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Table of Contents

6030

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

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Seasonal physiology of the algal community in Kongsfjorden sublittoral ecosystem is expected to be affected by Global Climate Change. We characterized the photosynthetic performance (by means of chlorophyll a fluorescence, O2 evolution and 14C fixation) and biochemical composition (pigments, soluble carbohydrates, soluble proteins, lipids and total C and N) of five common macroalgae 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 (not present in March). Fluorescence results endorse the previously reported higher values of maximum quantum yield (Fv/Fm) and electron transport rates (ETRmax) in brown and green species than in red ones. In addition, a decrease in ETRmax and lower saturation irradiances in brown and green algae in summer suggest more sensitivity to continuous irradiation than in rhodophytes. Photosynthetic parameters calculated from O2 measurements show that brown species have a better photosynthetic performance in March in response to increasing irradiance, while red and green species did in September. In general, 14C fixation at saturating light was higher in September, except for A. esculenta (in March). The loss of photosynthetic capacity of macroalgae in summer could be attributed to a decrease in pigment concentration, except for M. arcticum. Composition also varied along seasons; in summer, under continuous illumination, 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 temporal pattern. In general, high N content in March and high C content in August 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 the Arctic environment.