

Mid-winter surveys of sea ice biogeochemistry in polar oceans

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Sea ice has rarely been considered in estimates of global biogeochemical cycles, especially gas exchanges, because of the assumption that, in ice-covered seas, sea-ice acts as a barrier for atmosphere–ocean exchange. However, recent work has shown that sea ice and its snow cover play an active role in the exchange of gases between the ocean and atmosphere [1] [2]. Our results provide a useful **reference** for future studies as the ongoing drastic changes in polar climate and sea ice extent are likely to alter the biogeochemical cycles **in polar ocean–sea ice–atmosphere system**. However,, the lack of information for the winter-time sea ice biogeochemistry was pointed out, due to the difficulty to acquire data under harsh weather conditions. In this presentation, we will present our recent winter-time sea ice surveys of sea ice biogeochemistry on the *R/V Aurora Australis* off East Antarctica (SIPEX-II) in 2012 and the mid-winter sea ice cruise on the *R/V Polarstern* in the Weddell Sea, Antarctica (AWECS) in 2013. In addition, we will also show the ongoing project of Norwegian Young sea ICE cruise (N-ICE2015) on the *R/V Lance* drifting for half a year in Arctic sea ice north of Svalbard in 2015.

[1] Nomura *et al.* (2013) *J. Geophys. Res. Oceans* **118**, 6511-6524. [2] Delille *et al.* (2014) *J. Geophys. Res. Oceans* **119**, 6340-6355.