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Inter- and intra-specific responses of coccolithophores to CO_2-induced ocean acidification

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Table S1. Original carbonate system data determined from total alkalinity (TA) and dissolved inorganic carbon (DIC) at 20 ℃, 32‰ salinity.

Pumping CO_2 levels	pH	TA (μmol L^{-1})	TCO_2 (μmol L–1)	DIC (μmol L^{-1})	CO_3^{2-} (μmol L^{-1})	HCO_3^- (μmol L^{-1})	omega calcite
380 ppm	8.06 ±0.02	2586.71 ±11.34	21.46 ±1.21	2444.99 ±18.35	163.09 ±5.85	2260.45 ±23.01	3.46 ±0.12
750 ppm	7.79 ±0.01	2606.56 ±15.24	42.73 ±1.30	2555.49 ±17.86	93.69 ±1.46	2419.06 ±18.02	1.99 ±0.03
1000 ppm	7.65 ±0.02	2636.73 ±16.94	60.92 ±3.34	2627.51 ±22.85	70.08 ±2.61	2496.51 ±22.11	1.49 ±0.06
2000 ppm	7.48 ±0.02	2787.55 ±8.26	96.91 ±4.91	2833.42 ±15.22	50.97 ±2.11	2685.53 ±12.42	1.08 ±0.04

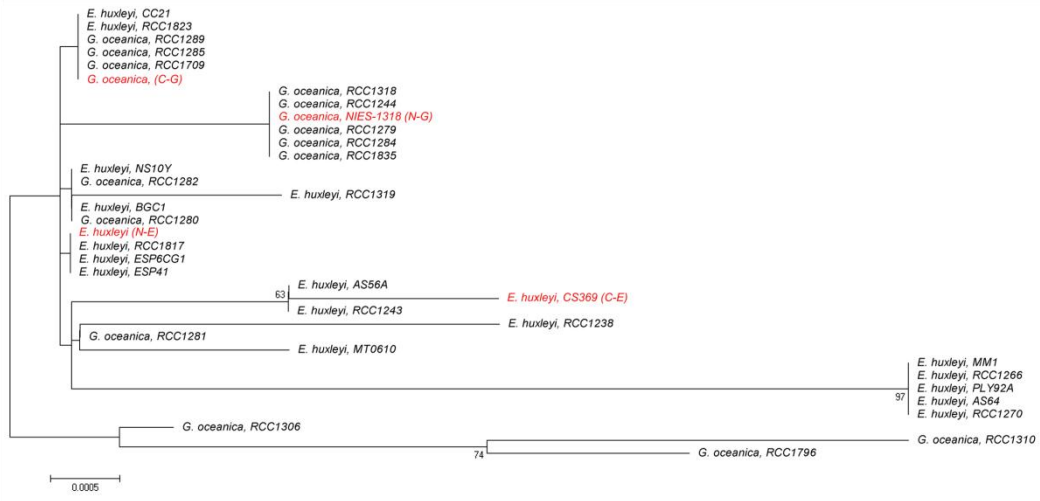

Figure S1. Taxonomic relationships of the four coccolithophore strains tested in this experiment. The taxonomic positions of four coccolithophore strains (red text) are depicted by maximum likelihood *cox1* tree, with their relationship to other coccolithophore strains (black text).

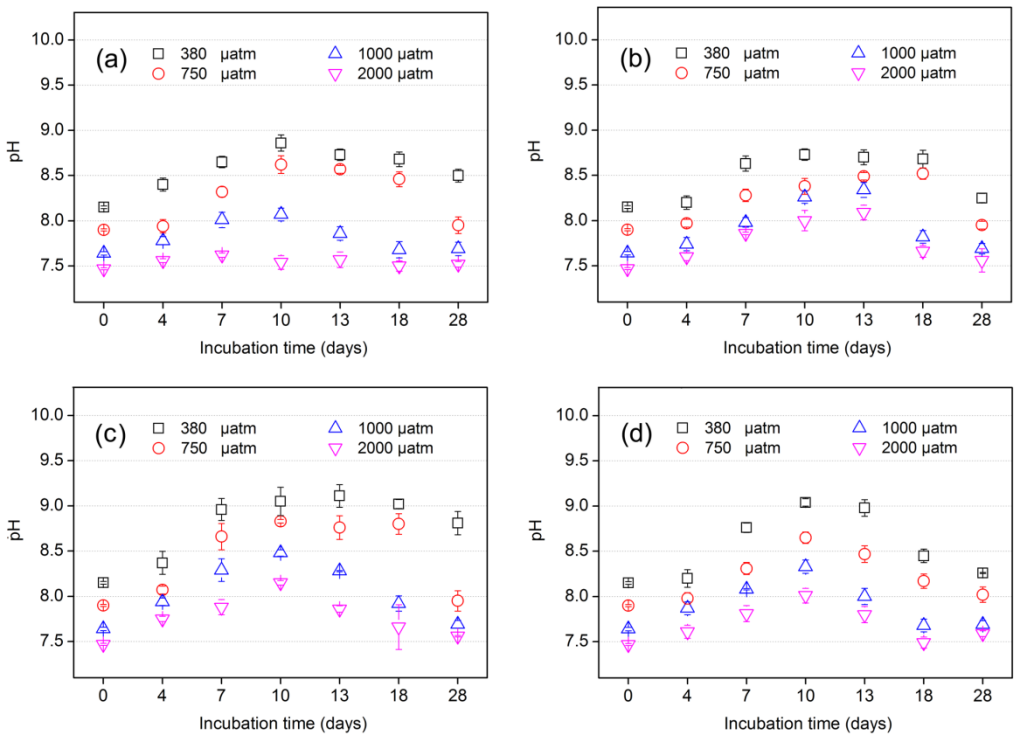

Figure S2. Changes of seawater pH of culturing different species (N-E: *E. huxleyi* (a), C-E: *E. CS369* (b), N-G: *G. NIES-1318* (c), C-G: *G. oceanica* (d)) determined at various time points for bubbling different concentration CO_2. Vertical bars represent the SD (n=3).

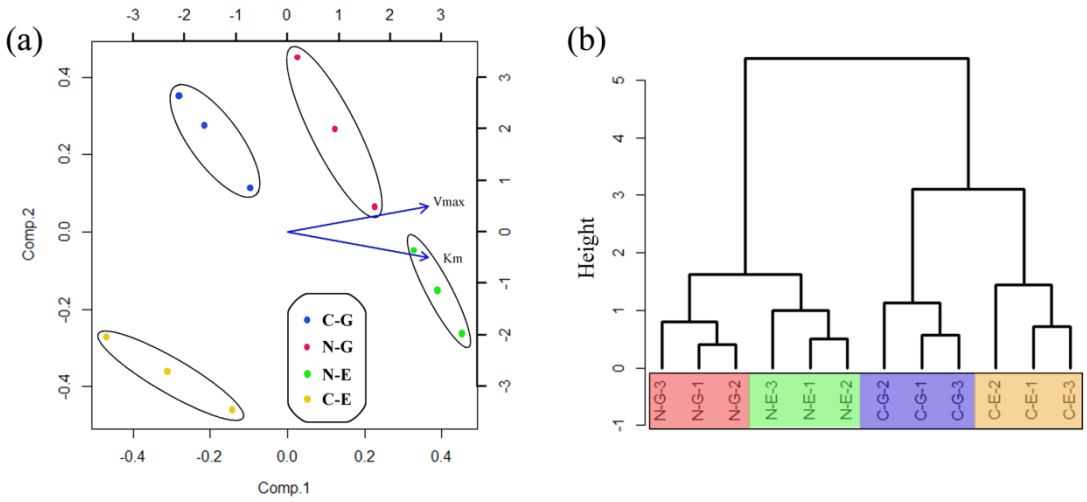

Figure S3. Results of multi-variate statistical analyses of Km and Vmax values from nitrogen uptake rate response curves. For all three replicates of each of the four strains, two kinetic parameters were analyzed using Principle Coordinate Analysis (PCoA) with the major axes of variation and grouped by Hierarchical Clustering. Results showed that replicates of each of the four strains formed well-defined clusters. (N-E: Naked strain *E. huxleyi*; C-E: Calcifying strain *E. huxleyi* CS369; N-G: Naked strain *G. oceanica* NIES-1318; C-G: Calcifying strain *G. oceanica*)

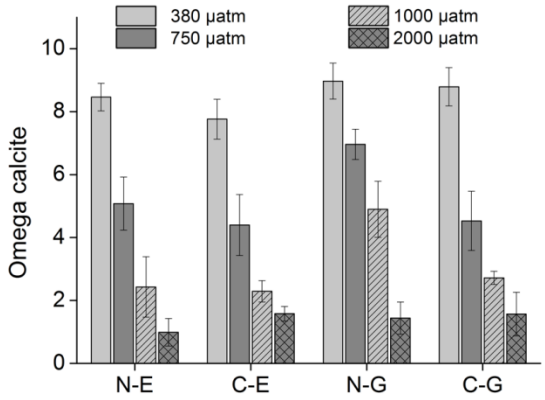

Figure S4. Changes of omega calcite value in the seawater used for culturing different species coccolithophores (N-E: Naked strain *E. huxleyi*; C-E: Calcifying strain *E. huxleyi* CS369; N-G: Naked strain *G. oceanica* NIES-1318; C-G: Calcifying strain *G. oceanica*) with bubbling different concentration CO_2 (from 380ppm to 2000ppm) on the seventh day. Vertical bars represent the SD (n=3).