

## **SPATIAL VARIABILITY OF $\Delta\text{O}_2/\text{Ar}$ IN THE AMUNDSEN SEA, ANTARCTICA**

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### **ABSTRACTS**

We surveyed  $\text{O}_2/\text{Ar}$  in the surface waters of the Amundsen Sea during the austral summer to investigate the variability of net community production (NCP), a measure of the net carbon removed from the atmosphere via biological productivity. The biological  $\text{O}_2$  saturation ( $\Delta\text{O}_2/\text{Ar}$ ) dropped as low as -10% in the sea-ice area, implying net consumption of  $\text{O}_2$  over the winter as a result of respiration and limited production. In contrast,  $\Delta\text{O}_2/\text{Ar}$  increased to 30% in the polynya, where  $\Delta\text{O}_2/\text{Ar}$ , together with  $\text{pCO}_2$  and chlorophyll-a, showed a strong correlation with sea surface temperature. This finding suggests that when the sea ice melts, causing radiative heating, the upper water column is stabilized, and this stabilization results in the high biological productivity and consequent  $\text{O}_2$  supersaturation in the polynya. The NCP in the polynya was 90 - 170  $\text{mmol O}_2 \text{ m}^{-2} \text{ d}^{-1}$ , making the Amundsen polynya one of the most effective carbon sinks in the world's oceans.