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*Supplement of*

## **A closed-chamber method to measure greenhouse gas fluxes from dry aquatic sediments**

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**Figure S1: Laboratory setup to test chamber sealing.**



**Figure S2: Field test sites.**

Bridgesoil site: near the shore of the river Elbe in Magdeburg, Germany (coordinates: 52° 7.62' N, 11° 39.04' O).



River sand site: Right shore (summer dry river bed) of the river Elbe in Magdeburg, Germany (coordinates: 52° 7.92' N, 11° 39.42' O).



Shores of Rappbode reservoir in the Harz mountains in Saxony-Anhalt, Germany, slightly north-west from the Hassel pre-dam (coordinates: 51° 43.83' N, 10° 52.63' O).



**Figure S3: Sealing the chamber with clay.**



**Table S1: CO2 flux data.**

CO2											
Chamber test (Table 2)											
Sample	ppm/d	r2	Final concentration	Time in h	T [°C] at end	F	mmol/sqm/d				
clay	<DL	0.001	290.7	14.5	27.3	40.06	<DL				
putty	<DL	0.321	270.2	17.3	26.3	40.19	<DL				
elbmud	1277	0.994	441.2	2.5	27.0	40.09	5.94				
river sand+glucose	12044	0.999	598.7	0.75	30.7	39.60	55.38				
bridgesoil	1270	0.960	1306.7	17.3	25.5	40.29	5.94				
river sand	2320	0.991	850.2	3.3	27.1	40.08	10.80				
Chamber low CO2 (Table 2)											
Sample	ppm/d	r2	mean	SD	T [°C]	F	mmol/sqm/d		mean	SD	
Clay 1	6242	0.997	6329	163	27.2	40.07	29.03		29	1	
Clay 2	6228	0.999			27.5	40.03	28.94				
Clay 3	6518	0.998			27.3	40.06	30.31				
putty 1	6898	0.996	5701	1168	26.3	40.19	32.19		27	5	
putty 2	5640	0.999			26.3	40.19	26.32				
putty 3	4564	0.999			26.3	40.19	21.30				
river mud 1	2121	0.917	4299	2279	27.0	40.09	9.87		20	11	
river mud 2	7502	0.996			27.0	40.09	34.92				
river mud 3	3936	0.997			27.0	40.09	18.32				
river mud 4	3638	0.998			27.0	40.09	16.93				
sand + glucose 1	34440	0.990	22490	10751	27.8	39.99	159.87		104	50	
sand + glucose 2	24579	0.989			27.8	39.99	114.10				
sand + glucose 3	9282	0.996			27.2	40.07	43.18				
sand + glucose 4	10883	0.995			29.0	39.83	50.32				
sand + glucose 5	33516	0.989			29.5	39.76	154.71				
sand + glucose 6	22239	0.997			30.7	39.60	102.25				
bridgesoil 1	6399	0.998	4753	1623	25.5	40.29	29.93		22	8	
bridgesoil 2	3154	0.999			25.5	40.29	14.75				
bridgesoil 3	4707	0.999			25.5	40.29	22.02				
river sand 1	8282	0.999	8998	6184	27.0	40.09	38.55		42	29	
river sand 2	3203	0.992			27.1	40.08	14.90				
river sand 3	15508	0.998			27.1	40.08	72.16				
CO2 production (Table 2)											
Sample	ppm/d	r2	mean	SD	T [°C]	F	weighed mass [g]	mmol kg-1 d-1	mean	SD	
blank 1	<DL	0.007	<DL		216						
blank 2	<DL	0.012									
blank 3	<DL	0.224									
Clay 1	1254	0.901	996	269	26.1	40.21	24	3.3	2.5	0.7	
Clay 2	1016	0.936			25.6	40.28	29.49	2.2			
Clay 3	<DL	0.817			25.7	40.27	22.853	<DL			
river mud 1	7748	0.993	6393	1861	26.5	40.16	30.248	16.5	15.3	3.2	
river mud 2	4272	0.997			26.6	40.15	23.58	11.6			
river mud 3	7160	0.992			27.0	40.09	25.95	17.7			
sand + glucose 1	10731	0.996	11126	559	24.3	40.46	23.58	29.5	31.7	2.4	
sand + glucose 2	11766	0.996			24.7	40.40	22.25	34.2			
sand + glucose 3	10882	0.998			25.5	40.29	22.21	31.6			
bridgesoil 1	2517	0.951	3139	539	25.5	40.29	24.39	6.7	8.4	1.6	
bridgesoil 2	3440	0.991			25.5	40.29	23.11	9.6			
bridgesoil 3	3461	0.995			25.5	40.29	24.84	9.0			
river sand 1	2475	0.989	1027	1258	26.3	40.19	22.5	7.1	2.9	3.7	
river sand 2	<DL	0.354			26.4	40.17	26	<DL			
river sand 3	<DL	0.096			26.9	40.11	25.22	<DL			
putty 1	1288	0.916	<DL	522	26.3	40.19	16	5.3	2.5	2.4	
putty 2	<DL	0.525			26.3	40.19	24.35	<DL			
putty 3	<DL	0.725			26.3	40.19	23.41	<DL			
Field measurements (Figure 2)											
site	Sample	rr	ppm/d flux	mean	SD	T [°C]	F	mmol/sq/d flux			
bridgesoil site	clay 1	0.999	49482	51782		2217	26.5	40.16	231	241	10
	clay 2	0.998	53905				26.5	40.16	251		
	clay 3	0.999	51959				26.5	40.16	242		
bridgesoil site	bridgesoil 1	0.997	56979	56749		1668	26.5	40.16	266	265	8
	bridgesoil 2	0.999	58291				26.5	40.16	272		
	bridgesoil 3	0.999	54978				26.5	40.16	256		
river sand site	clay 1	1.000	15336	15522		199	16.0	41.62	74	75	1
	clay 2	0.998	15732				16.0	41.62	76		
	clay 3	0.997	15500				16.0	41.62	75		
river sand site	river sand 1	1.000	49616	47800		1702	16.0	41.62	240	231	8
	river sand 2	1.000	47541				16.0	41.62	230		
	river sand 3	0.998	46242				16.0	41.62	223		
reservoir site	clay 1	0.999	31715	29136		2033	26.5	40.16	148	135	10
	clay 2	1.000	29762				27.0	40.09	139		
	clay 3	0.998	27201				30.0	39.70	125		
	clay 4	1.000	27864				30.0	39.70	128		
bank mud site	bank mud 1	1.000	78549	74219		3650	29.0	39.83	363	342	17
	bank mud 2	1.000	75884				30.0	39.70	350		
	bank mud 3	1.000	70731				31.0	39.57	325		
	bank mud 4	1.000	71714				29.0	39.83	332		
SRC site	SRC 1								125	118	6
	SRC 2								115		
	SRC 3								115		

Table S2: CH<sub>4</sub> flux data.

CH <sub>4</sub>										
Chamber test										
Sample	ppm/d	r <sup>2</sup>	Final concn	Time in h	T [°C]	at end	F	mmol/sqm/d		
clay	< DL	0.3270	1.07	14.5	27.3	40.06		< DL		
putty	< DL	0.8806	3.21	17.3	26.3	40.19		< DL		
elbmud	< DL	0.3026	1.13	2.5	27.0	40.09		< DL		
river sand+glucose	15	0.6523	1.27	0.75	30.7	39.60		0.07		
bridgesoil	< DL	0.0248	1.25	17.3	25.5	40.29		< DL		
river sand	< DL	0.2304	1.53	3.3	27.1	40.08		< DL		
Chamber low CH <sub>4</sub>										
Sample	ppm/d	r <sup>2</sup>	mean	SD	T [°C]	F	mmol/sqm/d	mean	SD	
Clay 1	24	0.1767	17.40		5.35	27.2	40.07	0.11	0.08	
Clay 2	15	0.0506				27.5	40.03	0.07		
Clay 3	14	0.2214				27.3	40.06	0.06		
putty 1	42	0.5200	35.39		11.13	26.3	40.19	0.20	0.17	
putty 2	23	0.2001				26.3	40.19	0.11		
putty 3	41	0.4993				26.3	40.19	0.19		
river mud 1	< DL	0.0366	< DL		7.94	27.0	40.09	< DL	< DL	
river mud 2	< DL	0.0003				27.0	40.09	< DL		
river mud 3	-15	0.0536				27.0	40.09	-0.07		
river mud 4	< DL	0.0024				27.0	40.09	< DL		
sand + glucose 1	-14	0.0730	37.64		41.47	27.8	39.99	-0.06	0.17	
sand + glucose 2	82	0.8169				27.8	39.99	0.38		
sand + glucose 3	20	0.1549				27.2	40.07	0.09		
sand + glucose 4	32	0.6339				29.0	39.83	0.15		
sand + glucose 5	92	0.8306				29.5	39.76	0.43		
sand + glucose 6	12	0.0577				30.7	39.60	0.06		
bridgesoil 1	< DL	0.0046	-12.92		12.87	25.5	40.29	< DL	-0.06	
bridgesoil 2	-28	0.3565				25.5	40.29	-0.13		
bridgesoil 3	< DL	0.0209				25.5	40.29	< DL		
river sand 1	13	0.0485	13.27		5.69	27.0	40.09	0.06	0.06	
river sand 2	19	0.1894				27.1	40.08	0.09		
river sand 3	8	0.0455				27.1	40.08	0.04		
CH <sub>4</sub> production										
Sample	ppm/d	r <sup>2</sup>	mean	SD	T [°C]	F	weighed mass [g]	mmol kg <sup>-1</sup> d <sup>-1</sup> mean	SD	
blank 1	-48.44	0.3358	-17		32		-			
blank 2	15.90	0.1482					-			
blank 3	-17.11	0.1231					-			
Clay 1	16.49	0.1408	15		8	26.1	40.21	24.474	0.04	
Clay 2	22.25	0.2911				25.6	40.28	29.490	0.05	
Clay 3	< DL	0.0203				25.7	40.27	22.853	< DL	
river mud 1	-29.28	0.4021	10		47	26.5	40.16	30.248	-0.06	
river mud 2	62.14	0.6058				26.6	40.15	23.580	0.17	
river mud 3	< DL	0.0013				27.0	40.09	25.950	< DL	
sand + glucose 1	64.58	0.7027	93		35	24.3	40.46	23.580	0.18	
sand + glucose 2	132.48	0.8076				24.7	40.40	22.250	0.38	
sand + glucose 3	81.37	0.8291				25.5	40.29	22.210	0.24	
bridgesoil 1	18.68	0.1363	18		8	25.5	40.29	24.390	0.05	
bridgesoil 2	25.83	0.2937				25.5	40.29	23.110	0.07	
bridgesoil 3	9.08	0.0273				25.5	40.29	24.840	0.02	
river sand 1	< DL	0.0014	9		10	26.3	40.19	22.500	< DL	
river sand 2	19.03	0.0872				26.4	40.17	26.000	0.05	
river sand 3	9.25	0.0731				26.9	40.11	25.220	0.02	
putty 1	40.58	0.3821	57		20	26.3	40.19	15.770	0.17	
putty 2	50.97	0.6327				26.3	40.19	24.350	0.13	
putty 3	79.07	0.6952				26.3	40.19	23.410	0.22	
Field measurements										
site	Sample	rr	ppm/d flux	mean	SD	T [°C]	F	mmol/sq/d flux	mean	SD
bridgesoil site	clay 1	0.0003	< DL	-18.79	16.74	26.5		40.16	< DL	-0.09
	clay 2	0.0965	-21.47			26.5		40.16	-0.10	
	clay 3	0.2889	-34.04			26.5		40.16	-0.16	
	bridgesoil 1	0.1394	-24.26	-15.01	10.57	26.5		40.16	-0.11	-0.07
	bridgesoil 2	0.0911	-17.28			26.5		40.16	-0.08	
river sand site	bridgesoil 3	0.0031	< DL			26.5		40.16	< DL	
	clay 1	0.0844	-13.79	-19.84	18.56	16.0		41.62	-0.07	-0.10
	clay 2	0.0137	-> DL			16.0		41.62	-> DL	
	clay 3	0.4688	-40.67			16.0		41.62	-0.20	
	river sand 1	0.0185	< DL	8.39		16.0		41.62	-> DL	< DL
reservoir site	river sand 2	0.0656	-17.28			16.0		41.62	-0.08	
	river sand 3	0.0008	-> DL			16.0		41.62	-> DL	
	clay 1	0.0267	< DL	< DL	15.12	26.5		40.16	< DL	< DL
	clay 2	0.0787	-15.71			27.0		40.09	-0.07	
	clay 3	0.0996	12.04			30.0		39.70	0.06	
bank mud	clay 4	0.0087	-> DL			30.0		39.70	< DL	
	bank mud 1	<b>0.9832</b>	<b>884.60</b>	255.35	572.41	29.0		39.83	<b>4.09</b>	0.86
	bank mud 2	0.2706	-234.45			30.0		39.70	-1.08	
	bank mud 3	0.7663	115.90			31.0		39.57	0.53	
	bank mud 4	0.0936	-25.98			29.0		39.83	-0.12	

**Table S3: N<sub>2</sub>O flux data.**

N <sub>2</sub> O										
Chamber test										
Sample	ppm/d	r2	Final concn	Time in h	T [°C] at end	F	mmol/sqm/d			
clay	<DL	0.0000	0	14.5	27.3	40.06	<DL			
putty	<DL	0.4775	1.304	17.3	26.3	40.19	<DL			
elbmud	<DL	0.0000	0	2.5	27.0	40.09	<DL			
river sand+glucose	<DL	0.0000	0	0.75	30.7	39.60	<DL			
bridgesoil	1321	0.8723	1579	17.3	25.5	40.29	6.18			
river sand	9	0.9817	1.74	3.3	27.1	40.08	0.04			
Chamber low CH <sub>4</sub>										
Sample	ppm/d	r2	mean	SD	T [°C]	F	mmol/sqm/d	mean	SD	
Clay 1	<DL	0.0000	<DL	0.00	27.2	40.07	<DL	<DL	<DL	0.00
Clay 2	<DL	0.0000	<DL	0.00	27.5	40.03	<DL	<DL	<DL	0.00
Clay 3	<DL	0.0000	<DL	0.00	27.3	40.06	<DL	<DL	<DL	0.00
putty 1	<DL	0.0000	<DL	0.00	26.3	40.19	<DL	<DL	<DL	0.00
putty 2	<DL	0.0000	<DL	0.00	26.3	40.19	<DL	<DL	<DL	0.00
putty 3	<DL	0.0000	<DL	0.00	26.3	40.19	<DL	<DL	<DL	0.00
river mud 1	<DL	0.8796	<DL	3.56	27.0	40.09	<DL	<DL	<DL	0.02
river mud 2	<DL	0.0000	<DL	0.00	27.0	40.09	<DL	<DL	<DL	0.00
river mud 3	<DL	0.0000	<DL	0.00	27.0	40.09	<DL	<DL	<DL	0.00
river mud 4	<DL	0.0000	<DL	0.00	27.0	40.09	<DL	<DL	<DL	0.00
sand + glucose 1	<DL	0.0000	<DL	0.00	27.8	39.99	<DL	<DL	<DL	0.00
sand + glucose 2	<DL	0.0000	<DL	0.00	27.8	39.99	<DL	<DL	<DL	0.00
sand + glucose 3	<DL	0.0000	<DL	0.00	27.2	40.07	<DL	<DL	<DL	0.00
sand + glucose 4	<DL	0.0000	<DL	0.00	29.0	39.83	<DL	<DL	<DL	0.00
sand + glucose 5	<DL	0.0000	<DL	0.00	29.5	39.76	<DL	<DL	<DL	0.00
sand + glucose 6	<DL	0.0000	<DL	0.00	30.7	39.60	<DL	<DL	<DL	0.00
bridgesoil 1	<DL	0.0000	<DL	0.00	25.5	40.29	<DL	<DL	<DL	0.00
bridgesoil 2	<DL	0.0000	<DL	0.00	25.5	40.29	<DL	<DL	<DL	0.00
bridgesoil 3	<DL	0.0000	<DL	0.00	25.5	40.29	<DL	<DL	<DL	0.00
river sand 1	15	0.9015	11.15	9.90	27.0	40.09	0.07	0.05	0.05	0.05
river sand 2	<DL	0.0000	<DL	0.00	27.1	40.08	<DL	<DL	<DL	0.00
river sand 3	19	0.9534	<DL	0.00	27.1	40.08	0.09	<DL	<DL	0.00
N <sub>2</sub> O production										
Sample	ppm/d	r2	mean	SD	T [°C]	F	weighed mass [g]	mmol kg <sup>-1</sup> d	mean	SD
blank 1	<DL	0.7005	<DL	<DL	4		-			
blank 2	<DL	0.0001	<DL	<DL			-			
blank 3	<DL	0.2190	<DL	<DL			-			
Clay 1	-16.59	0.4026	<DL	<DL	13	26.1	40.21	24.474	-0.04	<DL
Clay 2	<DL	0.8740	<DL	<DL		25.6	40.28	29.490	<DL	<DL
Clay 3	-13.23	0.2787	<DL	<DL		25.7	40.27	22.853	-0.04	<DL
river mud 1	<DL	0.6259	<DL	<DL	3	26.5	40.16	30.248	<DL	<DL
river mud 2	<DL	0.0000	<DL	<DL		26.6	40.15	23.580	<DL	<DL
river mud 3	<DL	0.0040	<DL	<DL		27.0	40.09	25.950	<DL	<DL
sand + glucose 1	<DL	0.5827	<DL	<DL	4	24.3	40.46	23.580	<DL	<DL
sand + glucose 2	<DL	0.0992	<DL	<DL		24.7	40.40	22.250	<DL	<DL
sand + glucose 3	<DL	0.1087	<DL	<DL		25.5	40.29	22.210	<DL	<DL
bridgesoil 1	<DL	0.2528	<DL	<DL	3	25.5	40.29	24.390	<DL	<DL
bridgesoil 2	<DL	0.1147	<DL	<DL		25.5	40.29	23.110	<DL	<DL
bridgesoil 3	<DL	0.5713	<DL	<DL		25.5	40.29	24.840	<DL	<DL
river sand 1	<DL	0.7064	<DL	<DL	3	26.3	40.19	22.500	<DL	<DL
river sand 2	10.94	0.8652	<DL	<DL		26.4	40.17	26.000	0.03	<DL
river sand 3	<DL	0.3836	<DL	<DL		26.9	40.11	25.220	<DL	<DL
putty 1	<DL	0.1813	<DL	<DL	3	26.3	40.19	15.770	<DL	<DL
putty 2	<DL	0.0872	<DL	<DL		26.3	40.19	24.350	<DL	<DL
putty 3	<DL	0.1207	<DL	<DL		26.3	40.19	23.410	<DL	<DL
Field measurements										
site	Sample	rr	ppm/d flux	mean	SD	T [°C]	F	mmol/sq/d flux	mean	SD
bridgesoil site	clay 1	0.9782	28.63	24.88	3.87	26.5	26.5	40.16	0.13	0.12
	clay 2	0.9384	25.13			26.5	26.5	40.16	0.12	
	clay 3	0.9449	20.89			26.5	26.5	40.16	0.10	
	bridgesoil 1	0.9702	26.72	26.59	0.25	26.5	26.5	40.16	0.12	0.12
	bridgesoil 2	0.9814	26.76			26.5	26.5	40.16	0.12	
	bridgesoil 3	0.9271	26.30			26.5	26.5	40.16	0.12	
river sand site	clay 1	0.3017	>DL	>DL	3.64	16.0	16.0	41.62	>DL	>DL
	clay 2	0.1117	>DL			16.0	16.0	41.62	>DL	
	clay 3	0.0124	>DL			16.0	16.0	41.62	>DL	
	river sand 1	0.2410	>DL	>DL	1.15	16.0	16.0	41.62	>DL	>DL
	river sand 2	0.1858	>DL			16.0	16.0	41.62	>DL	
	river sand 3	0.0531	>DL			16.0	16.0	41.62	>DL	
reservoir site	clay 1	0.0027	>DL	>DL	1.55	26.5	26.5	40.16	>DL	>DL
	clay 2	0.3650	>DL			27.0	27.0	40.09	>DL	
	clay 3	0.3697	>DL			30.0	30.0	39.70	>DL	
	clay 4	0.2675	>DL			30.0	30.0	39.70	>DL	
	bank mud 1	0.8158	19.57	20.16	9.69	29.0	29.0	39.83	0.09	0.09
	bank mud 2	0.9834	32.90			30.0	30.0	39.70	0.15	
	bank mud 3	0.9271	18.85			31.0	31.0	39.57	0.09	
	bank mud 4	0.4800	9.32			29.0	29.0	39.83	0.04	