1 Table. S1: List of reservoirs, elevation and corresponding weather stations and distance

2 between reservoir and weather station.

reservoir name	Lat	Long	elevation (m a.sl)	weather station	distance (km)
Carlsfeld	50.425	12.596	902.62	Carlsfeld	1
Cranzahl	50.507	13	714.17	Marienberg	19
Deesbach (Leibis-Lichte)	50.576	11.17	461.07	Neuhaus am Rennweg	9
Dreilägerbach	50.66	6.208	391.5	Kall-Sistig	29
Droeda	50.399	12.059	432.94	Hof	15
Ecker	51.84	10.58	557.95	Wernigerode	13
Eibenstock	50.53	12.6	536.66	Carlsfeld	11
Erletor	50.58	10.75	525.6	Meiningen	26
Falkenstein	50.468	12.378	560	Carlsfeld	17
Gottleuba	50.838	13.93	420.75	Lichtenhain-Mittelndorf	23
Kall	50.644	6.311	420.77	Kall-Sistig	29
Kleine Kinzig	48.4	8.366	605.8	Freudenstadt	7
Kleine Kinzig pre-dam	48.4	8.366	605.8	Freudenstadt	7
Lehnmuehle	50.836	13.59	517.96	Zinnwald-Georgenfeld	16
Lichtenberg	50.81	13.45	490.58	Zinnwald-Georgenfeld	23
Malter	50.927	13.656	326.5	Zinnwald-Georgenfeld	23
Muldenberg	50.41	12.4	712.4	Carlsfeld	15
Muldenberg Rote Mulde pre dam	50.41	12.4	712.4	Carlsfeld	15
Muldenberg Weiße Mulde	50.41	12.4	712.4	Carlsfeld	15

pre dam					
Neunzehnhain	50.71	13.15	525.05	Marienberg	7
Neustadt	51.578	10.864	445.98	Wernigerode	31
Ohra	50.765	10.72	525	Schmücke	14
Pirk	50.427	12.097	383.5	Plauen	7
Poehl	50.55	12.18	372.5	Plauen	8
Rappbode pre dam	51.42	10.47	432	Wernigerode	14
Hassel pre dam	51.42	10.49	432	Wernigerode	14
Königshütte pre dam	51.44	10.47	423	Wernigerode	12
Rauschenbach	50.69	13.498	593.78	Zinnwald-Georgenfeld	18
Riveris	49.707	6.76	319	Trier-Petrisberg	9
Rurtalsperre Schwammenauel	50.637	6.442	281.5	Kall-Sistig	16
Saidenbach	50.73	13.2189	436.67	Marienberg	10
Scheibe-Alsbach	50.488	11.08	662.34	Neuhaus am Rennweg	4
Söse pre-dam	51.746	10.352	333	Braunlage	18
Sösestausee	51.738	10.31	326.5	Braunlage	20
Sosa	50.49	12.64	636.97	Carlsfeld	7
Stollberg	50.715	12.8	443.37	Chemnitz	10
Wahnbach	50.805	7.284	124.1	Köln-Bonn	11
Wahnbach pre dam	50.805	7.284	124.1	Köln-Bonn	11
Werda	50.4496	12.305	591.49	Plauen	13

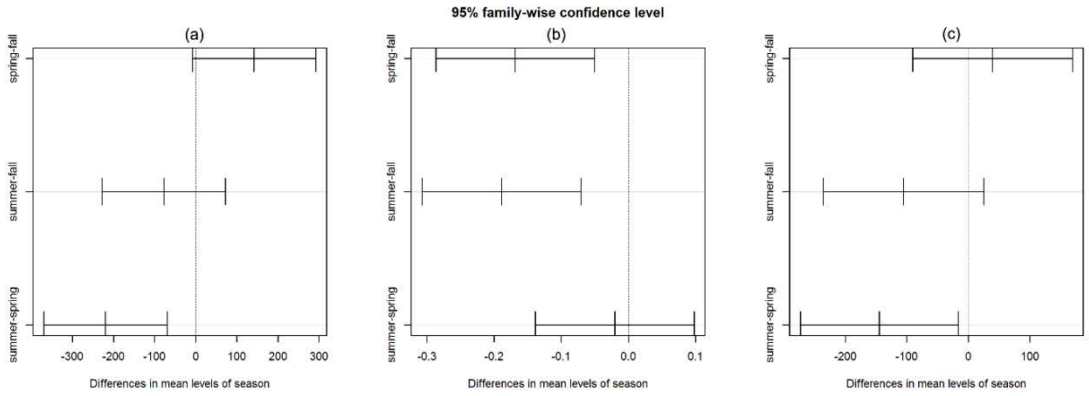

Figure S1: Tukey Honest Significant Differences for the seasonal fluctuation of CO_2 concentration (a), K (b), and CO_2 flux (c).

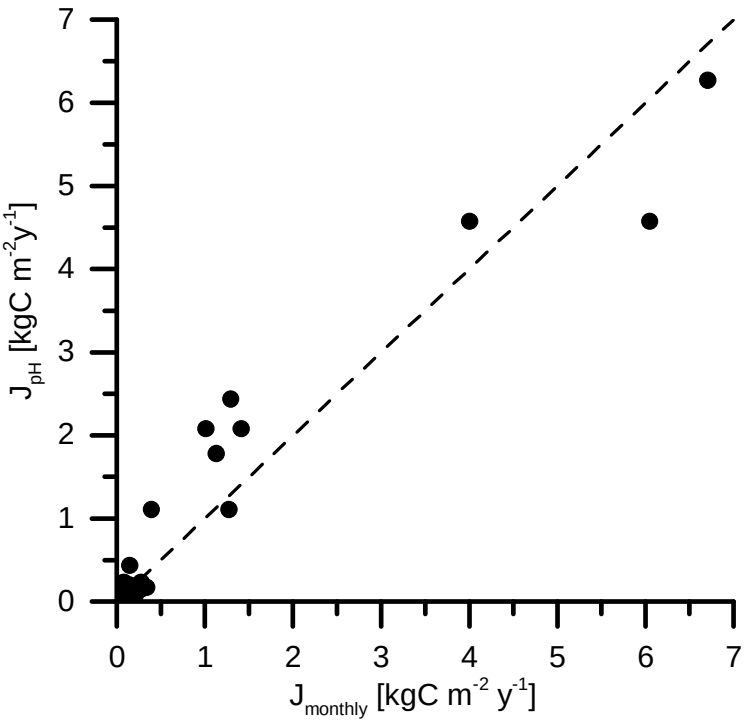

Figure S2: CO_2 flux from reservoirs calculated from pH compared with the flux calculated from monthly CO_2 and K.

Table. S2: Mean and median data for the different reservoirs. Reservoirs have been made anonymous because of legal requirements.

reservoir number	Mean CO_2 water (µmol l^{-1})	MedianCO_2 water (µmol l^{-1})	K (m/day)	Mean flux Monthly (g C $m^{-2}yr^{-1}$)	Median flux Monthly (g C $m^{-2}yr^{-1}$)	Mean flux Hourly (g C $m^{-2}yr^{-1}$)	Median flux Hourly (g C $m^{-2}yr^{-1}$)	DOC (mg l^{-1})	TIC (mg l^{-1})	pH	Mean Total Alkalinity (eq l^{-1})	Median Total Alkalinity (eq l^{-1})	flux/reservoir (t y^{-1})	CO2 content reservoir (t)	TIC content reservoir (t)	Flux calculated from pH (g C m^{-2} yr^{-1})
1	1758	1579	1.37	6936	6051	8921	7386	1.53		5.1	0.00005	0.00005	1259	21.4		4575
2	4062	2365	0.70	10209	6710	9052	5393	4.87		4.9	0.00005	0.00005	2535	86.1		6271
3	2694	1614	0.64	5525	4007	6763	3410	3.99		5.1	0.00006	0.00005	3137	111.8		4575
4	1211	1096	0.53	1773	1413	2795	2556			5.6	0.00009	0.00008	59			2081
5	1219	544	0.53	1905	1272	2889	1927			6.0	0.00012	0.00011	35			1109
6	1006	772	0.56	1693	1293	2345	1799	3.30		5.5	0.00007	0.00006	238	11.1		2435
7	894	497	0.70	1659	1012	2516	1538	1.81		5.6	0.00006	0.00006	605	35.4		2081
8	603	557	0.57	1188	1129	1363	1121	6.15	0.39	5.7	0.00008	0.00008	760	88.7	5.2	1777
9	550	300	0.62	1059	393	1428	709	3.72		6.0	0.00009	0.00008	305	17.6		1109
10	99	77	1.03	274	280	325	352			7.0	0.00025	0.00022	218	12.3		232
11	74	47	2.02	439	213	379	267	3.63		7.7	0.00049	0.00045	224	5.0		79
12	71	59	1.99	350	273	385	250	3.36		7.0	0.00022	0.00018	288	10.8		232
13	118	119	0.66	213	201	240	237			7.4	0.00091	0.00088	24			125
14	61	44	1.79	218	151	293	212	3.22		7.3	0.00028	0.00027	286	11.6		146
15	66	66	1.96	340	340	194	194	1.97		7.2	0.00034	0.00034	1519	160.5		170
16	122	107	0.52	198	149	222	184	2.26		6.6	0.00013	0.00014	681	95.9		433
17	78	74	0.86	153	163	265	183	3.00	2.98	7.9	0.00041	0.00042	40	2.9	9.6	59
18	72	76	0.64	108	102	172	172			7.1	0.00023	0.00023	2			199
19	97	97	0.56	145	148	171	168	1.75	3.26	7.1	0.00037	0.00036	24			199
20	76	78	0.55	145	157	139	167	2.85	9.68	7.4	0.00063	0.00062	23	1.2	11.9	125
21	40	40	2.17	225	274	158	158	0.92		7.3	0.00024	0.00022	130	8.6		146
22	139	62	0.87	396	115	373	153	2.39	5.34	7.6	0.00056	0.00057	38	1.5	11.0	92
23	45	37	2.09	183	136	177	151	2.57		7.5	0.00036	0.00033	140	6.4		107
24	68	65	0.76	164	71	137	132			7.7	0.00066	0.00071	32	1.0		79
25	57	58	0.70	93	77	130	127			7.0	0.00019	0.00018	34	3.2		232
26	103	70	0.49	97	88	134	97	2.66		7.0	0.00021	0.00021	28	2.4		232
27	81	38	0.90	148	65	143	94	1.32	2.04	7.5	0.00024	0.00026	5	0.2	0.9	107
28	62	63	0.63	85	80	97	94			7.6	0.00087	0.00087	187	31.2		92
29	64	60	0.78	187	99	128	93			8.0	0.00082	0.00087	24	1.0		51
30	63	60	0.53	71	73	94	89	2.05	2.62	7.2	0.00030	0.00029	110	18.4	66.8	170
31	70	63	0.55	81	78	101	80	2.18		7.2	0.00024	0.00023	28	2.3		170
32	48	45	0.93	101	73	130	74		5.38	7.7	0.00048	0.00046	14	1.1	11.3	79
33	55	45	0.72	81	65	96	74			7.6	0.00057	0.00056	24	0.8		92
34	43	32	1.03	91	63	105	63	3.48		7.5	0.00035	0.00031	37	5.0		107
35	37	30	0.97	65	30	80	53		3.79	7.5	0.00035	0.00035	21	1.3	13.9	107
36	35	28	0.67	23	17	57	36	5.78		8.4	0.00107	0.00108	45	5.8		29
37	30	28	0.54	31	27	36	33	3.83		8.0	0.00048	0.00048	47	7.5		51
38	22	15	0.56	4	-3	17	16	6.00		8.7	0.00093	0.00093	62	11.2		19
39	26	21	0.57	22	0.4	31	14	5.34		8.7	0.00075	0.00075	21	2.1		19
Min	22	15	0.5	4	-3	17	14	0.92	0.39	4.90	5.0099E-05	0.00005	1.7	0.2	0.9	19.5
Max	4062	2365	2.17	10209	6710	9052	7386	6.15	9.68	8.70	0.001070077	0.00108	3137.2	160.5	66.8	6270.6
Median	72	63	0.70	183	148	172	167	3.00	3.26	7.30	0.000296104	0.000293	46.7	7.0	11.1	145.9
Mean	411	283	0.90	940	689	1105	766	3.18	3.94	7.05	0.000374332	0.000368821	340.7	23.0	16.3	769.1
SD	825	524	0.51	2080	1518	2252	1545	1.44	2.65	0.98	0.000280654	0.000285253	679.8	38.5	20.8	1442.4