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The stratospheric ozone layer reduces the solar UV-B radiation (280-315 nm) reaching the earth surface and the ozone layer. In spite of great uncertainty, the ozone layer is projected to recover to pre 1960s level at about 2050 in arctic regions. At the same time warming leads to a substantial advance of the growing season the vegetation to the higher UV-B radiation in the spring.

High arctic plants are 'living on the edge' in an extreme environment with a short growing season, low temperatures and often nutrient limitation. The study of UV-B impact is an area of growing research interest which is focused on identifying and evaluating the importance of altered UV radiation on processes and organisms, particularly in arctic and antarctic ecosystems. However, little attention has been paid to the impact on photosynthetic performance. We hypothesized that if the present UV radiation affects the vegetation significantly, then reduction of the irradiance load would improve the photosynthetic performance of the plants. Therefore an experimental approach where ambient UV-irradiance is screened off by means of filters was chosen. Photosynthetic performance at the leaf level was characterized with simultaneous gas-exchange and fluorescence measurements. Photo system II (PSII) behavior through growth season was investigated from fluorescence measurements. End season harvest allowed for determination of specific leaf area and content of leaf carbon, nitrogen and UV-B absorbing compounds. Ambient UV-B reduced net photosynthesis in the high arctic dwarf shrub *Salix arctica*, when irradiance doses were homogenized. Ambient UV-B decreased both Calvin Cycle capacity via maximum rate of electron transport and maximum carboxylation rate of Rubisco, and the PSII performance via decreased quantum yield and increased energy dissipation processes. A detailed analysis of fluorescence transients clearly showed a decreased PSII performance in dark. With pulse amplitude modulated (PAM) photosynthesis measurements we found a negative impact on the processing of energy equivalents in the photosynthetic apparatus under natural light conditions. In addition, these data point to some of the difficulties in balancing effects in the photosynthetic apparatus from source (fx light harvesting, energy dissipation and electron transport) to sink processes (Calvin Cycle activity and other electron sinks). Hence it will be discussed what the targets of UV-B actually are, and in which direction the feedback mechanisms work. In conclusion, our findings add further evidence that ambient UV-B is an important stress factor for plants in high arctic Greenland.