

1 **Coastal *Synechococcus* strains can exploit low oxygen**
2 **habitats**

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10 **Supplemental materials**

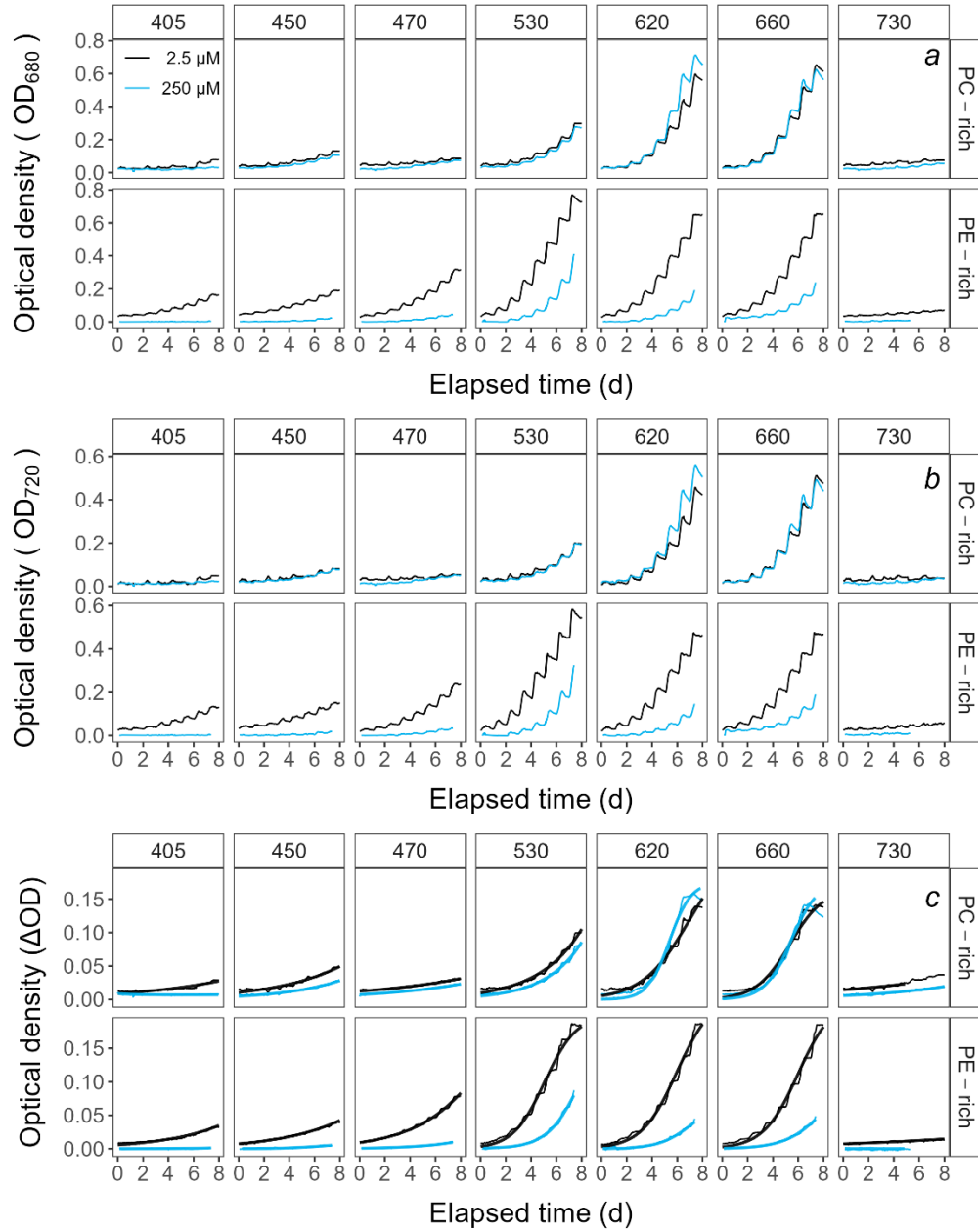


Fig. S1. Growth curves, tracked as OD₆₈₀ (a), OD₇₂₀ (b), or chlorophyll proxy OD₆₈₀-OD₇₂₀ (Δ OD) (c) vs. elapsed time (d). Growth curves were estimated over 5-min intervals for PC-rich (light green) and PE-rich (dark red) cultures of *Synechococcus* sp. grown at spectral bandwidths of 405, 450, 470, 530, 620, 660, or 730 nm and O₂ concentrations of 250 μ M or 2.5 μ M. Logistic fits (thick lines) of Δ OD vs. elapsed time (d) measured over 5-min intervals were also presented.

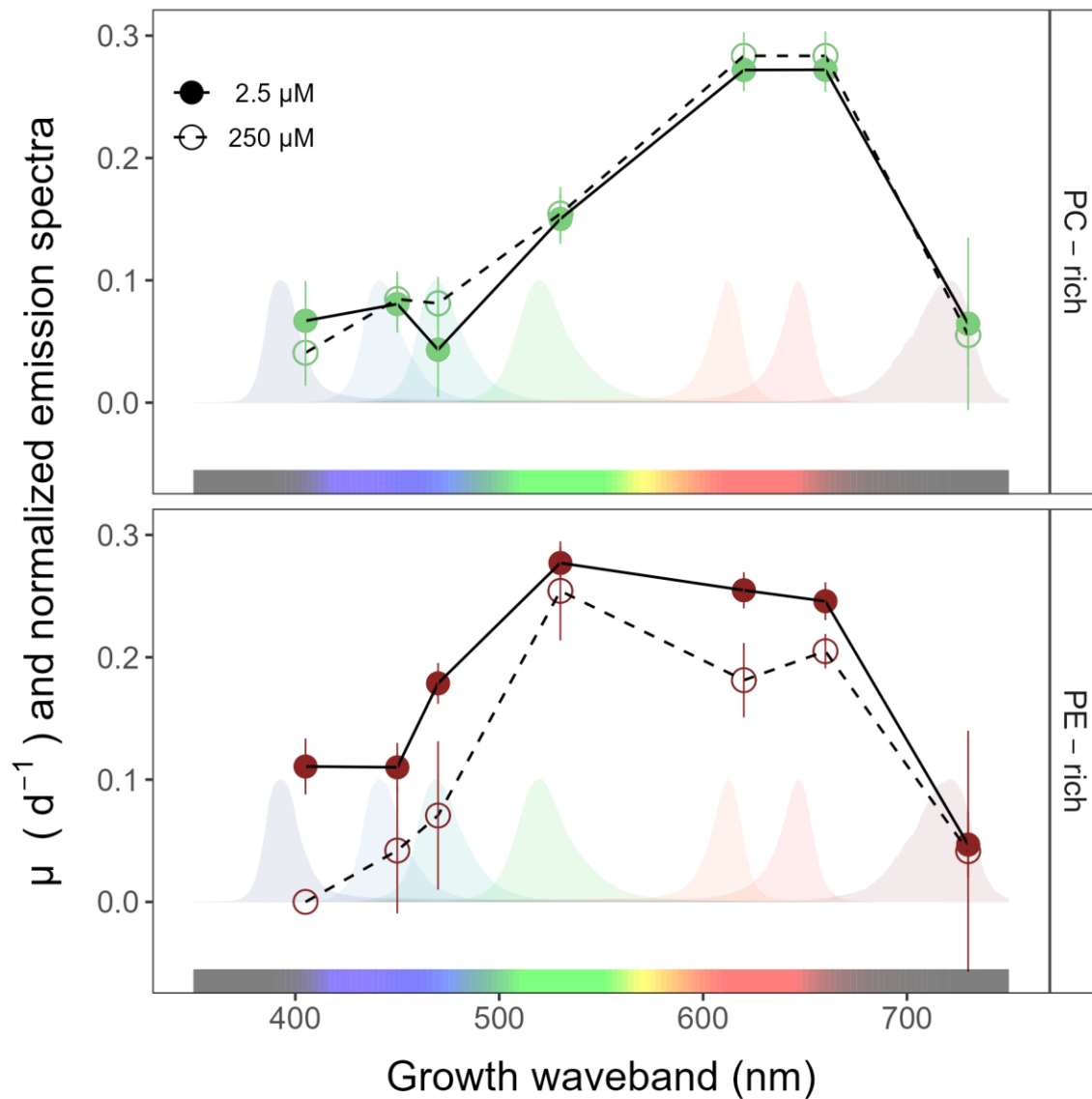


Fig. S2. Cell-specific exponential growth rates (μ ; d^{-1}) vs. growth waveband (nm, shaded regions). Growth rates (\pm SE) were estimated from logistic fits of OD_{720} vs. elapsed time, for PC-rich (green circle) and PE-rich (red circle) cultures of *Synechococcus* sp. grown at spectral bandwidths of 405, 450, 470, 530, 620, 660, or 730 nm, and O_2 concentrations of 250 μM (open symbols and dashed line) or 2.5 μM (closed symbols and solid line).

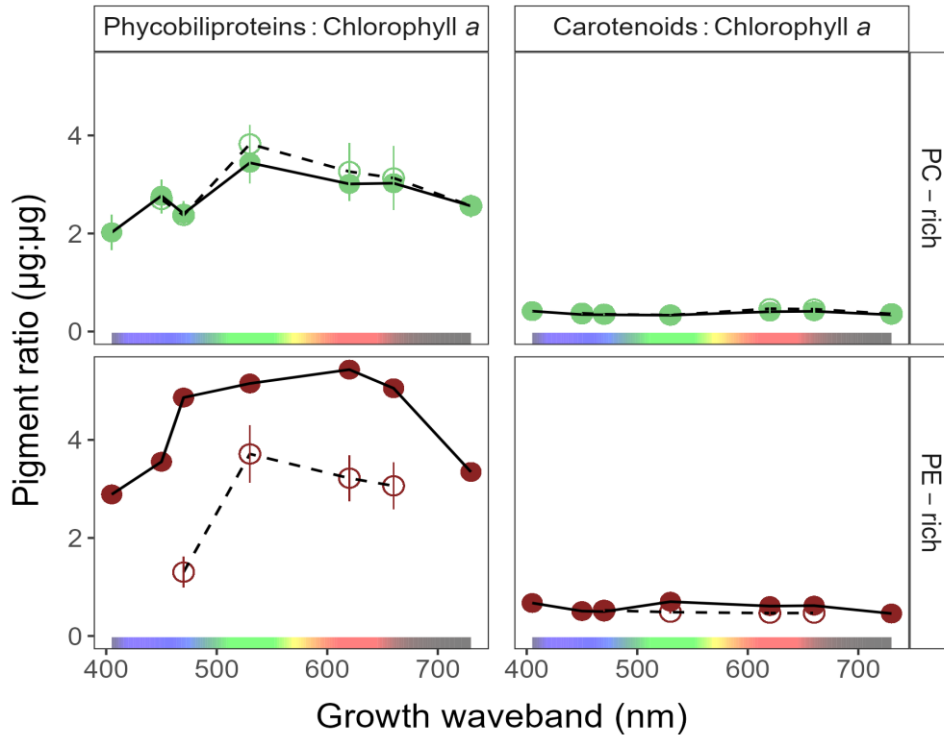


Fig. S3. Pigment ratio (μg:μg) vs. growth waveband (nm) for PC-rich (green circle) and PE-rich (red circle) cultures of *Synechococcus* sp. grown at spectral bandwidths of 405, 450, 470, 530, 620, 660, or 730 nm and O₂ concentrations of 250 μM (open symbols and dashed line) or 2.5 μM (closed symbols and solid line). Data not presented for those PE-rich cultures which showed negligible growth under 405, 450, 730 nm and 250 μM [O₂]; nor for those PC-rich cultures which showed negligible growth under 405 nm and 250 μM [O₂].

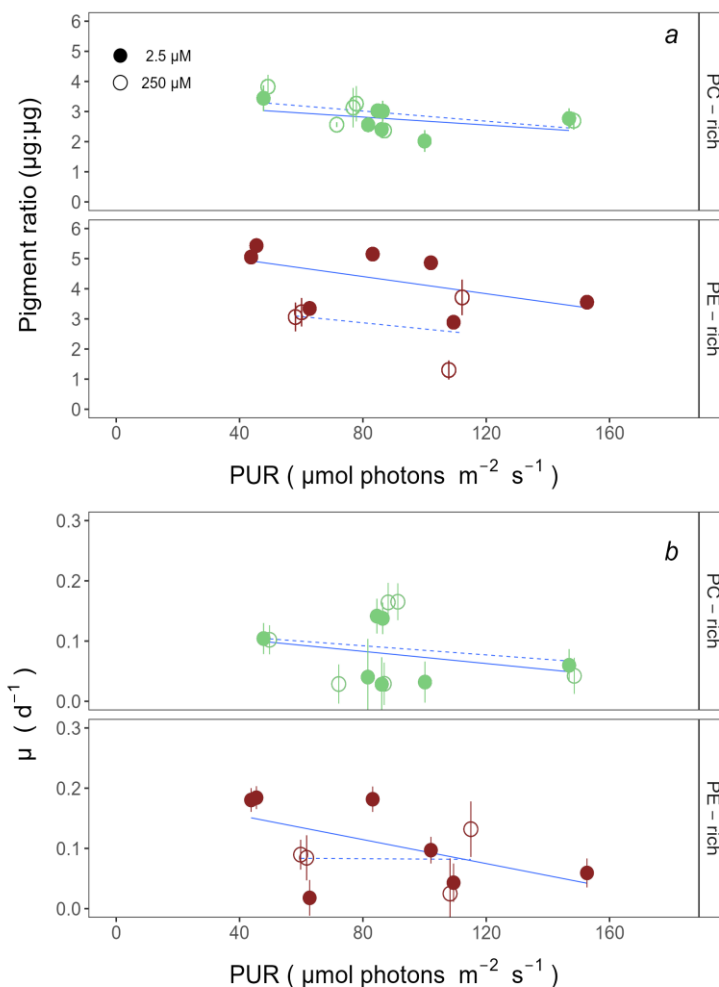


Fig. S4. Phycobiliproteins:Chlorophyll *a* ratio (µg:µg) (a); chlorophyll-specific growth rates (µ; d⁻¹) (b) vs. Photosynthetically Usable Radiation (PUR, µmol photons m⁻²s⁻¹) for PC-rich (green circle) and PE-rich (red circle) cultures of *Synechococcus* grown at spectral wavebands of 405, 450, 470, 530, 620, 660, or 730 nm and 250 µM [O₂] (open symbols and dashed line) or 2.5 µM [O₂] (closed symbols and solid line). Data not presented for those PE-rich cultures which showed negligible growth under 405, 450, 730 nm and 250 µM [O₂]; nor for those PC-rich cultures which showed negligible growth under 405 nm and 250 µM [O₂]. Blue lines shows linear model fit for data from each strain and [O₂] (solid for 2.5 µM [O₂] or dashed for 250 µM [O₂]) across spectral wavebands.

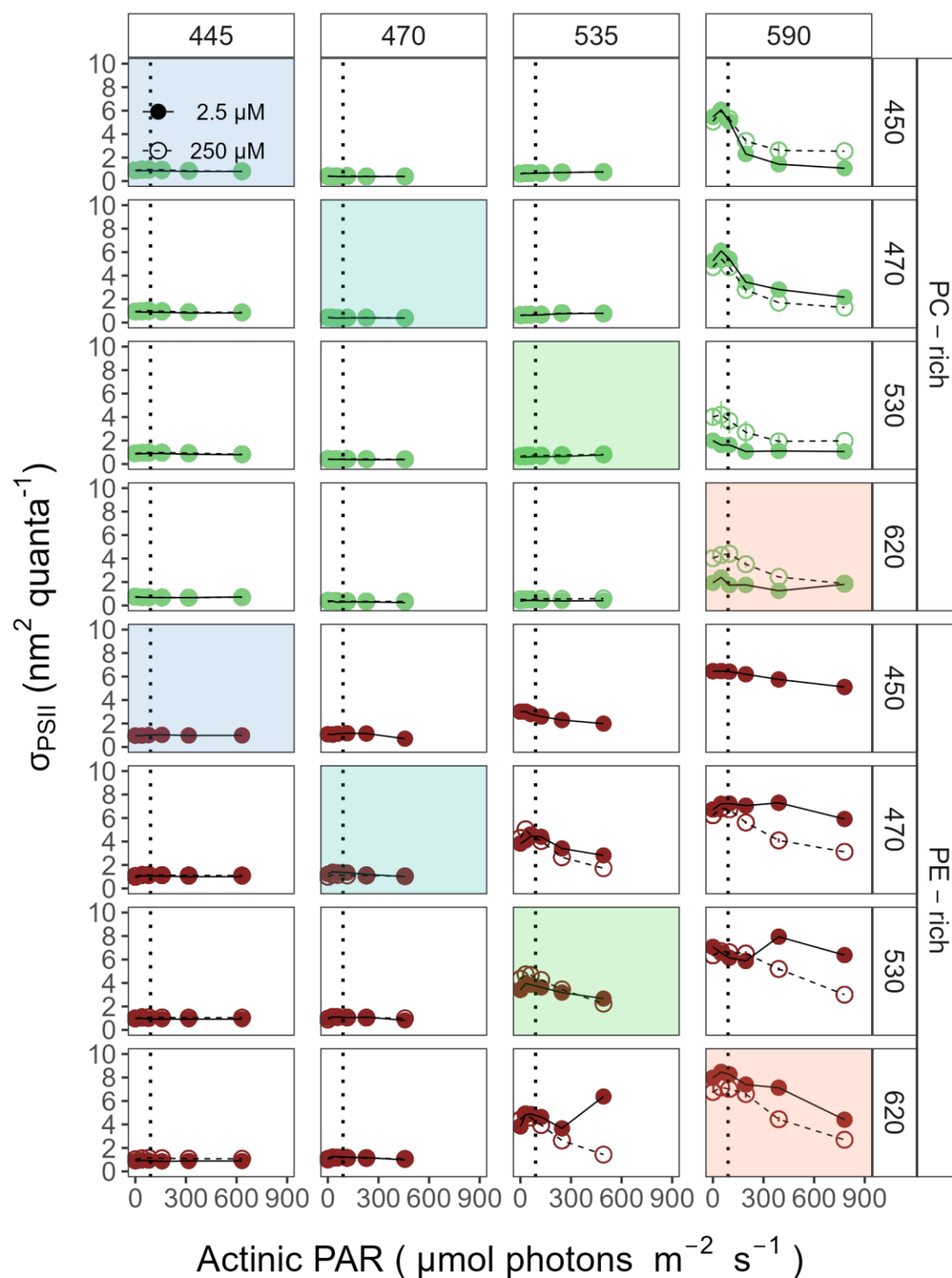
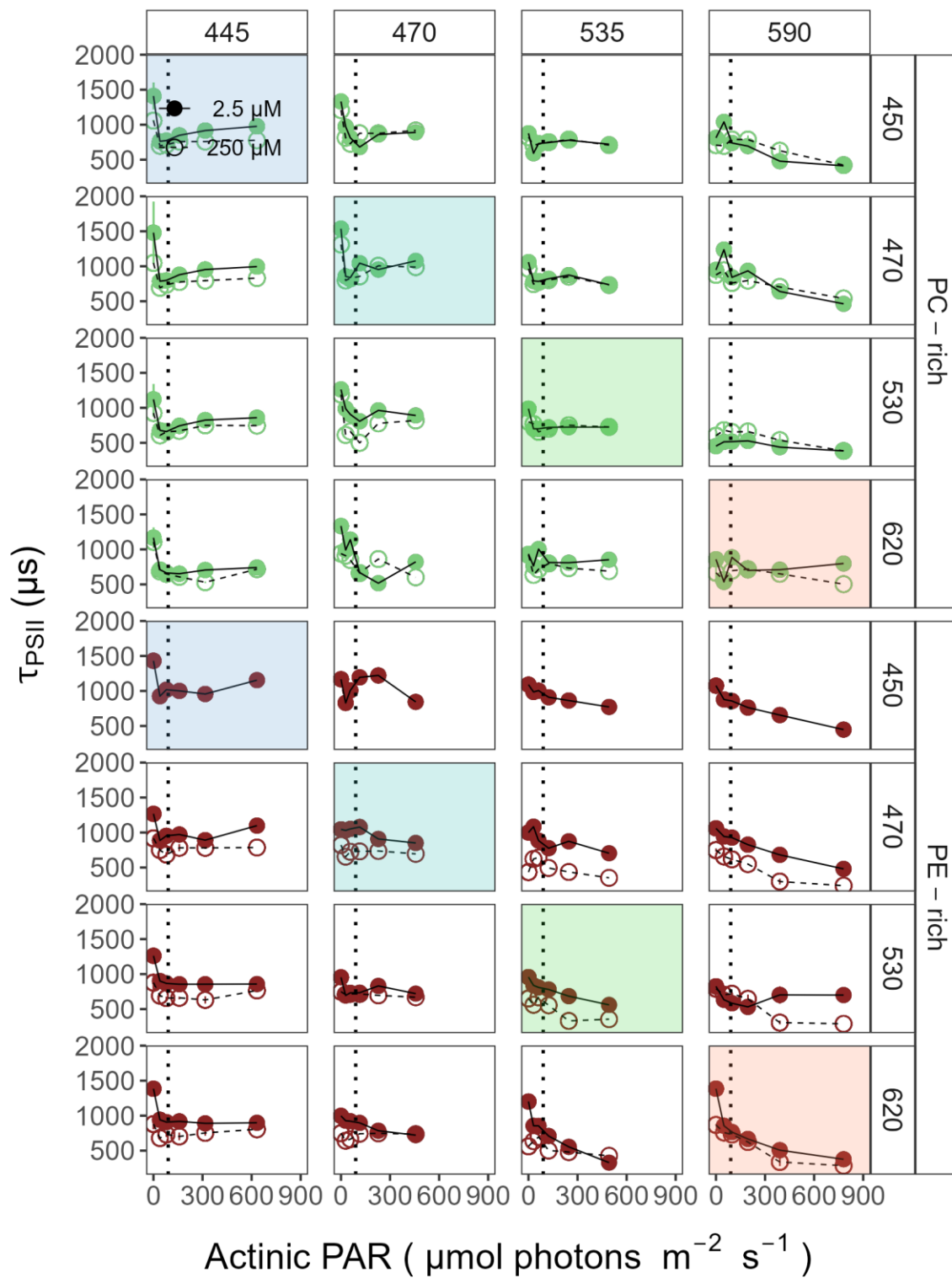


Fig. S5. Effective absorption cross section of PSII (σ_{PSII} ; $\text{nm}^2 \text{ quanta}^{-1}$) vs. Actinic PAR ($\mu\text{mol photons m}^{-2} \text{ s}^{-1}$). σ_{PSII} were estimated using FRRf induction curves with excitation (columns) at

47 EX_{445nm}, blue; EX_{470nm}, blue-green; EX_{535nm}, green; or EX_{590nm}, orange; for PC-rich (green circle) or
48 PE-rich (red circle) cultures of *Synechococcus* sp. grown at spectral bandwidths (rows) of 450,
49 470, 530, or 620 nm and O₂ concentrations of 250 μM (open symbols and dashed line) or 2.5 μM
50 (closed symbols and solid line). Shaded area show situations in which cultures were excited by,
51 and growing in, corresponding growth wavebands of 450, 470, 530, or 620 nm. The vertical lines
52 show half diel peak PAR growth light of 90 μmol photons m⁻²s⁻¹. Data not presented for those
53 PE-rich cultures which showed negligible growth under 405, 450, 730 nm and 250 μM O₂; nor for
54 those PC-rich cultures which showed negligible growth under 405 nm and 250 μM O₂.

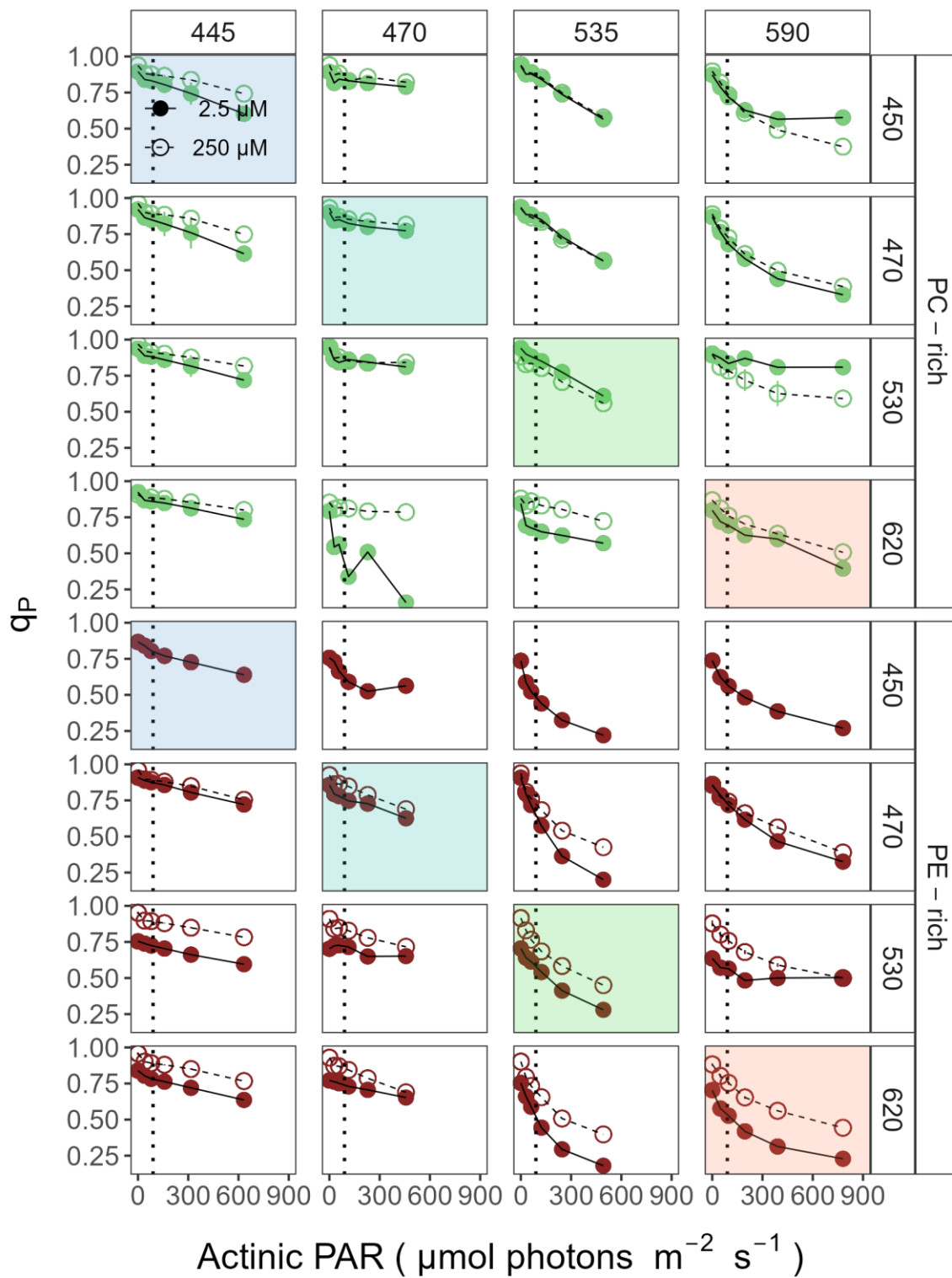


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56 **Fig. S6.** Turnover time of PSII photochemistry (τ_{PSII} ; μs) vs. Actinic PAR ($\mu mol photons m^{-2} s^{-1}$).

57 τ_{PSII} were estimated using FRRf induction curves with excitation (columns) at Ex_{445nm}, blue;

58 $\text{Ex}_{470\text{nm}}$, blue-green; $\text{Ex}_{535\text{nm}}$, green; or $\text{Ex}_{590\text{nm}}$, orange; for PC-rich (green circle) or PE-rich (red
59 circle) cultures of *Synechococcus* sp. grown at spectral bandwidths (rows) of 450, 470, 530, or 620
60 nm and O_2 concentrations of 250 μM (open symbols and dashed line) or 2.5 μM (closed symbols
61 and solid line). Shaded area show situations in which cultures were excited by, and growing in,
62 corresponding growth wavebands of 450, 470, 530, or 620 nm. The vertical lines show half diel
63 peak PAR growth light of 90 $\mu\text{mol photons m}^{-2}\text{s}^{-1}$. Data not presented for those PE-rich cultures
64 which showed negligible growth under 405, 450, 730 nm and 250 $\mu\text{M O}_2$; nor for those PC-rich
65 cultures which showed negligible growth under 405 nm and 250 $\mu\text{M O}_2$.

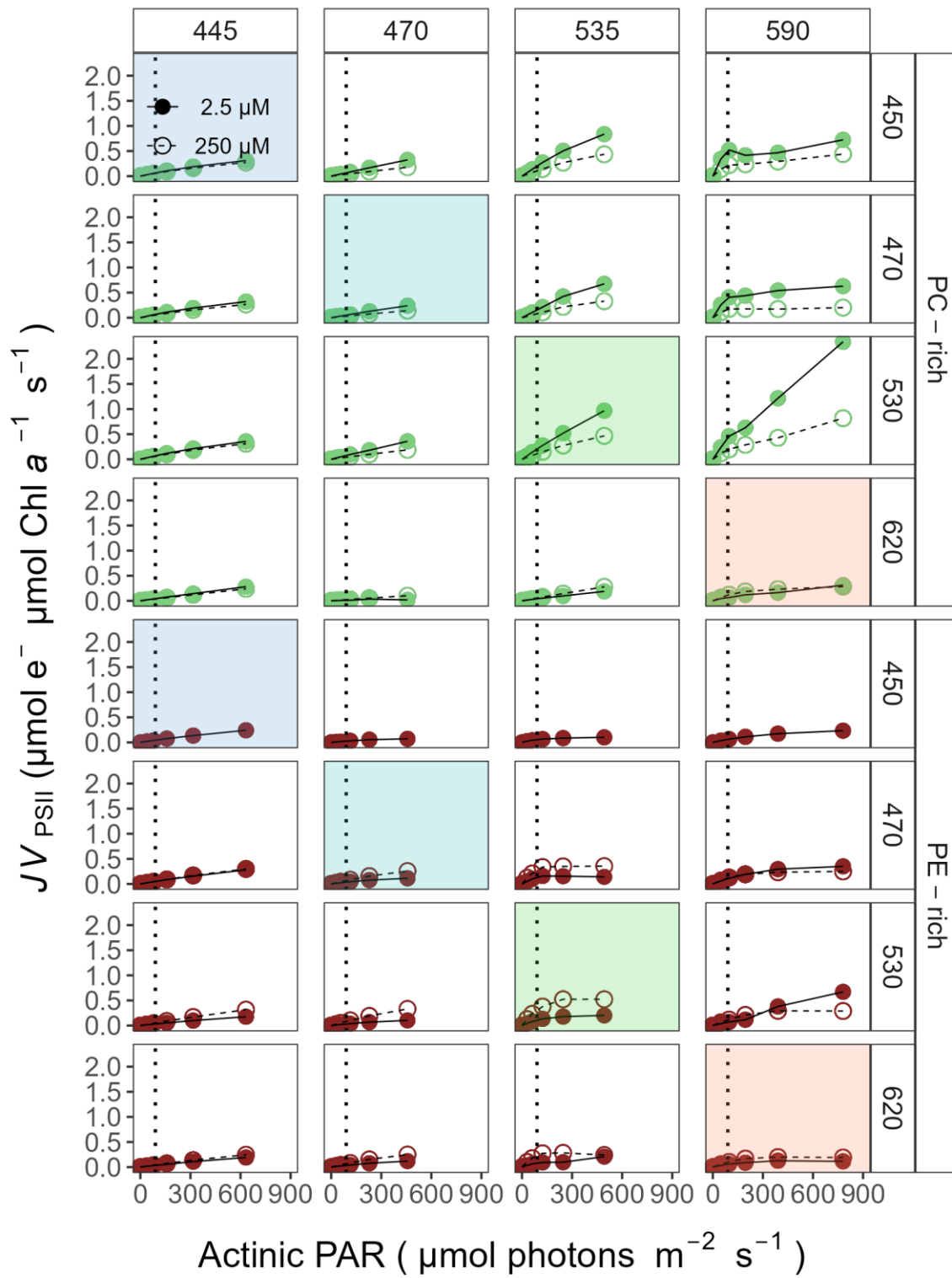


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67 **Fig. S7.** Photochemical quenching coefficient (q_P) vs. Actinic PAR ($\mu\text{mol photons m}^{-2}\text{s}^{-1}$). q_P

68 were estimated using FRRf induction curves with excitation (columns) at Ex_{445nm}, blue; Ex_{470nm},

69 blue-green; Ex_{535nm}, green; or Ex_{590nm}, orange; for PC-rich (green circle) or PE-rich (red circle)
70 cultures of *Synechococcus* sp. grown at spectral bandwidths (rows) of 450, 470, 530, or 620 nm
71 and O₂ concentrations of 250 μM (open symbols and dashed line) or 2.5 μM (closed symbols and
72 solid line). Shaded area show situations in which cultures were excited by, and growing in,
73 corresponding growth wavebands of 450, 470, 530, or 620 nm. The vertical lines show half diel
74 peak PAR growth light of 90 μmol photons m⁻²s⁻¹. Data not presented for those PE-rich cultures
75 which showed negligible growth under 405, 450, 730 nm and 250 μM O₂; nor for those PC-rich
76 cultures which showed negligible growth under 405 nm and 250 μM O₂.



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78 **Fig. S8.** PSII electron flux (JV_{PSII} ; $\mu\text{mol e}^- \text{Chl } a^{-1} \text{ s}^{-1}$) vs. Actinic PAR ($\mu\text{mol photons m}^{-2} \text{ s}^{-1}$).

79 σ_{PSII} were estimated using FRRf induction curves with excitation (columns) at Ex_{445nm}, blue;

Ex_{470nm}, blue-green; Ex_{535nm}, green; or Ex_{590nm}, orange; for PC-rich (green circle) or PE-rich (red circle) cultures of *Synechococcus* sp. grown at spectral bandwidths (rows) of 450, 470, 530, or 620 nm and O₂ concentrations of 250 μM (open symbols and dashed line) or 2.5 μM (closed symbols and solid line). Shaded area show situations in which cultures were excited by, and growing in, corresponding growth wavebands of 450, 470, 530, or 620 nm. The vertical lines show half diel peak PAR growth light of 90 μmol photons m⁻²s⁻¹. Data not presented for those PE-rich cultures which showed negligible growth under 405, 450, 730 nm and 250 μM O₂; nor for those PC-rich cultures which showed negligible growth under 405 nm and 250 μM O₂.

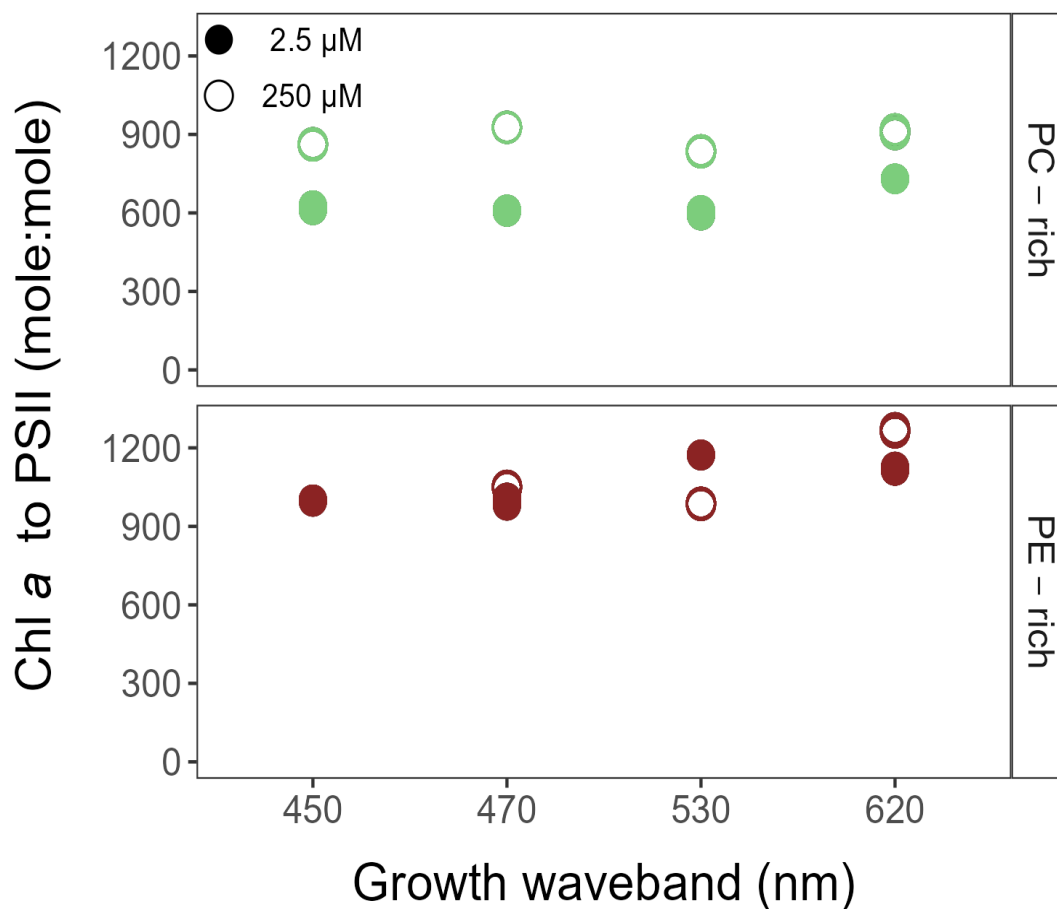


Fig. S9. PSII to Chl *a* ratio (mole:mole) vs. growth waveband (nm). ETR ($\mu\text{mol e}^- \text{PSII}^{-1} \text{s}^{-1}$) and JV_{PSII} ($\mu\text{mol e}^- \text{Chl } a^{-1} \text{s}^{-1}$) were estimated using FRRf induction curves with excitation at $\text{Ex}_{445\text{nm}}$, blue for PC-rich (green circle) or PE-rich (red circle) cultures of *Synechococcus* sp. grown at spectral bandwidths of 450, 470, 530, or 620 nm and O₂ concentrations of 250 μM (open symbols and dashed line) or 2.5 μM (closed symbols and solid line). Data not presented for those PE-rich cultures which showed negligible growth under 405, 450, 730 nm and 250 μM O₂; nor for those PC-rich cultures which showed negligible growth under 405 nm and 250 μM O₂.

Table S1. Linear regression, coefficient of determination (R square), Pearson correlation coefficients (R), and p-value used to calculate the number of cells (mL⁻¹) of PC-rich and PE-rich cultures of *Synechococcus* based on OD₆₈₀ and OD₇₂₀ (nm) measurements.

Linear_regression	Strain	OD	R_square	R	p_value
N/mL = (OD680*180449619)+4614995	PC-rich	680	0.946	0.971	0.000
N/mL = (OD680*237967540)+9721218	PE-rich	680	0.771	0.880	0.000
N/mL = (OD720*235186505)+6189673	PC-rich	720	0.929	0.960	0.000
N/mL = (OD720*306469787)+9429269	PE-rich	720	0.769	0.880	0.000

Table S2. Linear regression, coefficient of determination (R square), Pearson correlation coefficients (R), and p-value used to calculate the pigment content (µg mL⁻¹) of PC-rich and PE-rich cultures of *Synechococcus* based on absorbance (A) measurements.

Pigment	Abs	Linear_regression	R_square	R	p_value
Chl a	665	Chla µg/mL = (Abs665*13.411029)+0.154793	0.865	0.930	0.000
Car	480	Car µg/mL = (Abs480*5.469880)+0.089971	0.791	0.890	0.000
PE	565	PE µg/mL = (Abs565*26.760737)-0.143872	0.698	0.840	0.000
PC	620	PC µg/mL = (Abs620*29.979866)-0.182611	0.807	0.900	0.000
APC	650	APC µg/mL = (Abs650*3.873803)+0.021964	0.087	0.300	0.000

Table S3. Calibration slope for the blue LED (Ex~445nm~), blue-green LED (Ex_{470nm}), green LED (Ex_{530nm}), orange LED (Ex_{590nm}) excitations.

Ex_WL	Model	Slope	Slope_SE	Slope_P
445	JVPSII_ETRqpOxbo_FoSigmax_m2psii_e	108,832.416	7,242.289	0.000
470	JVPSII_ETRqpOxbo_FoSigmax_m2psii_e	98,039.255	7,704.088	0.000
535	JVPSII_ETRqpOxbo_FoSigmax_m2psii_e	110,082.181	6,127.011	0.000
590	JVPSII_ETRqpOxbo_FoSigmax_m2psii_e	254,327.562	10,495.613	0.000

Table S4. Three-way factorial ANOVA testing whether strain, growth waveband, O₂ concentration, and their interactions (Source_of_variation), significantly influence the chlorophyll specific exponential growth rate (μ ; d⁻¹), for PC-rich and PE-rich cultures of *Synechococcus* grown at spectral bandwidths of 405, 450, 470, 530, 620, 660, or 730 nm, and O₂ concentrations of 250 μ M or 2.5 μ M. Df – degrees of freedom; Sum Sq – sum of squares; Mean Sq – mean sum of squares; F_value – Fisher's F-test statistic; p_value - level of significance.

Source_of_variation	Df	Sum Sq	Mean Sq	F_value	p_value
O2	1	0.014	0.014	8.578e+30	0.000
WL	6	0.164	0.027	1.658e+31	0.000
Strain	1	0.000	0.000	1.625e+28	0.000
O2:WL	6	0.001	0.000	8.959e+28	0.000
O2:Strain	1	0.013	0.013	7.694e+30	0.000
WL:Strain	6	0.011	0.002	1.146e+30	0.000
O2:WL:Strain	6	0.007	0.001	6.741e+29	0.000
Residuals	28	0.000	0.000	NA	N/A

Table S5. Three-way factorial ANOVA testing whether strain, growth waveband, O₂ concentration, and their interactions (Source_of_variation), significantly influence the pigment content, for PC-rich and PE-rich cultures of *Synechococcus* grown at spectral bandwidths of 405, 450, 470, 530, 620, 660, or 730 nm, and O₂ concentrations of 250 µM or 2.5 µM. Df – degrees of freedom; Sum Sq – sum of squares; Mean Sq – mean sum of squares; F_value – Fisher's F-test statistic; p_value - level of significance.

Df	Sum Sq	Mean Sq	F_value	p_value	Pigments
1	0.001	0.001	1.140e+02	0.000	Chla
6	0.032	0.005	4.885e+02	0.000	Chla
1	0.023	0.023	2.144e+03	0.000	Chla
5	0.002	0.000	4.327e+01	0.000	Chla
1	0.000	0.000	1.837e+01	0.000	Chla
6	0.007	0.001	1.111e+02	0.000	Chla
3	0.000	0.000	8.476e+00	0.000	Chla
1005	0.011	0.000	NA	N/A	Chla
1	0.032	0.032	1.807e+02	0.000	Phyco
6	0.140	0.023	1.331e+02	0.000	Phyco
1	0.082	0.082	4.660e+02	0.000	Phyco
5	0.048	0.010	5.474e+01	0.000	Phyco
1	0.052	0.052	2.991e+02	0.000	Phyco
6	0.099	0.016	9.402e+01	0.000	Phyco
3	0.002	0.001	4.294e+00	0.005	Phyco
1005	0.176	0.000	NA	N/A	Phyco
1	0.000	0.000	8.045e+01	0.000	Car
6	0.003	0.000	2.767e+02	0.000	Car
1	0.000	0.000	2.642e+02	0.000	Car
5	0.000	0.000	5.254e+01	0.000	Car
1	0.000	0.000	5.298e+01	0.000	Car
6	0.001	0.000	8.490e+01	0.000	Car
3	0.000	0.000	4.544e+01	0.000	Car
1005	0.002	0.000	NA	N/A	Car

Table S6. Three-way factorial ANOVA testing whether strain, Actinic PAR, O₂ concentration, and their interactions (Source_of_variation), significantly influence the σ_{PSII} (nm² quanta⁻¹), for PC-rich and PE-rich cultures of *Synechococcus* grown at spectral bandwidths of 405, 450, 470, 530, 620, 660, or 730 nm, and O₂ concentrations of 250 μ M or 2.5 μ M. Df – degrees of freedom; Sum Sq – sum of squares; Mean Sq – mean sum of squares; F_value – Fisher's F-test statistic; p_value - level of significance.

Df	Sum Sq	Mean Sq	F_value	p_value	Ex_WL
1	0.018	0.018	3.391e+00	0.067	445.000
5	0.109	0.022	4.105e+00	0.001	445.000
1	0.490	0.490	9.232e+01	0.000	445.000
5	0.036	0.007	1.343e+00	0.247	445.000
5	0.042	0.008	1.579e+00	0.167	445.000
234	1.241	0.005	NA	N/A	445.000
1	2.182	2.182	7.042e+02	0.000	470.000
5	0.199	0.040	1.284e+01	0.000	470.000
1	17.938	17.938	5.788e+03	0.000	470.000
5	0.079	0.016	5.092e+00	0.000	470.000
1	0.426	0.426	1.376e+02	0.000	470.000
5	0.244	0.049	1.575e+01	0.000	470.000
5	0.041	0.008	2.615e+00	0.028	470.000
123	0.381	0.003	NA	N/A	470.000
1	4.905	4.905	1.033e+02	0.000	535.000
5	5.554	1.111	2.340e+01	0.000	535.000
1	344.148	344.148	7.250e+03	0.000	535.000
5	0.749	0.150	3.158e+00	0.011	535.000
1	3.190	3.190	6.720e+01	0.000	535.000
5	7.228	1.446	3.045e+01	0.000	535.000
5	0.833	0.167	3.510e+00	0.006	535.000
102	4.842	0.047	NA	N/A	535.000
1	6.099	6.099	1.721e+01	0.000	590.000
5	158.988	31.798	8.971e+01	0.000	590.000

Df	Sum Sq	Mean Sq	F_value	p_value	Ex_WL
1	640.126	640.126	1.806e+03	0.000	590.000
5	8.169	1.634	4.609e+00	0.001	590.000
1	109.841	109.841	3.099e+02	0.000	590.000
5	14.347	2.869	8.096e+00	0.000	590.000
5	2.381	0.476	1.344e+00	0.247	590.000
207	73.371	0.354	NA	N/A	590.000

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Table S7. Three-way factorial ANOVA testing whether strain, Actinic PAR, O₂ concentration, and their interactions (Source_of_variation), significantly influence the τ_{PSII} (μ s), for PC-rich and PE-rich cultures of *Synechococcus* grown at spectral bandwidths of 405, 450, 470, 530, 620, 660, or 730 nm, and O₂ concentrations of 250 μ M or 2.5 μ M. Df – degrees of freedom; Sum Sq – sum of squares; Mean Sq – mean sum of squares; F_value – Fisher's F-test statistic; p_value – level of significance.

Df	Sum Sq	Mean Sq	F_value	p_value	Ex_WL
1	3,496,028.622	3,496,028.622	2.678e+01	0.000	445.000
5	14,133,346.577	2,826,669.315	2.166e+01	0.000	445.000
1	253,264.052	253,264.052	1.940e+00	0.165	445.000
5	517,864.318	103,572.864	7.935e-01	0.555	445.000
5	265,256.514	53,051.303	4.064e-01	0.844	445.000
234	30,544,408.553	130,531.660	NA	N/A	445.000
1	914,186.431	914,186.431	1.634e+01	0.000	470.000
5	2,343,720.562	468,744.112	8.379e+00	0.000	470.000
1	3,470,763.124	3,470,763.124	6.204e+01	0.000	470.000
5	132,988.463	26,597.693	4.754e-01	0.794	470.000
1	81,876.328	81,876.328	1.464e+00	0.229	470.000
5	1,574,364.783	314,872.957	5.628e+00	0.000	470.000
5	140,936.185	28,187.237	5.038e-01	0.773	470.000
123	6,881,213.032	55,944.821	NA	N/A	470.000
1	1,029,225.897	1,029,225.897	3.209e+01	0.000	535.000
5	851,277.005	170,255.401	5.308e+00	0.000	535.000
1	435,345.883	435,345.883	1.357e+01	0.000	535.000
5	120,575.961	24,115.192	7.518e-01	0.587	535.000
1	219,676.028	219,676.028	6.848e+00	0.010	535.000
5	229,576.808	45,915.362	1.431e+00	0.219	535.000
5	64,482.291	12,896.458	4.021e-01	0.846	535.000
102	3,271,820.858	32,076.675	NA	N/A	535.000
1	3,424,919.953	3,424,919.953	1.343e+02	0.000	590.000
5	5,947,878.984	1,189,575.797	4.663e+01	0.000	590.000

Df	Sum Sq	Mean Sq	F_value	p_value	Ex_WL
1	1,011,575.664	1,011,575.664	3.965e+01	0.000	590.000
5	1,306,328.507	261,265.701	1.024e+01	0.000	590.000
1	371,948.064	371,948.064	1.458e+01	0.000	590.000
5	2,392,592.792	478,518.558	1.876e+01	0.000	590.000
5	329,109.359	65,821.872	2.580e+00	0.027	590.000
207	5,280,710.709	25,510.680	NA	N/A	590.000

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Table S8. Three-way factorial ANOVA testing whether strain, Actinic PAR, O₂ concentration, and their interactions (Source_of_variation), significantly influence the q_p, for PC-rich and PE-rich cultures of *Synechococcus* grown at spectral bandwidths of 405, 450, 470, 530, 620, 660, or 730 nm, and O₂ concentrations of 250 µM or 2.5 µM. Df – degrees of freedom; Sum Sq – sum of squares; Mean Sq – mean sum of squares; F_value – Fisher's F-test statistic; p_value – level of significance.

Df	Sum Sq	Mean Sq	F_value	p_value	Ex_WL
1	0.176	0.176	4.317e+01	0.000	445.000
5	1.056	0.211	5.191e+01	0.000	445.000
1	0.021	0.021	5.126e+00	0.024	445.000
5	0.022	0.004	1.066e+00	0.380	445.000
5	0.011	0.002	5.222e-01	0.759	445.000
234	0.952	0.004	NA	N/A	445.000
1	0.131	0.131	7.953e+01	0.000	470.000
5	0.407	0.081	4.960e+01	0.000	470.000
1	0.037	0.037	2.238e+01	0.000	470.000
5	0.002	0.000	2.392e-01	0.944	470.000
1	0.015	0.015	9.411e+00	0.003	470.000
5	0.023	0.005	2.781e+00	0.020	470.000
5	0.002	0.000	2.055e-01	0.960	470.000
123	0.202	0.002	NA	N/A	470.000
1	0.125	0.125	8.911e+01	0.000	535.000
5	1.410	0.282	2.012e+02	0.000	535.000
1	0.309	0.309	2.205e+02	0.000	535.000
5	0.004	0.001	5.519e-01	0.737	535.000
1	0.431	0.431	3.078e+02	0.000	535.000
5	0.100	0.020	1.420e+01	0.000	535.000
5	0.006	0.001	8.494e-01	0.518	535.000
102	0.143	0.001	NA	N/A	535.000
1	1.145	1.145	7.702e+02	0.000	590.000
5	3.624	0.725	4.874e+02	0.000	590.000

Df	Sum Sq	Mean Sq	F_value	p_value	Ex_WL
1	0.093	0.093	6.279e+01	0.000	590.000
5	0.017	0.003	2.309e+00	0.046	590.000
1	0.176	0.176	1.184e+02	0.000	590.000
5	0.081	0.016	1.091e+01	0.000	590.000
5	0.011	0.002	1.504e+00	0.190	590.000
207	0.308	0.001	NA	N/A	590.000

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Table S9. Three-way factorial ANOVA testing whether strain, Actinic PAR, O₂ concentration, and their interactions (Source_of_variation), significantly influence the JV_{PSII} ($\mu\text{mol e}^- \mu\text{mol Chl } a^{-1} \text{ s}^{-1}$), for PC-rich and PE-rich cultures of *Synechococcus* grown at spectral bandwidths of 405, 450, 470, 530, 620, 660, or 730 nm, and O₂ concentrations of 250 μM or 2.5 μM . Df – degrees of freedom; Sum Sq – sum of squares; Mean Sq – mean sum of squares; F_value – Fisher's F-test statistic; p_value - level of significance.

Df	Sum Sq	Mean Sq	F value	Pr(>F)	Ex_WL
1.000	0.008	0.008	15.469	0.000	445.000
5.000	0.545	0.109	198.876	0.000	445.000
1.000	0.027	0.027	49.061	0.000	445.000
5.000	0.024	0.005	8.647	0.000	445.000
5.000	0.080	0.016	29.153	0.000	445.000
234.000	0.128	0.001	N/A	N/A	445.000
1.000	0.020	0.020	46,812.049	0.000	470.000
5.000	0.125	0.025	58,268.956	0.000	470.000
1.000	0.007	0.007	15,238.014	0.000	470.000
5.000	0.048	0.010	22,239.254	0.000	470.000
1.000	0.006	0.006	14,952.048	0.000	470.000
5.000	0.014	0.003	6,729.399	0.000	470.000
5.000	0.014	0.003	6,746.817	0.000	470.000
123.000	0.000	0.000	N/A	N/A	470.000
1.000	0.022	0.022	178.250	0.000	535.000
5.000	2.440	0.488	4,036.491	0.000	535.000
1.000	0.069	0.069	569.276	0.000	535.000
5.000	0.070	0.014	115.148	0.000	535.000
1.000	0.008	0.008	67.870	0.000	535.000
5.000	0.143	0.029	237.352	0.000	535.000
5.000	0.028	0.006	45.868	0.000	535.000
102.000	0.012	0.000	N/A	N/A	535.000
1.000	0.034	0.034	35.783	0.000	590.000
5.000	1.783	0.357	377.019	0.000	590.000

Df	Sum Sq	Mean Sq	F value	Pr(>F)	Ex_WL
1.000	0.049	0.049	51.717	0.000	590.000
5.000	0.071	0.014	15.097	0.000	590.000
1.000	0.050	0.050	53.290	0.000	590.000
5.000	0.123	0.025	25.982	0.000	590.000
5.000	0.089	0.018	18.820	0.000	590.000
207.000	0.196	0.001	N/A	N/A	590.000

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209 **Table S10.** Three-way factorial ANOVA testing whether strain, growth wavebands, O₂ concentration, and their
210 interactions (Source_of_variation), significantly influence the Chl *a* to PSII (mole:mole), for PC-rich and PE-rich
211 cultures of *Synechococcus* grown at spectral bandwidths of 450, 470, 530, or 620, and O₂ concentrations of 250 µM
212 or 2.5 µM. Df – degrees of freedom; Sum Sq – sum of squares; Mean Sq – mean sum of squares; F_value – Fisher's
213 F-test statistic; p_value - level of significance.

Df	Sum Sq	Mean Sq	F value	Pr(>F)
1.000	7,839,890.462	7,839,890.462	413,015.033	0.000
3.000	1,899,199.990	633,066.663	33,350.727	0.000
1.000	12,400,741.437	12,400,741.437	653,286.249	0.000
3.000	452,756.717	150,918.906	7,950.593	0.000
1.000	1,277,345.441	1,277,345.441	67,292.123	0.000
3.000	330,392.577	110,130.859	5,801.829	0.000
2.000	548,872.590	274,436.295	14,457.640	0.000
534.000	10,136.439	18.982	N/A	N/A

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Table S11. T-test of linear fit model (Fit_model) across different strains and O₂ concentration for a given growth waveband, for chlorophyll-specific exponential growth rate vs. Phycobiliproteins to Chl *a* ratio for PC-rich and PE-rich cultures of *Synechococcus* grown at spectral bandwidths of 405, 450, 470, 530, 620, 660, or 730 nm, and O₂ concentrations of 250 µM or 2.5 µM. Estimate - estimation statistics; Std.Error - standard error of the estimate; t_value – t-test statistic; p_value - level of significance.

Fit_model	Estimate	Std.Error	t_value	p_value
PC-rich_0:21	-3.079e-04	2.416e-04	-1.275	0.203
PE-rich_0:21	-1.492e-03	8.630e-05	-17.289	0.000
0_PC-rich:PE-rich	9.005e-03	4.230e-03	2.129	0.034
21_PC-rich:PE-rich	-1.586e-02	2.609e-03	-6.080	0.000

Table S12. T-test of linear fit model (Fit_model) across different strains and O₂ concentration in situations in which cultures were excited by, and growing in, corresponding growth wavebands of 450, 470, 530, or 620 nm, for chlorophyll-specific exponential growth rate vs. *JV*_{PSII}. Estimate - estimation statistics; Std.Error - standard error of the estimate; t_value – t-test statistic; p_value - level of significance.

Fit_model	Estimate	Std.Error	t_value	p_value
PC-rich_0:21	2.717e-05	1.311e-06	0.930	0.000
PE-rich_0:21	8.408e-05	-3.048e-06	-4.418	0.000
0_PC-rich:PE-rich	4.928e-06	8.750e-02	0.171	1.443
21_PC-rich:PE-rich	5.470e-05	3.888e-03	0.822	0.228