ICE CRYSTALS GROWN FROM THE VAPOR AT TEMPERATURES LOWER THAN −17°C (Abstract)

Akira YAMASHITA*, Asaharu ASANO* and Makoto WADA**

*Osaka Kyoiku University, 88, Minami-kawahori-cho 4-chome, Tennoji-ku, Osaka 543
**National Institute of Polar Research, 9–10, Kaga 1-chome, Itabashi-ku, Tokyo 173

A series of experiments to grow ice crystals at low temperatures were carried out in the low temperature laboratory of the National Institute of Polar Research by using an unforced air flow cloud chamber, which was designed to grow ice crystals in a stable supercooled cloud at temperatures between the melting point and −25°C. After the cloud chamber was operated continuously for days, a few threads were hung vertically from the top plate. Ice crystals were grown from the vapor on the vertical threads or on solid frost covering the wall of the chamber. Those grown for about 12 hours were sampled and observed under a polarization microscope in the laboratory. The temperature range in which ice crystals are possible to grow was between −17 and −38°C.

Results of the present experiments are as follows: (i) Almost all types of ice crystals grown in the previous free fall experiment with the low temperature range grew in the stable condition of the present study. (ii) Polycrystals were predominant. And those called "Gohei" or "V-shaped ice crystals" were also obtained. (iii) The number of V-shaped crystal's repeated structure in a unit length was about 1/5 of that of a freely fallen crystal and they grew slower than falling crystals.

(*Received April 16, 1983*)

SEA ICE CONDITION AROUND SYOWA STATION, LÜTZOW-HOLM BAY, IN 1981 (Abstract)

Yoshio YOSHIDA and Kiichi MORIWAKI

National Institute of Polar Research, 9–10, Kaga 1-chome, Itabashi-ku, Tokyo 173

Observations of sea ice around Syowa Station were carried out in 1981 mainly for the safe operation of marine geological survey from the surface of sea ice. Data were obtained by ice thickness measurement, visual observation from the air, and monitoring of ice condition by NOAA-6 satellite images. Usually the fast ice covers Lützow-Holm Bay almost entirely in winter, and a shore recurring polynya is formed along the northeast coast of the bay in late summer. Degree of development of the polynya differs greatly from year to year. As in the case of 1980, the polynya in 1981 enlarged extensively to occupy more than a fourth of the bay area, and survived until the beginning of June. It was very small in 1982. Cyclic change in the development of the polynya seems to exist; controlling factors are not known, but the amount of snow fall on sea ice in early summer appears to be partly responsible for such fluctuation. Ice thickness measurements at 1 to 2 km intervals along the traverse routes 500 km long were done mainly in October; the thickness of first-year ice in the eastern part of the bay ranges from 100 to 140 cm and thins generally toward the eastern coast and the thickness of second-year or multi-year ice in the west increases toward west from 160 to more than 300 cm. Thickness of some old ice seems to exceed 10 m, estimated from the

surface elevation above sea level. This thick ice, which rarely breaks out, locks a glacier tongue, iceberg tongues, and many isolated icebergs in the western Lützow-Holm Bay.

(*Received March 31, 1983*)

BRINE EXCLUSION AND SEA ICE SALINITY (Abstract)

Masaaki WAKATSUCHI

The Institute of Low Temperature Science, Hokkaido University, Kita-19, Nishi-8, Kita-ku, Sapporo 060

The exclusion process of brine from growing sea ice has been quantitatively studied under various ice growing conditions in the field and laboratory. With a decrease in ice growth rate the salinity of brine increases markedly but its volume flux decreases. Consequently, the salt flux decreases with decreasing ice growth rate, and hence the amount of salt excluded depends largely upon the volume rather than the salinity. The total volume of brine excluded during the ice formation process increases with increasing both growth rate and duration of formation. Change in salinity of sea ice with ice growing conditions can be understood from the above observation results on brine exclusion. A lower salinity in sea ice that took a longer time to grow to a fixed thickness is due to the exclusion of a larger amount of brine with a higher salinity during the ice formation process. Meanwhile, a higher salinity in thick sea ice that formed during a certain period is due to the exclusion of a smaller amount of brine with a lower salinity per unit growth amount of ice during the period. These results suggest that in future the salinity and volume of brine excluded during the formation process of sea ice can be estimated approximately by measuring the formation time, thickness and salinity of the sea ice.

(*Received April 7, 1983*)

THE OCEANIC EDDY IN THE SOUTHERN OCEAN (Abstract)

Jiro FUKUOKA*, Hideo MIYAKE* and Kou KUSUNOKI**

**Faculty of Fisheries, Hokkaido University, 1–1, Minato-cho 3-chome, Hakodate 041*
***National Institute of Polar Research, 9–10, Kaga 1-chome, Itabashi-ku, Tokyo 173*

The object of this study is the analysis of oceanographical structure in the Southern Ocean (south of 50°S) around Antarctica. We deal with 627 oceanographical data including nutrient for the period from 1932 to 1974, provided by the Japan Oceanographical Data Center. In this report the analysis is made only on the Pacific Ocean side from the viewpoint of the ocean current pattern with the use of the dynamical topography and the water mass distributions by T-S diagram.

From the dynamical topography in the Pacific we can find the anticyclonic circulation near 100°W to 90°W and the cyclonic circulation near 135°W. In both areas the water mass analysis is also made by using T-S diagram. The water masses along 100°W have high water temperature, 6°C to 5°C from surface to 150 m depth near 55°S and 3°C to 2°C from surface to 150 m depth near 60°S, whereas the water masses along 135°W show lower temperature, that is, 3°C to 2°C from surface to 150 m depth near 56°S and 1°C to 0°C near 60°S. Namely, we