

Supplementary A. Basic information and environmental conditions of sampling stations

Table S1. Information of shipboard grazing experiments in each cruise-station.

Cruise-station	Date	Latitude N	Longitude E
2014_Oct_st01	2 October 2014	26.099	120.164
2014_Oct_st03	2 October 2014	26.001	120.555
2014_Oct_st05	2 October 2014	25.834	121.027
2014_Oct_st09	30 September 2014	25.501	121.968
2014_Oct_st11	1 October 2014	25.333	122.441
2015_Jul_st05	23 July 2015	25.834	121.027
2016_May_st01	13 May 2016	26.13	120.109
2016_May_st03	13 May 2016	26.001	120.55
2016_May_st05	12 May 2016	25.834	121.025
2016_May_st07	12 May 2016	25.659	121.514
2016_May_st09	10 May 2016	25.498	121.974
2016_May_st11	11 May 2016	25.334	122.44
2017_Jun_st01	18 June 2017	26.095	120.182
2017_Jun_st05	19 June 2017	25.832	121.026
2017_Jun_st09	20 June 2017	25.502	121.961

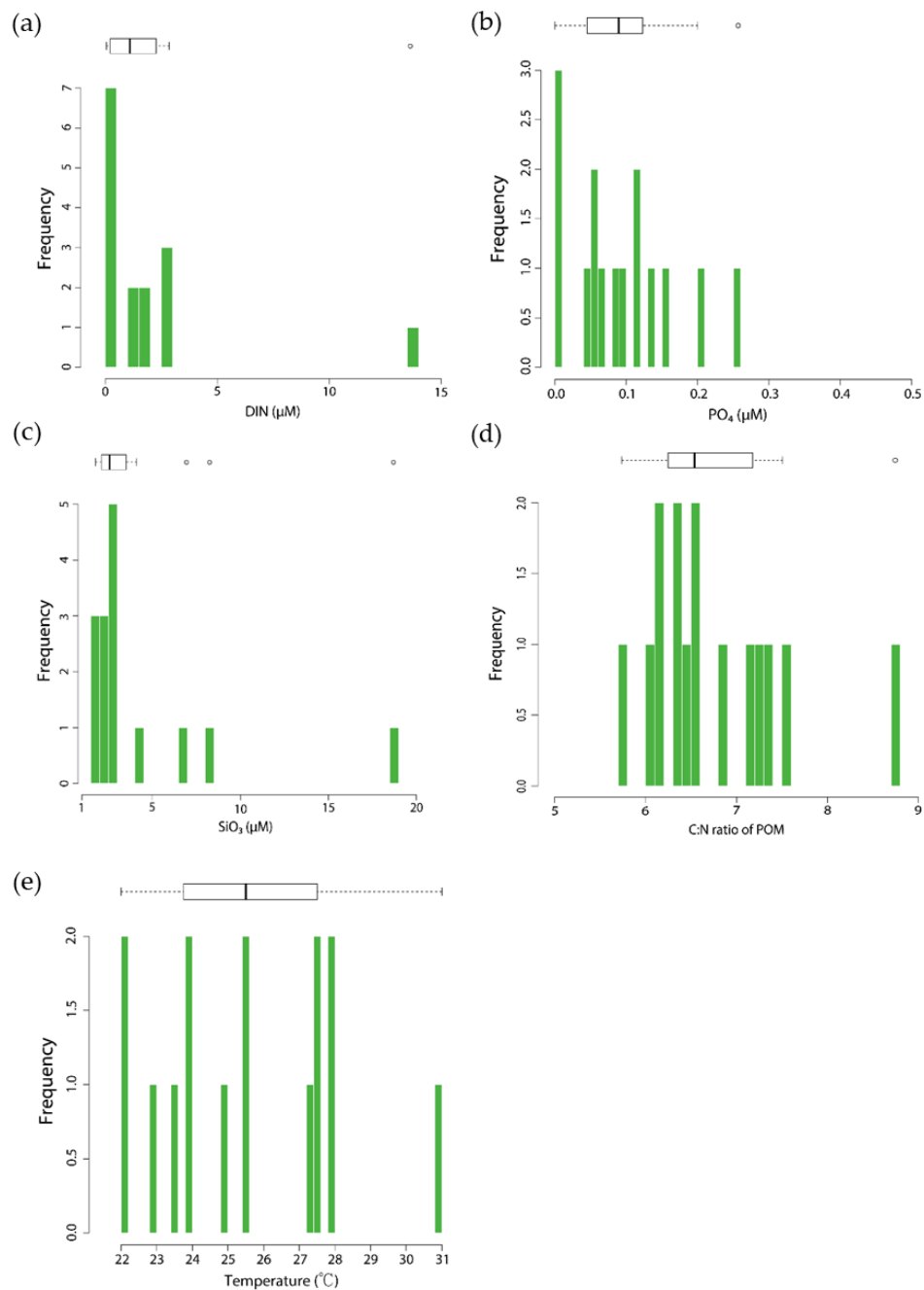


Figure S1. The variation of each environmental factor in our study: (a) Dissolved inorganic nitrogen (DIN, unit: μM), (b) PO_4 (μM), (c) SiO_3 (μM), (d) C:N ratio of POM, and (e) Incubation temperature ($^{\circ}\text{C}$). For each figure, boxplot (upper) and histogram (lower) indicate the variation and the frequency distribution of each environmental factor. The highest nutrient concentrations were mostly from the inshore area influenced by the terrestrial input.

Supplementary B. Calculation of phytoplankton carbon mass

Carbon mass of each phytoplankton cell is calculated based on their equivalent spherical diameter (ESD).

Table S2. Conversion factors from cell volume to carbon (Menden-Deuer & Lessard 2000). C: carbon weight (pg), V: volume (μm^3).

Equivalent spherical diameter (ESD) of plankton cell	Equation
< 20 μm	$\log C = -0.583 + 0.86 \times \log V$
< 50 μm	$\log C = -0.665 + 0.939 \times \log V$

Supplementary C. Predator abundance in each incubation

Table S3. Total number of zooplankton and non-copepod zooplankton in each replicate experimental bottle. NA indicates that the data are unavailable.

Cruise-station	Replicate	Number of zooplankton	Number of non-copepod zooplankton
2014_Oct_st01	1	1276	7
	2	1041	2
	3	915	7
2014_Oct_st03	1	282	6
	2	290	2
	3	186	2
2014_Oct_st05	1	99	0
	2	124	0
	3	91	0
2014_Oct_st09	1	17	0
	2	75	0
	3	55	0
2014_Oct_st11	1	786	0
	2	454	0
	3	NA	NA
2015_Jul_st05	1	241	0
	2	217	1
	3	204	0
2016_May_st01	1	450	11
	2	242	1
	3	553	3
2016_May_st03	1	489	7
	2	1008	13
	3	539	17
2016_May_st05	1	853	10
	2	603	8
	3	1148	4
2016_May_st07	1	412	3
	2	502	4
	3	233	2
2016_May_st09	1	125	0
	2	332	0
	3	464	4
2016_May_st11	1	233	1
	2	166	1
	3	8	0
2017_Jun_st01	1	381	1
	2	439	1
	3	473	2

2017_Jun_st05	1	507	1
	2	593	10
	3	544	3
2017_Jun_st09	1	173	1
	2	281	1
	3	198	1

Supplementary D. Intensity of trophic cascade in each *in situ* incubation experiment

Table S4. The intensity of trophic cascade (*TC*) in each cruise-station.

Cruise-station	Intensity of trophic cascade ($\times 10^{-4}$)
2014_Oct_st01	12.991
2014_Oct_st03	75.366
2014_Oct_st05	19.596
2014_Oct_st09	24.208
2014_Oct_st11	-9.309
2015_Jul_st05	-12.424
2016_May_st01	51.993
2016_May_st03	24.579
2016_May_st05	14.634
2016_May_st07	28.708
2016_May_st09	8.85
2016_May_st11	-33.031
2017_Jun_st01	-11.758
2017_Jun_st05	10.5
2017_Jun_st09	32.441

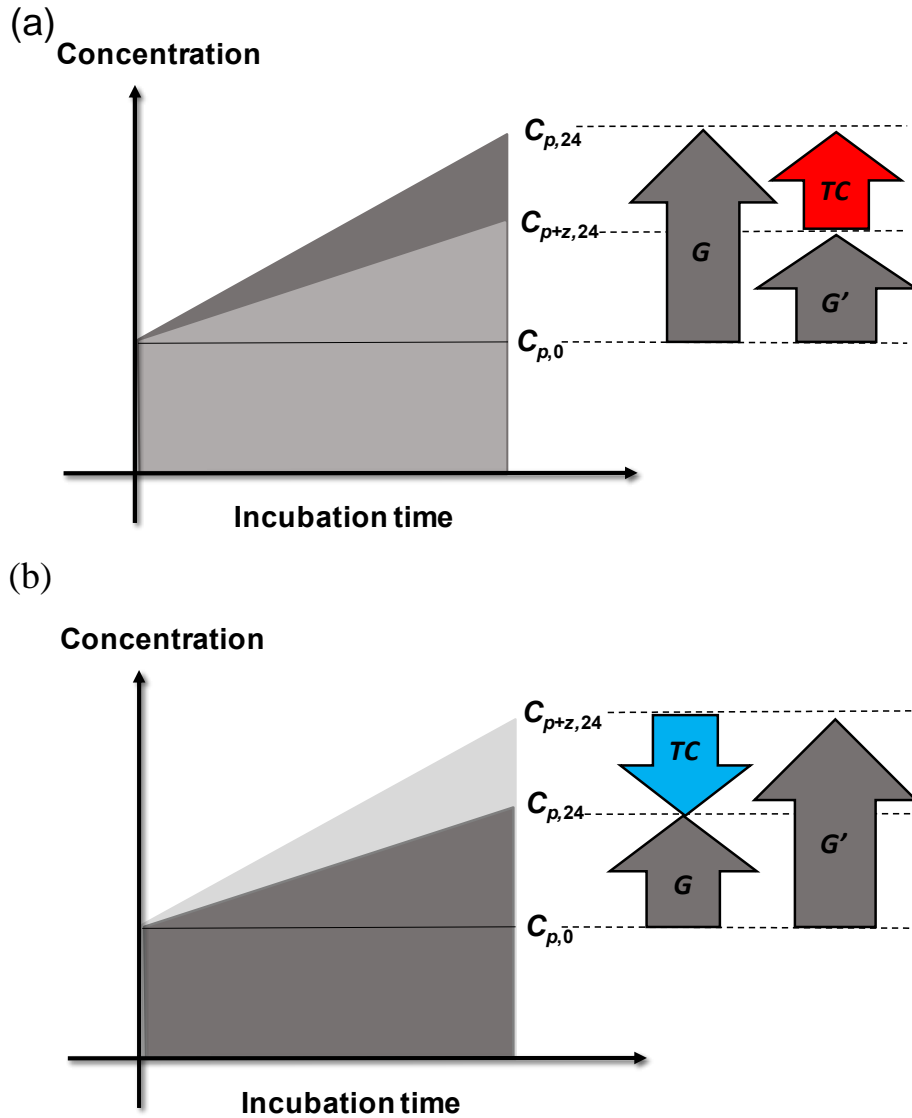


Figure S2. Calculation of the intensity of trophic cascade (TC) when phytoplankton grow after incubation. Concentration of phytoplankton at the beginning of incubation is $C_{p,0}$. Concentrations of phytoplankton in the bottles without and with copepod grazers after 24 hours of incubation are $C_{p,24}$ and $C_{p+z,24}$, respectively. The grazing of copepods can lead to two possible results: (a) The increase of phytoplankton (negative elimination) in the experimental bottles (G') is lower than the increase of phytoplankton in the control bottles (G), and thus TC is negative. (b) The increase of phytoplankton in the experimental bottles (G') is higher than the increase of phytoplankton in the control bottles (G), and thus TC is positive. We defined negative TC as the experiments exhibiting no trophic cascade.

Supplementary E. Elimination and growth of phytoplankton biomass during incubations

Table S5. Phytoplankton mean carbon density (unit: μg) in the control samples collected before the incubation ($C_{p,0}$), control bottles without copepods ($C_{p,24}$) and experimental bottles with copepods ($C_{p+z,24}$) after the incubation in each cruise-station. Cruise-stations labeled with * indicate that phytoplankton growth occurred after the dark incubation.

Cruise-station	$C_{p,0}$	$C_{p,24}$	$C_{p+z,24}$
2014_Oct_st01	0.63	0.137	0.481
2014_Oct_st03*	0.109	0.259	1.632
2014_Oct_st05*	0.076	0.545	0.605
2014_Oct_st09*	0.16	0.413	0.205
2014_Oct_st11*	0.189	0.321	0.335
2015_Jul_st05*	0.016	0.028	0.02
2016_May_st01*	0.058	0.023	0.152
2016_May_st03*	0.116	0.053	0.295
2016_May_st05	0.539	0.094	0.265
2016_May_st07	0.068	0.017	0.05
2016_May_st09*	0.029	0.031	0.04
2016_May_st11	0.138	0.072	0.07
2017_Jun_st01	0.424	0.208	0.116
2017_Jun_st05*	0.054	0.038	0.071
2017_Jun_st09	0.119	0.064	0.104

Table S6. Elimination rates in each replicate control bottle without copepods (G) and each replicate experimental bottle with copepods (G'). Negative elimination rates indicated that phytoplankton grew more abundant after dark incubation (see Figure. S2).

Cruise-station	Replicate	G	G'
2014_Oct_st01	1	1.071	0.224
	2	2.296	0.286
	3	1.576	0.3
2014_Oct_st03	1	-1.141	-2.464
	2	-0.606	-2.977
	3	-0.775	-2.605
2014_Oct_st05	1	-2.464	-2.217
	2	-1.297	-2.09
	3	-1.824	-1.903
2014_Oct_st09	1	-1.958	0.003
	2	1.197	-0.847
	3	1.023	0.644
2014_Oct_st11	1	-0.29	-0.643
	2	-0.42	0.417
	3	-0.81	-1.014
2015_Jul_st05	1	-0.388	-0.468
	2	0.027	0.034
	3	-1.037	-0.173
2016_May_st01	1	0.45	-0.043
	2	1.203	-1.195
	3	1.395	-1.256
2016_May_st03	1	0.732	0.302
	2	0.389	-1.108
	3	1.58	-1.345
2016_May_st05	1	2.11	0.592
	2	1.084	1.06
	3	2.737	0.556
2016_May_st07	1	1.199	-0.345
	2	1.026	1.07
	3	2.463	0.864
2016_May_st09	1	-0.655	0.284
	2	0.048	-0.434
	3	1.128	-0.617
2016_May_st11	1	0.499	0.511
	2	0.94	0.782
	3	0.555	0.743
	1	0.757	1.074

2017_Jun_st01	2	1.309	1.327
	3	0.311	1.533
2017_Jun_st05	1	0.545	0.294
	2	1.04	0.295
	3	-0.197	-0.904
2017_Jun_st09	1	0.204	-0.196
	2	0.492	0.366
	3	1.721	0.342

Supplementary F. Multiple linear regressions between the intensity of trophic cascade and environmental factors

Table S7. Results of multiple linear regression. The intensity of trophic cascade (*TC*) is the response variable; NBSS slopes, C:N ratio of POM and temperature are explanatory variables. Based on AIC value, no variable can better explain the variation of *TC* compared to the null model.

Initial model: <i>TC</i> ~ intercept	
Variable selection	AIC
<none>	-141.98
+ ln (C:N of POM)	-140.49
+ NBSS slopes	-140.29
+ Temperature	-140.09
Most parsimonious model: <i>TC</i> ~ intercept	

Table S8. NBSS slopes, temperature (°C) and C:N ratio of POM in each cruise-station. NA indicates that the data are unavailable.

Cruise-stations	NBSS slopes	Temperature (°C)	C:N ratio of POM
2014_Oct_st01	-0.417	28	6.04
2014_Oct_st03	-0.541	28	6.331
2014_Oct_st05	-0.397	27.3	6.167
2014_Oct_st09	-0.359	27.5	6.806
2014_Oct_st11	NA	27.5	6.589
2015_Jul_st05	NA	31	7.238
2016_May_st01	-0.586	22	7.35
2016_May_st03	-0.683	25	8.745
2016_May_st05	-0.424	22	6.477
2016_May_st07	-0.591	25.5	6.369
2016_May_st09	-0.566	24	7.115
2016_May_st11	-0.684	25.5	7.507
2017_Jun_st01	NA	23	5.74
2017_Jun_st05	-0.63	23.5	6.538
2017_Jun_st09	-0.559	24	6.105

Supplementary G. Relationship between trophic cascade and the phytoplankton within the optimal prey size range

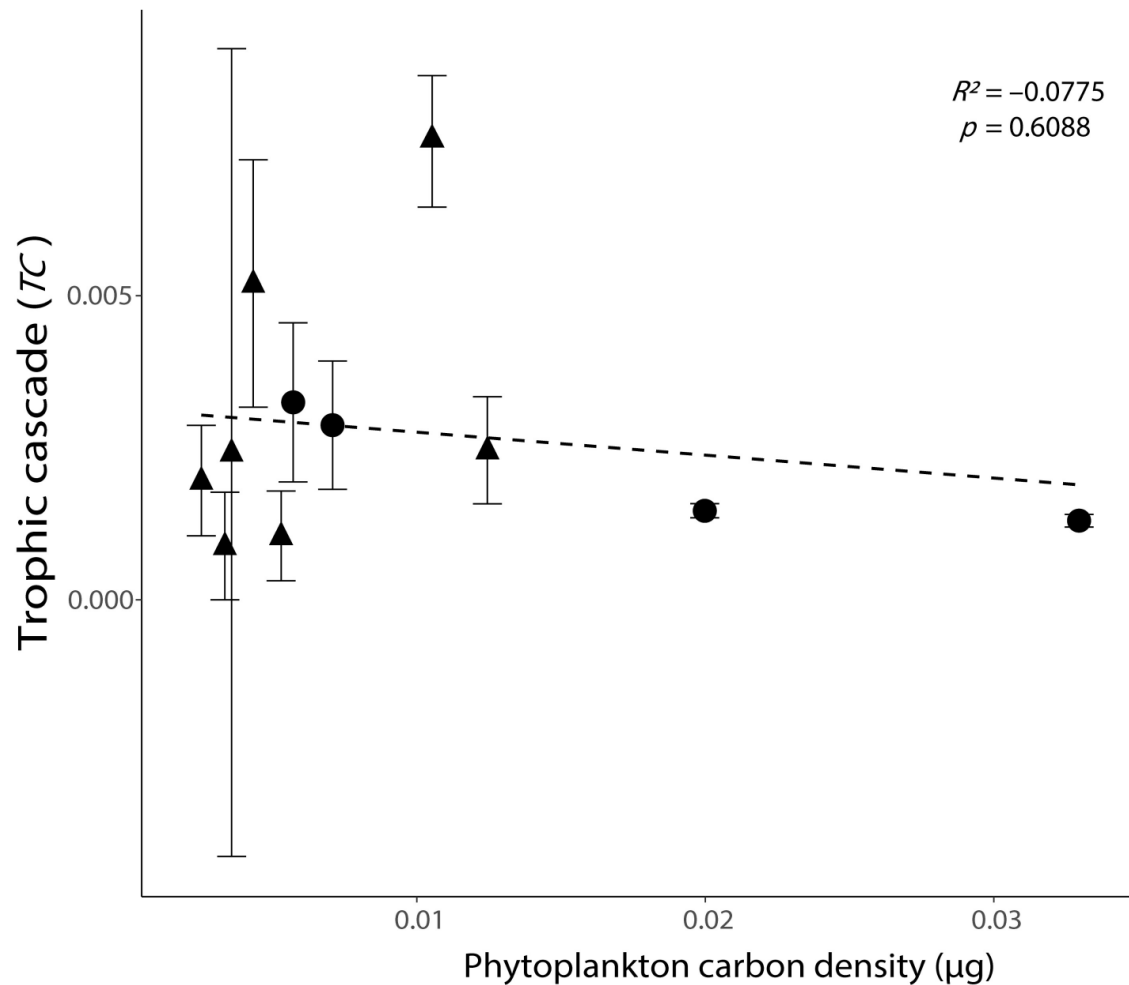


Figure S3. Relationship between the intensities of trophic cascade (TC) and the phytoplankton carbon density within the optimal prey size range (5.8-11.2 μm). All values are shown as mean \pm 1 standard error. Negative values of TC were removed, as these experiments exhibit no trophic cascade. Triangular points indicate the TC calculated from the incubations with phytoplankton growth (Fig. S2). The dash line indicates the best-fit regression line.

Supplementary H. Size-specific intensity of trophic cascade and elimination rate in each *in situ* incubation experiment

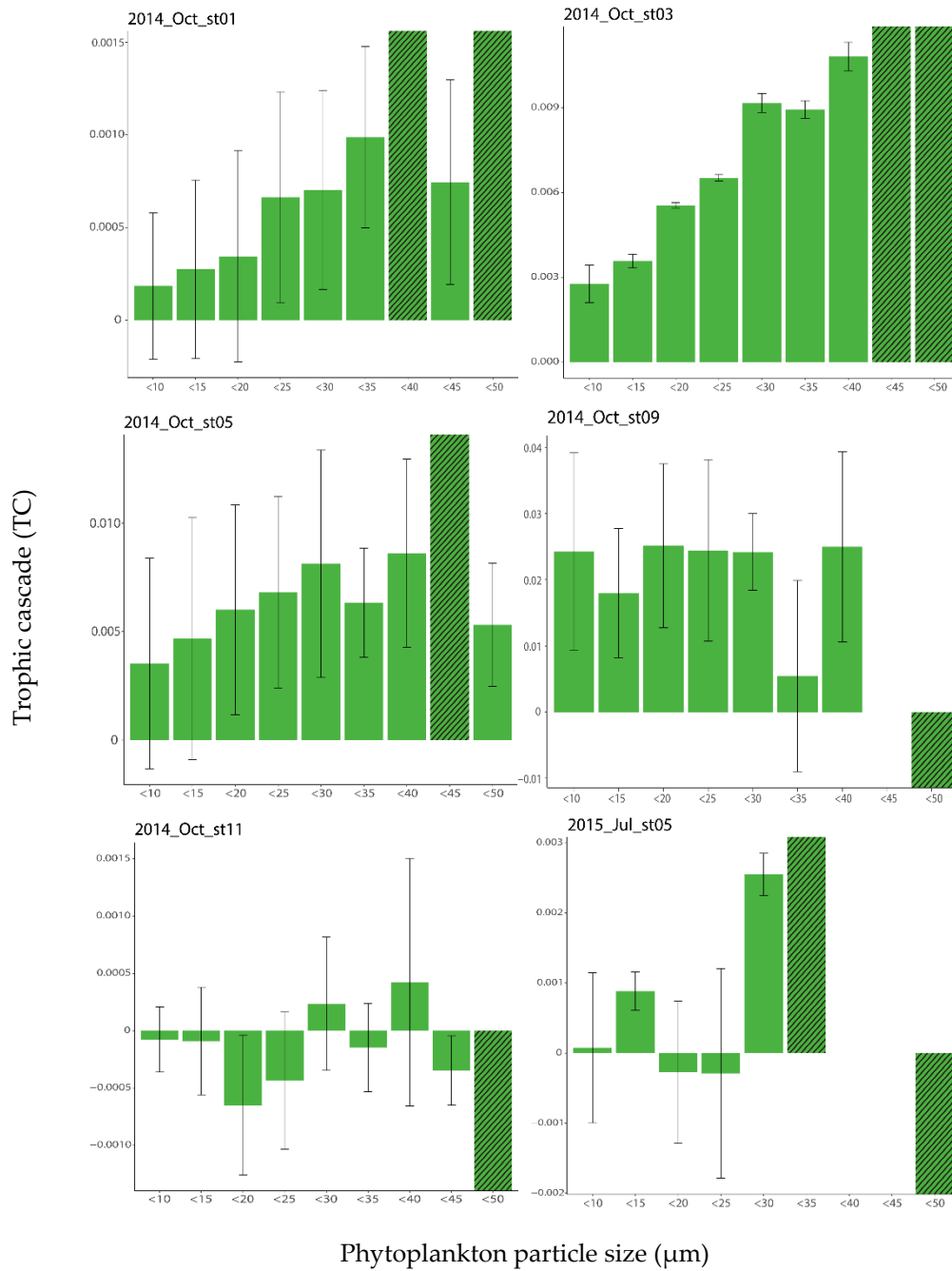


Figure S4. The size-specific intensity of trophic cascade in each station of the cruise in October, 2014 (2014_Oct) and July, 2015 (2015_Jul). All values are shown as mean \pm 1 standard error. Shaded bars indicate the infinite values. Arrangement follows the station, indicating no spatial difference.

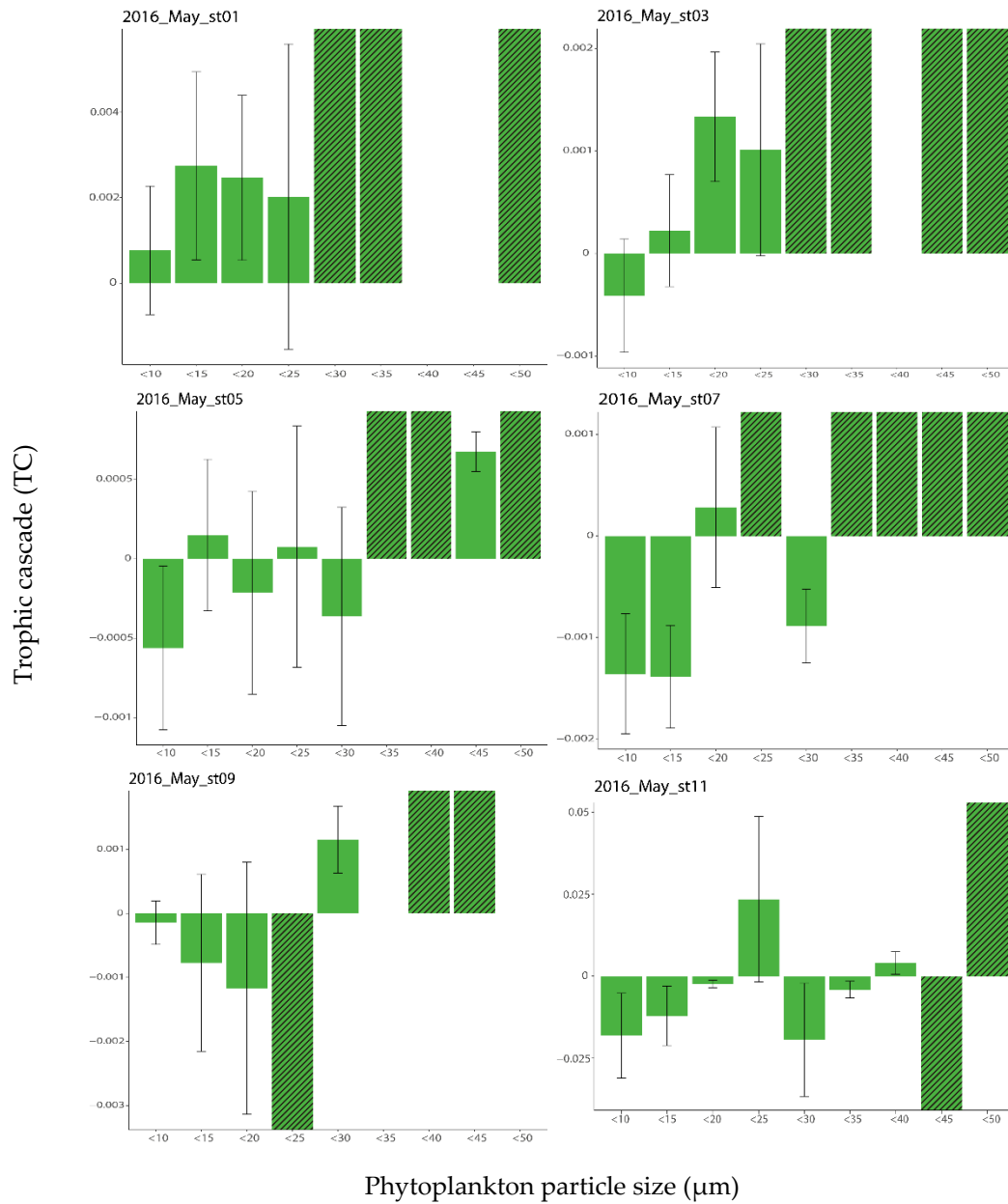


Figure S5. The size-specific intensity of trophic cascade in each station of the cruise in May, 2016 (2016_May). All values are shown as mean \pm 1 standard error. Shaded bars indicate the infinite values. Arrangement follows the station, indicating no spatial difference.

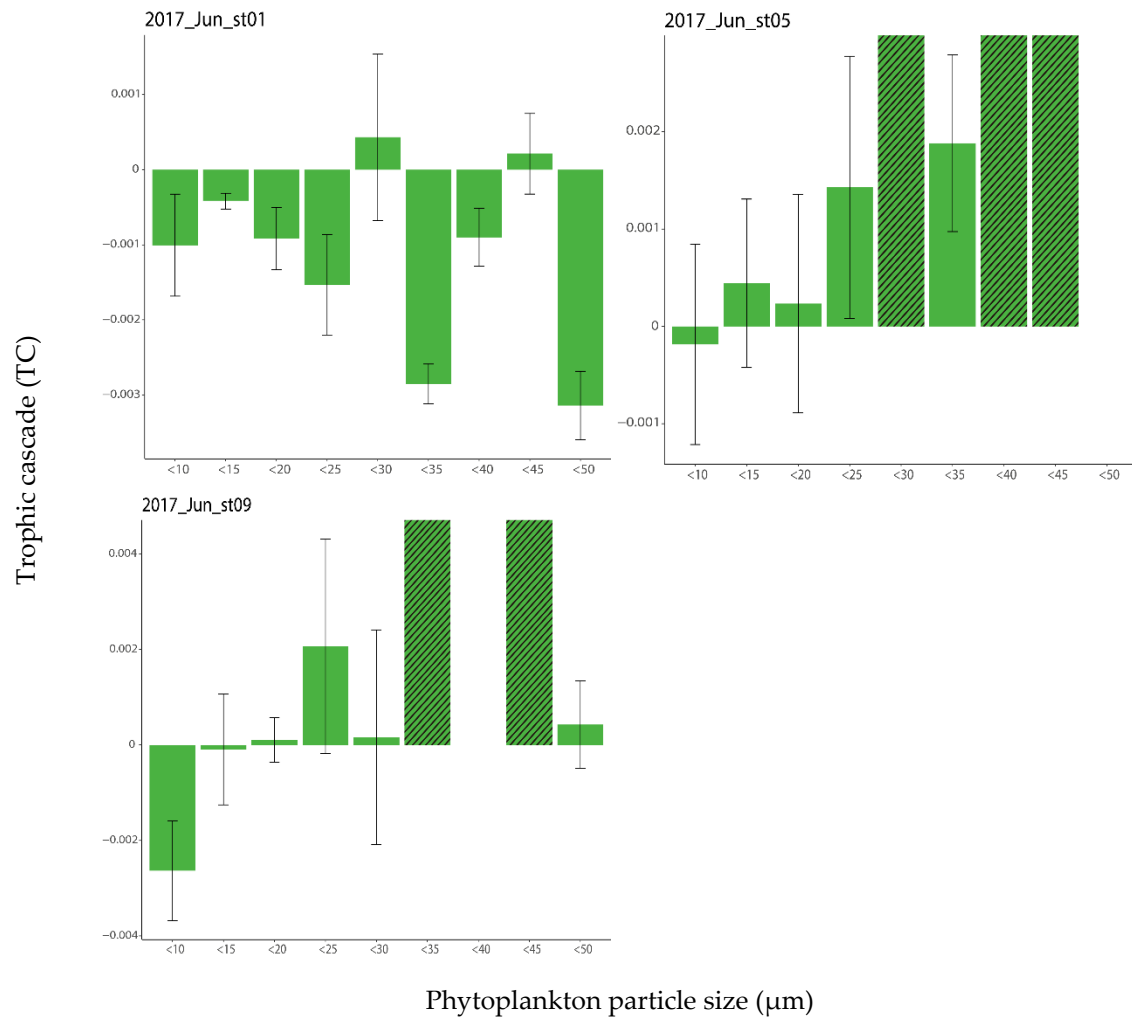


Figure S6. The size-specific intensity of trophic cascade in each station of the cruise in June, 2017 (2017_Jun). All values are shown as mean \pm 1 standard error. Shaded bars indicate the infinite values. Arrangement follows the station, indicating no spatial difference.

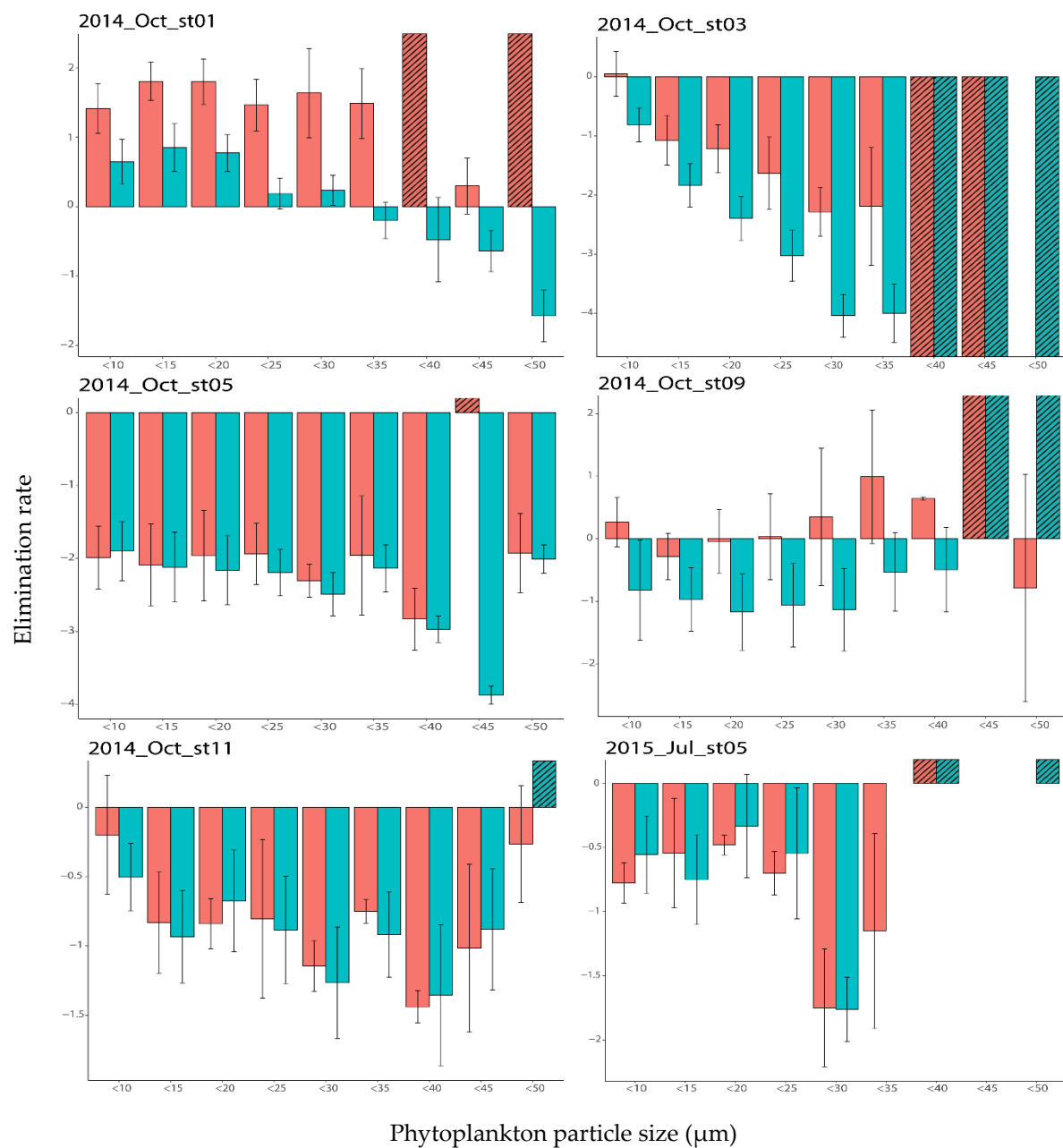


Figure S7. The size-specific elimination rate in each replicate control bottle without copepods (red) and in each replicate experimental bottle with copepods (blue) in each station of the cruise in October, 2014 (2014_Oct) and July, 2015 (2015_Jul). All values are shown as mean \pm 1 standard error. Shaded bars indicate the infinite values.

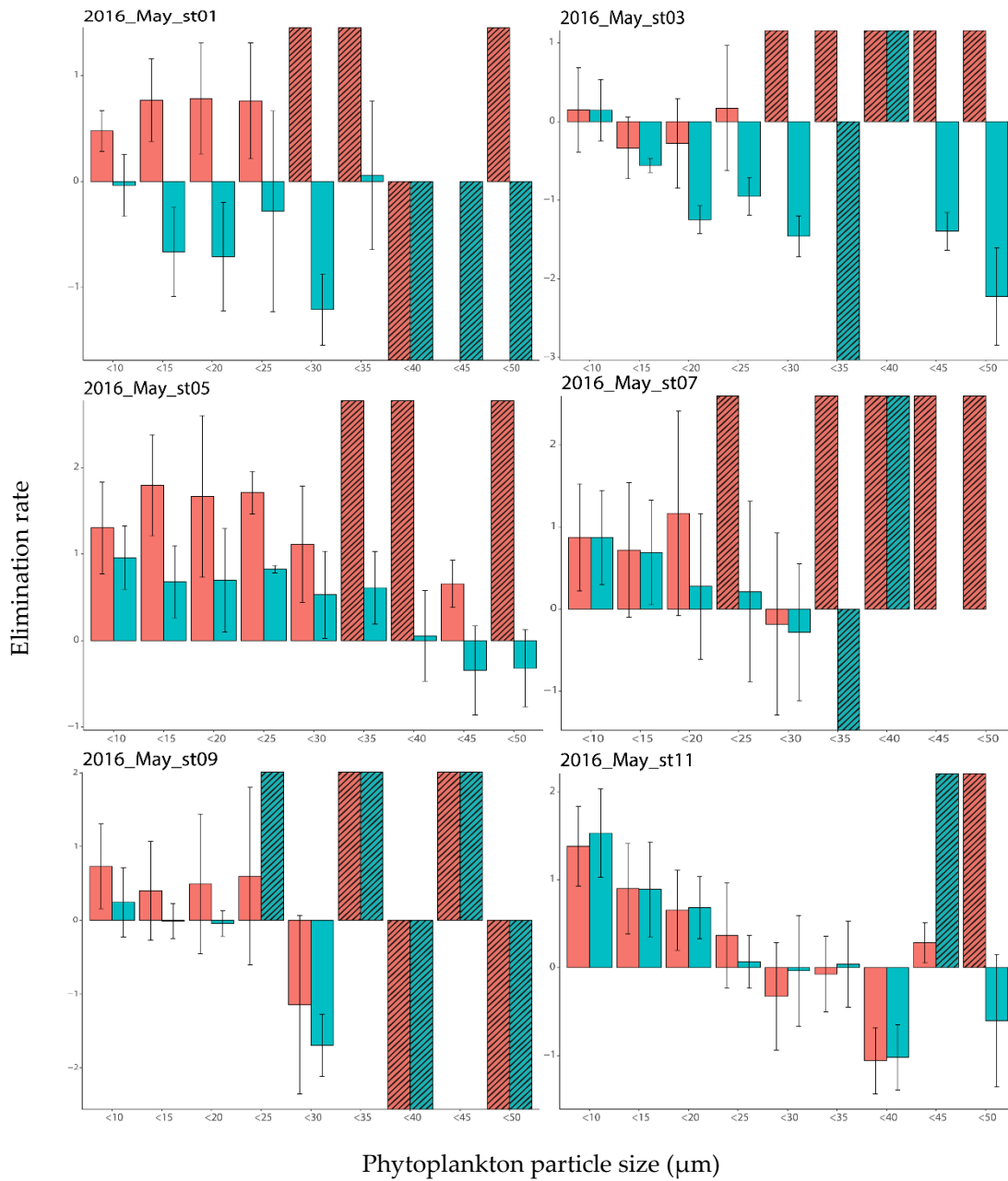


Figure S8. The size-specific elimination rate in each replicate control bottle without copepods (red) and in each replicate experimental bottle with copepods (blue) in each station of the cruise in May, 2016 (2016_May). All values are shown as mean \pm 1 standard error. Shaded bars indicate the infinite values.

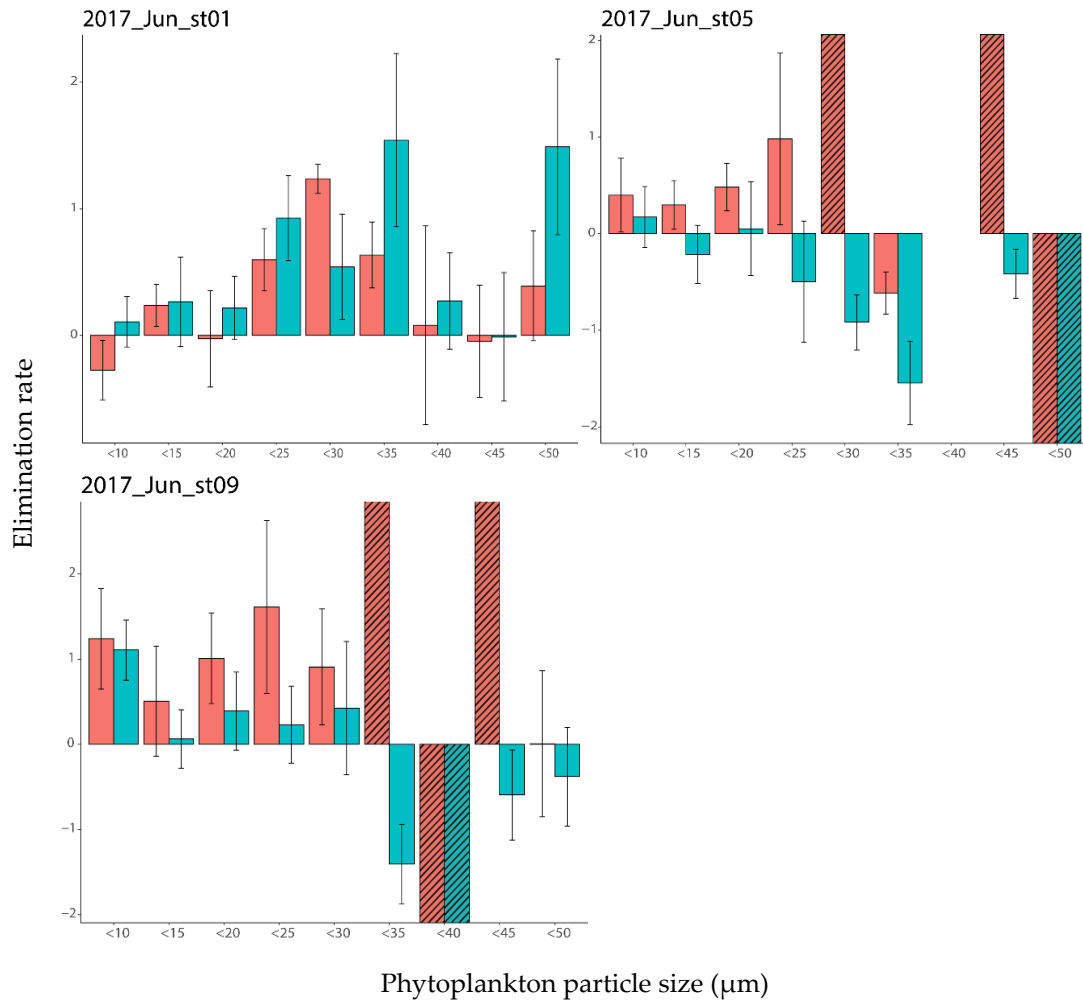


Figure S9. The size-specific elimination rate in each replicate control bottle without copepods (red) and in each replicate experimental bottle with copepods (blue) in each station of the cruise in June, 2017 (2017_Jun). All values are shown as mean \pm 1 standard error. Shaded bars indicate the infinite values.

Reference

Menden-Deuer, S.; Lessard, E.J. Carbon to volume relationships for dinoflagellates, diatoms, and other protist plankton. *Limnol. Oceanogr.* **2000**, *45*, 569-579.