THE EFFECT OF A NEARBY POLYNYA ON THE AIR TEMPERATURE AT SYOWA STATION, EAST ANTARCTICA (Abstract)

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The influence of multi-year fast ice around Syowa Station on the local climate has been studied with the data of a special case when a large polynya appeared near the station. The shore fast ice around Syowa Station, which is located on East Ongul Island (69°00′S, 39°35′E), was fractured by the action of swell from an offshore open sea on March 18, 1980. The ice close to the island never broke until this case since Syowa Station was established in 1957.

The monthly mean air temperatures at Syowa Station in the subsequent several months of the year were higher than the average values of more than twenty years. The magnitude of the warm anomaly of each month was about 2.5 degrees in March, about 4 degrees from April to July, and about 2 degrees in August and September. According to the climatological data at Syowa Station, warm anomalies during twenty years or more never exceeded 2.5 degrees from January to May, in the austral summer and fall seasons, except the year 1980. The warm anomalies in 1980 continued through the period of rapid growth of ice in the polynya. New ice covered the polynya in the end of April, and the thickness of ice increased as 55 cm in the beginning of June, 85 cm in the end of July, 105 cm in the end of September, and 115 cm in early November. It is recognized as the air temperature at Syowa Station was affected by the latent heat release of ice formation in the nearby polynya.

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PROFILING OF ANTARCTIC SEA ICE THICKNESS AND RELEVANT SEA ICE STRUCTURE NEAR SYOWA STATION BY IMPULSE RADAR (Abstract)

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Using impulse radar on Antarctic sea ice near Syowa Station, sea ice thickness was profiled and relevant sea ice structure studied in August 1982. The impulse radar system consisted of two transmitter-receiver antennae, a control unit and a graphic display recorder. Operating frequencies were on the order of 300 and 500 MHz.

The profile of sea ice thickness was carried out for about 3 km. The thickness varied from 80 to 200 cm. Intensity of signals reflected from the interface between sea ice and sea water (bottom echo) changed markedly both from the first year and multi-year ice. No echo was recorded along about 10% of the survey line. To study the reflection between reflected signals and the internal structure of sea ice, linearly polarized antennae were rotated on sea ice. A sea ice core of 155 cm in length was sampled, and ice crystal structure and salinity distribution were studied.

The multi-year ice indicated noticable internal signals reflected from a depth of about 90 cm. It was found that internal signals correspond to the brine-soaked layer by core analyzing. When the antenna was rotated on the multi-year ice, the bottom echo intensity changed and gave two maxima and two minima approximately every 90° of rotation, but the internal echo did not change. Changing bottom echo signals are attributed to platelet structure of newly-grown ice on the sea ice bottom. The first year ice gave an apparent bottom echo but no internal echo.

In the present experiment, it is found that an impulse radar system is useful for thickness profiling of sea ice and will be a useful instrument to study the anisotropic structure of sea ice and to detect the brine-soaked layer.

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