Supporting Information for

Hysteresis of phytoplankton communities over Sub-polar North Atlantic to CO2 forcing

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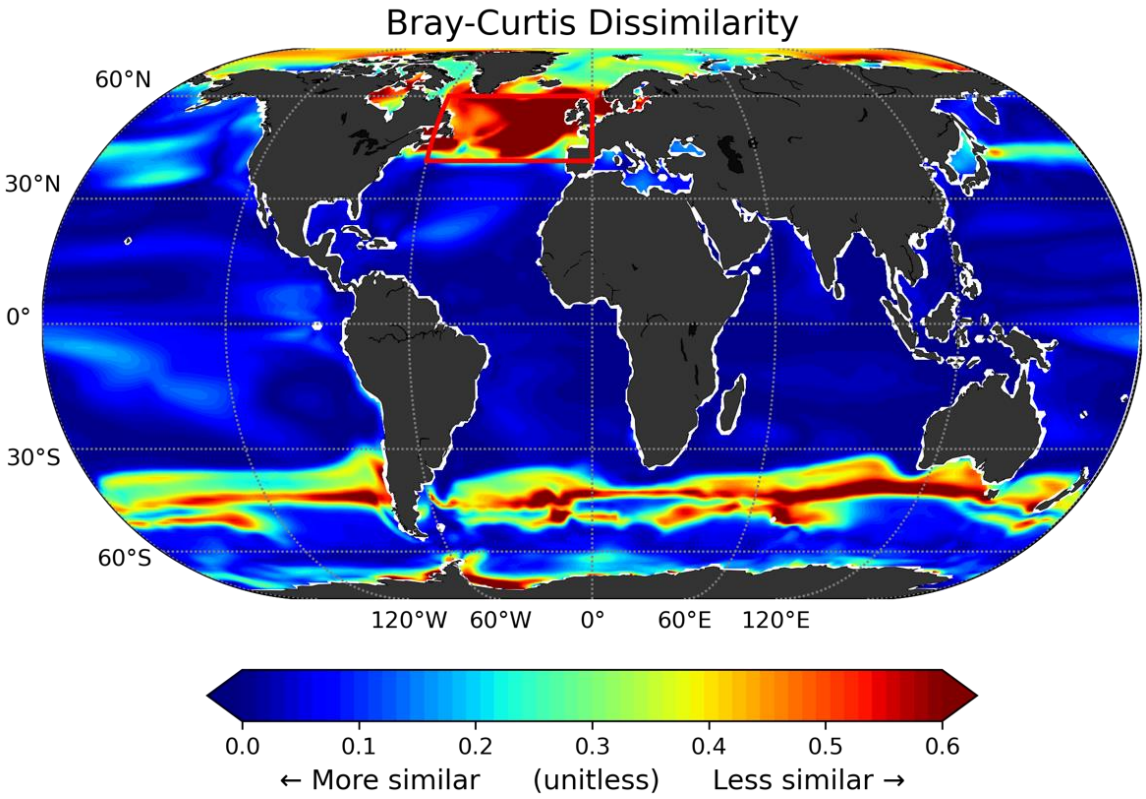

Figure S1. Global distribution of Bray-Curtis dissimilarity of phytoplankton community between climatology period and CO_2 down period. Larger values indicate a significant change in phytoplankton composition between the two periods.

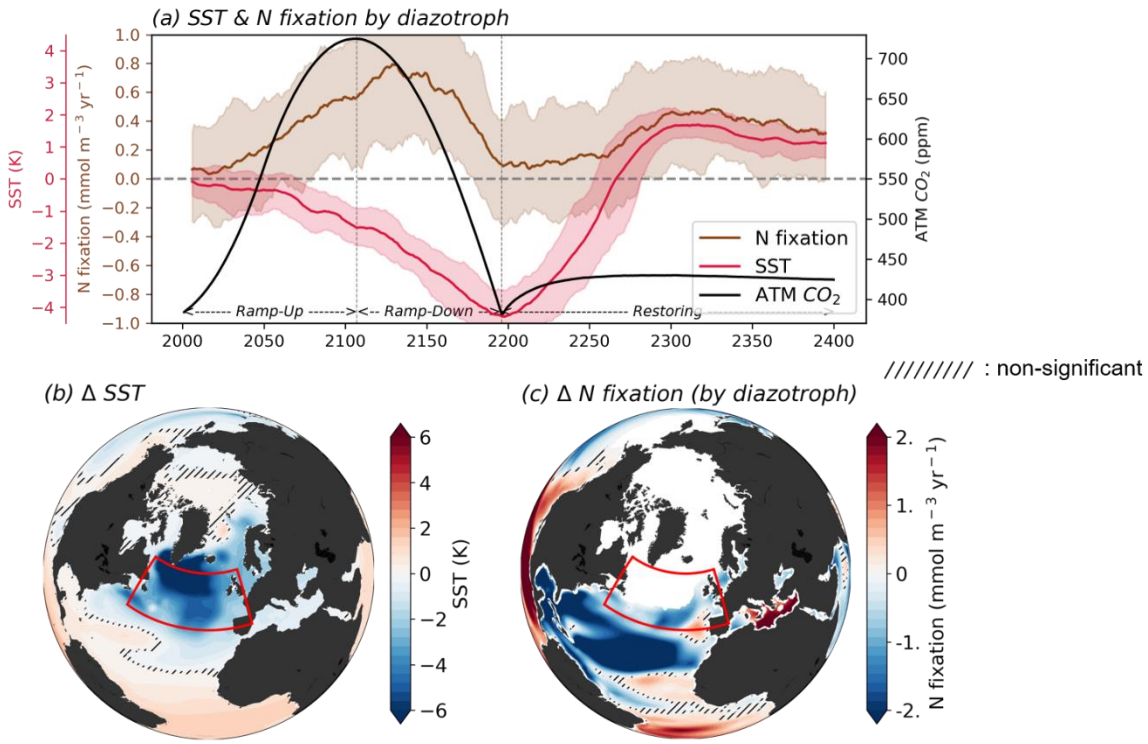

Figure S2. (a) Time series of Sea Surface Temperature (SST; red plot) and Nitrogen (N; brown plot) fixation by diazotroph. All plots are drawn in 11-year moving averages. Shading indicates the range of minimum-maximum values between ensembles. **(b-c)** Differences in SST (Fig. S2b) and N fixation (Fig. S2c) between CO_2 down and climatology periods. Red boxes indicate the Subpolar North Atlantic (SPNA) region which is the research area in this study.

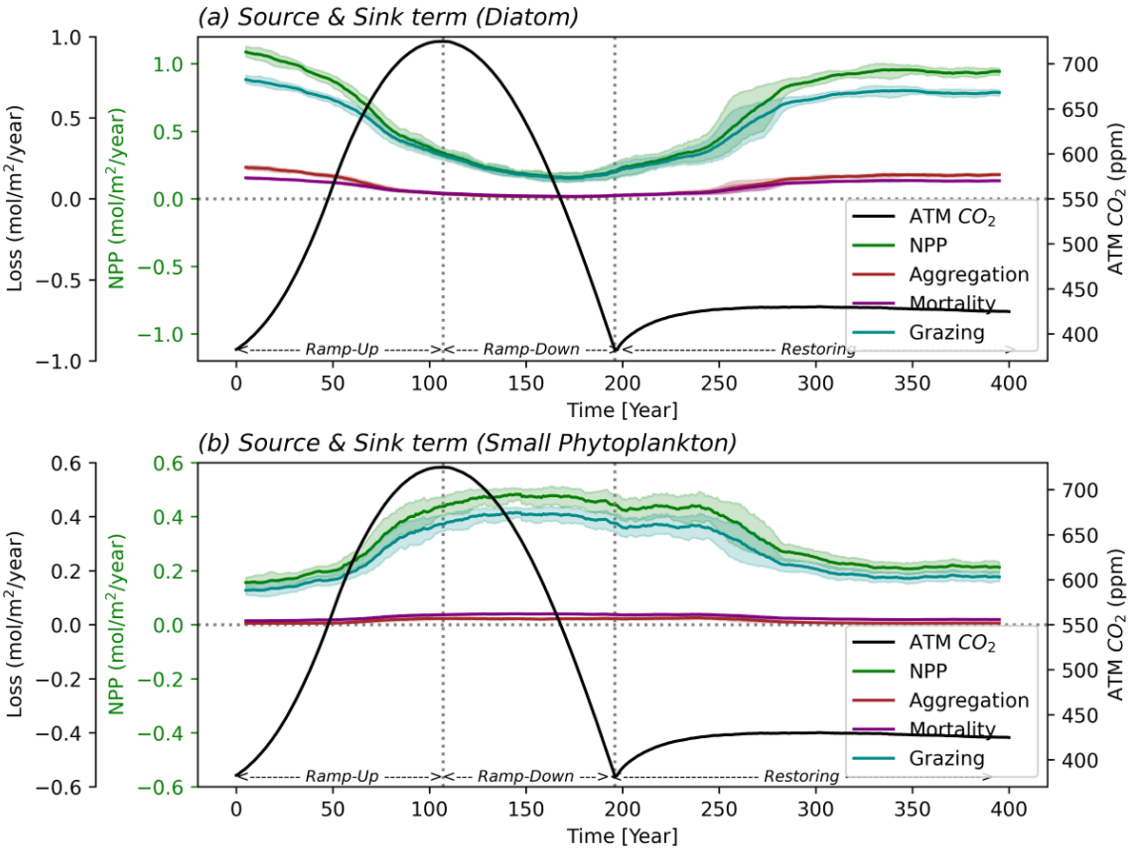

Figure S3. Source & Sink terms for both diatom (Fig. S3a) and small phytoplankton (Fig.S3b) in the SPNA region.

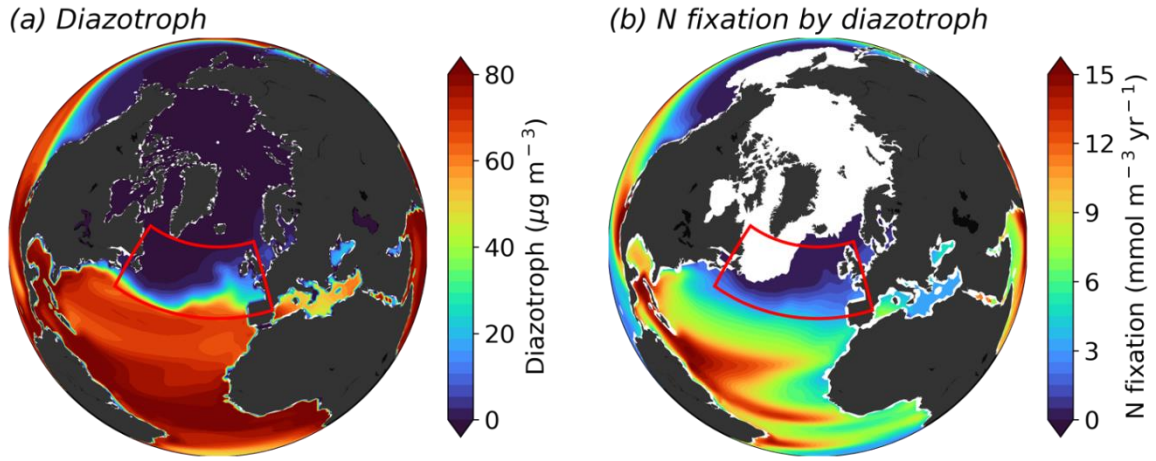

Figure S4. Diazotroph concentration (Fig. S4a) and N fixation by diazotroph (Fig. S4b) during the climatology period.

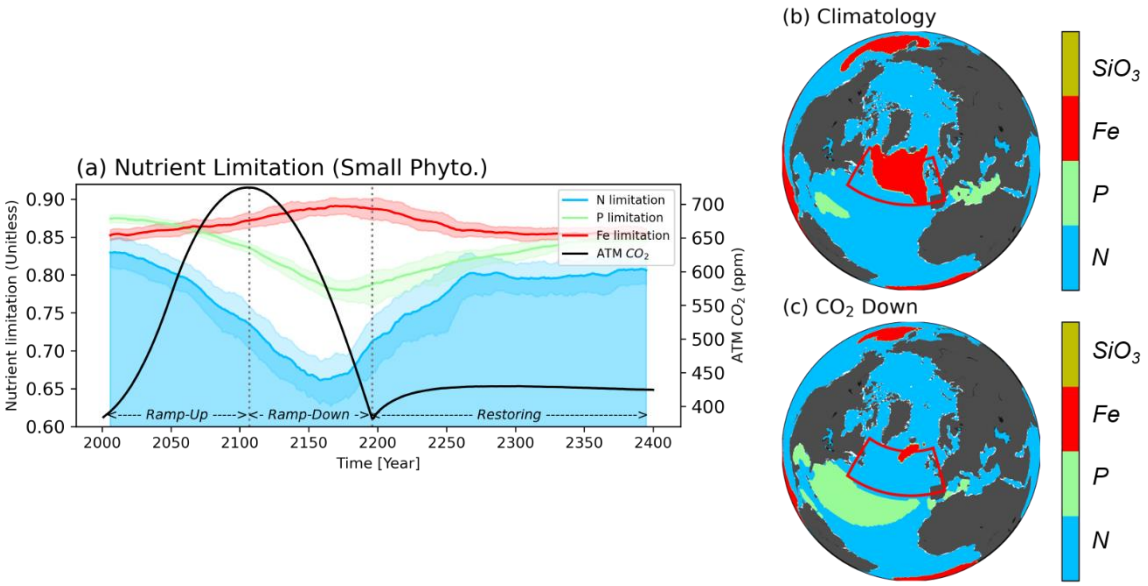

Figure S5. (a) Nutrient limitation of small phytoplankton for three nutrients (N; Sky-blue, Phosphorus (P); light-green, Iron (Fe); red). All plots are drawn in 11-year moving averages and shading indicates the range of minimum-maximum values between ensembles. (b-c) Nutrient limitation distribution of small phytoplankton during both climatology and CO_2 down period.

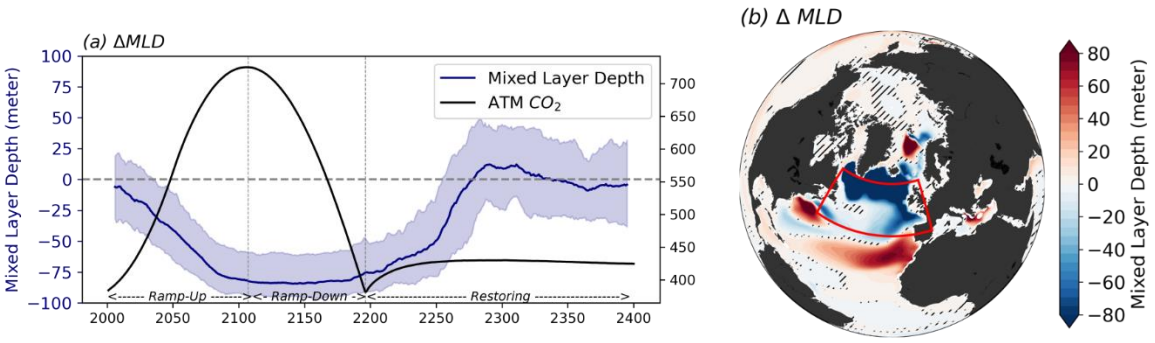

Figure S6. Time series (Fig. S6a) of Mixed Layer Depth (MLD) and the difference (Fig. S6b) in MLD between CO_2 down and climatology periods.

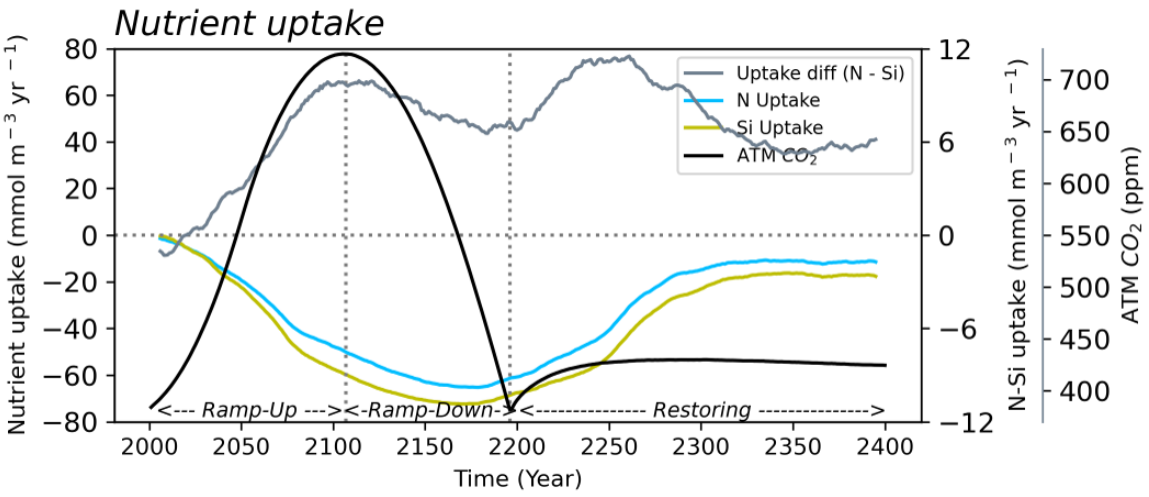

Figure S7. Time series of the magnitude of nutrient uptake of Silicate (Si; dark-khaki) and Nitrogen (N; Sky-blue). The gray color indicates the difference between N uptake and Si uptake.

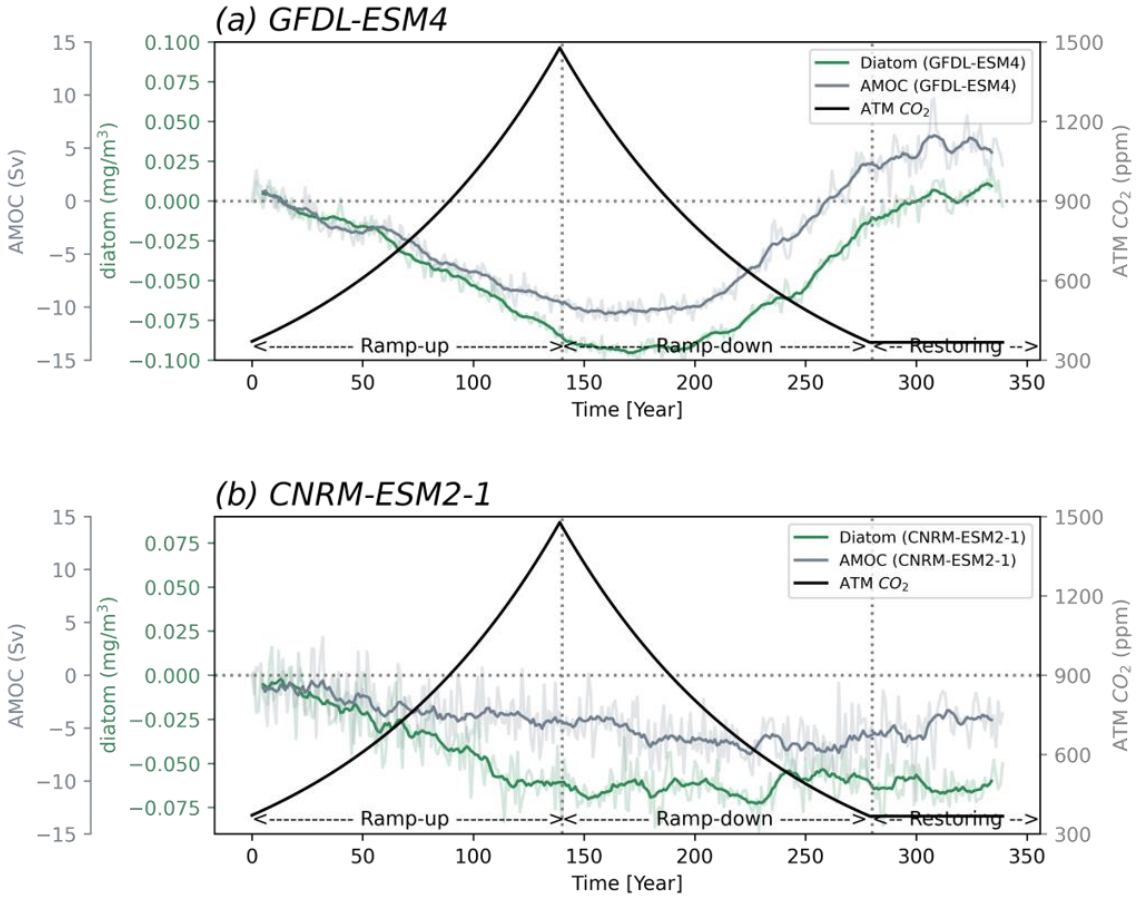

Figure S8. (a-b) Time series of AMOC strength and surface diatom concentrations for two Earth System Models (ESMs). Light gray color indicates the AMOC strength for both ESMs. Light green colors indicate the surface diatom concentrations for both ESMs. The thick colored plots are plotted in 11-year moving averages.