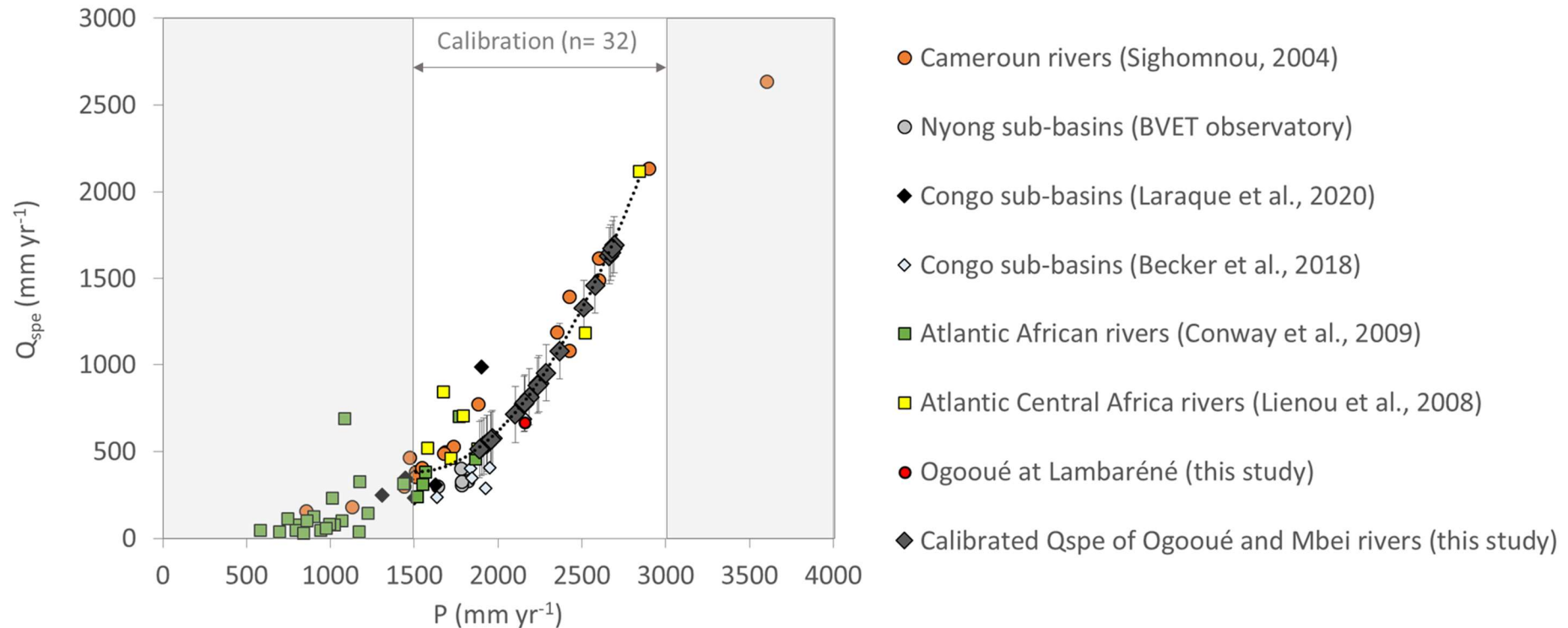


Supplementary Material

Supplementary table S1: Lithological composition for each sub-basin (source: lithological map of Gabon; Thiéblemont et al., 2009).

sample number	river	location	Sandstone	Non-calcareous Sedimentary	Limestone	Mafic and volcanic rocks	Granite and schist
1	Mbei tributary 1		0%	0%	0%	20%	80%
2	Mbei tributary 2	Akelayong	0%	0%	0%	0%	100%
3	Mwengue	Akoga	0%	0%	0%	8%	92%
4	Binguili	Assok	0%	0%	0%	0%	100%
18	Ogooué river	Dam Poubara 2	30%	2%	6%	4%	58%
17		Franceville	43%	9%	8%	3%	38%
20		Lastourville	29%	23%	9%	7%	33%
26		Ayem	8%	18%	4%	4%	66%
8		Ndjolé	9%	15%	4%	5%	68%
6		SEEG_bras_nord	7%	14%	7%	5%	68%
7	Abanga	Bel_Abanga	0%	6%	0%	9%	85%
9	Missanga	Ndjolé	0%	0%	0%	34%	66%
10	Okano	Alembé	0%	1%	0%	8%	91%
11	Lara	Mindzi	0%	0%	0%	0%	100%
12	Mvoug	Ovan	0%	0%	0%	2%	97%
13	Ivindo	Loaloa	0%	1%	2%	4%	93%
19	Leyou	Ndoubi	0%	6%	5%	28%	61%
21	Lolo	Lolo	0%	14%	2%	1%	84%
22	Ouagna	Wagny	0%	44%	3%	0%	54%
23	Offoué	Entrance Lopé park	0%	33%	1%	1%	64%
25	Lopé	Lopé	0%	11%	5%	0%	84%
14	Sébé	Okandja	45%	32%	12%	1%	10%
15	Lékoni	Akieni	96%	1%	2%	0%	0%
16	Passa	Franceville	70%	11%	5%	1%	12%



Supplementary Figure S2: Relationship between specific discharge (Q_{spe}) and rainfall (P) for various African rivers extracted from published data (table S1): Congo River (Becker et al., 2018; Laraque et al., 2020), Atlantic African rivers (Lienou et al., 2008; Conway et al., 2009), various rivers in Cameroon (Sighomnou, 2004), and Nyong River (BVET observatory database : <https://mtropics.obs-mip.fr/catalogue-m-tropics>). Note that the polynomial fit relationship between Q_{spe} and P is extracted for the P range 1500-3000 mm yr⁻¹ ($n=32$), which is representative of the precipitation rates measured in the Ogooué and Mbei basins ($P = 1890-2692$ mm yr⁻¹). The polynomial fit relationship used to estimate the Ogooué and Mbei Q_{spe} is: $Q_{spe} = 0.00090P^2 - 2.649P + 2304.03$ ($R = 0.95$, $p\text{-value} < 0.01$). The RMSE between predicted values and observed values of the 32 compiled basins is 161 mm yr⁻¹. We use this value as a measure of the uncertainty on the Q_{spe} estimates for the Ogooué-Mbei sub-basins of the present study. The data for the Ogooué at the Lambaréné gauging station is added for reference.

Supplementary Table S3: Annual specific discharge (Q_{spe}) and precipitation data used to calibrate the Q_{spe} vs. P relationship (Figure S1). The “*” symbol stands for data actually used for the calibration ($1500 \text{ mm yr}^{-1} < P < 3000 \text{ mm yr}^{-1}$). Note that when two publications report different Q_{spe} and P values for the same river, we used the more recent dataset. For the BVET basins (<https://mtropics.obs-mip.fr/catalogue-m-tropics>), we used the local rainfall record for the Nyong river at the Nsimi station (data available on the BVET website). For the other BVET basins, we used the same TRMM precipitation grid (1998-2015) as the one used for the Ogooué Basin in the present study (see section 3.5 for details).

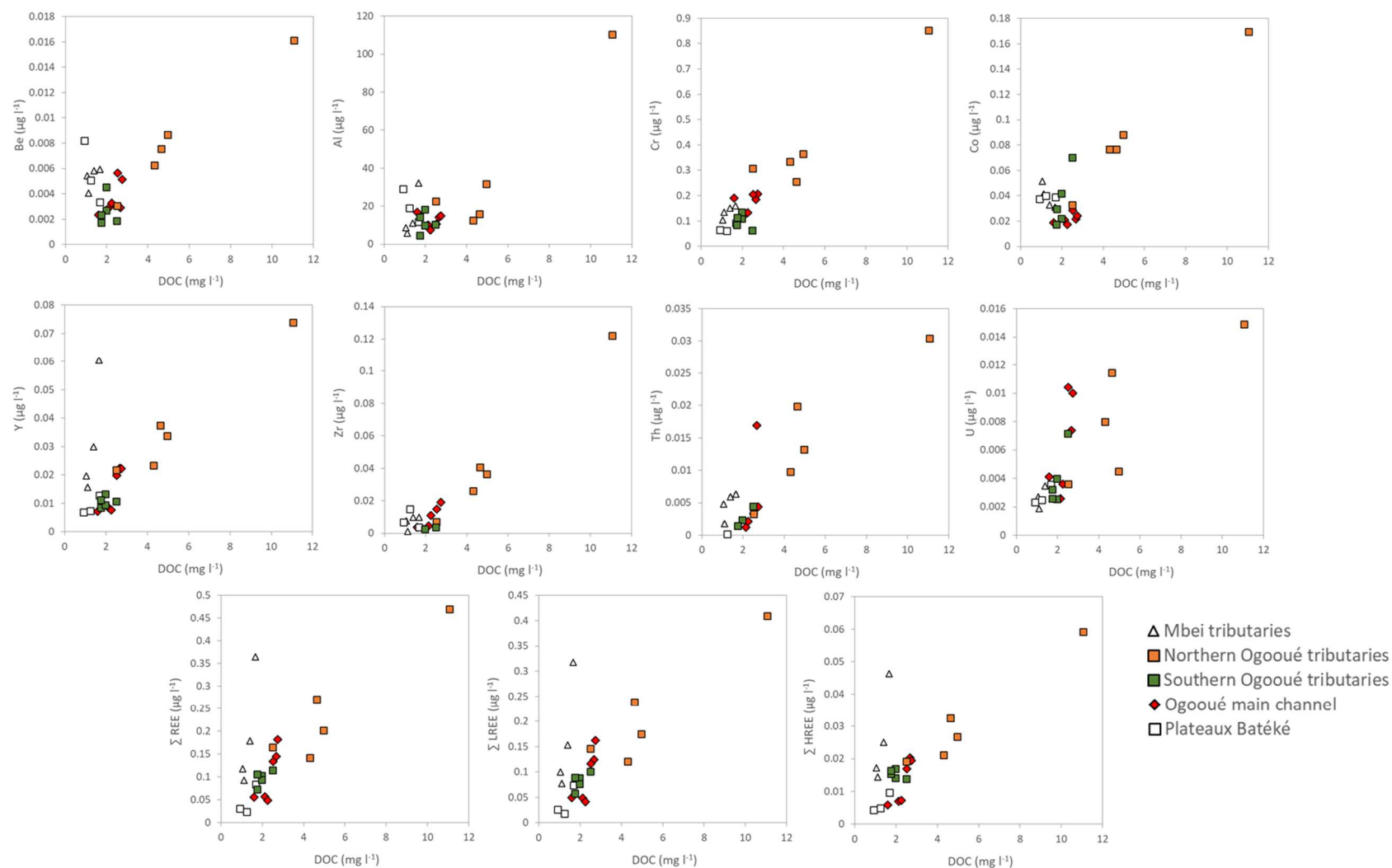
Region	River	station	Rainfall (P) mm yr ⁻¹	Specific discharge (Q_{spe}) mm yr ⁻¹	Included in the calibration	period	Reference
Cameroun rivers	Mungo	Mundame	2843	2121	included	1951-1984	Lienou et al., 2008
	Wouri	Yabassi	2519	1186	included	1951-1984	Lienou et al., 2008
	Ntem	Ngoazik	1718	462	included	1951-1986	Lienou et al., 2008
	Nyong	Dehane	1878	516	included	1951-1984	Lienou et al., 2008
	Cross	Mamfe	3600	2635	No, >3000 mm yr ⁻¹	1950-1980	Sighomnou, 2004
	Metchum	Gouri	2600	1492	included	1950-1980	Sighomnou, 2004
	Meme	Baï	2600	1617	included	1950-1980	Sighomnou, 2004
	Sanje	Idenau	5100	3891	No, >3000 mm yr ⁻¹	1950-1980	Sighomnou, 2004
	Mungo	Mudame	2900	2137	No, more recent value from Leniou et al. (2008) used instead	1950-1980	Sighomnou, 2004
	Wouri	Yabassi	2350	1189	No, more recent value from Leniou et al. (2008) used instead	1950-1980	Sighomnou, 2004
	Dibamba (estimations)		2660	1643	included	1950-1980	Sighomnou, 2004
	Sanaga	Edéa	1686	497	included	1950-1980	Sighomnou, 2004
	Nyong	Dehane	1732	528	No, more recent value from Leniou et al. (2008) used instead	1950-1980	Sighomnou, 2004
	Lokoundje Lolodorf		1880	773	included	1950-1980	Sighomnou, 2004
	Lobé	Kribi	2425	1398	included	1950-1980	Sighomnou, 2004
	Kienké	Kribi	2425	1081	included	1950-1980	Sighomnou, 2004
	Ntem	Niabessan	1675	491	included	1950-1980	Sighomnou, 2004
	Kadéi	Pana	1510	382	included	1950-1980	Sighomnou, 2004
	Ngoko	Moloundou	1510	356	included	1950-1980	Sighomnou, 2004
	Vina du Nord	Touboro	1440	300	No, <1500 mm yr ⁻¹	1950-1980	Sighomnou, 2004

Supplementary Table S3: continued

Region	River	station	Rainfall (<i>P</i>) mm yr ⁻¹	Specific discharge (<i>Q_{spe}</i>) mm yr ⁻¹	Included in the calibration	period	Reference
Cameroun rivers	Mbéré	Mbéré	1470	467	No, <1500 mm yr ⁻¹	1950-1980	Sighomnou, 2004
	Bénoué	Garoua	1130	182	No, <1500 mm yr ⁻¹	1950-1980	Sighomnou, 2004
	Faro	Djelepo	1545	407	included	1950-1980	Sighomnou, 2004
	Mayo Tsanaga	Bogo	853	160	No, <1500 mm yr ⁻¹	1950-1980	Sighomnou, 2004
	Mengong	Nsimi	1639	302	included	1991-2017	BVET observatory database
	Awout	Messam	1779	403	included	1999-2015	BVET observatory database
	So'o	Pont So'o	1821	333	included	1999-2015	BVET observatory database
	Nyong	Mbalmayo	1782	307	included	1999-2015	BVET observatory database
	Nyong	Olama	1783	329	included	1999-2015	BVET observatory database
Congo River sub-basin	Lualaba	Kisangani	1307	247	No, <1500 mm yr ⁻¹	1951-2012	Laraque et al., 2020
	Kasaï	Kutu-Mok	1456	339	No, <1500 mm yr ⁻¹	1948-2012	Laraque et al., 2020
	Sangha	Ouessou	1625	307	included	1947-2018	Laraque et al., 2020
	Ubangi	Bangui	1499	234	No, <1500 mm yr ⁻¹	1936-2018	Laraque et al., 2020
	Batéké Plateau	-	1900	985	included	1947-1994	Laraque et al., 2020
	Congo	BZV/KIN	1447	349	No, <1500 mm yr ⁻¹	1903-2018	Laraque et al., 2020
	Ubangi	Ubangi mouth	1924	287	No, more recent value from Laraque et al. (2020) used instead	1993-2007	Becker et al., 2018
	Sangha	Sangha mouth	1950	406	No, more recent value from Laraque et al. (2020) used instead	1993-2007	Becker et al., 2018
	Middle congo	Above Ubangi	2164	687	included	1993-2007	Becker et al., 2018
	Kasai	Lediba	1834	404	included	1993-2007	Becker et al., 2018
	Lwalaba	Confluence Lomani-Lwalaba	1634	238	included	1993-2007	Becker et al., 2018
	Congo	Brazzaville	1842	347	included	1993-2007	Becker et al., 2018
	Congo	Brazzaville	1842	347	included	1993-2007	Becker et al., 2018
	Sangha	Ouessou	1550	312	included	1961–1990	Conway et al., 2009
	Oubangui	Bangui	1517	243	included	1961–1990	Conway et al., 2009
	Congo	Kinshasa	1567	385	included	1961–1990	Conway et al., 2009

Supplementary Table S3: continued

Region	River	station	Rainfall (P) mm yr ⁻¹	Specific discharge (Q_{spe}) mm yr ⁻¹	Included in the calibration	period	Reference
Other Atlantic African rivers	Kouilou	Sounda	1578	520	included	1951-1985	Lienou et al., 2008
	Nyanga	Tchibanga	1672	847	included	1951-1982	Lienou et al., 2008
	Niger	Koulikoro	1436	318	No, <1500 mm yr ⁻¹	1961–1990	Conway et al., 2009
	Niger	Douna	1066	103	No, <1500 mm yr ⁻¹	1961–1990	Conway et al., 2009
	Niger	Dire	1020	80	No, <1500 mm yr ⁻¹	1961–1990	Conway et al., 2009
	Niger	Niamey	693	40	No, <1500 mm yr ⁻¹	1961–1990	Conway et al., 2009
	Benue	Makurdi	1175	327	No, <1500 mm yr ⁻¹	1961–1990	Conway et al., 2009
	Niger	Onitsha	898	127	No, <1500 mm yr ⁻¹	1961–1990	Conway et al., 2009
	Senegal	Bakel	808	78	No, <1500 mm yr ⁻¹	1961–1990	Conway et al., 2009
	Bakoy	Oualia	793	47	No, <1500 mm yr ⁻¹	1961–1990	Conway et al., 2009
	Volta	Senshi Halcrow	992	85	No, <1500 mm yr ⁻¹	1961–1990	Conway et al., 2009
	Black Volta	Dapola	836	32	No, <1500 mm yr ⁻¹	1961–1990	Conway et al., 2009
	Chari	N'Djamena	942	47	No, <1500 mm yr ⁻¹	1961–1990	Conway et al., 2009
	N'Gounie	Fougamou	1862	459	included	1961–1990	Conway et al., 2009
	Kagera	Nyaka Ferry	1084	691	No, <1500 mm yr ⁻¹	1961–1990	Conway et al., 2009
	L. Victoria	Owen Falls	1222	145	No, <1500 mm yr ⁻¹	1961–1990	Conway et al., 2009
	L. Victoria	Owen Falls*	1167	40	No, <1500 mm yr ⁻¹	1961–1990	Conway et al., 2009
	Sobat	Hillet Doleib	974	61	No, <1500 mm yr ⁻¹	1961–1990	Conway et al., 2009
	Blue Nile	El Deim	1010	235	No, <1500 mm yr ⁻¹	1961–1990	Conway et al., 2009
	Atbara	Kilo 3	582	49	No, <1500 mm yr ⁻¹	1961–1990	Conway et al., 2009
	Zambezi	Victoria Falls	857	103	No, <1500 mm yr ⁻¹	1961–1990	Conway et al., 2009
	Okavango	Mohembo	743	115	No, <1500 mm yr ⁻¹	1961–1990	Conway et al., 2009
Ogooué	Ogooué	Lambaréné	1792	705	included	1951-1989	Lienou et al., 2008
	Ogooué	Lambaréné	1764	704	No, more recent value from Leniou et al. (2008) used instead	1961–1990	Conway et al., 2009
	Ogooué	Lambaréné	2159	666	Not included (for validation in the present study)	1998-2017	This study



Supplementary Figure S4. *Be, Al, Cr, Fe, Co, Y, REEs, Zr, Th, and U concentrations vs. DOC concentration relationships in the Ogooué and Mbei basins.*

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