

## CCM performance in Arctic and Antarctic seaweeds in a warming and acidifying marine environment

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Ocean acidification and warming are affecting with special intensity the polar coastal ecosystems. The Arctic kelps *Saccharina latissima* and *Laminaria solidungula* from Kongsfjorden (Svalbard) were cultured at 4 and 9 °C in combination with current (390 ppm, CC) and increased (1200 ppm, HC) levels of atmospheric CO<sub>2</sub>. The Antarctic endemic *Desmarestia anceps* and *D. menziesii* were cultured at 2 and 7 °C, and also at CC and HC. For all these species  $\delta^{13}\text{C}$  values suggested an absence of deactivation of carbon concentrating mechanisms at increased CO<sub>2</sub> levels. The lack of inhibition of CCM at high CO<sub>2</sub> shown by  $\delta^{13}\text{C}$  values seems to be a common pattern in polar species, but it is not related to responses in photosynthesis and growth. Growth of both Arctic species were largely unaffected by increased CO<sub>2</sub> conditions, regardless the temperature. In contrast, the Antarctic species were favored by high CO<sub>2</sub>, specially at the highest temperature. External carbonic anhydrase (eCA) was responsible for about 50% to 80% of the photosynthetic O<sub>2</sub> evolution in all the species, according to inhibition assays using DBS. CO<sub>2</sub> promoted a decrease in eCA contribution to O<sub>2</sub> evolution in the Antarctic species but not in the Arctic ones. The addition of EZ did not promote further inhibition in any species, indicating a low relevance of internal CA, although a concomitant inhibition of eCA may mask this contribution if no other mechanism of active transport was operating. Our latest results of the gene expression of *D. anceps* reveal that there is a low response to CO<sub>2</sub>. The relevance of this resilience to CO<sub>2</sub> in polar environments will be discussed.