12.13	-22.57	13.32	-9.4
	Average		-22.67		-9.78
	1SD		0.1		0.39
4/4/2023	JM21_W8 600UG A.raw	-11.57	-22.02	15.18	-7.58
4/4/2023	JM21_W8 600UG B.raw	-10.69	-21.14	15.14	-7.62
4/4/2023	JM21_W8 600UG C.raw	-11.69	-22.13	14.88	-7.88
	Average		-21.76		-7.69
	1SD		0.54		0.16
4/4/2023	JM21_W9 600UG A.raw	-7.6	-18.08	11.93	-10.75
4/4/2023	JM21_W9 600UG B.raw	-8.39	-18.86	12.11	-10.58
4/4/2023	JM21_W9 600UG C.raw	-7.93	-18.41	12.04	-10.65
	Average		-18.45		-10.66
	1SD		0.39		0.09
4/6/2023	JM21-W23 600UG 1.raw	-0.6	-11.13	15.38	-7.39
4/6/2023	JM21-W23 600UG 2.raw	-0.57	-11.1	15.38	-7.39
4/6/2023	JM21-W23 600UG 3.raw	-0.26	-10.79	13.55	-9.18
	Average		-11.01		-7.98
	1SD		0.19		1.03

Table S2D. Uncalibrated and VPDB Samples.

Reference

Chiang, P.-C., & Pan, S.-Y. (2017). *Carbon dioxide mineralization and utilization*. Springer.