Population structure of planktonic Foraminifera near the sea ice edge in January 2016

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Planktonic foraminiferans are distributed broadly in the Southern Ocean (SO). However, the mesh sizes of sampling nets in previous studies were too large to estimate abundances of early stage foraminiferans. Thus, these studies might have underestimated their abundances in the water column. The typical cold water species, *Neogloboquadrina pacyderma*, is found abundantly both within pack ice and water column in the vicinity of ice edge in SO (Ojima *et al.* 2017). This suggests that planktonic foraminiferans have significant predation pressure in the marginal ice zone. The present study aimed to investigate the population structure of planktonic foraminiferans within pack ice and water column.

Foraminiferans were sampled in January of 2016 during the training vessel *Umitaka-maru* cruise. Water column samples were collected at two stations along the 110°E transect (Fig. 1). Pack ice were collected at ice edge near the southern station. Both water and melted pack ice samples were concentrated using a 20 μm hand net and preserved by neutralized formalin sea water (final conc. 5%). Fixed samples were stained by Rose Bengal solution, and then identified, counted and measured under an upright microscope in the laboratory.

This study identified three planktonic foraminiferan species, *N. pachyderma*, *N. incompta* and *Turborotalita quinqueloba*, of which the most dominant species was *N. pachyderma.* Foraminiferans were found in nine out of 11 pack ice. The abundances were various by sea ice ranging 0 – 20.5 ind. /L, which was low compared with previous studies. It is known that foraminiferans exhibit patchy distribution in sea ice (Spindler and Dieckmann, 1986). In the water column, the abundance ranged 0 – 2.2 ind. /L. At both stations, the maximum abundance was observed at 75 m depth. *N. pachyderma* were divided into three developmental phases based on shell length and surface structure of the shell (phases *A, B* and *C*). In comparison by the phase, *N. pachyderma* found in pack ice was significantly larger than that in the water column in phases *A* and *B*, suggesting that sea ice itself provide a favourable environment for their growth. In water column samples, the early phase *A* was dominant in the station near ice edge (Stn. KC6), while the older phase *B* was dominant in the northern station (C07). For the phase *C*, only three individuals of was collected in Stn. C07. Satellite observation revealed that sea ice melted in Stn. C07 approximately one month earlier than KC6. These facts implied that the population in C07 was not released from melting sea ice but recruited by reproduction based on the reproduction cycle of Arctic foraminiferan being one month (Volkmann, 2000) .

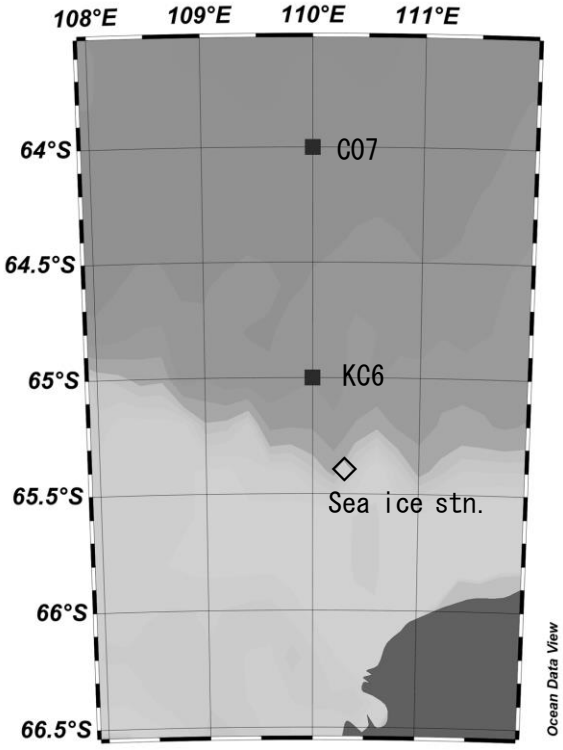

Fig. 1. Sampling stations of water column (■) and sea ice (◇)

References

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