Seasonal changes in photosynthesis and biochemical composition in Arctic macroalgae undergoing a climatic transition

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Seasonal physiology of algal community in Kongsfjorden ecosystem is expected to be affected by Global Climate Change. We characterized the photosynthetic performance and biochemical composition of five common macroalgal species of Kongsfjorden, from early autumn 2016 to late summer 2017. The studied species were the ochrophytes *Saccharina latissima* and *Alaria esculenta*, the rhodophytes *Phycodrys rubens* and *Ptilota gunneri*, and the chlorophyte *Monostroma* aff. *arcticum*.

Fluorescence results endorsed higher values of maximum quantum yield (F_v/F_m) and electron transport rates (ETR_{max}) in brown and green species. Decrease in ETR_{max} and saturation irradiance in brown and green algae in summer suggest more sensitivity to continuous radiation than in rhodophytes. Photosynthetic parameters from O_2 measurements showed a better photosynthetic performance of ochrophytes in March, under increasing light conditions, while red and green species did in September. In general, ^{14}C fixation at saturating light was higher in September, except for *A. esculenta* that was in March. The loss of photosynthetic capacity of macroalgae in summer could be attributed to a decrease in pigment concentration, except for *M. arcticum*. In August, brown and green species accumulated more soluble carbohydrates, while rhodophytes did in early autumn. In most species lipids presented minimum values in March and proteins did not show a clear pattern. In general, higher N and C contents in March and August, respectively, reveal a seasonal pattern in elemental composition, related to nutrient and light availability along the year. Seasonal responses are species-specific and likely related to their particular adaptive features to Arctic environment.