Table S1. Coordinates, age, water depth (m), sediment depth (cm), sediment accumulation rate (SAR; cm yr^{-1}), organic carbon (OC) burial rate (g C m^{-2} yr^{-1}) of the sampled cores during the rising and falling water period.

Water Period	Core	Latitude	Longitude	Age (years)	Water Depth (m)	Sediment depth (cm)	SAR (cm y^{-1})	OC Burial rate (gC m^{-2} y^{-1})
Rising (R)	R01	-2.945	-54.483	39.1	7.5	40	1.0	158.3
Rising (R)	R02	-2.945	-54.483	39.1	6.5	22	0.6	85.1
Rising (R)	R03	-2.959	-54.481	39.1	3.6	23	0.6	89.1
Rising (R)	R04	-2.959	-54.480	39.1	2.5	3	0.1	7.8
Rising (R)	R05	-2.968	-54.473	39.1	5.2	33	0.8	129.8
Rising (R)	R06	-2.841	-54.321	39.1	8.5	11	0.3	40.3
Rising (R)	R07	-2.975	-54.474	39.1	2.3	23	0.6	89.1
Rising (R)	R08	-2.858	-54.334	39.1	6.2	40	1.0	158.3
Rising (R)	R09	-2.858	-54.334	39.1	6.2	20	0.5	76.9
Rising (R)	R10	-2.820	-54.304	39.1		28	0.7	109.5
Rising (R)	R11	-2.820	-54.304	39.1		30	0.8	117.6
Rising (R)	R12	-2.865	-54.357	39.1	5.7	9	0.2	32.2
Rising (R)	R13	-2.865	-54.357	39.1	5.7	17	0.4	64.7
Rising (R)	R14	-3.010	-54.457	39.1	2.3	10	0.3	36.3
Rising (R)	R15	-2.900	-54.410	39.1	2.9	22	0.6	85.1
Rising (R)	R16	-2.900	-54.410	39.1	2.9	23	0.6	89.1
Rising (R)	R17	-2.914	-54.467	39.1	6.2	26	0.7	101.3
Rising (R)	R18	-2.937	-54.492	39.1	6.2	15	0.4	56.6
Rising (R)	R19	-2.937	-54.492	39.1	11.5	39	1.0	154.2
Rising (R)	R20	-2.937	-54.494	39.1	6.3	3	0.1	7.8
Rising (R)	R21	-2.937	-54.492	39.1	11.2	52	1.3	207.1
Rising (R)	R22	-3.114	-54.452	39.1	7.4	15	0.4	56.6
Rising (R)	R23	-2.928	-54.488	39.1	8	40	1.0	158.3
Rising (R)	R24	-2.922	-54.480	39.1	4.7	28	0.7	109.5
Rising (R)	R25	-2.972	-54.467	39.1	4.8	24	0.6	93.2
Rising (R)	R26	-2.995	-54.585	39.1	2.3	35	0.9	137.9
Rising (R)	R27	-2.975	-54.475	39.1	3.7	22	0.6	85.1
Rising (R)	R28	-2.989	-54.574	39.1	1.7	0	0.0	0.0
Rising (R)	R29	-2.980	-54.565	39.1	2.3	20	0.5	76.9
Rising (R)	R30	-2.964	-54.477	39.1	3.6	29	0.7	113.5
Rising (R)	R31	-2.952	-54.596	39.1	2.3	24	0.6	93.2
Rising (R)	R32	-2.952	-54.610	39.1	1.4	35	0.9	137.9
Rising (R)	R33	-2.981	-54.472	39.1	4.5	18	0.5	68.8
Rising (R)	R34	-2.954	-54.583	39.1	2.1	0	0.0	0.0
Rising (R)	R35	-2.958	-54.582	39.1	3.1	51	1.3	203.0
Rising (R)	R36	-2.958	-54.569	39.1	3	6	0.2	20.0
Rising (R)	R37	-2.991	-54.465	39.1	3.8	0	0.0	0.0
Rising (R)	R38	-2.997	-54.464	39.1	2.5	36	0.9	142.0
Rising (R)	R39	-3.002	-54.596	39.1	1.5	7	0.2	24.0
Rising (R)	R40	-3.004	-54.461	39.1	1.2	9	0.2	32.2
Rising (R)	R41	-3.031	-54.459	39.1	1.1	19	0.5	72.9
Rising (R)	R42	-3.040	-54.461	39.1	5.3	37	0.9	146.1
Rising (R)	R43	-3.049	-54.457	39.1	2	21	0.5	81.0

Table S2. Coordinates, age, water depth (m), sediment depth (cm), sediment accumulation rate (SAR; cm yr^{-1}), organic carbon (OC) burial rate (g C m^{-2} yr^{-1}) of the sampled cores during the rising and falling water period.

Water Period	Core	Latitude	Longitude	Age (years)	Water Depth (m)	Sediment depth (cm)	SAR (cm y^{-1})	OC Burial rate (gC m^{-2} y^{-1})
Rising (R)	R44	-3.066	-54.459	39.1	5.4	45	1.2	178.6
Rising (R)	R45	-3.070	-54.463	39.1	4	1	0.0	0.0
Rising (R)	R46	-3.083	-54.452	39.1	1.8	3	0.1	7.8
Rising (R)	R47	-3.093	-54.455	39.1	3.3	54	1.4	215.2
Rising (R)	R48	-3.093	-54.455	39.1	3.1	6	0.2	20.0
Rising (R)	R49	-2.974	-54.471	39.1	1.6	0	0.0	0.0
Rising (R)	R50	-2.981	-54.477	39.1	3.6	20	0.5	76.9
Rising (R)	R51	-2.952	-54.596	39.1	2.3	35	0.9	137.9
Rising (R)	R52	-2.956	-54.593	39.1	1.6	4	0.1	11.8
Falling (F)	F03	-2.818	-54.303	40.7	10	41	1.0	155.8
Falling (F)	F05	-2.823	-54.307	40.7	9	43	1.1	163.6
Falling (F)	F06	-2.830	-54.294	40.7	6.3	31	0.8	116.7
Falling (F)	F08	-2.826	-54.310	40.7	9.8	44	1.1	167.5
Falling (F)	F09	-2.831	-54.314	40.7	10.5	28	0.7	105.0
Falling (F)	F10	-2.836	-54.323	40.7	9.5	22	0.5	81.5
Falling (F)	F11	-2.848	-54.319	40.7	7.1	39	1.0	148.0
Falling (F)	F12	-2.848	-54.318	40.7	11.4	42	1.0	159.7
Falling (F)	F13	-2.849	-54.319	40.7	3.8	31	0.8	116.7
Falling (F)	F14	-2.856	-54.329	40.7	8.5	33	0.8	124.5
Falling (F)	F15	-2.854	-54.342	40.7	9.4	30	0.7	112.8
Falling (F)	F16	-2.868	-54.356	40.7	8.4	34	0.8	128.4
Falling (F)	F17	-2.860	-54.372	40.7	8.4	61	1.5	233.9
Falling (F)	F18	-2.860	-54.373	40.7	13.1	0.00	0.0	0.0
Falling (F)	F19	-2.880	-54.389	40.7	12.9	0.00	0.0	0.0
Falling (F)	F20	-2.882	-54.384	40.7	7.6	0.00	0.0	0.0
Falling (F)	F21	-2.882	-54.390	40.7	7.6	0.00	0.0	0.0
Falling (F)	F22	-2.882	-54.390	40.7	7.8	22	0.5	81.5
Falling (F)	F23	-2.883	-54.407	40.7	8	24	0.6	89.4
Falling (F)	F24	-2.900	-54.411	40.7	5.2	21	0.5	77.6
Falling (F)	F25	-2.899	-54.429	40.7	7.2	39	1.0	148.0
Falling (F)	F26	-2.900	-54.450	40.7	7.2	36	0.9	136.2
Falling (F)	F27	-2.915	-54.467	40.7	9.2	25	0.6	93.3
Falling (F)	F28	-3.114	-54.453	40.7	15.4	0	0.0	0.0
Falling (F)	F29	-3.102	-54.455	40.7	3.9	70	1.7	269.1
Falling (F)	F30	-3.086	-54.447	40.7	6	20	0.5	73.7
Falling (F)	F31	-3.068	-54.457	40.7	4.6	18	0.4	65.9
Falling (F)	F33	-3.052	-54.456	40.7	6.6	61	1.5	233.9
Falling (F)	F34	-3.020	-54.453	40.7	4.6	20	0.5	73.7
Falling (F)	F35	-3.020	-54.452	40.7	11.3	28	0.7	105.0
Falling (F)	F36	-2.966	-54.474	40.7	5.2	23	0.6	85.4
Falling (F)	F37	-2.937	-54.492	40.7	12.7	46	1.1	175.3
Falling (F)	F38	-2.955	-54.644	40.7	3.2	0	0.0	0.0
Falling (F)	F39	-2.950	-54.634	40.7	2.6	38	0.9	144.1

Table S3. Coordinates, age, water depth (m), sediment depth (cm), sediment accumulation rate (SAR; cm yr^{-1}), organic carbon (OC) burial rate (g C m^{-2} yr^{-1}) of the sampled cores during the rising and falling water period.

Water Period	Core	Latitude	Longitude	Age (years)	Water Depth (m)	Sediment depth (cm)	SAR (cm y^{-1})	OC Burial rate (gC m^{-2} y^{-1})
Falling (F)	F40	-2.952	-54.617	40.7	1.6	12	0.3	42.5
Falling (F)	F41	-2.949	-54.608	40.7	2.3	0	0.0	0.0
Falling (F)	F42	-2.952	-54.596	40.7	4.1	43	1.1	163.6
Falling (F)	F43	-2.955	-54.586	40.7	7	29	0.7	108.9
Falling (F)	F44	-2.956	-54.568	40.7	7.5	18	0.4	65.9
Falling (F)	F45	-2.955	-54.562	40.7	6.4	20	0.5	73.7
Falling (F)	F46	-2.960	-54.549	40.7	8	22	0.5	81.5
Falling (F)	F47	-2.956	-54.538	40.7	7.9	12	0.3	42.5
Falling (F)	F48	-2.956	-54.538	40.7	7.9	39	1.0	148.0
Falling (F)	F49	-2.964	-54.521	40.7	7	5	0.1	15.1
Falling (F)	F50	-2.957	-54.504	40.7	8	18	0.4	65.9
Falling (F)	F52	-3.034	-54.619	40.7	1	13	0.3	46.4
Falling (F)	F53	-3.019	-54.610	40.7	5.9	11	0.3	38.6
Falling (F)	F54	-3.019	-54.610	40.7	1.9	0	0.0	0.0
Falling (F)	F55	-3.016	-54.611	40.7	1.7	8.5	0.2	28.8
Falling (F)	F56	-3.000	-54.606	40.7	2.2	24	0.6	89.4
Falling (F)	F57	-3.002	-54.596	40.7	2.7	23	0.6	85.4
Falling (F)	F58	-2.995	-54.579	40.7	3.6	9	0.2	30.7
Falling (F)	F59	-2.988	-54.568	40.7	4.2	19	0.5	69.8
Falling (F)	F60	-2.974	-54.554	40.7	6.2	39	1.0	148.0
Falling (F)	F61	-2.965	-54.544	40.7	7.2	30	0.7	112.8
Falling (F)	F62	-2.932	-54.482	40.7	5.5	33	0.8	124.5
Falling (F)	F63	-2.917	-54.477	40.7	5.4	29	0.7	108.9
Falling (F)	F64	-2.857	-54.319	40.7	9	55	1.4	210.5
Falling (F)	F65	-2.860	-54.354	40.7	5.7	27	0.7	101.1
Falling (F)	F66	-2.870	-54.381	40.7	6.4	32	0.8	120.6
Falling (F)	F67	-2.911	-54.432	40.7	5.8	32	0.8	120.6
Falling (F)	F68	-2.908	-54.458	40.7	8.9	19	0.5	69.8

Table S4. Composition of N (%) and C (%) and C:N ratio in the surface layers of the sediment cores during the rising water period.

Core	N (%)	C (%)	C: N ratio
R05	0.08	1.23	17.0
R08	0.85	8.14	11.2
R10	0.83	7.33	10.3
R12	0.71	6.79	11.2
R15	0.82	7.51	10.7
R17	0.68	6.41	10.9
R19	0.46	4.45	11.3
R22	0.20	2.56	15.0
R23	0.32	3.39	12.3
R25	0.28	3.33	13.8
R26	0.43	4.13	11.1
R29	0.67	5.99	10.4
R31	0.68	8.53	14.6
R33	0.11	1.48	15.5
R36	0.79	8.44	12.4
R38	0.25	3.57	16.6
R40	0.52	6.40	14.3
R42	0.55	6.64	14.0
R44	0.56	6.40	13.2

Table S5. Land cover in Curuá-Una reservoir per sub-basin and a total percentage of forest, managed areas and water classes.

Basin	Forest (%)	Managed area (%)	Water (%)	Area (km^2)
1	76.7	11.7	14.6	83
2	96.4	3.6	0.0	283
3	82.6	14.8	5.5	245
4	97.8	2.2	0.0	297
5	60.6	40.9	0.0	300
6	96.1	3.9	0.1	6966
7	98.1	1.9	0.2	331
8	98.6	1.4	0.1	2855
9	65.9	34.2	0.0	2111
Total	**90.8**	**8.9**	**0.3**	**13471**

Table S6. Number of samples above the saturation line in the pore water CH_4 profiles.

Season	Core	N	N above saturation	% above saturation
Falling	F05	12	0	0.0
	F06	27	4	14.8
	F24	12	0	0.0
	F29	28	10	35.7
	F33	24	10	41.7
	F37	20	4	20.0
	F42	22	7	31.8
	F48	21	8	38.1
	F57	11	1	9.1
Rising	R06	8	1	12.5
	R09	12	5	41.7
	R11	12	4	33.3
	R13	9	0	0.0
	R16	10	1	10.0
	R18	8	1	12.5
	R21	16	6	37.5
	R24	17	11	64.7
	R27	21	16	76.2
	R30	11	2	18.2
	R32	11	4	36.4
	R34	10	2	20.0
	R37	18	2	11.1
	R39	7	1	14.3
	R41	22	5	22.7
	R45	17	6	35.3

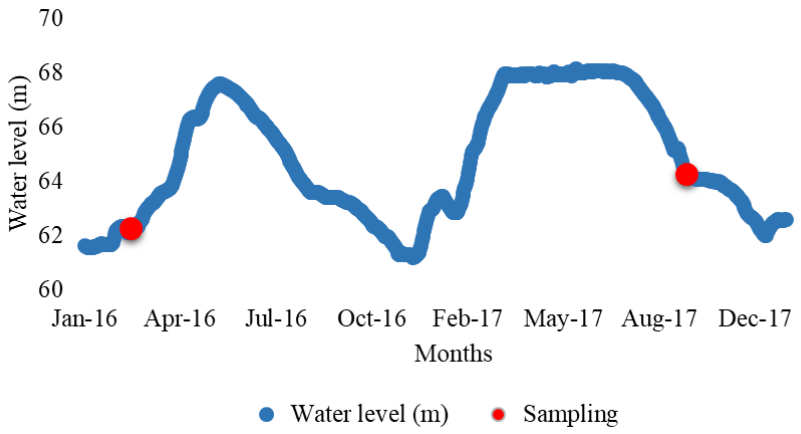

Figure S1. Water level of Curuá-Una reservoir in 2016 and 2017. Red points represent the sampling campaigns.

Figure S2. Pictures with sediment cores of Curuá-Una reservoir showing the transition zone between pre-flooded (gray color) and post-flooding (brown color) sediment.

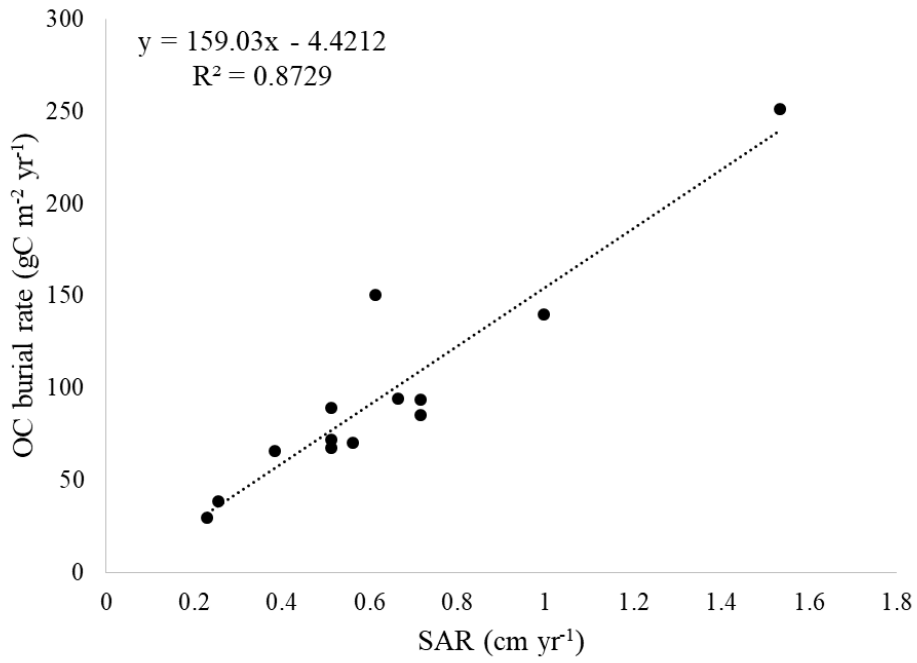

Figure S3. Regression model of sediment accumulation rate (SAR; cm yr^{-1}) and OC burial rate (g C m^{-2} yr^{-1}).

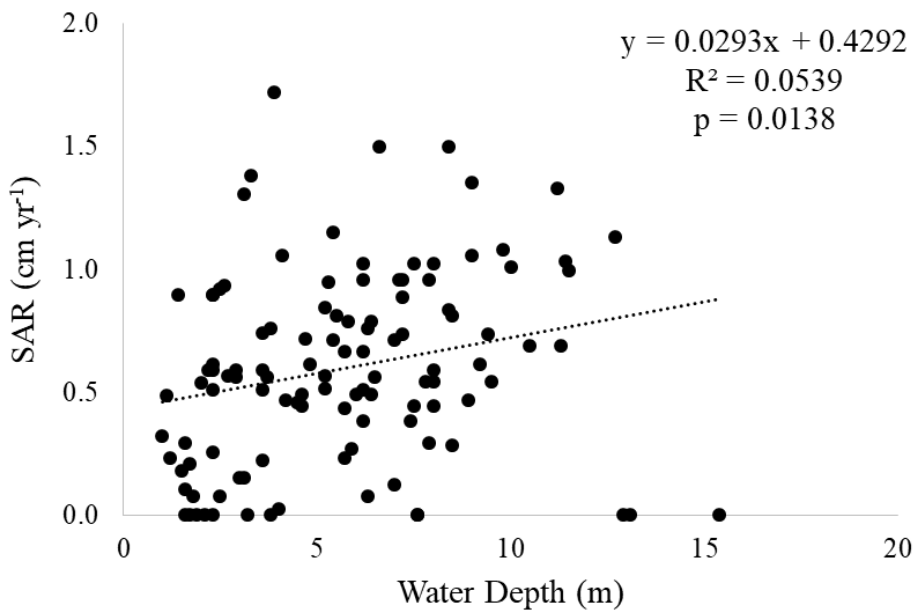

Figure S4. Regression model of sediment accumulation rate (SAR; cm yr^{-1}) and water depth (m).

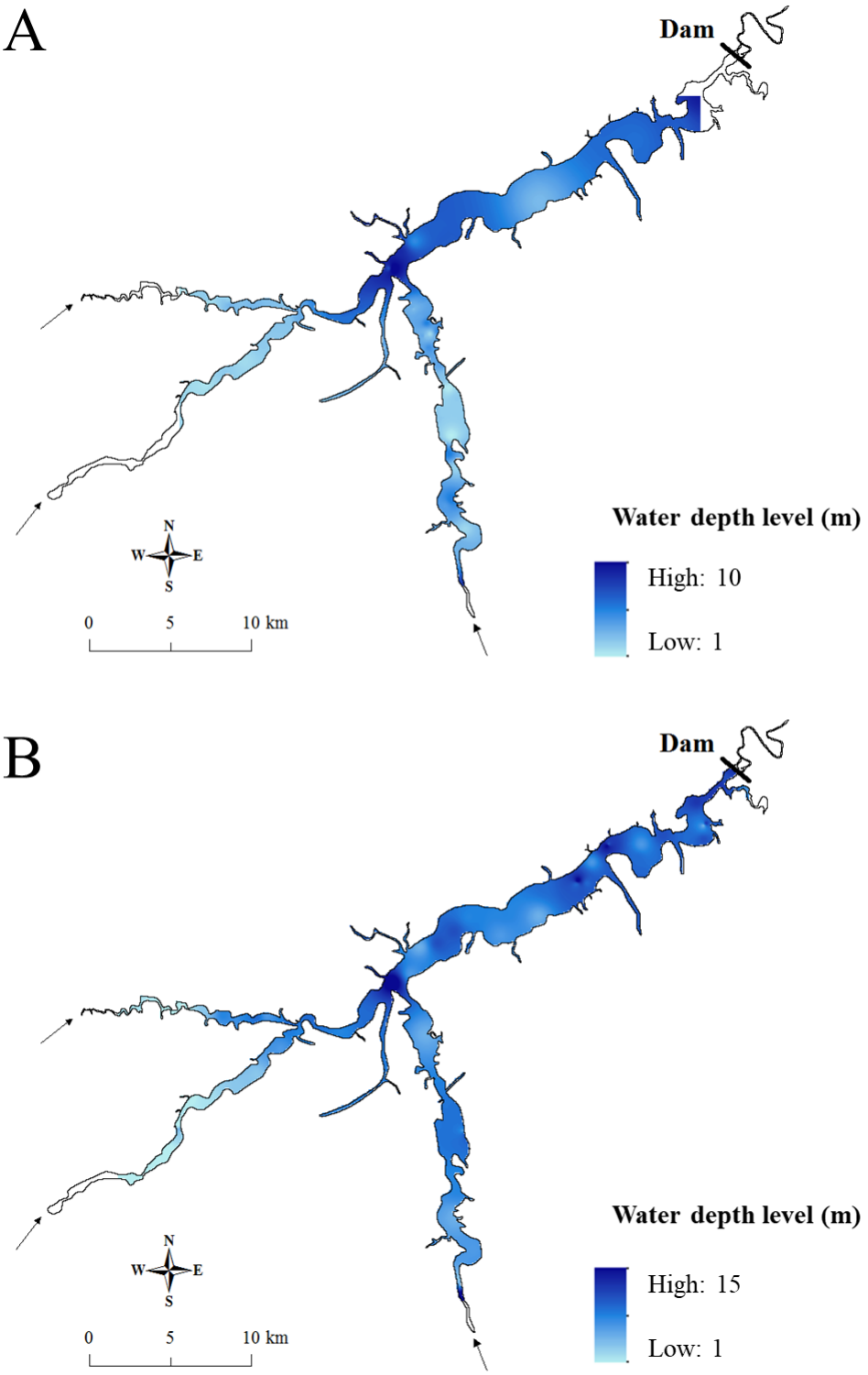

Figure S5. Bathymetric map (m) of CUN during rising (A) and falling (B) periods.

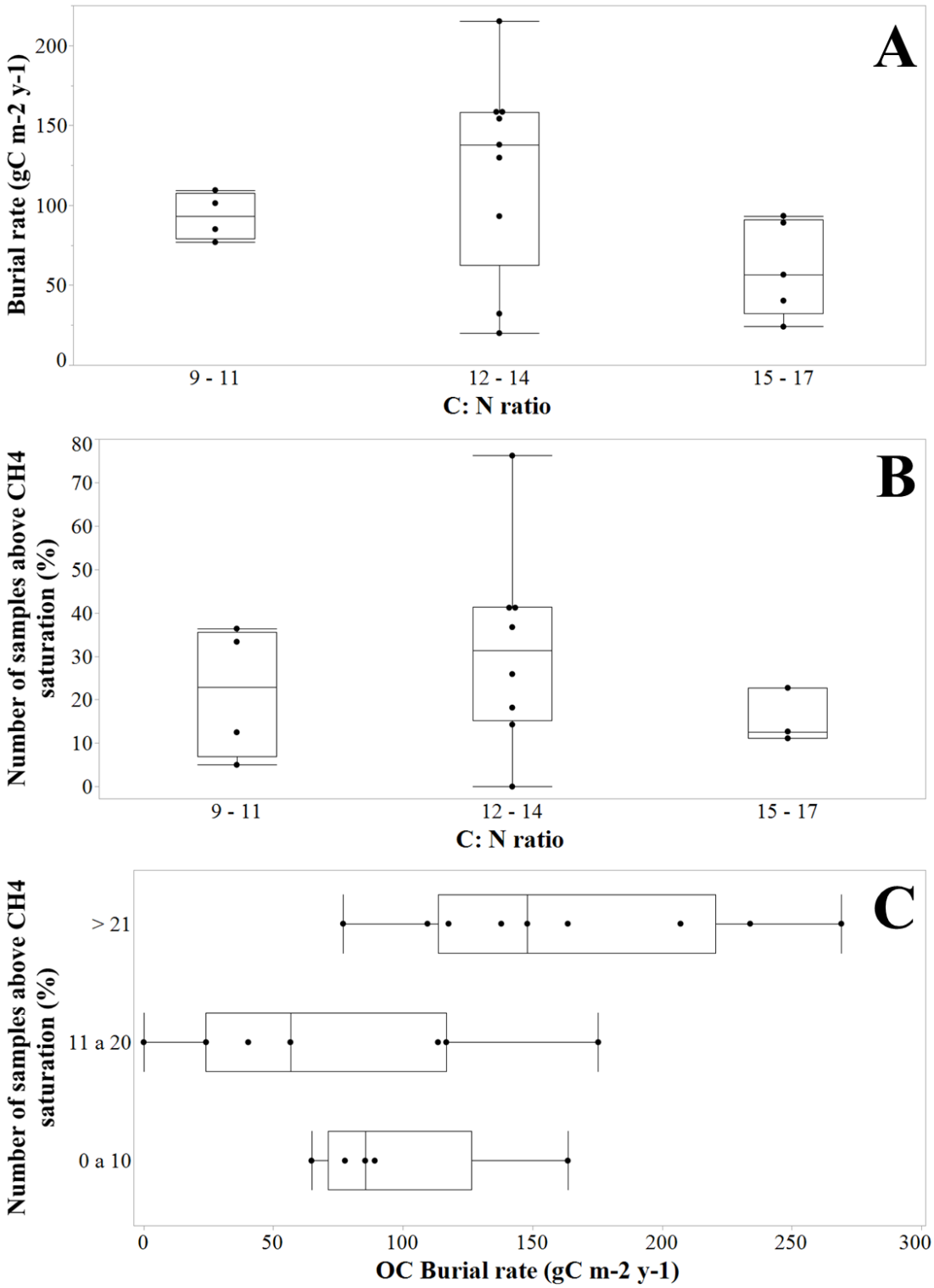

Figure S6. Boxplots of (A) C:N ratio and OC burial rate and; (B) C:N ratio and percentage of sediment layers with CH_4 concentration >80% saturation; and (C) percentage of sediment layers with CH_4 concentration >80% saturation and OC burial rate.

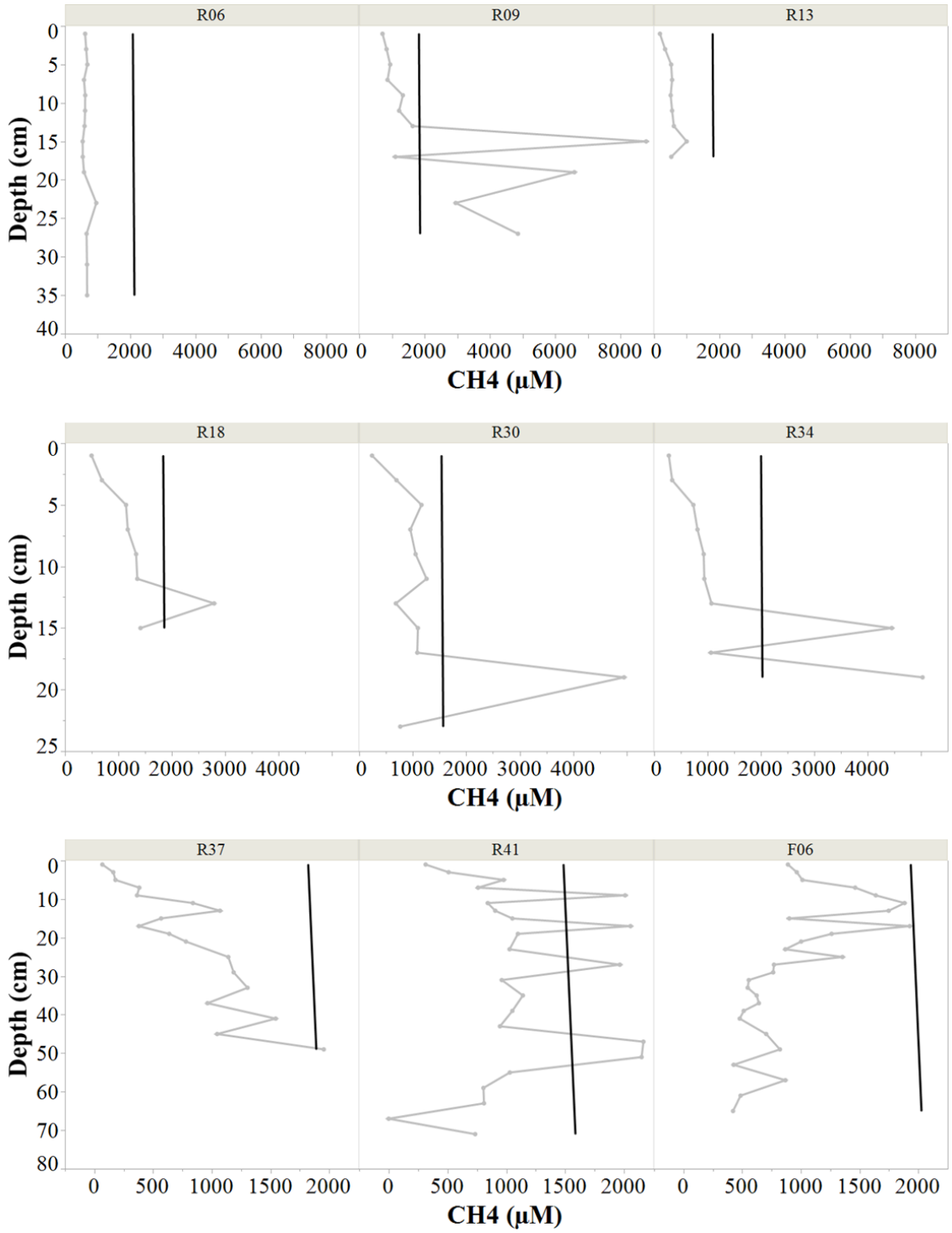

Figure S7. Pore water CH_4 profiles from rising and falling water periods. Black lines represent the CH_4 saturation line (µM) and grey lines represent the measured CH_4 concentration (µM).