

Table S5: Overview of TA, DIC,  $\delta^{13}\text{C}_{\text{DIC}}$ , major elements (Ca, Mg, DSi),  $\text{pCO}_2$ ,  $\text{CH}_4$  and  $\text{N}_2\text{O}$  concentrations,  $\text{CO}_2$  and  $\text{CH}_4$  fluxes and K600 for the different sampling sites during the wet season sampling campaign of 2013.

River	Station ID	TA [mmol L <sup>-1</sup> ]	DIC	$\delta^{13}\text{C}_{\text{DIC}}$ [‰]	Ca	Mg [μM]	DSi	$\text{pCO}_2$ [ppm]	$\text{CH}_4$ [nmol L <sup>-1</sup> ]	$\text{N}_2\text{O}$	$\text{CO}_2$ flux [mg C m <sup>-2</sup> d <sup>-1</sup> ]	$\text{CH}_4$ flux	K600 [cm h <sup>-1</sup> ]
<b>Zambezi mainstem</b>													
Zambezi River	ZBZ.1	0.212	0.820	-13.3	42	40	150	2005	612	7.0	645	9.2	0.9
Zambezi River	ZBZ.2	0.101	0.762	-13.0	27	13	82	2576	134	6.2	1202	1.1	1.2
Zambezi River	ZBZ.3	0.917		-11.4	255	149	185	2560	274	6.9	2278	8.3	2.3
Zambezi River	ZBZ.5	0.642		-6.1	172	91	224	10351	12127	3.5			
Zambezi River	ZBZ.6	0.653		-6.7	182	93	242	1555	299	6.3	278	2.4	0.5
Zambezi River	ZBZ.7	0.706		-7.4	190	100	240	4979	987	5.6	4672	19.6	2.2
Zambezi River	ZBZ.8	0.703		-6.4	194	105	242	1718	198	6.2	392	1.7	0.7
Zambezi River	ZBZ.11	0.811	0.878	-7.8	222	108	165	2207	165	8.0	1409	5.1	1.7
Zambezi River	ZBZ.13	1.132	1.170	-8.3	249	135	190	1447	186	6.2	1158	12.1	2.4
Zambezi River	ZBZ.15	1.216	1.236	-6.8	307	174	234	1272	332	7.5	1536	22.7	3.9
Zambezi River	ZBZ.17	1.332	1.412	-8.4				3615	928	6.9	5610	77.4	3.8
Zambezi River	ZBZ.18	1.638	1.969	-7.2	330	219	257	12199	1769	2.5	33292	154.3	6.1
Zambezi River	ZBZ.19	1.397	1.540	-7.5	322	190	263	4291	149	6.5	9179	3.6	5.1
Zambezi River	ZBZ.20	1.418	1.544	-7.5	331	197	262	4521	67	6.3			
<b>Tributaries</b>													
Kafue River	KAF.1	1.290	1.388	-9.0	436	294	194	4346	302	5.9			
Kafue River	KAF.2	1.157	1.221	-9.8	517	307	191	3093	217	6.9	1940	5.8	1.6
Kafue River	KAF.3	1.186	1.284	-10.8				3407	264	6.5	1950	7.7	1.4
Kafue River	KAF.4	1.197	1.370	-7.8	469	322	187	4136	456	5.6	1676	4.6	1.0
Kafue River	KAF.5	1.225	1.287	-8.7	424	260	196	2300	196	5.9	454	2.4	0.5
Kafue River	KAF.6	1.295	1.312	-7.5	449	294	190	1237	100	6.8	429	0.8	1.1
Kafue River	KAF.8	1.905	2.261	-8.6	559	349	364	11747	524	3.0	22799	76.6	4.4
Kafue River	KAF.9	1.942	2.239	-8.7	549	341	351	10915	550	3.7	12412	18.9	2.6
Kafue River	KAF.10	1.948	1.958	-7.9	565	345	351	1552	352	6.8	1178	17.4	2.3
Kabompo River	KAB.1	0.308	0.434	-10.6	74	39	221	1234	284	7.2			
Kabompo River	KAB.2	1.592	1.708	-10.1	454	270	269	2470	165	6.9			
Luangwa River	LUA.1			-9.6				1410	213	7.5			
Luangwa River	LUA.2	1.577	1.601	-10.7	345	219	258	1855	139	6.7	2641	9.2	4.0
Luangwa River	LUA.4	0.818	0.857	-10.3	196	100	244	1432	298	6.8	1601		3.4
Luangwa River	LUA.5	0.890	0.923	-9.6	222	108	212	1317	96	6.7	1501	6.5	3.6
Lunsewma River	LUNSE.1	0.783	0.845	-10.8	163	164	200	2493	725	6.8	4902	50.6	5.1
Lunsewma River	LUNSE.2	0.867	0.925	-9.8	192	136	225	2154	534	7.1	1100	10.0	1.4

Lunga River	LUN.1	1.477	1.556	-11.1	342	325	198	3284	445	6.6	2837	14.8	2.1
Lunga River	LUN.3	1.772	1.837	-9.7	531	288	208	2855	314	6.4	1691		1.5
Mazoe River	MAZ.	1.025	1.038	-9.4	240	149	306	955	152	6.7	157	3.1	0.6
Shire River	SH.	1.597	2.054	-6.8	324	213	235	14004	37807	1.9	25776	1170.7	4.1
<b>Reservoirs</b>													
Kariba	KAR.2	0.792		-1.9	211	106	166	275	35	6.5	-100	1.3	1.2
Kariba	KAR.3	0.813	0.803	-1.8	214	107	165	179	22	6.6	-84	0.1	0.8
Cabora Bassa	C.B.2	1.132	1.068	-3.0	305	165	172	151	24	6.6	-456	0.5	3.6
Cabora Bassa	C.B.3	1.141	1.062	-1.8	304	165	176	215	132	6.3	-235	2.4	2.4
Itezhi Tezhi	ITT.1	1.276	1.318	-7.1	434	272	206	2139	46	6.9	791	1.0	1.0
Itezhi Tezhi	ITT.2	1.262	1.292	-6.4	428	277	186	1397	22	6.4	1459	0.3	3.3
Itezhi Tezhi	ITT.3	1.503	1.503	-4.6	503	335	171	1127	50	6.3	1995	4.8	6.3