*Supplementary Material*

# Hyposalinity tolerance in the coccolithophorid *Emiliania huxleyi* under the influence of ocean acidification involves enhanced photosynthetic performance

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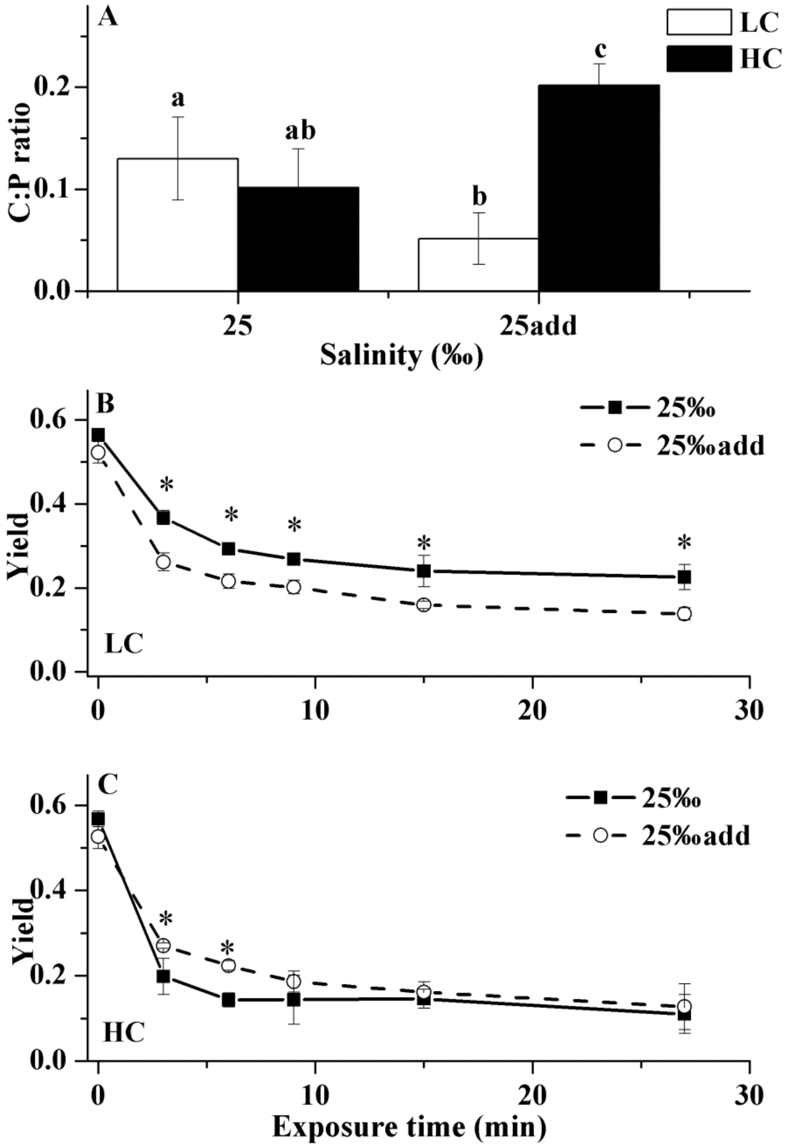
We set up another two treatments (25‰ $LC_{add}$ and 25‰ $HC_{add}$) to test if the strain of PML B92/11 of *E. huxleyi* had the ability to adjust the inorganic carbon allocation between photosynthesis and calcification under different carbonate chemistry conditions in which the DIC concentration was different (Herfort et al., 2002; Bach et al., 2013).

After diluting the prepared artificial seawater (salinity = 35‰) with Milli - Q water to obtain 25‰ seawater, we added $NaHCO_3$ to reach the same amount as that of artificial seawater (salinity = 35‰) before sterilization, nutrient addition and aeration (ambient or elevated $CO_2$ levels). The procedures for determination of photosynthetic and calcification rates and chlorophyll *a* fluorescence under high light were the same as described in the main text. After the exponentially growing cells were acclimated to 25‰ $LC_{add}$ or 25‰ $HC_{add}$ treatment for about 14 generations, we took samples for the measurements.

Under LC, with increased DIC concentration, the calcification to photosynthesis ratio (C:P) decreased by 61% (one-way ANOVA, $p$ = 0.047) compared with the cells grown at the salinity 25‰ without $NaHCO_3$ addition. In contrast, the C:P ratios of cells grown under the 25‰ $HC_{add}$ treatment was 100% higher (one-way ANOVA, $p$ =

0.016) than that of 25‰ HC treatment (Supplementary Fig. 1A). This result supported the conclusion that the cells could "invest" more inorganic carbon to produce coccoliths with increased DIC supply. The result of photochemical responses agrees with $^{14}C$ results. When exposed to highlight (800 μmol photons $m^{-2}$ $s^{-1}$), the effective photochemical quantum yield $\Phi_{PSII}$ was significantly lower under 25‰ $LC_{add}$ treatment than that of 25‰ LC ($p < 0.05$, Supplementary Fig. 1B), which indicated that 25‰ $LC_{add}$ cells were less calcified (Xu and Gao, 2012). However, under HC, cells had a better performance to cope with high light stress after DIC addition (Supplementary Fig. 1C), comparing with the treatment without DIC addition at a same salinity level, which again proved our conclusion.




**Supplementary Figure 1.** Calcification to photosynthesis ratio C:P (A) of two salinity treatments: 25‰ and 25‰ with DIC addition (LC, 400 µatm, open bars; HC, 1000 µatm, solid bars) and changes in effective photochemical quantum yield of the LC (400 µatm, LC, B) and HC (1000 µatm, HC, C) cells when exposed to solar radiation of 800 µmol photons $m^{-2}$ $s^{-1}$ for 27 min under two salinity treatments – 25‰ (solid squares) and 25‰ with DIC addition (open squares). Values are means ± SD of triplicate cultures. Asterisks represent significant differences among salinity treatments ($p$ < 0.05). Different letters represent significant differences among treatments. Vertical lines represent the SD.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