Supplementary Information: Changes in Arctic Ocean plankton community structure and trophic dynamics on seasonal to interannual timescales

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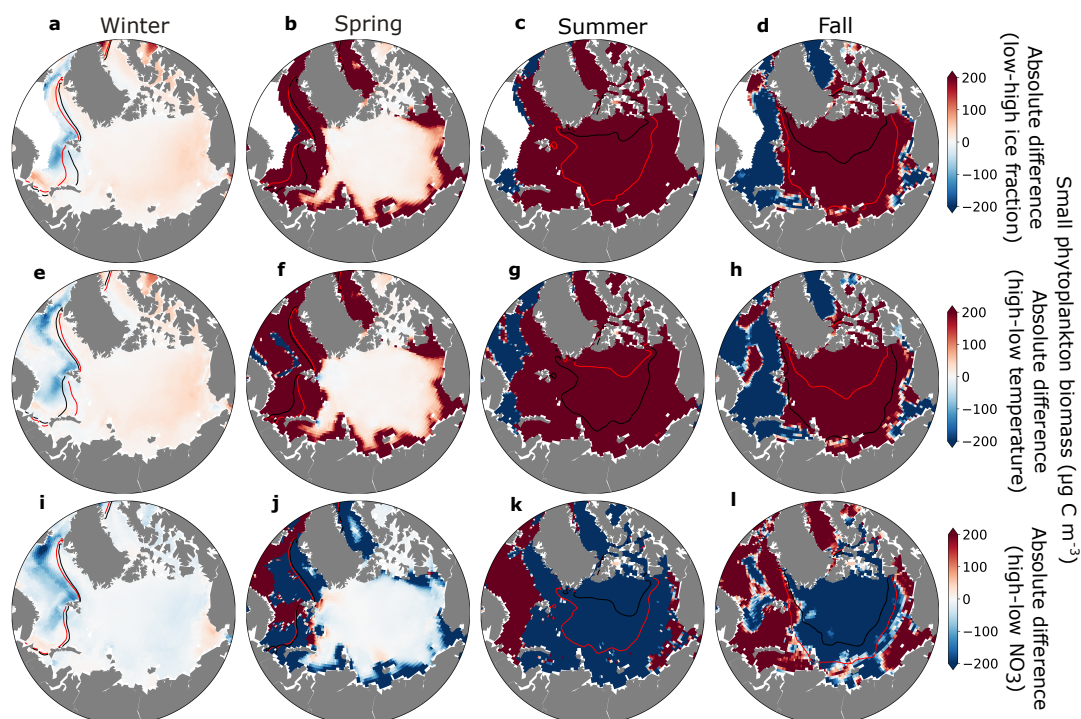
Figure S1. Absolute differences in small phytoplankton (picoplankton (pp), diazotrophs (diaz), small mixed phytoplankton (mp1,mp2), and small diatoms (diat1)) biomass over the top 150 meters ($\mu gC\ m^{-3}$) between low and high ice (a-d), temperature (e-h), and NO$_3$ (i-l) years for winter (a,e,i), spring (b,f,j), summer (c,g,k), and fall (d,h,l). Black contour lines indicate the sea-ice extent in years with high ice fraction (a-d), low temperatures (e-h), and low nutrients (i-l). Red contour lines indicate sea-ice extent in years with low ice fraction (a-d), high temperature (e-h), high nutrients (i-l).
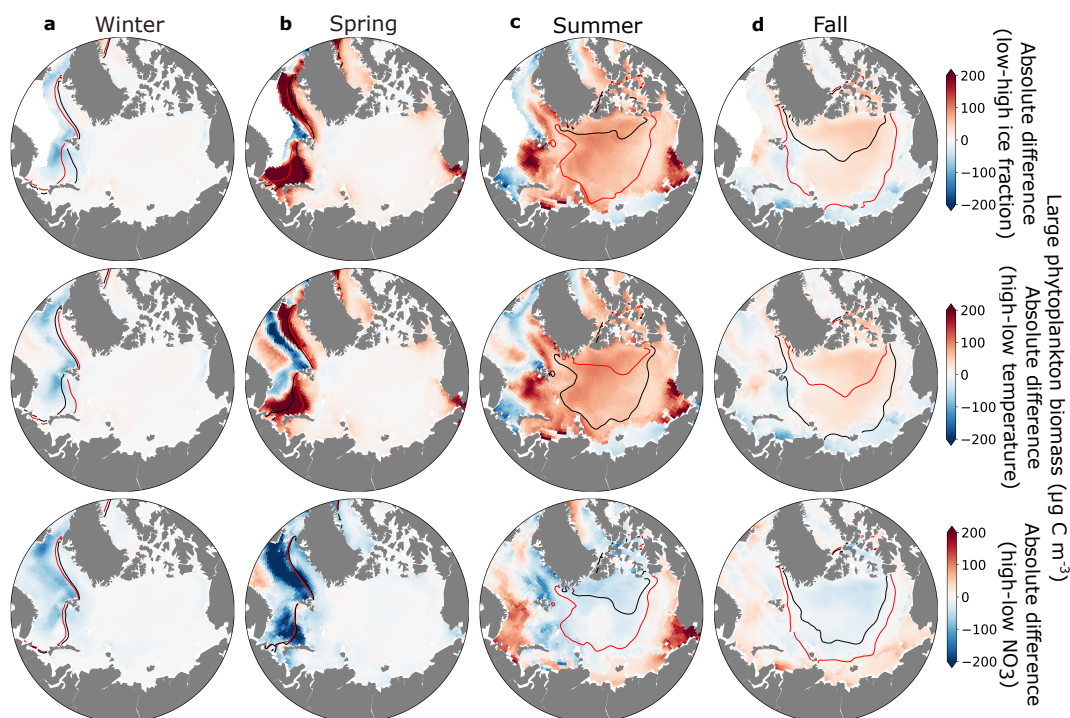
Figure S2. Absolute differences in large phytoplankton (medium and large mixed phytoplankton (mp3,mp4), and diatoms (diat2,diat3)) biomass over the top 150 meters (μgC m^{-3}) between low and high ice (a-d), temperature (e-h), and NO$_3$ (i-l) years for winter (a,e,i), spring (b,f,j), summer (c,g,k), and fall (d,h,l). Black contour lines indicate the sea-ice extent in years with high ice fraction (a-d), low temperatures (e-h), and low nutrients (i-l). Red contour lines indicate sea-ice extent in years with low ice fraction (a-d), high temperature (e-h), high nutrients (i-l).
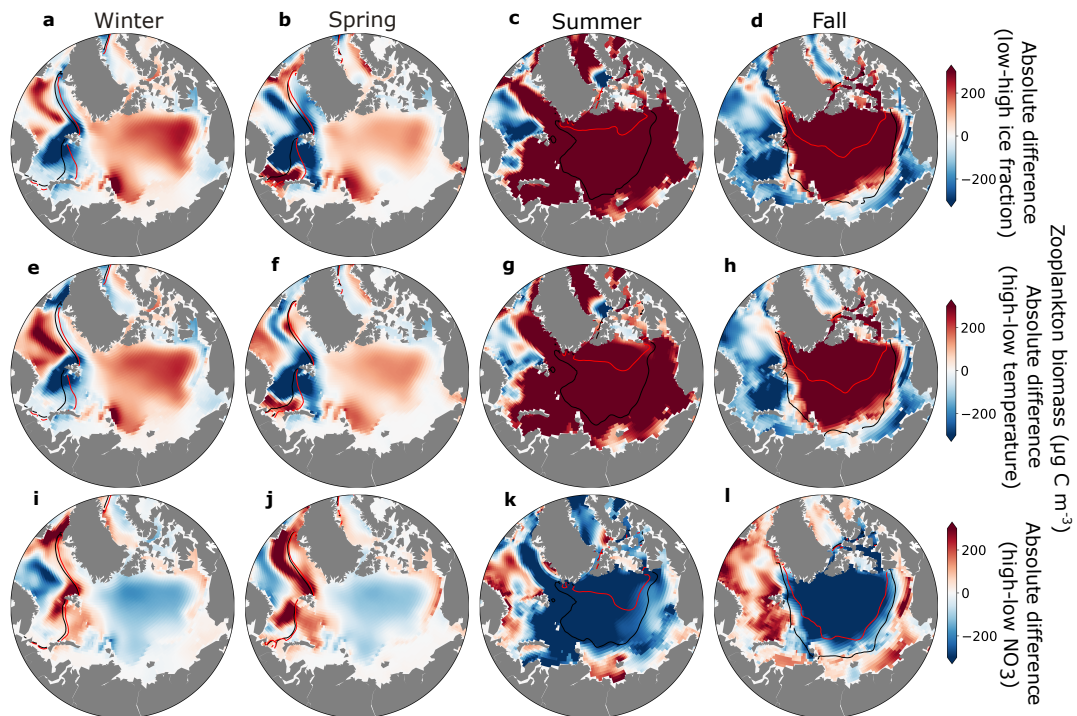
Figure S3. Absolute differences in zooplankton biomass over the top 150 meters (μgC m^{-3}) between low and high ice (a-d), temperature (e-h), and NO$_3$ (i-l) years for winter (a,e,i), spring (b,f,j), summer (c,g,k), and fall (d,h,l). Black contour lines indicate the sea-ice extent in years with high ice fraction (a-d), low temperatures (e-h), and low nutrients (i-l). Red contour lines indicate sea-ice extent in years with low ice fraction (a-d), high temperature (e-h), high nutrients (i-l).

Figure S4. Seasonal log-log relationship between phytoplankton abundance (cells m^{-3}) and phytoplankton volume (μm^3) in three locations in the Arctic Ocean (Fig. 1): the Western Nordic Seas (a), the Central Arctic (b) and the Chukchi Sea (c). In this figure, the lines are color-coded to represent different seasons: black lines correspond to winter, blue lines depict spring, red lines indicate summer, and green lines represent the fall.
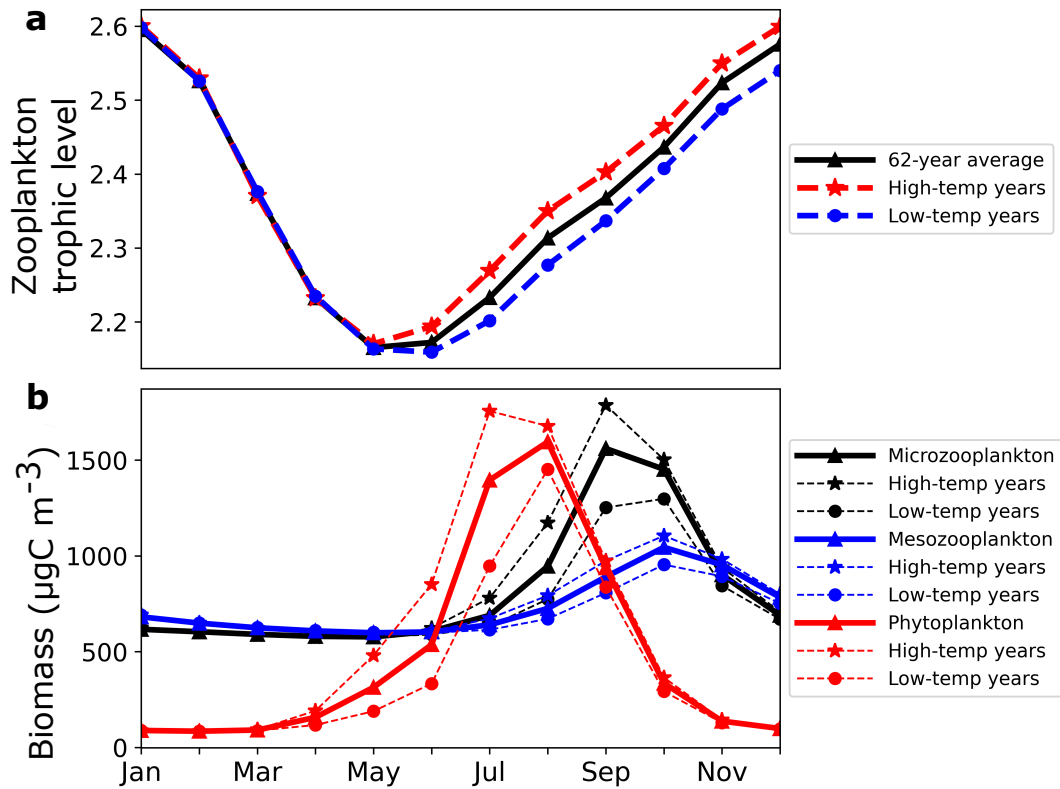
Figure S5. (a) Monthly averages of mean zooplankton trophic level (black) compared with mean zooplankton trophic level during high temperature years (red) and low temperature years (blue). (b) Plankton biomass (μgC m^{-3}), including microzooplankton (black), mesozooplankton (blue), and phytoplankton (red). The sold lines represent the 62-year average, while dashed stars and circles indicate high-temperature and low-temperature seasonal averages, respectively.