Estimation of Antarctic sea ice primary production inferred from biomass accumulation

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Antarctic sea ice is one of the largest ecosystems on Earth, with an extent varying between a maximum of $19x10^6$ km^2 in late winter and a minimum of $3x10^6$ km^2 in late summer, most of which consists of annual pack ice. Direct measurements of primary production in Antarctic sea ice, using either oxygen-based or tracer incubation methods, remain scare. Thus, to estimate large-scale Antarctic sea ice primary productivity, two approaches have been used. First, sea ice biogeochemical models suggest that Antarctic pack ice contributes to a small but significant fraction (10 to 28%) of the primary production in the ice-covered area of the Southern Ocean. Second, accumulation of organic matter being trapped within sea ice during the growth season is likely to be representative of the net community production. More than 20 years ago, Legendre et al. (1992) used the few available observations to infer Antarctic sea ice primary productivity. We believe that it is time to revisit this estimation by accounting from a much larger compilation of data (historical to present). Here, we present the first results using an updated dataset of historical ice cores sampled between 1989 and 2017. These allow us to provide an updated estimation of the sea ice primary production based on in-situ data, and its contribution to the SIZ and Southern Ocean. A comparison between pack and fast ice will be also briefly discussed.

No preference