

**Data of Sea-ice Cores Obtained in Lützow-Holm Bay from 1990 to 1992
(JARE-31, -32) in the Period of Japanese Antarctic Climate Research**

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As part of the Japanese Antarctic Climate Research (ACR) Program, a two-year study of atmosphere/sea-ice/ocean interaction was conducted off Queen Maud Land and Enderby Land, Antarctica by JARE-31 and JARE-32. Research on the distribution of snow depth and sea-ice thickness and on the growth process of sea ice was done in Lützow-Holm Bay. This report presents data of sea-ice core samples obtained during the period.

A total of 16 stations were established on three observation lines named OW, L and P. The locations of the stations are shown in Fig. 1 and Table 1. Observation trips were carried out with snow vehicles and sledges in April/May, August and October in 1990 and 1991. Observations were carried out on all the lines in 1990. In 1991, however, only L-Line and then OW-Line together with L-Line were selected. Sea-ice samples were also collected by mean of a helicopter from the icebreaker "Shirase" in January, 1990, 1991 and 1992. Table 2 shows the snow depth and sea-ice thickness at the stations at each designated time. Sea-ice cores were collected at approximately half of all the observations to assess structure, temperature, salinity and oxygen isotope concentration.

Sea-ice core samples were obtained with a 100-mm diameter CRREL-type coring auger. The cores were packed in bags, stored in a cold room at Syowa Station and shipped under the same storage conditions to Japan for analyses, which were as follows. Each core was cut to obtain a 5-mm thick vertical section of the entire length, and 5-mm thick horizontal sections were selected in order to examine bubble and brine-layer distributions under scattered light. These thick sections were smoothed to a thickness of approximately 1 mm and were illuminated under polarized light to identify

individual grains and their structures. Thus, the authors divided the entire length of the cores into ice types according to their structure. The cores were then cut horizontally at 50-100 mm intervals depending on the structure. The oxygen isotope concentration of the melted samples was analyzed with a mass spectrometer (Finnigan MAT Delta E) with a precision of $\pm 0.2 \text{‰}$. The salinity of the melted samples was determined using a refractometer. The results from the analyses of the sea-ice cores are shown in Fig. 2 in terms of stratigraphy, salinity and oxygen isotope concentration profiles.

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Table 1. Latitude, longitude and depth of each station.

Station	latitude (S)	longitude (E)	depth (m)
OW 1	69° 02.8	39° 12.4	158
OW 2	69° 02.7	38° 56.4	183
OW 3	69° 02.7	38° 40.0	430
OW 4	69° 02.7	38° 25.0	721
OW 5	69° 02.2	38° 11.1	758
L 0	69° 15.8	39° 29.8	337
L 1	69° 16	39° 22.5	229
L 2 (1990)	69° 15.6	39° 09.4	225
L 2 (1991)	69° 16	39° 10	492
L 3	69° 16.4	38° 53.2	510
L 4	69° 17.3	38° 46.0	965
L 5	69° 16.8	38° 30.4	645
P 0	69° 35.7	38° 35.9	978
P 1	69° 23.0	39° 06.0	483
P 2	69° 35.9	38° 39.0	1110
P 3	69° 35.3	38° 29.0	600
P 4	69° 35.4	38° 51.7	465

Table 2. Snow depth (Zs) and sea ice thickness (Zi) of the stations in Lützow-Holm Bay at each designated time. Sea ice core samples, denoted by the underlined figures, were collected and analyzed, with the results shown in Fig. 2.

		OW 1		OW 2		OW 3		OW 4		OW 5	
		Zs (m)	Zi (m)	Zs (m)	Zi (m)	Zs (m)	Zi (m)	Zs (m)	Zi (m)	Zs (m)	Zi (m)
MAY	1990	0.33	1.60	0.47	1.90	0.46	1.28				
AUG.	1990	0.53	2.00	0.98	2.11	0.72	1.70	1.30	2.31	1.13	3.02
OCT.	1990	0.55	2.01	1.17	2.19	1.02	<u>2.26</u>	1.21	2.85	1.64	<u>2.77</u>
AUG.	1991	0.48	<u>2.45</u>	1.04	<u>2.83</u>	1.09	<u>1.77</u>	1.40	<u>3.38</u>		
OCT.	1991	0.64	<u>2.39</u>	1.10	<u>2.73</u>	1.16	<u>2.05</u>	1.54	<u>3.30</u>		

		L 0		L 1		L 2		L 3		L 4		L 5	
		Zs (m)	Zi (m)	Zs (m)	Zi (m)	Zs (m)	Zi (m)	Zs (m)	Zi (m)	Zs (m)	Zi (m)	Zs (m)	Zi (m)
MAY	1990			0.11	1.44	0.39	2.20	0.63	<u>2.15</u>	0.72	2.20		
AUG.	1990			0.15	1.70	0.70	2.50	0.97	2.13	1.20	2.13	1.40	2.13
OCT.	1990			0.29	<u>1.98</u>	1.05	2.22	1.39	2.24	1.59	<u>2.37</u>	1.65	2.12
APR.	1991	0.05	<u>0.72</u>	0.05	<u>1.45</u>	0.10	<u>2.10</u>	0.35	<u>3.03</u>	0.58	<u>3.16</u>	0.47	<u>2.88</u>
AUG.	1991	0.20	<u>1.34</u>	0.22	<u>1.74</u>	0.36	<u>2.15</u>	0.86	<u>3.25</u>	0.92	<u>2.81</u>	1.12	<u>2.97</u>
OCT.	1991	0.15	<u>1.60</u>	0.20	<u>2.04</u>	0.53	<u>2.36</u>	0.98	<u>3.25</u>	1.13	<u>2.86</u>	1.42	<u>2.80</u>
JAN.	1992							0.53	<u>3.38</u>				

		P 0		P 1		P 2		P 3		P 4	
		Zs (m)	Zi (m)	Zs (m)	Zi (m)	Zs (m)	Zi (m)	Zs (m)	Zi (m)	Zs (m)	Zi (m)
JAN.	1990	0.26	<u>2.38</u>								
APR.	1990			0.27	1.89	0.65	<u>2.35</u>	0.60	2.05	0.56	2.08
AUG.	1990			0.72	2.08	1.35	2.25	1.35	2.10	1.04	2.08
OCT.	1990			0.86	<u>1.90</u>	1.52	<u>2.45</u>	1.45	2.15	1.25	2.10
JAN.	1991	0.67	<u>2.71</u>								
JAN.	1992	0.88	<u>3.32</u>								

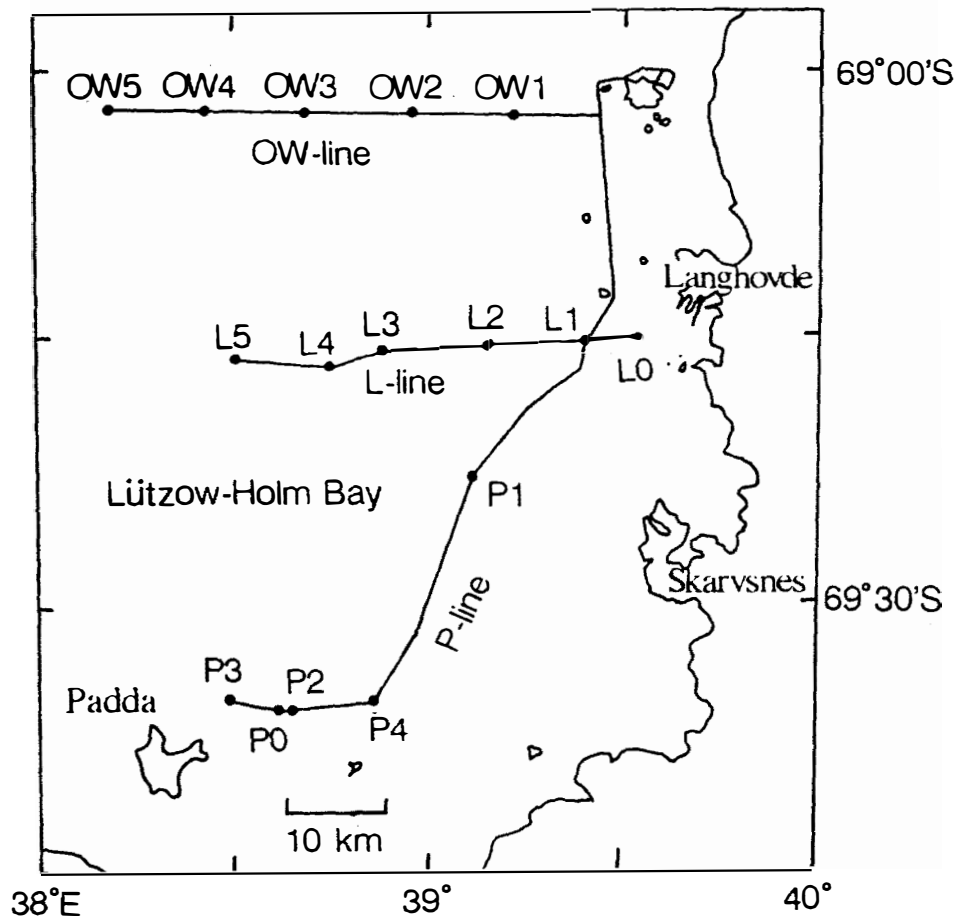


Fig. 1. Location map of Lützow-Holm Bay showing the 16 offshore observation stations on three lines.

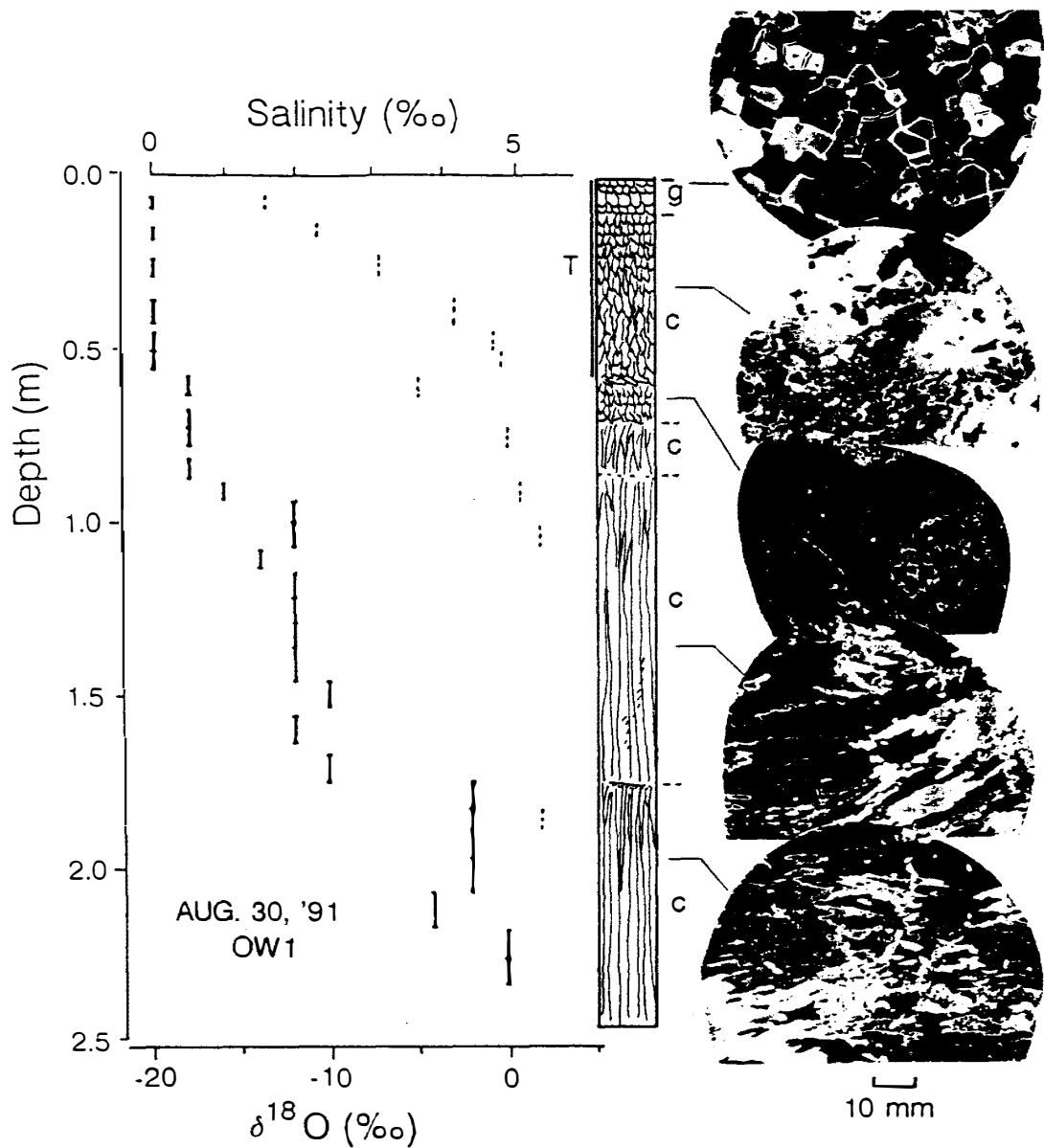


Fig. 2. Salinity (solid line) and oxygen isotope concentration (dashed line) profiles, vertical structure sections and horizontal thin section photographs of the sea-ice samples. The symbols c and g located on the right side of the vertical structure section denote columnar ice and granular ice, respectively. The symbol c/g represents intermediate or mixed columnar/granular ice. The symbol T on the left side denotes a transparent ice layer.

