

Global patterns in phytoplankton community size structure — evidence for a direct temperature effect

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Supplement. This supplement supplies 2 additional sets of analyses supporting the main article. According to Table 3 in the main article, 3 sets of explanatory variables performed almost equally well at explaining the fraction of large phytoplankton: (1) temperature and dissolved inorganic nitrogen; (2) temperature and phosphate; (3) temperature, dissolved inorganic nitrogen and phosphate. All subsequent analyses were therefore performed for each set of variables but as the results were the same, only variable set 3 was presented in the main article. This Supplement supplies the results for variable sets 1 and 2.

Table S1. Supplementary model details to the results presented in Table 3 in the paper: slopes and intercepts from the model comparison of the fraction of phytoplankton larger than 10 μm versus temperature and nutrient availability (dissolved inorganic nitrogen [DIN] and phosphate)

Dependent variable	Independent Variable 1	Independent variable 2	Independent variable 3	Slope 1	Slope 2	Slope 3	Intercept
Fraction of phytoplankton >10 μm	Temperature			-0.03			-0.56
	DIN			0.30			-1.11
	Phosphate			0.57			-0.79
	Temperature	DIN		-0.02	0.19		-0.82
	Temperature	Phosphate		-0.02	0.37		-0.61
	DIN	Phosphate		0.15	0.33		-0.93
	Temperature	DIN	Phosphate	-0.01	0.09	0.25	-0.72

Table S2. Results from model comparison of the residuals (from a linear regression of the fraction of phytoplankton larger than 10 μm versus dissolved inorganic nitrogen [DIN]) versus temperature and phosphate using Akaike's information criterion (AIC), delta AIC (Δ_i) and Akaike weights (w_i)

Dependent variable	Independent variable	Slope	Intercept	$R^2_{\text{adj.}}$	AIC	Δ_i	w_i
Residuals from the fraction of phytoplankton >10 μm vs. DIN	Temperature	-0.01	0.14	0.03	305.1	0	0.94
	Phosphate	0.10	0.04	0.01	310.5	5.4	0.06

Table S3. Results from model comparison of the residuals (from a linear regression of the fraction of phytoplankton larger than 10 μm versus phosphate) versus temperature and dissolved inorganic nitrogen (DIN) using Akaike's information criterion (AIC), delta AIC (Δ_i) and Akaike weights (w_i)

Dependent variable	Independent variable	Slope	Intercept	$R^2_{\text{adj.}}$	AIC	Δ_i	w_i
Residuals from the fraction of phytoplankton >10 μm vs. phosphate	Temperature	-0.01	0.15	0.03	302.2	0	0.97
	DIN	0.05	-0.01	0.00	309.0	6.8	0.03

Table S4. Results from model comparison of the residuals (from a linear regression of the fraction of phytoplankton larger than 10 μm versus dissolved inorganic nitrogen [DIN]) versus temperature and ocean region with and without including interactions using Akaike's information criterion (AIC), delta AIC (Δ_i) and Akaike weight (w_i)

Dependent variable	Independent variable/factor	Oceanic region	Slope	Intercept	$R^2_{\text{adj.}}$	AIC	Δ_i	w_i
Residuals from the fraction of phytoplankton >10 μm vs. DIN	Temperature		-0.01	0.14	0.03	305.1	17.4	<0.001
		Eastern Atlantic		0.68				
		Eastern Pacific		0.42				
		Indian Ocean Sector		0.29				
	Temperature and region	North-eastern Atlantic	-0.03	0.43	0.11	287.6	0	0.986
		North-western Atlantic		0.12				
		Southern Ocean		0.14				
		Western Atlantic		0.53				
	Temperature and region inclusive interactions	Western Pacific		0.76				
		Eastern Atlantic	-0.01	0.40				
		Eastern Pacific	0.00	-0.14				
		Indian Ocean Sector	-0.02	0.22				
		North-eastern Atlantic	-0.02	0.31	0.11	296.1	8.5	0.014
		North-western Atlantic	-0.04	0.22				
		Southern Ocean	-0.03	0.14				
Western Atlantic	-0.04	0.72						
Western Pacific	-0.03	0.80						

Table S5. Results from model comparison of the residuals (from a linear regression of the fraction of phytoplankton larger than 10 μm versus phosphate) versus temperature and ocean region with and without including interactions using Akaike's information criterion (AIC), delta AIC (Δ_i) and Akaike weight (w_i)

Dependent variable	Independent variable/factor	Oceanic region	Slope	Intercept	$R^2_{\text{adj.}}$	AIC	Δ_i	w_i
Residuals from the fraction of phytoplankton >10 μm vs. phosphate	Temperature		-0.01	0.15	0.03	302.2	34.5	<0.001
		Eastern Atlantic		0.68				
		Eastern Pacific		0.34				
		Indian Ocean Sector		0.21				
	Temperature and region	North-eastern Atlantic	-0.03	0.53	0.17	267.7	0	0.771
		North-western Atlantic		0.21				
		Southern Ocean		0.09				
		Western Atlantic		0.66				
	Temperature and region inclusive interactions	Western Pacific		0.71				
		Eastern Atlantic	-0.02	0.46				
		Eastern Pacific	0.02	-0.46				
		Indian Ocean Sector	-0.07	0.88				
		North-eastern Atlantic	-0.02	0.36	0.18	270.2	2.5	0.228
		North-western Atlantic	-0.04	0.73				
		Southern Ocean	-0.02	0.07				
Western Atlantic	-0.03	0.73						
Western Pacific	-0.05	1.12						

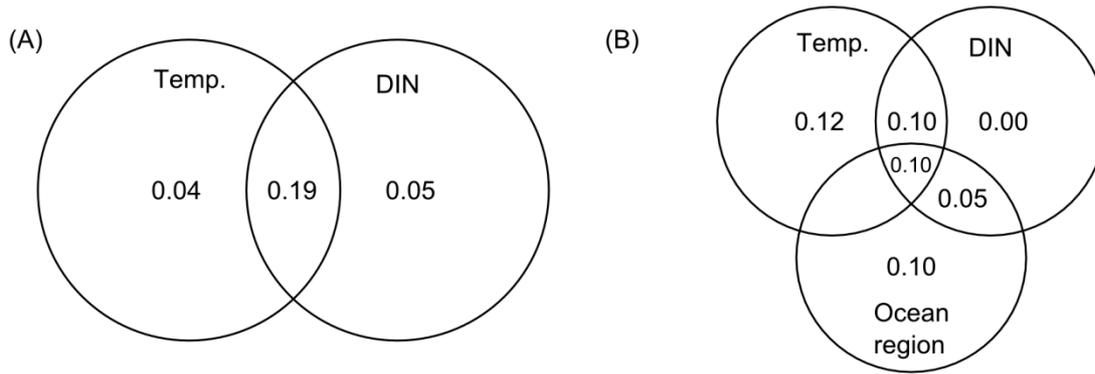


Fig. S1. Variance partitioning of the multivariate regression of the fraction of phytoplankton larger than 10 μm versus (A) temperature (Temp.) and dissolved inorganic nitrogen (DIN) and (B) temperature, DIN and ocean region

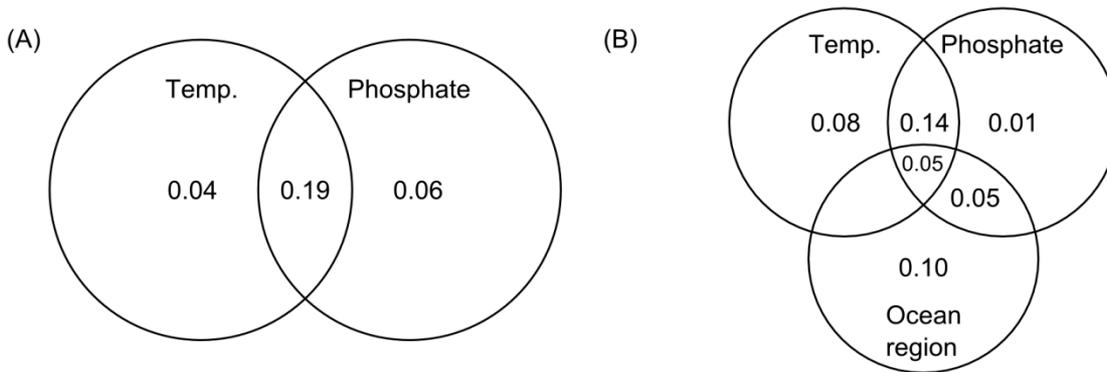


Fig. S2. Variance partitioning of the multivariate regression of the fraction of phytoplankton larger than 10 μm versus (A) temperature (Temp.) and phosphate and (B) temperature, phosphate and ocean region

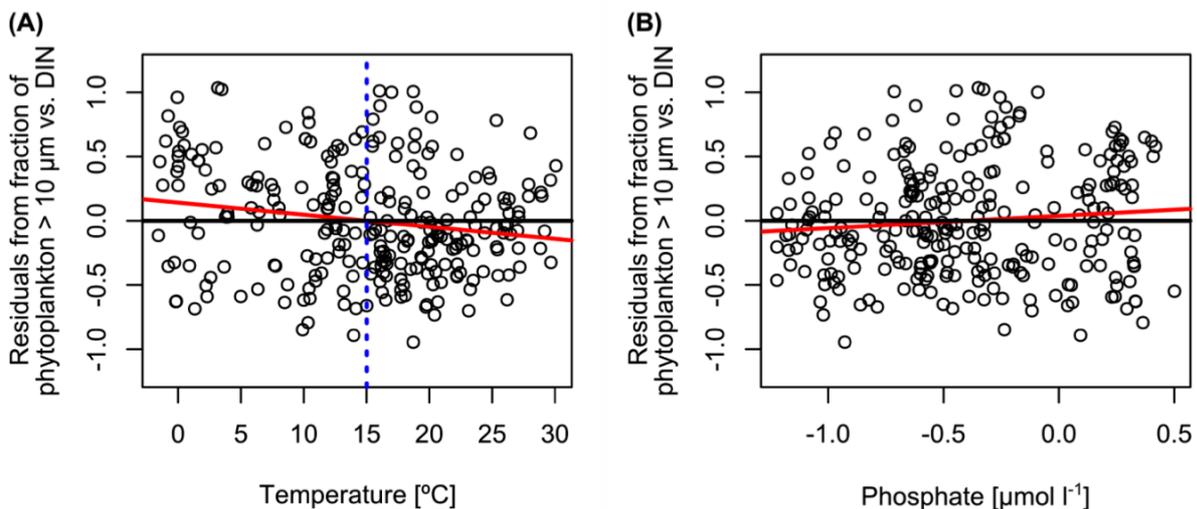


Fig. S3. Bivariate plots of the residuals (from a linear regression of the fraction of phytoplankton larger than 10 μm versus dissolved inorganic nitrogen [DIN]) versus (A) temperature and (B) phosphate. The red and black lines represent the results from a linear regression model and the line where $y = 0$, respectively. The vertical blue line represents the temperature where the regression line intercepts the black line and, thus, where the residuals change from being predominantly positive to predominately negative

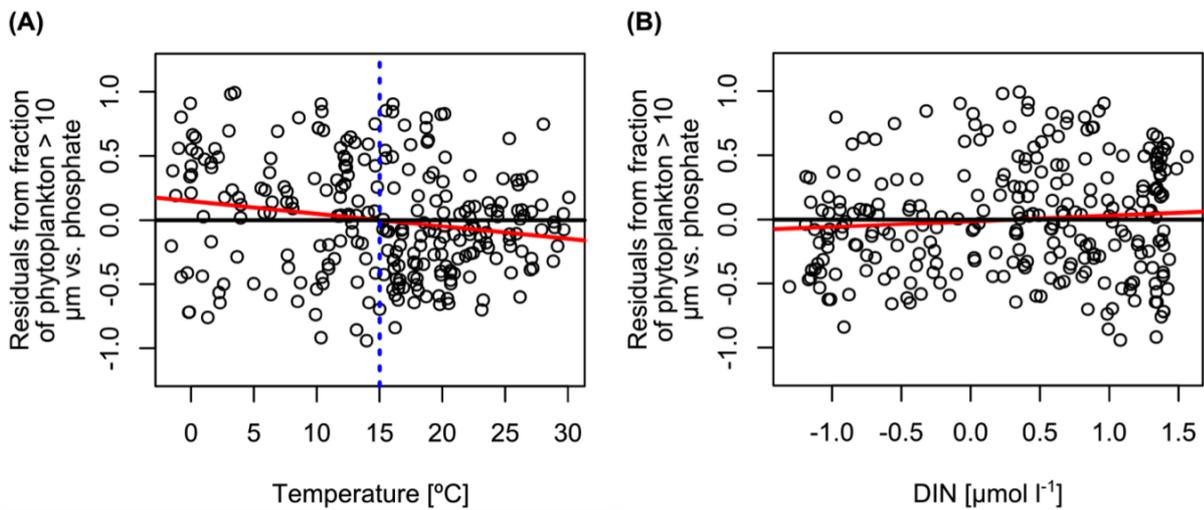


Fig. S4. Bivariate plots of the residuals (from a linear regression of the fraction of phytoplankton larger than 10 μm versus phosphate) versus (A) temperature and (B) dissolved inorganic nitrogen (DIN). The red and black lines represent the results from a linear regression model and the line where $y = 0$, respectively. The vertical blue line represents the temperature where the regression line intercepts the black line and, thus, where the residuals change from being predominantly positive to predominately negative

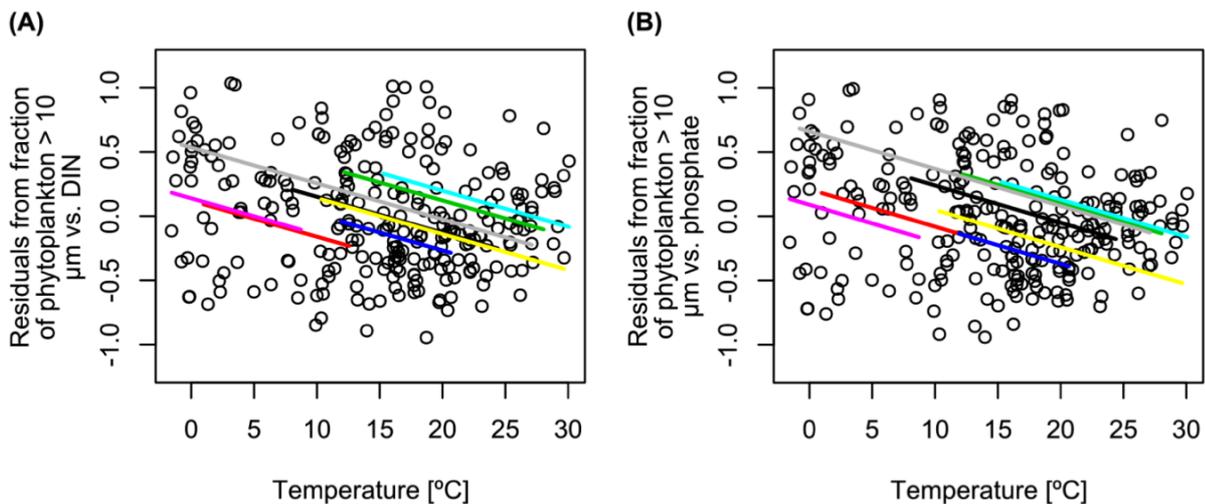


Fig. S5. Bivariate plots of (A) the residuals (from a multivariate regression of the fraction of phytoplankton larger than 10 μm versus dissolved inorganic nitrogen [DIN]) versus temperature and (B) the residuals (from a multivariate regression of the fraction of phytoplankton larger than 10 μm versus phosphate) versus temperature. The colored lines represent the results from a linear regression model including ocean region as a factor (slopes are forced to be the same according to the results shown in Tables S4 and S5). Black: North-eastern Atlantic (n = 37); turquoise: Western Pacific (n = 28); red: North-western Atlantic (n = 21); pink: Southern Ocean (n = 37); green: Eastern Atlantic (n = 26); yellow: Eastern Pacific (n = 28); blue: Indian Ocean Sector (n = 37); grey: Western Atlantic (n = 40)