



*Supplement of*

## **Ocean acidification alters phytoplankton diversity and community structure in the coastal water of the East China Sea**

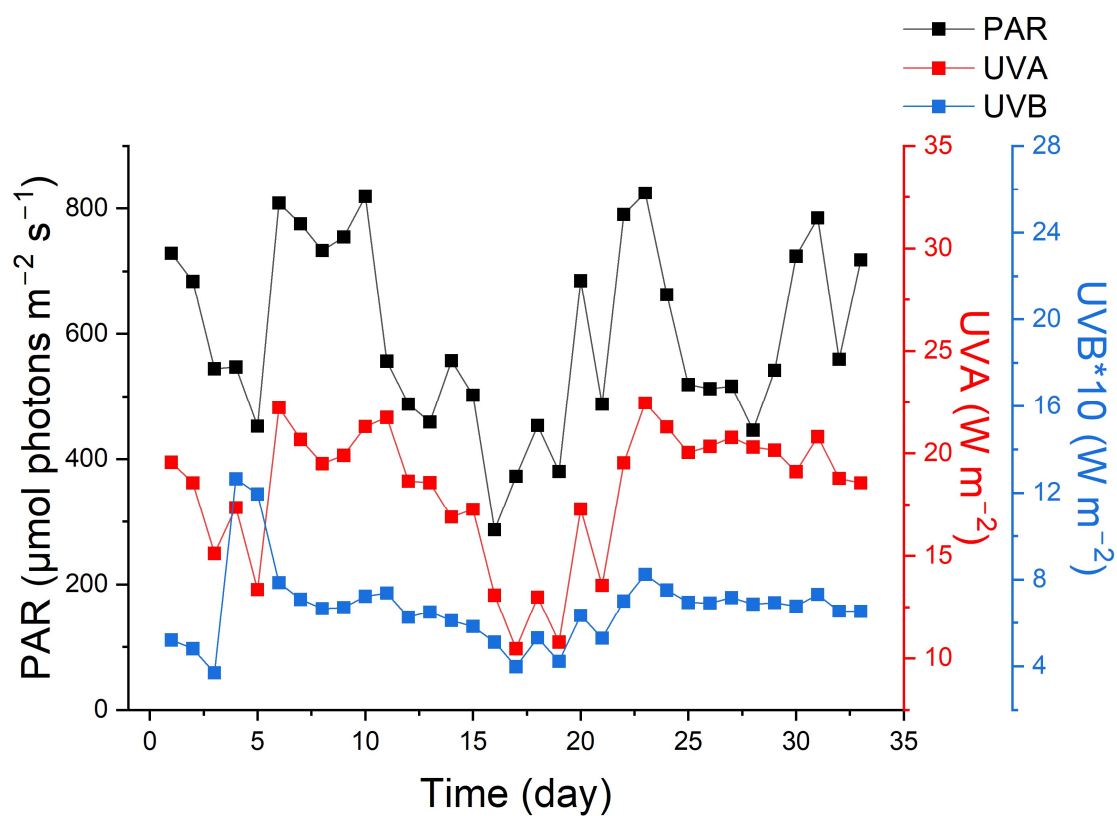
**Yuming Rao et al.**

*Correspondence to:* Kunshan Gao ([ksgao@xmu.edu.cn](mailto:ksgao@xmu.edu.cn))

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Abbreviations			
OA	Ocean acidification	Diat	Diatoms
HC	Elevated $p\text{CO}_2$	Dino	Dinoflagellates
AC	Ambient $p\text{CO}_2$	Cyano	Cyanobacteria
Chl <i>a</i>	chlorophyll <i>a</i>	Chlo	Chlorophyta
DIC	Dissolved inorganic carbon	Cryp	Cryptophyta
TA	Total alkalinity	Eugl	Euglenophyta
POC	Particulate organic carbon	PSU	Photosynthetic unit
PON	Particulate organic nitrogen	CCMs	$\text{CO}_2$ -concentrating mechanisms
PAR	Photosynthetic active radiation		

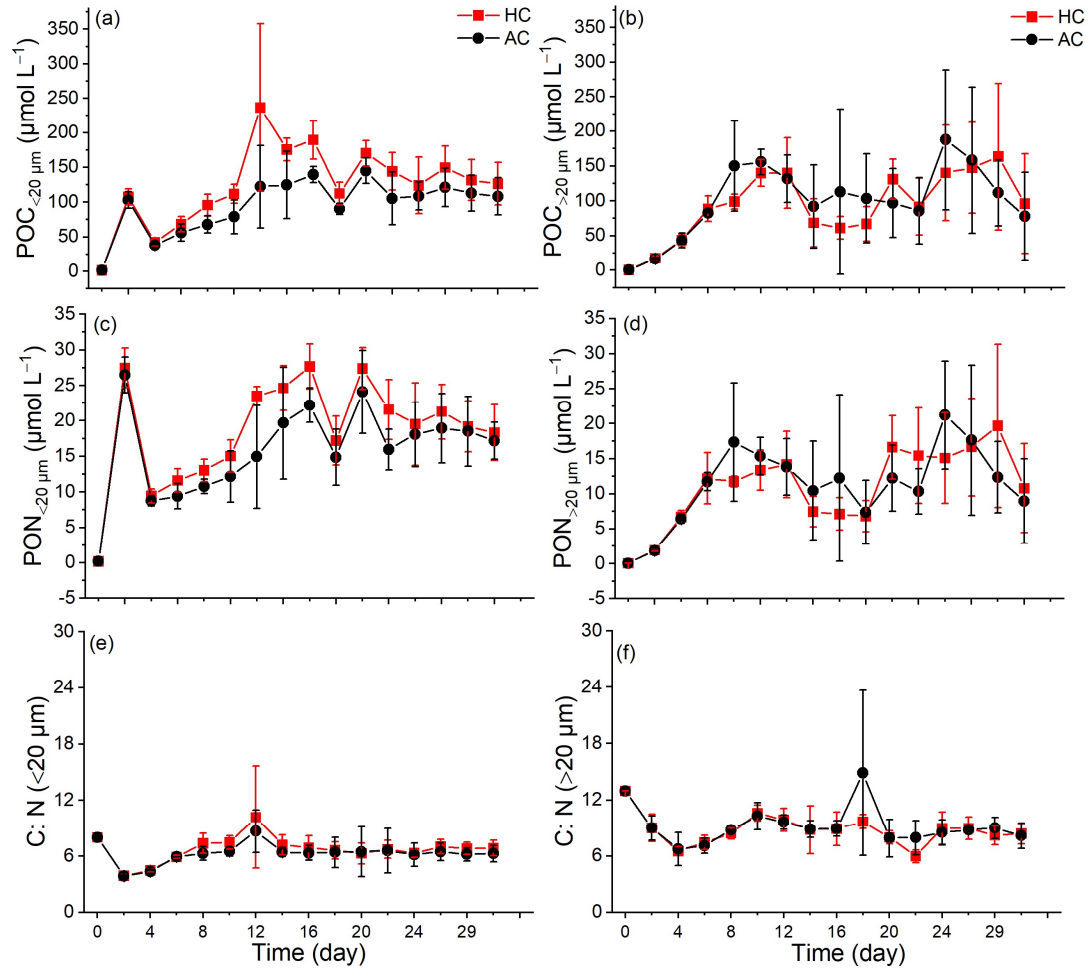
1 Table S1. List of abbreviations used in this study.



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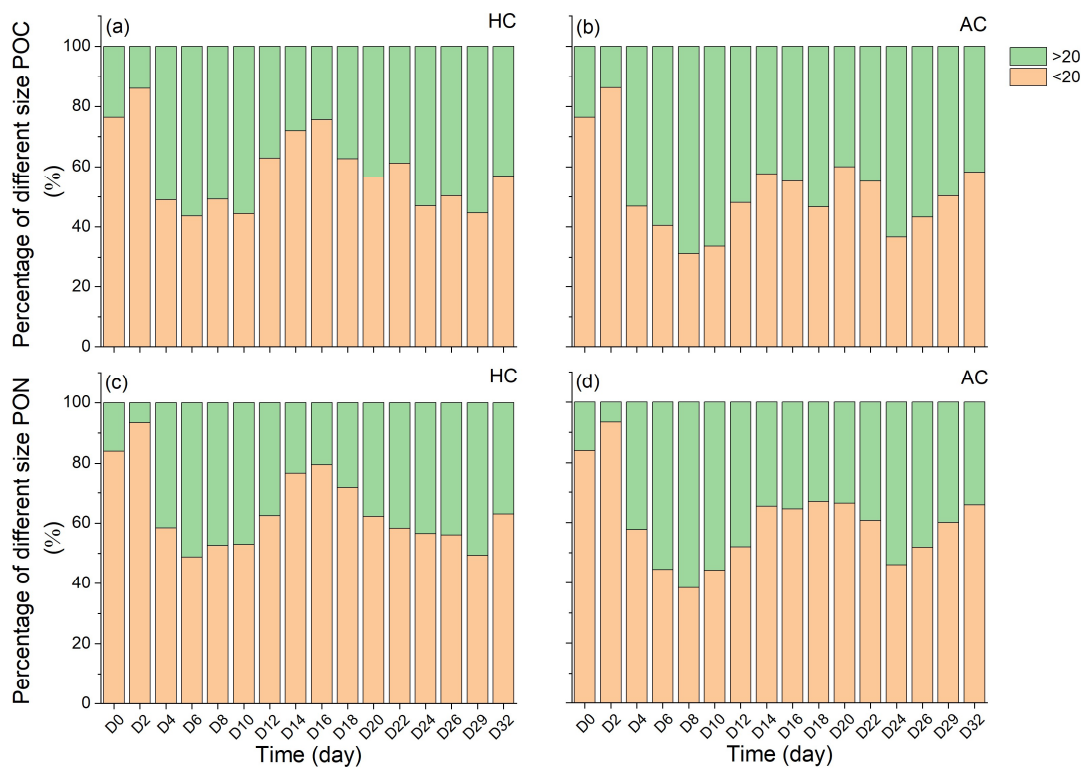
3 Figure S1. The daily variation of 12h-average photosynthetic active radiation (PAR), ultraviolet A

4 (UVA) and ultraviolet B (UVB) during the mesocosm experiment.



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6 Figure S2. Temporal variations of different size particulate organic carbon (< 20 μm, a; > 20 μm, b),  
 7 particulate organic nitrogen (< 20 μm, c; > 20 μm, d) and C/N ratio (< 20 μm, e; > 20 μm, f) in HC  
 8 (1000 μatm) and AC (410 μatm) mesocosms. Data are means ± SD of 5 replicates for HC and 4  
 9 replicates for AC mesocosms.

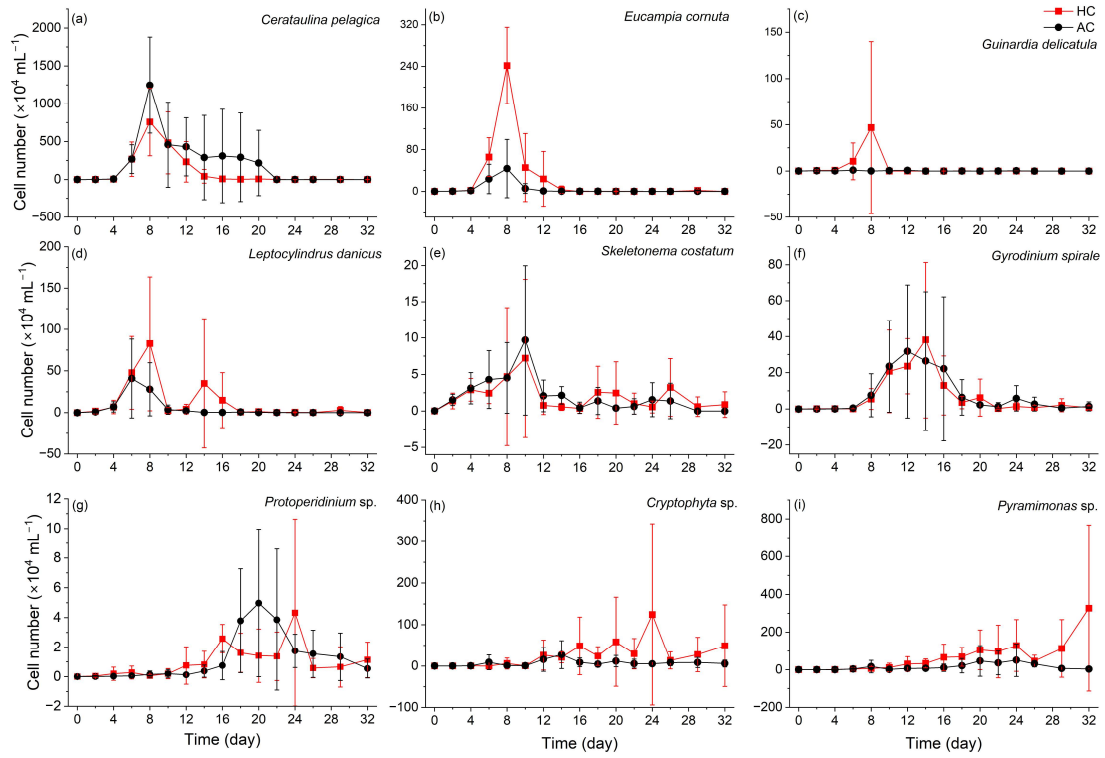


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11 Figure S3. Temporal variations of the relative composition of different size particulate organic  
 12 carbon (HC, a; AC, b), particulate organic nitrogen (HC, c; AC, d) in HC (1000  $\mu\text{atm}$ ) and AC (410  
 13  $\mu\text{atm}$ ) mesocosms. Data are means of 5 replicates for HC and 4 replicates for AC mesocosms.

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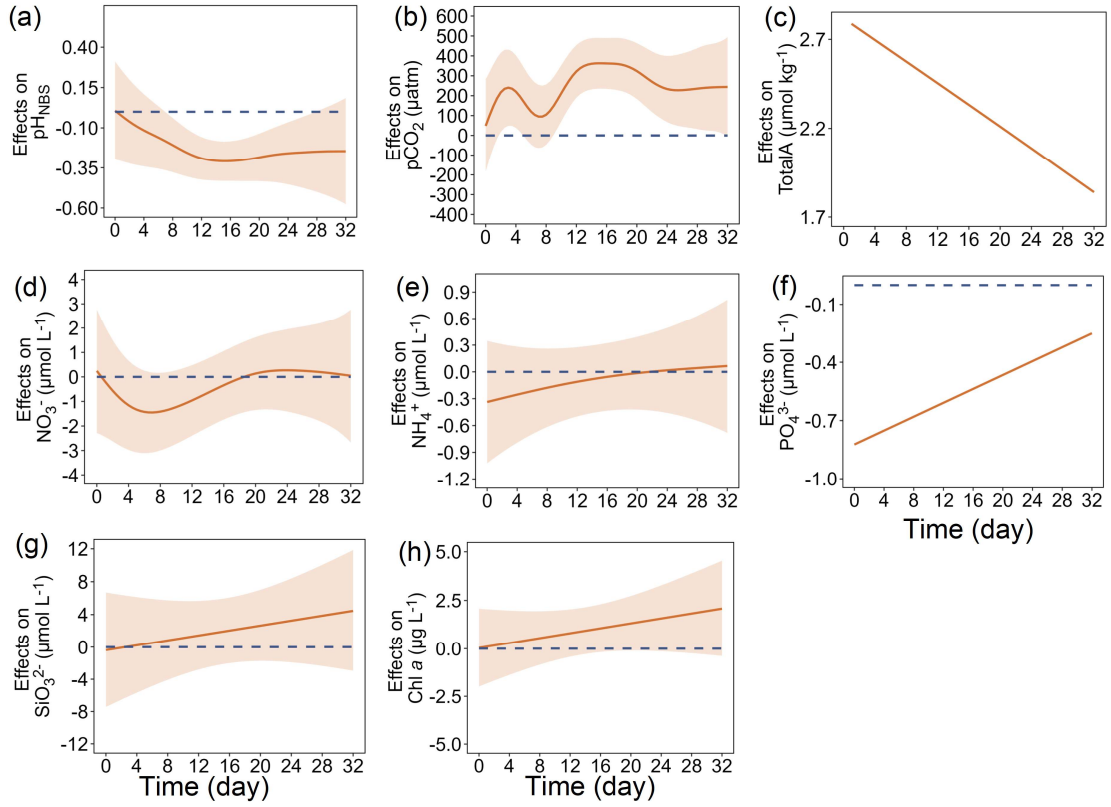
17 Figure S4. Temporal variations of different dominant species in HC (1000  $\mu\text{atm}$ ) and AC (410  $\mu\text{atm}$ )

18 mesocosms. Data are means  $\pm$  SD of 5 replicates for HC and 4 replicates for AC mesocosms.

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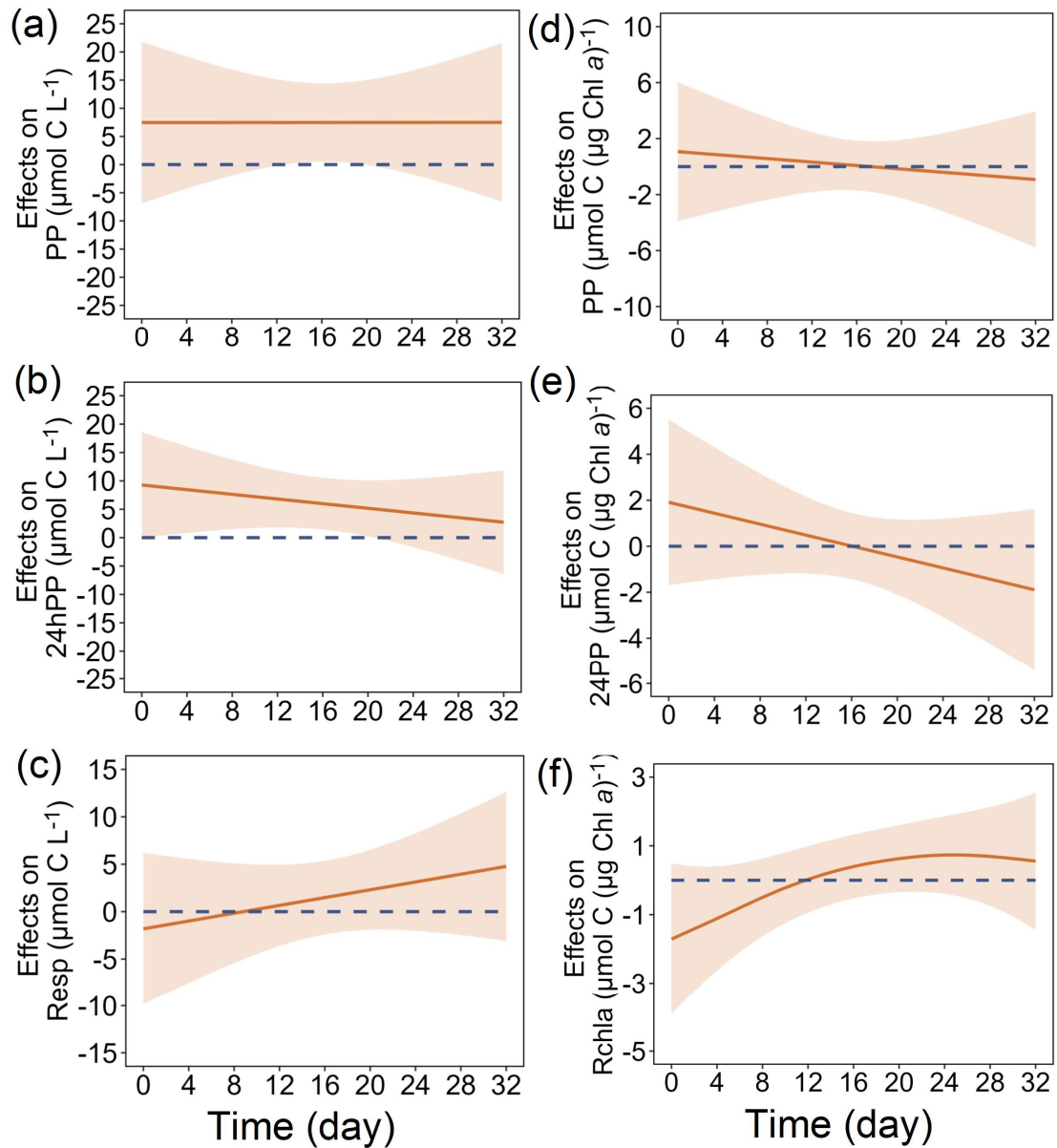
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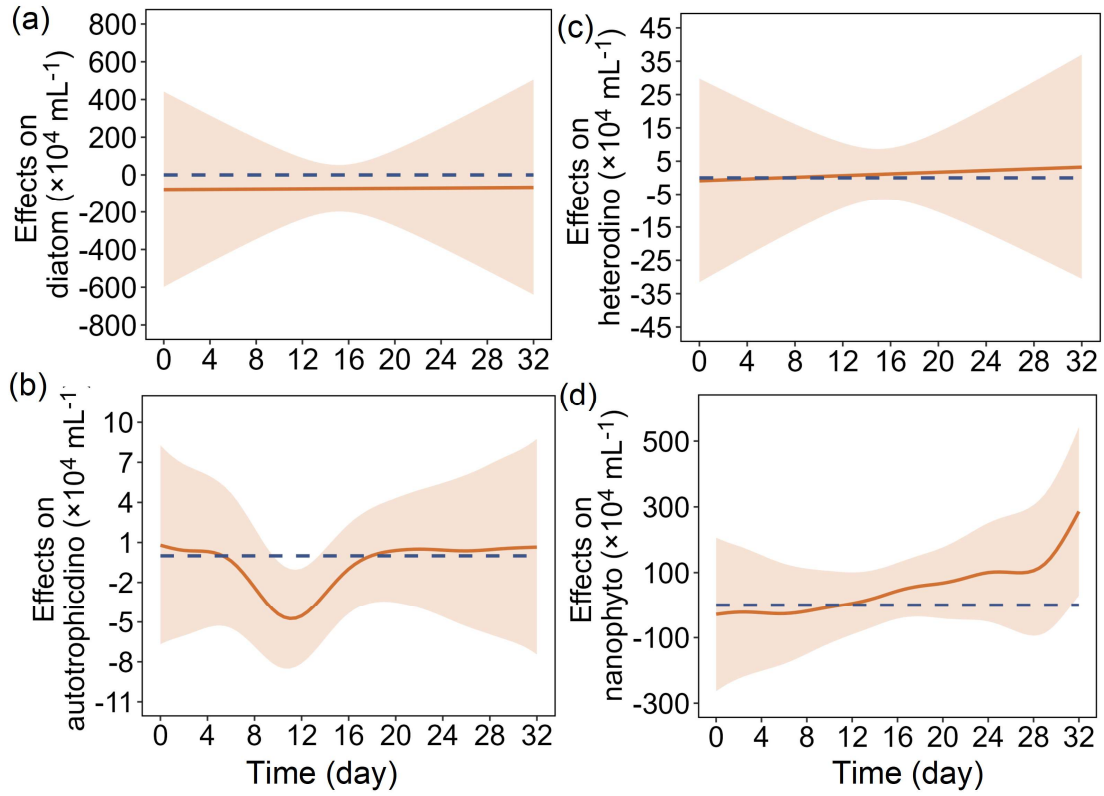
23 Figure S5. GAMM analyses of the effect of HC on (a)  $\text{pH}_{\text{NBS}}$ , (b)  $p\text{CO}_2$ , (c) Total alkalinity (TA),  
 24 (d)  $\text{NO}_3^-$  concentration, (e)  $\text{NH}_4^+$  concentration, (f)  $\text{PO}_4^{3-}$  concentration, (g)  $\text{SiO}_3^{2-}$  concentration  
 25 and (h) Chl *a* concentration. Solid lines and shadows are predicted values with 95 % confidence  
 26 intervals.



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28 Figure S6. GAMM analyses of the effect of HC on (a) daytime primary production (PP) and (b)  
 29 daytime primary productivity, (c) 24 h primary production and (d) 24 h primary productivity, dark  
 30 respiration per water volume (e) and per Chl *a* (f). Solid lines and shadows are predicted values with  
 31 95 % confidence intervals.

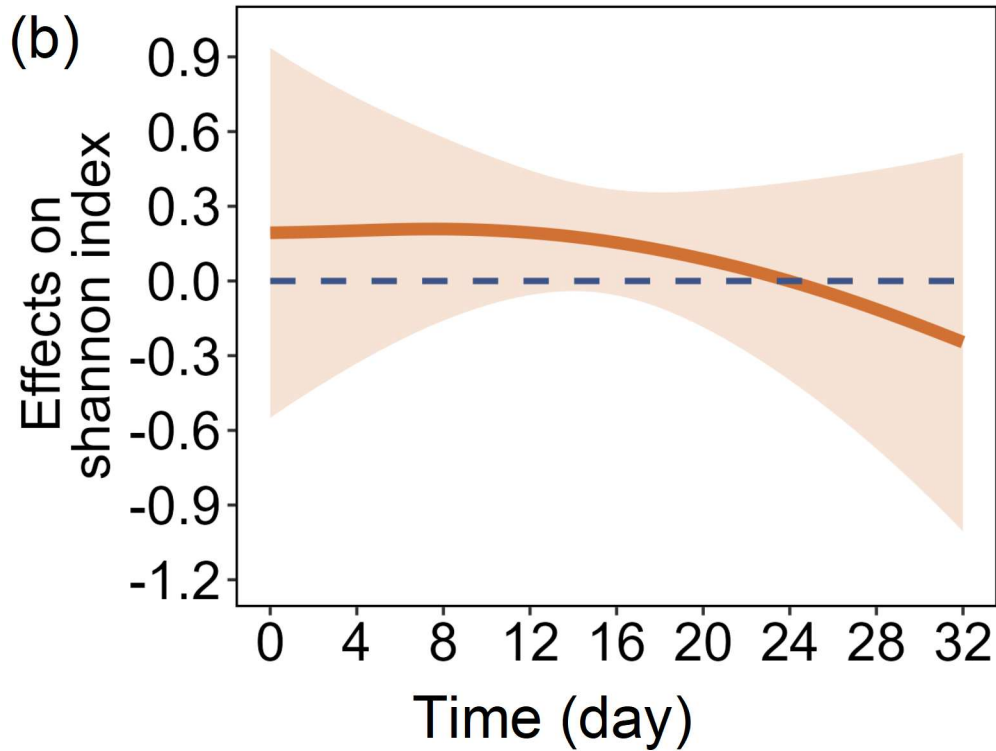
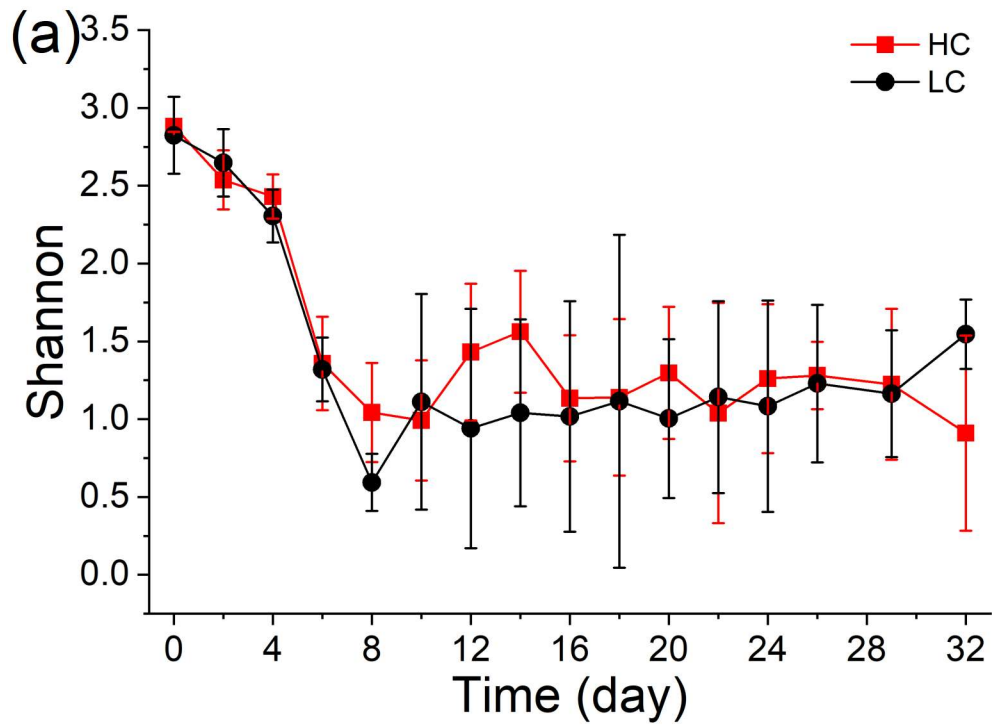
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34 Figure S7. GAMM analyses of the effect of HC on (a) diatom biomass, (b) autotrophic dinoflagellate  
 35 biomass, (c) heterodino flagellate biomass and (d) nanophytoplankton (Cyanobacteria, Chlorophyta,  
 36 Cryptophytes, Euglenophyta) biomass. Solid lines and shadows are predicted values with 95 %  
 37 confidence intervals.

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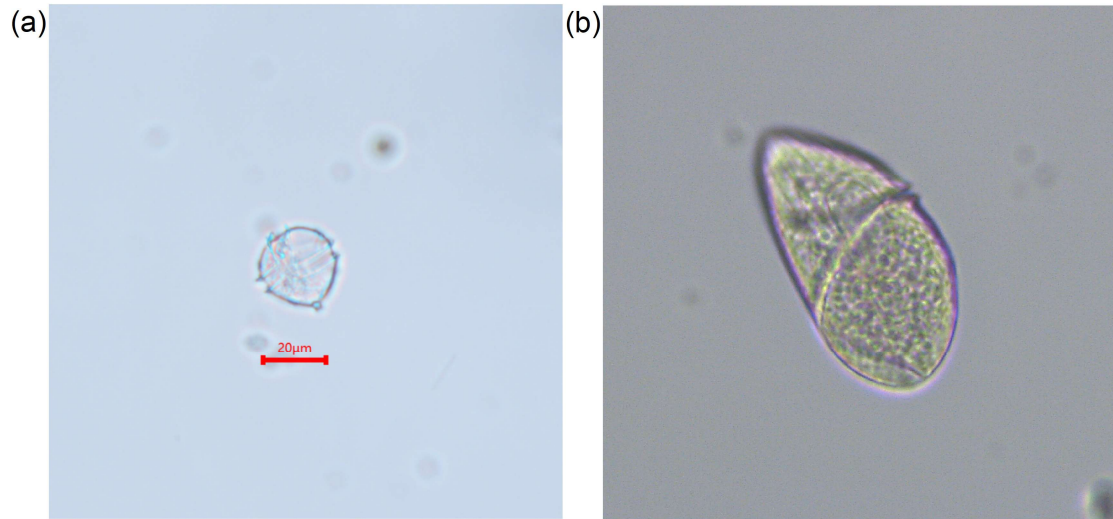
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40 Figure S8. Shannon diversity index (a) and GAMM analyses of the effect of HC on Shannon

41 diversity index (b). In panel a, data are means  $\pm$  SD of 5 replicates for HC and 4 replicates for AC

42 mesocosms. In pane b, solid lines and shadows are predicted values with 95 % confidence intervals.

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45 Figure S9. Living algal cells in unstained water samples under 40× microscope. (a) *Protoperidinium*

46 sp.; (b) *Gyrodinium spirale*.