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Sea Surface CO_2 trends in the Canada Basin

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Shipboard underway sea surface pCO_2 data were obtained during the late summer or early autumn from 2012-2017 in the Canada Basin. The field studies captured a large range of sea ice extent and exposure of the sea surface to the atmosphere. Measurements show that more southern open water had pCO_2 levels closer to atmospheric saturation whereas northern ice-covered areas were typically more than 100 uatm below saturation. There is a strong correlation between the mean seasonal pCO_2 and the mean ice extent over the study period showing that the loss of sea ice is increasing sea surface pCO_2 in the Canada Basin. The mechanisms for producing the higher open water pCO_2 levels include uptake of atmospheric CO_2 and heating based on analyses using correlations and modeling. Net community production is limited by nutrient availability in the stratified surface waters and did not significantly offset the increase in pCO_2 driven by these physical processes.