北極海環境変動研究：海氷減少と海洋生態系の変化
進捗状況と今後の計画

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Ecosystem studies of the Arctic Ocean declining Sea ice (ECOARCS/GRENE): Progress and future plan

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The recent drastic decrease in the Arctic summer sea ice may cause various environmental changes. However, it is still highly uncertain how sea ice variability affects the Arctic environments from physical, chemical, and biological points of views. Is the decrease in Arctic sea ice favorable or unfavorable for the Arctic marine ecosystem? To clarify and predict influences of sea ice reduction to the Arctic marine ecosystem, a research project "Ecosystem studies on the Arctic Ocean declining sea ice (ECOARCS)" was initiated under the GRENE Arctic Climate Change Research Project (2011-2015). In the ECOARCS/GRENE project, we focus on the Chukchi Sea of the Arctic Ocean, where various environmental changes have been already accompanied by the sea ice reduction.

To collect not only physical but also bio-geochemical observational data in ice-free area of the Chukchi Sea, multi-displinary cruise was conducted using R/V Mirai in September-October 2012 (Kikuchi et al., 2012, *The 3rd sympo. of Polar Sci.*). In July 2013, we had another observational cruise in the Chukchi and Bering seas by T/S Oshoro-Maru (Fig.1). Special purpose of the Oshoro-Maru cruise is to determine the distribution and movement patterns of marine mammals in Chukchi and Bering seas. The observation items were CTD, water collection in the water column, biological and chemical analyses of the water, sediment sampling, fish larvae collection, plankton collection. We also successfully operated bottom trawl and dredge, and bio-optical measurements for satellite oceanography. The sea bird and mammal sighting surveys were also conducted from the upper bridge. The Oshoro-maru cruise has been completed almost of what we planned. In this presentation will outline the preliminary results during the Oshoro-maru cruise.

For year-long monitoring physical, chemical, and biological variations in the so-called "hot spot", mooring observation are very useful. Since July 2012, we have been conducting mooring observation at the Hope Valley of the southern Chukchi Sea and at the top of the Barrow Canyon. To clarify the feeding behavior of higher trophic levels, we also use the techniques of bio-logging. Furthermore, we are developing marine ecosystem models for the Arctic Ocean, which can diagnose in detail the ongoing changes in the Arctic marine ecosystem and may predict its future.

ECOARCS/GRENE project is closely collaborated with the inernational projects. Distributed Biological Observatory (DBO) is one of such projects, which is endored by the Marine Working Group of the International Arctic Science Committee (IASC) and one of the tasks of Sutaining Arctic Observing Networks (SAON).

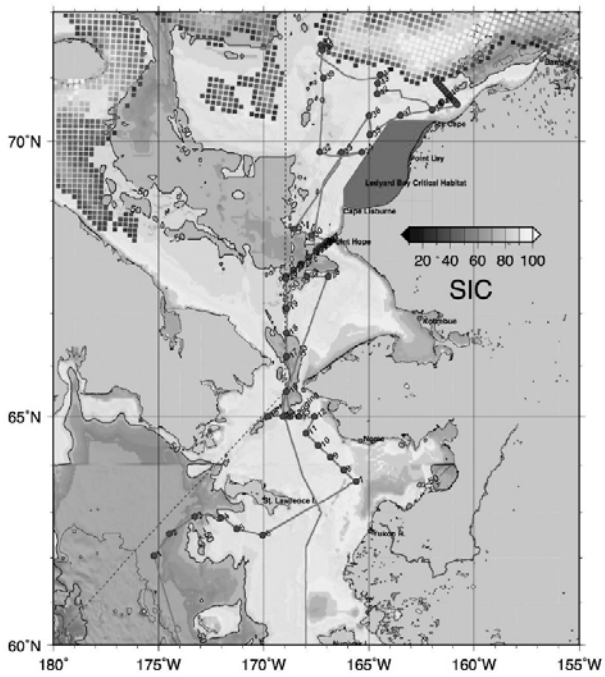

Figure 1. Map of sampling station and track in the Chukchi and northern Bering seas during Leg-2 of T/S Oshoro-Maru cruise. Square dots with gray scale show sea ice concentration of AMSR-2/GCOM-W on July 12, 2013..

References

Kikuchi, T., S. Nishino, and T. Hirawake, Preliminary results on R/V Mirai 2012 Arctic Ocean cruise and future observation plan of ECOARCS/GRENE project, *The Third Symposium on Polar Science* (oral presentation), National Institute of Polar Research, Tachikawa, Tokyo, JAPAN, November, 2012.