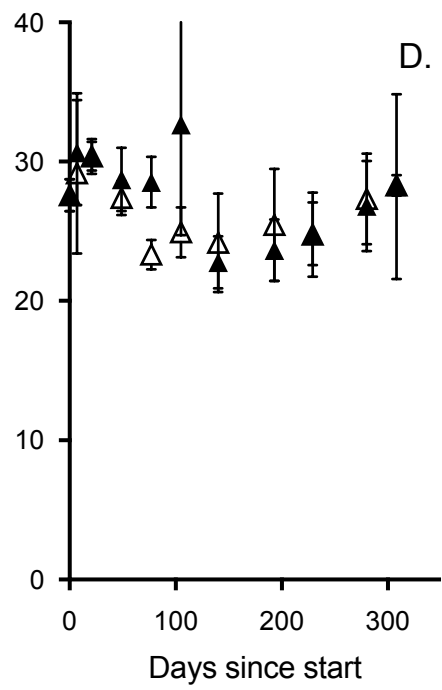
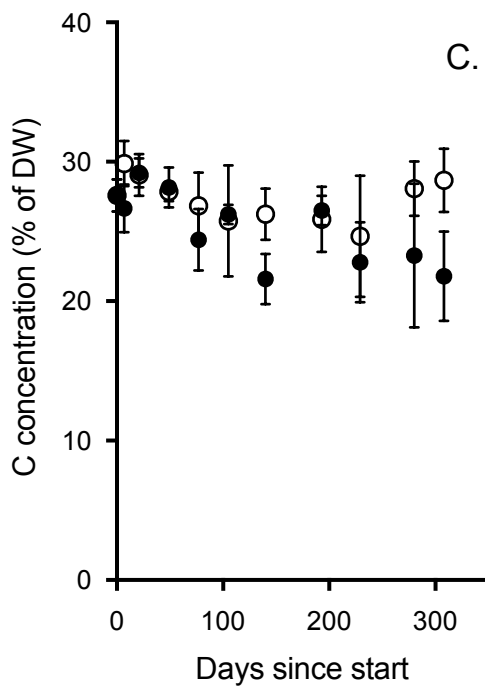
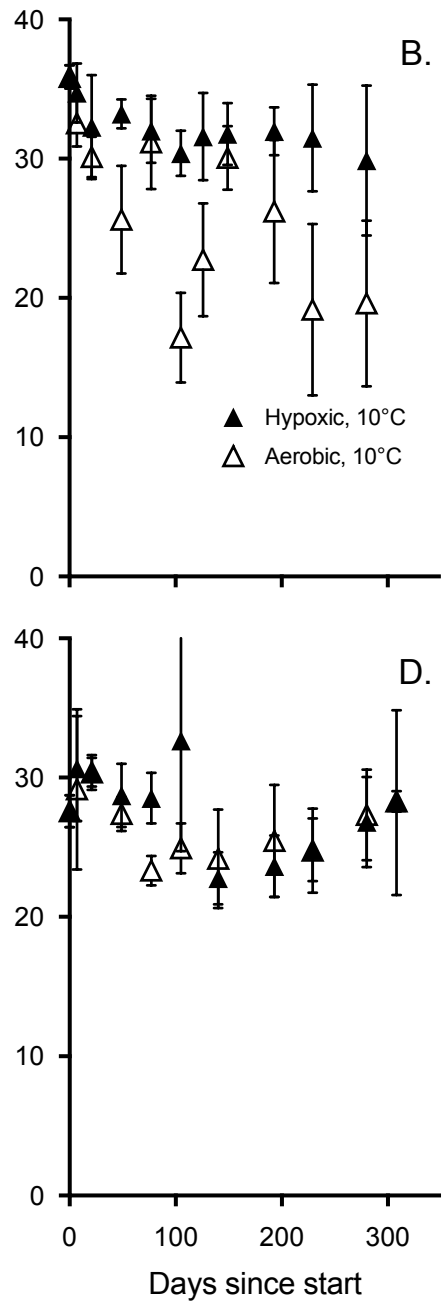
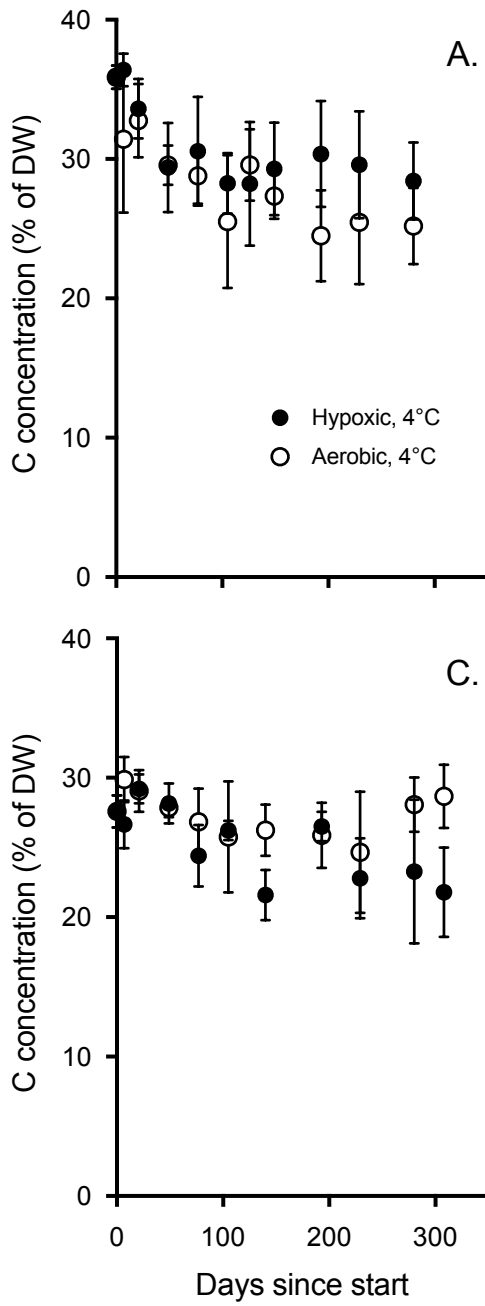


Supplementary information

Title: ‘Carbon sequestration potential increased by incomplete anaerobic decomposition of kelp detritus’.

Authors: Morten Foldager Pedersen, Karen Filbee-Dexter, Nikolai Lond Frisk, Zsuzsa Sárossy and Thomas Wernberg.



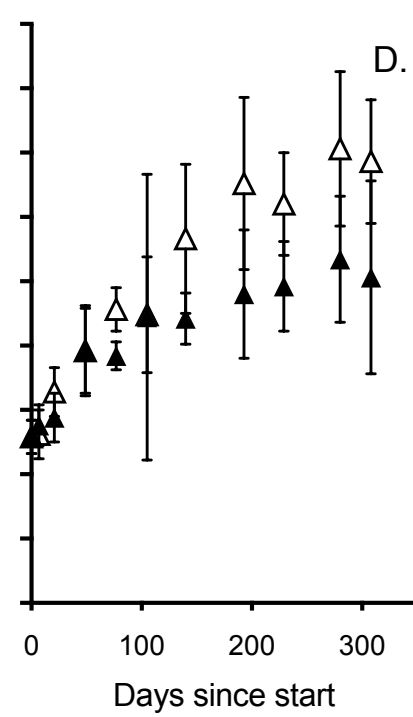
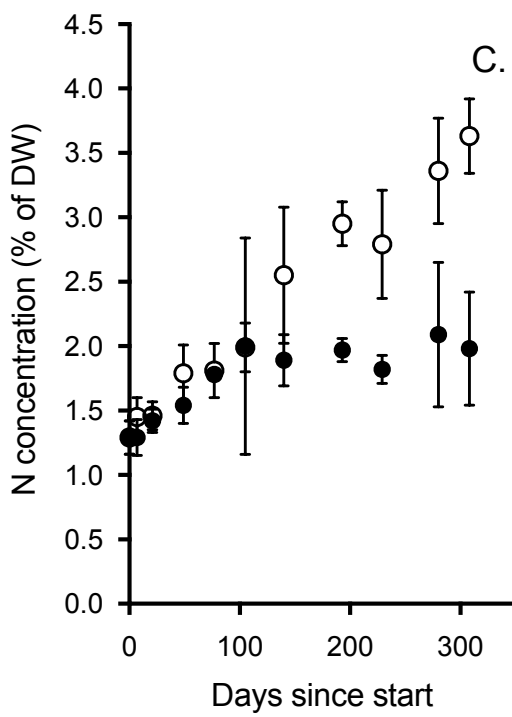
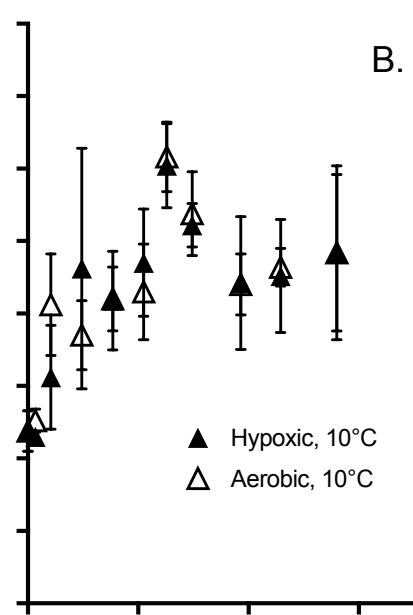
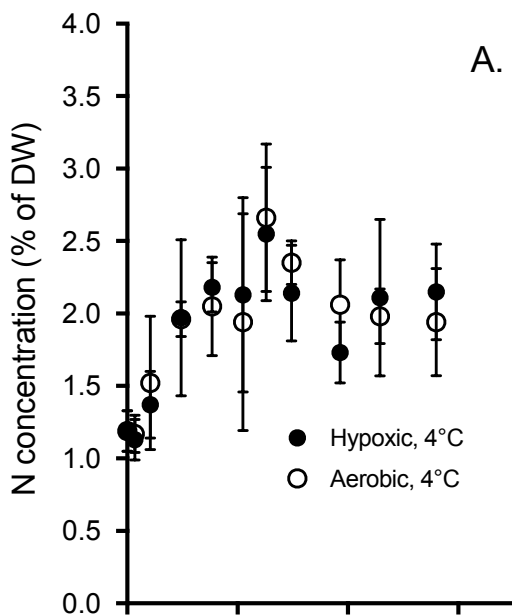


Table S1. The concentration of dissolved O₂ in the water of the treatment tanks. Values are means ± sd (averaged across time and replicate tanks, n = 100 for each treatment combination).

Plant part:	Treatments		O ₂ -concentration (mg L ⁻¹)		
	Oxygen	Temperature (°C)	Mean	± sd	Range
Blade	Aerobic	4	10.1	0.3	9.4 – 10.7
Blade	Aerobic	10	8.9	0.3	8.3 – 9.6
Blade	Anaerobic	4	0.7	0.5	0.1 – 2.0
Blade	Anaerobic	10	0.7	0.4	0.1 – 2.0
Stipe	Aerobic	4	10.0	0.2	9.3 – 10.6
Stipe	Aerobic	10	9.0	0.3	8.3 – 9.6
Stipe	Anaerobic	4	0.6	0.4	0.0 – 2.0
Stipe	Anaerobic	10	0.6	0.4	0.1 – 2.5

Table S2. ANOVA output for two factor repeated measures ANOVA testing the effects of time, O₂-treatment and temperature on the C-concentration in blade and stipe detritus, respectively. Data for stipe detritus were ln-transformed prior to analysis. Greenhouse-Geisser Epsilon was 0.438 for blade detritus and 0.505 for stipe detritus, why G-G corrected p-values are shown for within subject effects.

Source	SS	df	MS	F-ratio	p	G-G corrected p
Blade detritus:						
<i>Between subject effects:</i>						
Oxygen	719.41	1	719.41	53.18	<0.001	
Temperature	9.93	1	9.93	0.73	0.408	
Temperature × Oxygen	152.61	1	152.61	11.28	0.006	
Error	162.32	12	13.53			
<i>Within subject effects:</i>						
Time	1788.90	10	178.89	17.24	<0.001	<0.000
Time × Oxygen	316.81	10	31.68	3.05	0.002	0.021
Time × Temperature	145.71	10	14.57	1.40	0.186	0.242
Time × Temperature × Oxygen	248.55	10	24.86	2.40	0.013	0.057
Error	1244.98	120	10.38			
Stipe detritus:						
<i>Between subject effects:</i>						
Oxygen	0.023	1	0.023	1.67	0.221	
Temperature	0.039	1	0.039	2.81	0.120	
Temperature × Oxygen	0.151	1	0.151	10.99	0.006	
Error	0.165	12	0.014			
<i>Within subject effects:</i>						
Time	0.842	10	0.084	6.82	<0.001	<0.001
Time × Oxygen	0.281	10	0.028	2.28	0.018	0.057
Time × Temperature	0.107	10	0.011	0.87	0.568	0.511
Time × Temperature × Oxygen	0.152	10	0.015	1.23	0.279	0.306
Error	1.482	120	0.012			

Table S3. ANOVA output for two factor repeated measures ANOVA testing the effects of time, O₂-treatment and temperature on the N-concentration in blade and stipe detritus, respectively. Both data sets were ln-transformed prior to analysis. Greenhouse-Geisser Epsilon was 0.453 for blade detritus and 0.345 for stipe detritus, why G-G corrected p-values are shown for within subject effects.

Source	SS	df	MS	F-ratio	p	G-G corrected p
Blade detritus:						
<i>Between subject effects:</i>						
Oxygen	0.011	1	0.011	0.211	0.654	
Temperature	0.525	1	0.525	9.748	0.009	
Temperature × Oxygen	0.001	1	0.001	0.027	0.871	
Error	0.646	12	0.054			
<i>Within subject effects:</i>						
Time	12.003	10	1.200	38.202	<0.001	<0.001
Time × Oxygen	0.269	10	0.027	0.855	0.577	0.508
Time × Temperature	0.248	10	0.025	0.791	0.638	0.550
Time × Temperature × Oxygen	0.137	10	0.014	0.435	0.926	0.805
Error	3.770	120	0.031			
Stipe detritus:						
<i>Between subject effects:</i>						
Oxygen	1.673	1	1.673	41.070	<0.001	
Temperature	0.473	1	0.473	11.610	0.005	
Temperature × Oxygen	0.067	1	0.067	1.653	0.223	
Error	0.489	12	0.041			
<i>Within subject effects:</i>						
Time	12.909	10	1.291	47.428	<0.001	<0.001
Time × Oxygen	1.140	10	0.114	4.187	<0.001	0.008
Time × Temperature	0.190	10	0.019	0.696	0.726	0.582
Time × Temperature × Oxygen	0.198	10	0.020	0.729	0.696	0.562
Error	3.266	120	0.027			

Table S4. ANOVA output for two factor repeated measures ANOVA testing the effects of time, O₂-treatment and temperature on CN-ratio in blade and stipe detritus, respectively. Both data sets were ln-transformed prior to analysis. Greenhouse-Geisser Epsilon was 0.446 for blade detritus and 0.283 for stipe detritus, why G-G corrected p-values are shown for the within subject effects.

Source	SS	df	MS	F-ratio	p	G-G corrected p
Blade detritus:						
<i>Between subject effects:</i>						
Oxygen	1.31	1	1.31	12.66	0.004	
Temperature	0.88	1	0.88	8.48	0.013	
Temperature × Oxygen	0.33	1	0.33	3.10	0.104	
Error	1.25	12	0.10			
<i>Within subject effects:</i>						
Time	22.45	10	2.25	58.11	<0.001	<0.001
Time × Oxygen	0.52	10	0.05	1.34	0.216	0.266
Time × Temperature	0.72	10	0.07	1.87	0.056	0.123
Time × Temperature × Oxygen	0.58	10	0.06	1.49	0.151	0.214
Error	4.64	120	0.06			
Stipe detritus:						
<i>Between subject effects:</i>						
Oxygen	1.30	1	1.30	37.73	<0.001	
Temperature	0.24	1	0.24	6.98	0.022	
Temperature × Oxygen	0.02	1	0.02	0.49	0.500	
Error	0.42	12				
<i>Within subject effects:</i>						
Time	18.51	10	1.85	90.78	<0.001	<0.001
Time × Oxygen	0.60	10	0.06	2.92	0.003	0.051
Time × Temperature	0.35	10	0.04	1.70	0.089	0.188
Time × Temperature × Oxygen	0.34	10	0.03	1.67	0.096	0.194
Error	2.45	120	0.02			

Table S5. ANOVA output table for the effects of time and O₂-treatment on the total mass loss and mass losses within different temperature intervals during pyrolysis of blade detritus.

Source	SS	df	MS	F-ratio	p
Total mass loss:					
Time	2194.9	2	1097.4	228.5	<0.001
O ₂ -treatment	168.1	1	168.1	35.0	<0.001
Time × O ₂	92.8	2	46.4	9.7	0.003
Error	57.6	12	4.8		
TI₁₈₀₋₃₀₀:					
Time	474.4	2	237.2	166.1	<0.001
O ₂ -treatment	48.9	1	48.9	34.3	<0.001
Time × O ₂	24.8	2	12.4	8.7	0.005
Error	17.1	12	1.4		
TI₃₀₀₋₄₀₀:					
Time	988.6	2	494.3	173.1	<0.001
O ₂ -treatment	12.5	1	12.5	4.4	0.059
Time × O ₂	10.8	2	5.4	1.9	0.193
Error	34.3	12	2.9		
TI₄₀₀₋₆₀₀:					
Time	4.21	2	2.11	8.21	0.006
Time	3.36	1	3.36	13.11	0.004
O ₂ -treatment	1.82	2	0.91	3.55	0.062
Time × O ₂	3.08	12			
Error					
TI₆₀₀₋₈₀₀:					
Time	7.91	2	3.95	22.5	<0.001
O ₂ -treatment	0.93	1	0.93	5.31	0.040
Time × O ₂	0.54	2	0.27	1.52	0.257
Error	2.10	12			

Table S6. ANOVA output table for the effects of time and O₂-treatment on the total mass loss and mass losses within different temperature intervals during pyrolysis of stipe detritus.

Source	SS	df	MS	F-ratio	p
Total mass loss:					
Time	352.9	2	176.5	88.6	<0.001
O ₂ -treatment	29.5	1	29.5	14.8	0.002
Time × O ₂	31.0	2	15.5	7.8	0.007
Error	23.9	12	2.0		
TI₁₈₀₋₃₀₀:					
Time	626.1	2	313.1	362.4	<0.001
O ₂ -treatment	1.2	1	1.2	1.4	0.260
Time × O ₂	0.9	2	0.4	0.5	0.613
Error	10.4	12	0.9		
TI₃₀₀₋₄₀₀:					
Time	43.9	2	21.9	48.1	<0.001
O ₂ -treatment	7.9	1	7.9	17.4	0.001
Time × O ₂	4.4	2	2.2	4.8	0.029
Error	5.5	12	0.5		
TI₄₀₀₋₆₀₀:					
Time	5.44	2	2.72	7.95	0.006
O ₂ -treatment	1.88	1	1.88	5.51	0.037
Time × O ₂	3.18	2	1.59	4.65	0.032
Error	4.10	12	0.34		
TI₆₀₀₋₈₀₀:					
Time	6.30	2	3.15	36.95	<0.001
O ₂ -treatment	0.02	1	0.02	0.23	0.639
Time × O ₂	0.93	2	0.47	5.47	0.021
Error	1.02	12	0.09		