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SUPPLEMENTARY MATERIAL

Assessing temporal and spatial variability of phytoplankton composition in a large reservoir in the Brazilian northeastern region under intense drought conditions

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Supplementary Tab. 1. Mean, standard deviation, maximum and minimum values of the abiotic variables in surface water observed in the inner, middle and dam zones from Castanhão reservoir.

Variables	**Inner** (n = 5)	**Middle** (n = 6)	**Dam** (n=16)
Temperature (°C)	28.7 ± 0.5[a]	28.8 ± 0.9[a]	28.9 ± 1.0[a]
	28.1 - 29.3	27.6 - 29.8	27.3 - 31.0
Secchi (m)	2.6 ± 0.6[a]	3.0 ± 0.7[a]	2.8 ± 0.6[a]
	2.0 - 3.4	2.0 - 3.8	1.7 - 3.6
Turbidity (NTU)	1.9 ± 0.6[a]	1.4 ± 0.2[b]	1.2 ± 0.2[b]
	1.5 - 2.9	1.1 - 1.6	1.0 - 1.8
Conductivity (µS cm^{-1})	337.8 ± 12.1[a]	330.9 ± 18.3[a]	328.1 ± 19.1[a]
	324.0 - 354.2	309.5 - 350.3	307.1 - 372.0
DO (mg L^{-1})	6.7 ± 0.3[a]	6.8 ± 0.1[a]	6.9 ± 0.6[a]
	6.2 - 7.0	6.6 - 7.0	6.1 - 8.4
pH	8.2 ± 0.6[a]	7.7 ± 0.3[a]	7.8 ± 0.4[a]
	7.4 - 8.8	7.3 - 8.1	7.1 - 8.4
phosphate-P (µg L^{-1})	4.2 ± 2.6[a]	4.1 ± 4.2[a]	4.8 ± 3.8[a]
	nd - 6.4	nd - 10.7	nd - 11.2
nitrate-N (µg L^{-1})	21.8 ± 20.4[a]	13.9 ± 21.5[a]	12.7 ± 19.5[a]
	nd - 43.2	nd - 43.0	nd - 44.6
nitrite-N (µg L^{-1})	0.1 ± 0.1[a]	0.2 ± 0.3[a]	0.2 ± 0.6[a]
	nd - 0.3	nd - 0.5	nd - 2.5
ammonium-N (µg L^{-1})	3.1 ± 4.3[a]	7.5 ± 8.5[a]	20.8 ± 36.2[a]
	nd - 8.6	nd -18.4	nd - 132.4
Total phosphorus, TP (µg L^{-1})	21.4 ± 8.6[a]	23.8 ± 8.7[a]	26.3 ± 9.5[a]
	7.6 - 30.0	13.0 - 36.8	14.0 - 48.5
Total nitrogen, TN (µg L^{-1})	441 ± 171[a]	611 ± 141[a]	458 ±149[a]
	259 - 706	412 - 798	216 - 713

Different letters are significant different mean values (T-HSD, with $P<0.05$); nd (no detectable values), for phosphate-P <1.0 µg L^{-1}; nitrate-N <10 µg L^{-1}; nitrite-N <0.1 µg L^{-1}; ammoniacal-N <1.4 µg L^{-1}; TP < 5.0 µg L^{-1}; TN <0.1 mg L^{-1}.

Supplementary Tab. 2. Mean, standard deviation, maximum and minimum values of the abiotic variables in surface water observed in the phases I (Mar.12), II (Jan.13 and Aug.12) and III (Aug.13) in Castanhão reservoir.

Variables	Phase I	Phase II	Phase III
	(n=5)	(n=16)	(n=6)
Temperature (°C)	30.2 ± 0.6[a]	28.3 ± 0.6[b]	29.2 ± 0.4[c]
	29.5 - 31.0	27.3 - 29.3	28.8 - 29.8
Secchi (m)	2.2 ± 0.4[a]	3.1 ± 0.5[b]	2.5 ± 0.5[a]
	1.7 - 2.6	2.0 - 3.8	2.0 - 3.2
Turbidity (NTU)	1.1 ± 0.1[a]	1.5 ± 0.5[a]	1.3 ± 0.1[a]
	1.0 - 1.3	1.1 - 2.9	1.1 - 1.5
Conductivity (µS cm^{-1})	312.4 ± 4.4[a]	329.2 ± 15.6[a]	349.0±11.5[c]
	308.2 - 317.4	307.1 - 354.2	340.0-372.0
DO (mg L^{-1})	6.6 ± 0.2[a]	6.9 ± 0.5[a]	6.8±0.4[a]
	6.4 - 6.8	6.1 - 8.4	6.2 - 7.4
pH	8.1 ± 0.2[a]	7.7 ± 0.4[a]	8.0 ± 0.4[a]
	7.9 - 8.4	7.2 - 8.8	7.6 - 8.6
phosphate-P (µg L^{-1})	nd[a]	4.7 ± 2.7[b]	7.9 ± 3.2[b]
	nd	nd - 8.4	3.8 - 11.2
nitrate-N (µg L^{-1})	8.4 ± 18.7[a]	6.8 ± 14.8[a]	40.9 ± 3.0[c]
	nd - 41.8	nd - 43.0	36.2 - 44.6
nitrite-N (µg L^{-1})	nd[a]	0.2 ± 0.6[a]	nd[a]
	nd	nd - 2.5	nd
ammonium-N (µg L^{-1})	43.6 ± 51.9[a]	3.7 ± 3.9[b]	19.4 ± 29.7[a,b]
	nd - 132.4	nd - 12.7	nd - 78.9
Total Phosphorus, TP (µg L^{-1})	18.7 ± 6.8[a]	27.3 ± 9.1[a]	23.4 ± 8.9[a]
	12.0 - 28.0	17.8 - 48.5	7.6 - 33.7
Total Nitrogen, TN (µg L^{-1})	416 ± 179[a]	490 ± 166[a]	548 ± 123[a]
	216 - 611	259 - 798	371 - 713

Different letters are significant different mean values (T-HSD, with $P<0.05$); nd (no detectable values), for phosphate-P <1.0 µg L^{-1}; nitrate-N <10 µg L^{-1}; nitrite-N <0.1 µg L^{-1}; ammonium-N < 1.4 µg L^{-1}; TP <5.0 µg L^{-1}; TN <0.1 mg L^{-1}.

Supplementary Tab. 3. Mean, ± standard deviation, maximum and minimum values of density ($\times 10^3$ organisms L^{-1}) of the major contributors (characterizing taxa) and functional group in surface water observed in the phases I (Mar.12), II (Jan.13 and Aug.12) and III (Aug.13) in Castanhão reservoir. *Pl. minor* and *Pl. limnetica*; *Ps. catenata* and *Ps. papillaterminata*; *C. helicoidea* and *C. raciborskii*; *S. acus* and *F. delicatissima* were not identified individually during counting due to strong similarity, therefore counts refer to each pair of species.

Characterizing species	Functional group*	Phase I (n=5)	Phase II (n=16)	Phase III (n=6)
Cyanophyceae				
Planktolyngbya minor (Geitler & Ruttner) Komárek & Cronberg / *Planktolyngbya limnetica* (Lemmermann) Komárková-Legnerová & Cronberg	S1	12,545 ± 3182 9184 - 16212	820 ± 1323 0.0 - 2370	1551 ± 1978 139 - 4115
Pseudanabaena limnetica (Lemmermann) Komárek	S1	4945 ± 2059 1608 - 6828	284 ± 898 0.0 - 3609	4330 ± 2115 1559 - 7193
Pseudanabaena catenata Lauterborn / *Pseudanabaena papillaterminata* (Kiselev) Kukk	MP	1510 ± 1007 124 - 2969	6.0 ± 21 0.0 - 83	906 ± 448 307 - 1370
Cylindrospermopsis helicoidea Cronberg & Komárek / *Cylindrospermopsis raciborskii* (Woloszynska) Seenayya & Subba Raju	S_N	336 ± 350 0.0 - 557	138 ± 320 0.0 - 1029	62 ± 96 0.0 - 247
Romeria victoriae Komárek & Cronberg	?	0.0 0.0	1258 ± 1515 0.0 – 5903	0.0 0.0
Pseudanabaena cf. *biceps* Böcher	MP	6.0 ± 14 0.0 - 31	304 ± 424 0.0 - 1574	524 ± 633 0.0 - 1623
Myxobaktron sp.	X1 (?)	43 ± 81 0.0 - 186	98 ± 94 0.0 - 337	235 ± 159 0.0 - 400
Chlophyceae				
Schroederia setigera (Schröder) Lemmermann	X1	0.0 0.0	27 ± 48 0.0 - 177	43 ± 56 0.0 - 139

Monoraphidium circinale (Nygaard) Nygaard	X1	0.0	24 ± 38	114 ± 172
		0.0	0.0 - 112	0.0 - 433
Ankyra judayi (G.M.Smith) Fott	X1	6.0 ± 14	8.0 ± 18	303 ± 384
		0.0 - 31	0.0 - 66	32 - 1039
Monoraphidium minutum (Nägeli) Komárková-Legnerová	X1	108 ± 116	55 ± 64	265 ± 158
		0.0 - 278	0.0 - 206	57 - 439
Oocystis lacustris Chodat	F	7.0 ± 12	29 ± 38	22 ± 25
		0.0 - 29	0.0 - 135	0.0 - 62
Elakatothrix sp.	F	24 ± 33	26 ± 43	17 ± 27
		0.0 - 62	0.0 - 135	0.0 - 57
Micractinium pusillum Fresenius	F	15 ± 33	23 ± 43	690 ± 611
		0.0 - 72	0.0 - 135	34 - 1651
Golenkinia sp.	J	1.0 ± 2.0	32 ± 61	110 ± 84
		0.0 - 5.0	0.0 - 225	0.0 - 226
Bacillariophyceae				
Nitzschia sp. (12-25 µm)	D	183 ± 154	208 ± 288	559 ± 314
		0.0 - 309	0.0 - 919	135 - 881
Synedra acus Kützing / *Fragilaria delicatissima* (W.Smith) Lange-Bertalot	D	2.0 ± 1.0	0.0 ± 1.0	0.0
		1.0 - 2.0	0.0 - 1.0	0.0
Aulacoseira granulata (Ehrenberg) Simonsen var. *granulata*	P	31 ± 26	122 ± 112	39 ± 19
		6.0 - 65	7.0 - 372	13 - 68
Aulacoseira granulata (Ehrenberg) Simonsen var. *angustissima*	P	11 ± 14	43 ± 41	26 ± 6.0
		1.0 - 35	4.0 - 118	18 - 33

*Functional group: defined according to Reynolds *et al.* (2002) and Padisák *et al*. (2009). (? - unidentified functional group).

Supplementary Tab. 4. Descriptive taxa, functional group, life form and frequency of occurrence of phytoplankton in Castanhão Reservoir. *Pl. minor* and *Pl. limnetica*; *Ps. catenata* and *Ps. papillaterminata*; *C. helicoidea* and *C. raciborskii* were not identified individually during counting due to strong similarity, therefore counts refer to each pair of species.

Descriptive taxa[°]	Functional group[#]	Life form[§]	Frequency of occurrence[^]
Cyanophyceae			
Planktolyngbya minor (Geitler & Ruttner) Komárek & Cronberg / *Planktolyngbya limnetica* (Lemmermann) Komárková-Legnerová & Cronberg	S1	Fi	Constant
Pseudanabaena limnetica (Lemmermann) Komárek	S1	Fi	Constant
Pseudanabaena catenata Lauterborn / *Pseudanabaena papillaterminata* (Kiselev) Kukk	MP	Fi	Common
Pseudanabaena sp.2[*]	?	Fi	Rare
Cylindrospermopsis sp. / *Cylindrospermopsis raciborskii (Woloszynska) Seenayya & Subba Raju*	S_N	Fi	Common
Pseudanabaena sp.1	?	Fi	Constant
Pseudanabaena cf. *biceps* Böcher	MP	Fi	Constant
Myxobaktron sp.	X1 ?	UNF	Constant
Chlophyceae			
Ankyra judayi (G.M.Smith) Fott	X1	UNF	Common
Monoraphidium minutum (Nägeli) Komárková-Legnerová	X1	UNF	Constant
Monoraphidium komarkovae[*]	X1	UNF	Rare
Oocystis lacustris Chodat	F	CNF	Constant
Micractinium pusillum Fresenius	F	CNF	Constant
Bacillariophyceae			
Nitzschia sp. (12-25 µm)	D	UNF	Constant
Aulacoseira granulata (Ehrenberg) Simonsen var. *granulata*	P	CNF	Constant
Aulacoseira granulata (Ehrenberg) Simonsen var. *angustissima*	P	CNF	Constant
Fragilaria sp.[*]	P	UNF	Common
Penada 1[*]	?	UNF	Rare

[°]Descriptive taxa are defined as those with >5% of the total phytoplankton density (organisms L^{-1}) in at least one sample; [#]defined according to Reynolds *et al.* (2002) and Padisák *et al.* (2009).); [§]unicellular non-flagellated (UNF), colonial non-flagellated (including coenobia) (CNF) and filaments (Fi); [^]rare (F ≤10%), common (10% < F ≤50%) and constant (F>50%) based on the occurrence related to the total number of samples; *taxa that was not defined as 'characterizing taxa' according to SIMPER procedure; ?, unidentified functional group.