THE VOYAGE OF THE KONAN MARU NO. 16 TO THE ANTARCTIC WHALING GROUNDS

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ABSTRACT

Three major Japanese whaling companies, the Kyokuyo, the Nippon Suisan and the Taiyo Gyogyo Co. Ltds., made the joint observation on the distribution and abundance of whales by the whale catcher Konan Maru No. 16 in the Australian and New Zealand sector of the Antarctic Ocean from January 10 to March 8, 1973.

The number of whales sighted in about eight weeks and on the passage of 9,377 nautical miles was not great. We saw only 20 fin, 16 sei and 7 humpback whales. The blue and right whales was not encountered at all. The minke and sperm whales sighted are rather great; the former is 251 and the latter 108. 5 fin, 2 sei, 2 humpback and 8 sperm whales were effectively marked.

Oceanic observations at the surface were also worked during the voyage. The locations of the Subtropical and Antarctic Convergences and the Australasian Subantarctic Front on four traverse courses across the Antarctic Ocean are determined by the steep meridional gradient in the surface temperature and salinity. The distibution of the pack-ice, icebergs and patch of the krill at the surface are also shown.

INTRODUCTION

In order to contribute to the stock assessment of whales in the Antarctic Ocean, the major whaling companies, the Kyokuyo, the Nippon Suisan and the Taiyo Gyogyo Co. Ltds., made the joint observation on the distribution and abundance of whales by the whale catcher Konan Maru No. 16 in the Australian and New Zealand sector of the Antarctic Ocean from January 10 to March 8, 1973. The principal purpose of the voyage was: 1) to obtain the latest information on the distribution and abundance of whales in that area; 2) to mark as many whales as possible; 3) to observe some oceanic conditions at the surface. In those days Japanese whaling fleets were not operating in high latitudes south of Australia and New Zealand. We, therefore, have little information on the distribution and abundance of whales and on some oceanic conditions at the surface in the region, in which a great number of the blue, humpaback and fin whales had been taken in the early Antarctic whaling age.

The Konan Maru No. 16, belonging to the Nippon Suisan Co. Ltd., has a gross tonnage of 739.82, a disel engine of 3,280 HP, a cruising speed of 13.75 knots.

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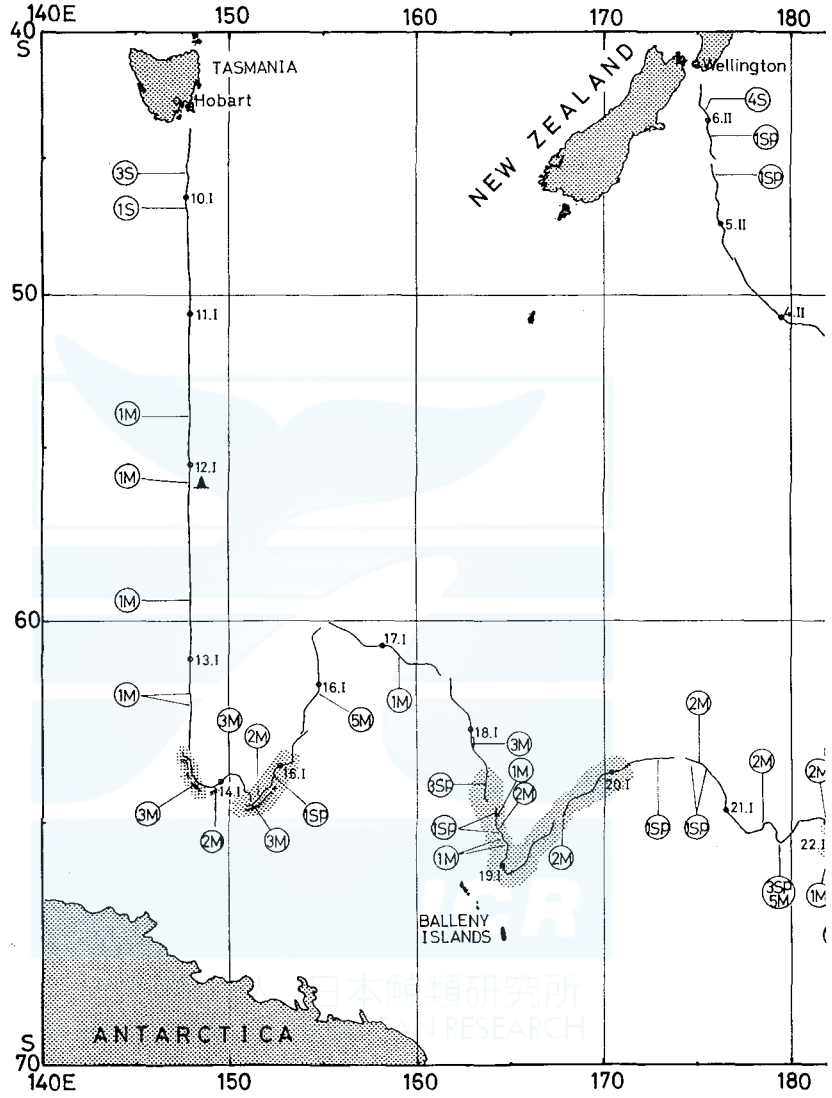
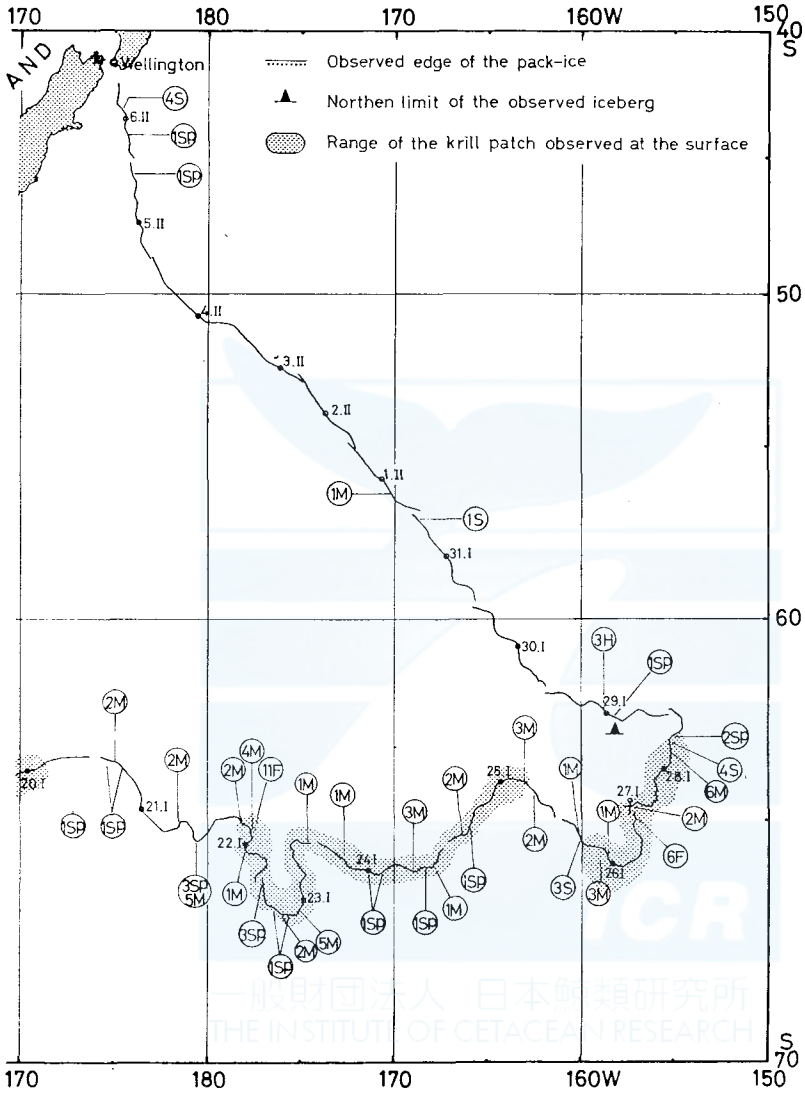


Fig. 1. Voyage of the Konan Maru No. 16 the first period from January 10 to Feb- major species sighted, observed edge of encountered on the traverse courses,



in the Antarctic whaling grounds during ruary 6, 1973. Ship's track, whales of the pack-ice, northern limit of icebergs and range of the krill patch observed.

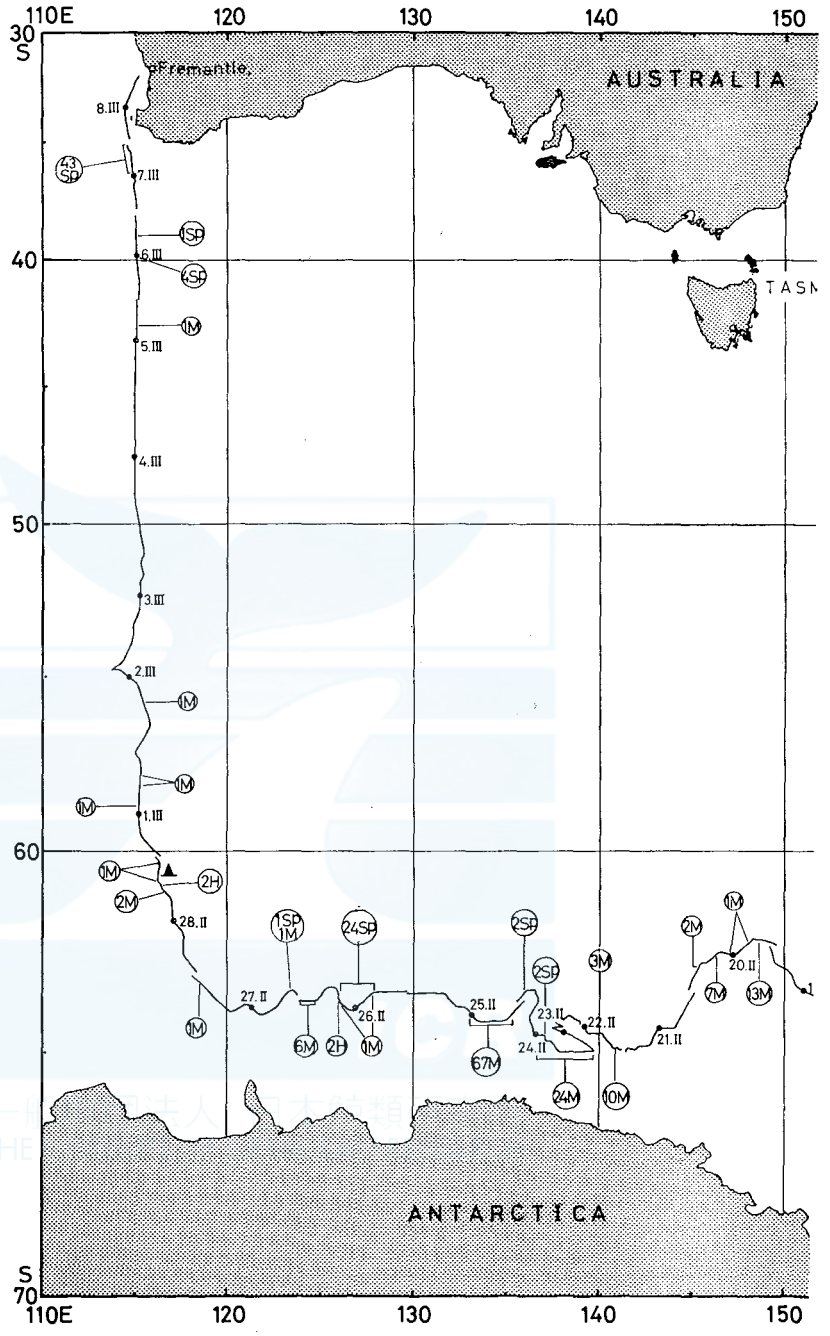
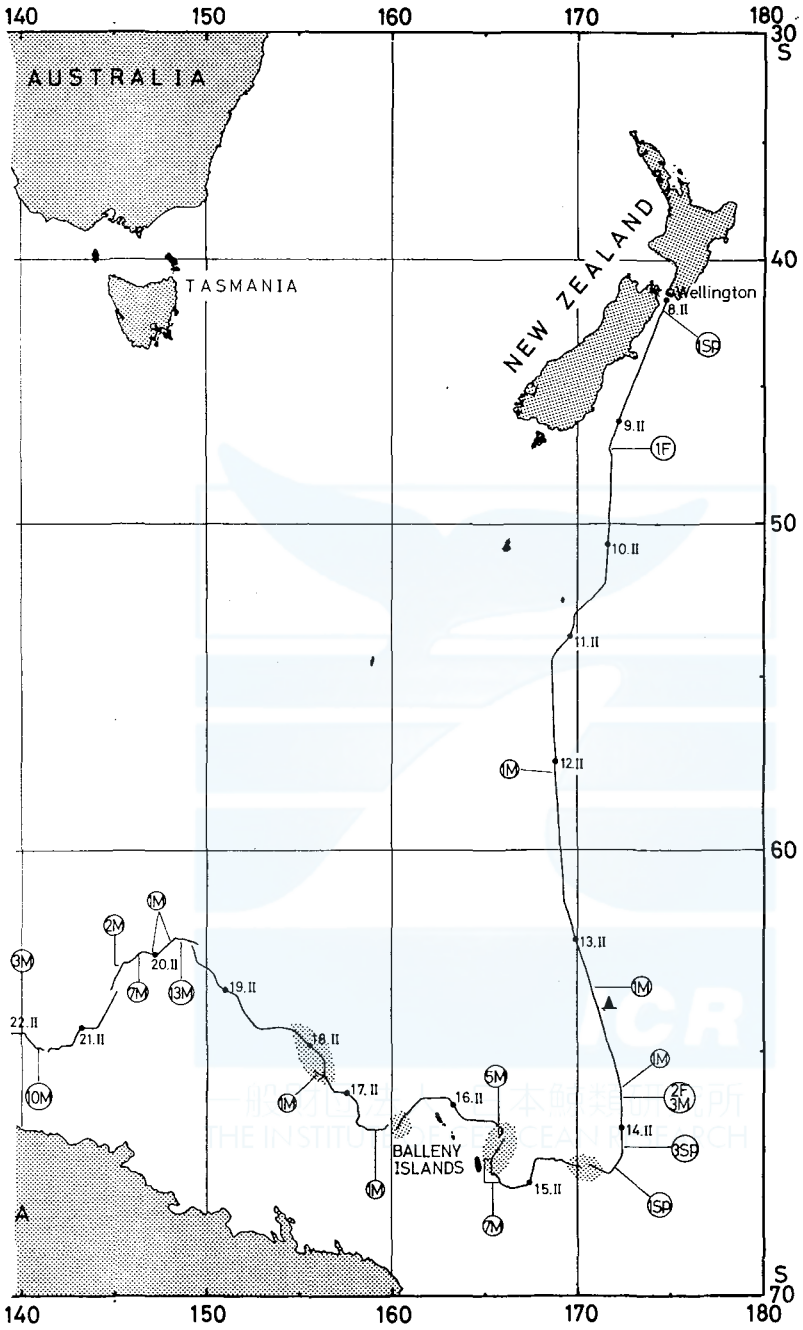


Fig. 2. Voyage of the Konan Maru No. 16 the second period from February 8 to major species sighted, northern limit of courses and range of the krill patch



in the Antarctic whaling grounds during March 8, 1973. Ship's track, whales of icebergs encountered on the traverse observed.

and Leader of the sighting observation; H., Kano (Captain of a whale catcher of the Kyokuyo Co. Ltd.); S., Isobe (Chief Officer of a whale catcher of the Taiyo Gyogyo Co. Ltd.); the officers and crew of the ship. They have excellent experience in whaling more than twenty years. I get on board the ship in order to make some oceanic observations at the surface in the Australian and New Zealand sector of the Antarctic Ocean.

A continuous sighting for whales was usually maintained on the cross net (two watchers) and on the upper bridge (three ones) from dawn untill dusk every day, except on when visibility is poor and heavy seas greatly disturb our sighting observation. We, therefore, can look out over the horizon as far as 6 to 7 nautical miles from the cross net in good visibility. On all nights in higher latitudes than about 60° S except on when the weather or schedule gave us reason to steam, we lay stopped to avoid missing whales in the hours of darkness. For the same reason we steamed slow speed in heavy rain, fog and snow; when the weather was very thick we would stop untill it cleared.

WHALES SIGHTED AND MARKED

The voyage of seeking after whales by the Konan Maru No. 16 consisted of two periods in the Australian and New Zealand sector of the Antarctic Ocean from January to March, 1973. The first period was occupied on the passage from Hobart to Wellington between January 9 and February 6 (Fig. 1). In the second period the whale sighting was occupied on the course from Wellington to Freemantle during February 8 and March 8 (Fig. 2). There is no need to describe in detail the whole of about eight weeks occupied in sighting for whales, but reference should be made to the ship's track, location of major whales encountered, distribution of observed edge of the pack-ice and some oceanic conditions at the surface in Figs. 1–6, and in Tables 1 and 2. In general it may be said that the Konan Maru No. 16 steered easterly courses in the first period and westerly ones in the second period by passing through the grounds in which favorite haunts and dense local concentrations of the blue, fin and humpback whales had been located in the early Antarctic whaling age.

As is given in Tables 1 and 2, and Figs. 1 and 2, major whales sighted in the two periods are not as great as we had hoped, except the minke and sperm whales. We could not saw the blue and right whale at all, and fin whales encountered was 20 in about two months. I wonder whether the very few numbers of the fin sighted are reflected in the size of their stocks in the Australian and New Zealand sector of the Antarctic Ocean? 19 among 20 fins were distributed in the South Pacific Antarctic Ridge region.

Although we observed on the grounds in which most humpback whales had been taken by early pelagic expeditions, only 7 individuals were encountered there. Two humpabacks sighted in 60°53′S, 116°30′E on February 28 were adult and calf. It may be said the stock of the southern humpback groups IV and V does not recovered yet well.

We observed 16 sei whales, 8 of which were distributed in the Subtropical

TABLE 1. VOYAGE OF THE KONAN MARN NO 16 TO THE AUSTRALIAN AND NEW ZEALAND SECTOR OF THE ANTARCTIC OCEAN. WHALES SIGHTED AND WHALES MARKED EACH DAY.

Date		Noon	Position	Sighted		Sea condition (1)	Visibility (2)	Major species of whales sighted					Whales marked			
				Distances (naut. mile)	Hours (h.m.)			Fin	Hump.	Sei	Minke	Sperm	Fin	Hump.	Sei	Sperm
10	I	46°29′S	147°47′E	143	15 30	Bad	Good			4						
11		50°35′S	147°54′E	188	16 00	Bad	Moderate									
12		55°31′S	147°56′E	207	16 40	Good	Moderate				2					
13		61°01′S	149°25′E	238	16 20	Moderate	Bad				3					
14		64°05′S	149°25′E	160	16 00	Bad	Bad				8					
15		63°40′S	152°41′E	168	17 20	Moderate	Bad				5	1				
16		61°42′S	154°43′E	180	16 35	Moderate	Good				5					
17		60°42′S	158°11′E	207	16 55	Bad	Good				1					
18		62°51′S	162°52′E	203	17 30	Bad	Good				3	3				2
19		65°58′S	164°38′E	205	16 50	Moderate	Moderate				5	2				
20		63°53′S	170′26′E	195	16 30	Bad	Good				2	1				
21		64°49′S	176°40′E	211	17 05	Moderate	Good				9	5				
22		65°20′S	177°54′W	183	15 20	Moderate	Good	11			7		2			
23		66°46′S	175°12′W	183	16 50	Good	Good				8	5				
24		66°11′S	171°23′W	207	15 40	Good	Good				5	3				
25		64°18′S	164°40′W	228	15 55	Moderate	Good				7	1				
26		66°00′S	158°24′W	205	17 15	Moderate	Good	6		3	5		3		1	
27		64°39′S	157°26′W	12	1 10	Good	Bad				1					
28		63°48′S	155°36′W	221	17 00	Moderate	Good			4	7	2			1	
29		62°27′S	158°47′W	211	16 55	Moderate	Good		3			1		2		
30		60°43′S	163°27′W	201	16 15	Moderate	Good									
31		58°18′S	167°18′W	196	16 45	Moderate	Moderate			1						
1	II	55°57′S	170°43′W	205	16 40	Bad	Bad				1					
2		53°57′S	173°32′W	116	15 50	Bad	Good									
3		52°26′S	176°11′W	no sighting												
4		50°38′S	179°20′E	160	12 50	Moderate	Bad									
5		47°21′S	176°13′E	197	14 40	Moderate	Good					1				
6		43°34′S	175°27′E	183	14 35	Moderate	Good			4*		1				
27		working days	Total	5,013	422 55			17	3	12+4*	84	26	5	2	2	2
8		41°36′S	174°44′E	112	8 00	Moderate	Good									
9		46°16′S	172°12′E	148	14 20	Moderate	Good	1								
10		50°44′S	171°36′E	154	14 15	Bad	Bad									
11		53°47′S	169°29′E	no sighting												
12		57°26′S	168°52′E	159	15 10	Bad	Good				1					
13		62°16′S	169°54′E	201	15 10	Moderate	Good				1					
14		66°36′S	172°21′E	182	15 40	Moderate	Good	2			4	4				
15		67°46′S	167°22′E	194	15 40	Moderate	Good				7					
16		66°10′S	163°15′E	195	16 00	Bad	Moderate				5					
17		65°42′S	157°33′E	155	11 20	Moderate	Good				1					
18		64°53′S	155°33′E	93	14 00	Bad	Moderate				1					
19		63°31′S	151°00′E	163	15 30	Bad	Good									
20		62°42′S	147°21′E	174	14 35	Moderate	Good				24					

Continued . . .

TABLE 1. Continued.

Date	Noon	Position	Sighted: Distances (naut. mile)	Sighted: Hours (h.m.)	Sea condition (1)	Visibility (2)	Major species of whales sighted: Fin	Hump.	Sei	Minke	Sperm	Whales marked: Fin	Hump.	Sei	Sperm
21	64°24′S	143°07′E	147	12 15	Bad	Moderate									
22	64°17′S	139°06′E	108	9 30	Moderate	Bad				13					
23	64°20′S	137°45′E	no sighting												
24	64°34′S	136°36′E	192	14 30	Maderate	Good				24	4				
25	63°56′S	133°22′E	189	14 35	Moderate	Good				67					
26	63°57′S	126°57′E	206	14 35	Good	Good		2		8	24				
27	63°55′S	121°21′E	199	15 05	Bad	Good				2	1				
28	61°45′S	116°59′E	195	14 00	Bad	Good		2		4					
1 III	58°58′S	115°10′E	177	13 45	Bad	Good				3					
2	55°00′S	114°51′E	107	10 15	Bad	Good				1					
3	52°17′S	115°14′E	166	13 00	Bad	Good									
4	47°36′S	114°54′E	177	12 30	Moderate	Bad									
5	43°20′S	114°54′E	173	12 20	Moderate	Good									
6	39°52′S	115°06′E	159	12 50	Moderate	Good				1					
7	36°23′S	115°02′E	168	14 35	Good	Good					5				6
8	33°23′S	114°40′E	71	6 00	Good	Good					43				
27 working days		Total	4,364	359 25			3	4		167	82				6
54 working days		Sum Total	9,377	782 20			20	7	12+4*	251	108	5	2	2	8

(1), (2) mean value of 06, 08, 10, 12, 14, 16, 18 ships time. * Probably Bryde's whale.
(1) 0～2 Good, 3～5 Moderate, 6～ Bad.
(2) ～6 Good, 5～3 Moderate, 2～ Bad.

TABLE 2. WHALES ESTIMATED TO HAVE BEEN EFFECTIVELY MARKED.

Species	Fin	Hump.	Sei	Minke	Sperm	Total
Whales sighted	20	7	12+4*	251	108	402
Schools encountered	6	3	6+3*	158	76	252
Whales marked effectively	5	2	2		8	16
Marking						
Hit	7	4	4		9	24
Hit-mark protruding						
Possible hit					2	2
No verdict	2				2	4
Richochet	1				1	2
Miss	5	1	2	3	7	18
Total	15	5	6	3	21	50

* Probably Bryde's whale.

Convergence regions, just south of Tasmania and east waters to New Zealand. However, at the begining of March not one sei whale were encountered in the convergence region of the South East Indian Ocean, where most sei whales have been recently taken by Japanese whaling expeditions between December and early February. It is conceivable that 4 sei whales encountered in the east water to New

Zealand were Bryde's whales, judging from their swimming behaviours. They were located over the Mernoo Bank on the Chatham Rise. 7 among other 8 sei whales were distributed in the South Pacific Antarctic Ridge region. That more sei whales were not encountered was likely to due to the possibility that sighting areas was not their major feeding grounds or that we may had been early in the season for them migrating into high latitudes.

The minke whale were encountered in every part of high latitudes south of the Antarctic Convergence compared to the distribution of other baleen whales, and we sighted up to 251 after all. It seems that the great number of the minke whale encountered indicates the large population of the species well.

The number of the sperm whale observed is also rather great. Most of them, except those encountered south of Cape of Leeuwin in South West Australia, were solitary bulls. It seemed that sperm whales sighted south of Cape Leeuwin were main herds, which were distributed on the continental slope. It will be noted that distinct concentration of solitary bulls (24) were lacated between 126° and 128° E on about 64° S.

The whale marks and marking guns were provided us by the Far Seas Fisheries Laboratory, Japanese Fisheries Agency. We used the marks of the International Whale Marking Programe and some of Japanese Fisheries Agency. Tables 1 and 2 show the whales marked during the cruise. We intended have marked as many whales sighted as possible. We were oblidged not to waste much marking time because the time and distance for whale sighting were to be extended.

OCEANIC OBSERVATIONS AT THE SURFACE

Locations of Some Major Oceanic Fronts

Some conspicuous oceanic features of the Antarctic Ocean are the Subtropical and Antarctic Convergences. There has been proposed another oceanic front, which is named the Australasian Subantarctic Front, existing south of the East Indian Ocean, the Australian Continent and the Tasman Sea (Burling, 1961). In this report the location of these oceanic fronts are determined from the steep mridional gradient of the surface salinity and temperature, with refering to some previous works.

Course I: Oceanic observations were made between 44° and 64° S in approximate longitude 148° E from January 9 to 14. The sea surface salinity and temperature along this traverse course have been plotted in Fig. 3. Between 45° and 46° S salinity decrease from 35.2 to 34.8‰ and temperature falls off from 14° to 11°C. These conditions seem to show evidently the Subtropical Convergence region locating south of Tasmania.

A great increase and decrease in temperature and salinity occurred repeatedly between 50° and 53° S. In the region salinity fluctuates from 34.6 to 34.1‰ and temperature varies between 9.5° and 7°C. A character of the Australasian Subantarctic Front is sufficently met with their sharp gradients. As the steep meridional gradient occurred three times, it seems possible, therefore, that the front meandered

in the counter-S shape.

Between 53.5° and 55.5° S the surface temperature decrease sharply from 7° to 1.5°C. There is also sharp change in salinity from 34.1 to 33.8‰ in this zone. These oceanic conditions seem to indicate clearly the Antarctic Convergence.

Course II: Fig. 4 shows a latitudinal change of salinity and temperature at the surface along the traverse course, observed between 42° and 62° S during January

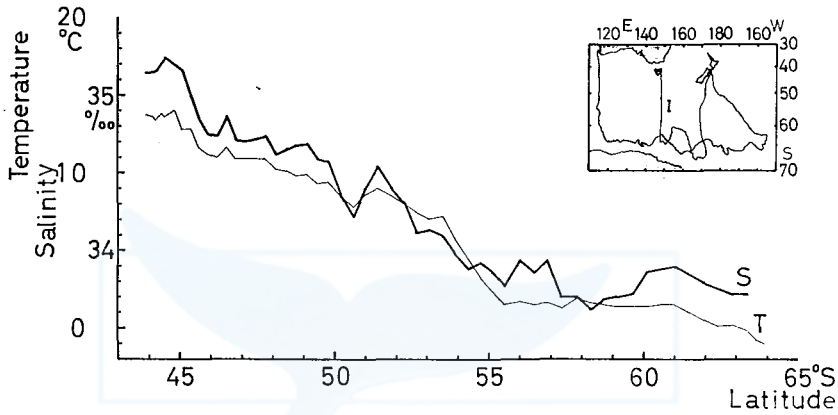


Fig. 3. Surface temperature and salinity along the traverse course I in approximately 148°E (January 10–14, 1973).

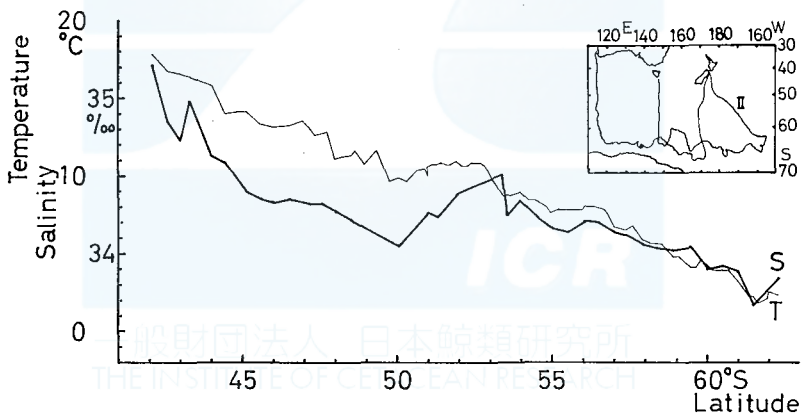


Fig. 4. Surface temperature and salinity along the traverse course II (January 29–February 6, 1973).

29 to February 6. The convergence region in the eastern waters to New Zealand is generally shown by about from 35.0 to 34.5‰ and by about from 13° to 16°C in summer (Deacon, 1937; Garner, 1954, 1959). These oceanic parameters were clearly distributed between about 42° and 44.5° S, and the gradient in salinity and temperature are considerably sharp between about 42° and 44.5° S and so it may be con-

cluded that the Subtropical Convergence region present between 42° and 44.5° S. A sudden increase in salinity near 43° 15′ S seems to suggest the curvature of the convergence and the southward tangue-shaped extension of the Subtropical Water.

Temperature fall off from about 4° to 2°C and salinity also decrease from about 33.9 to 33.7‰ between 60° 45′ and 61° 30′ S. These conditions met sufficently with characters of the Antarctic Convergence.

Course III: The observation of the surface salinity and temperature were made between 43° and 67° S from February 8 to 14. The meridional change of the surface salinity and temperature along this traverse section are given in Fig. 5.

As already mentioned in the Course II, the Subtropical Convergence region in the eastern waters to New Zealand is generally defined with salinity 35.0 to 34.5‰ and temperature 13° to 16°C in summer. These oceanic conditions are sufficiently presented in the region between 43° and 45° S, where steep meridional gradients in salinity and temperature occur.

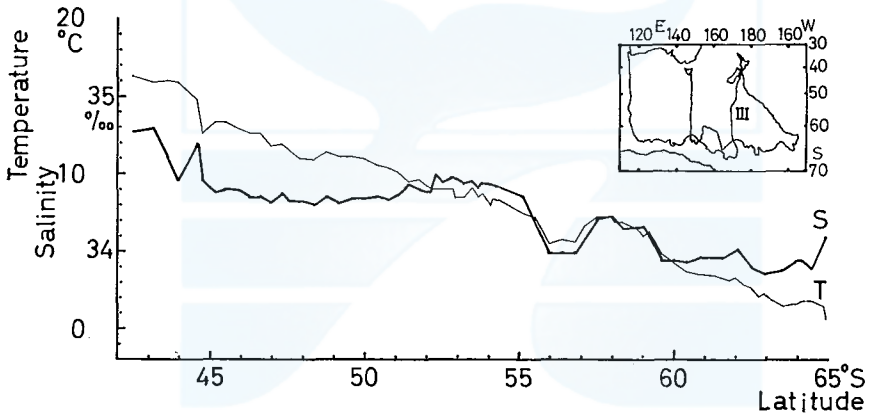


Fig. 5. Surface temperature and salinity along the traverse course III in approximately 170°E (February 8–14, 1973).

The sharp salinity increase in the Subtropical Convergence region seems that its water mass belongs to the Southland Current system. The current, which is a branch of the Tasman Current having characters of the Subtropical Water, passes through the Fouevaux Channel from the Tasman Sea, flows northward along the coast of the South Island and extends to off Banks Peninsula in the latitude about 44° S (Brodie, 1960; Garner, 1961).

It seems possible that the steep meridional gradient in salinity and temperature between 55° and 57.5° S show an oceanic front and a curvature of the West Wind Drift. The Subantarctic Slope of the Campbell Plateau locates just between 55° and 56° S on this traverse course. The sounding variation could have influence on the current.

The surface temperature falls sharply off from 6.5° to 4°C between 59° and 60° S and salinity also decrese sharply in the region. These steep gradient suggest

evidently the Antarctic Convergence.

Course IV: Fig. 6 shows the meridional variation of the surface salinity and temperature along this traverse course, observed for the period from February 8 to March 8.

It is every difficult to define the Subtropical and Antarctic Convergence regions on account of irregular temperature and salinity changes. The salinity variation between about 35° and 40° S, where the location of the Subtropical Convergence region is expected, do not give a simple steep gradient but repeats a sharp decrease and increase. However, a more steep gradient of temperature occurs between 39.5° and 40.5° S, with a sharp salinity gradient. It is quite possible that these steep gradient in the region indicate the Subtropical Convergence region. As the temperature change from 17.5° to 14°C and salinity fluctuate between 35.6 and 34.9‰ in that region, these conditions support that estimation.

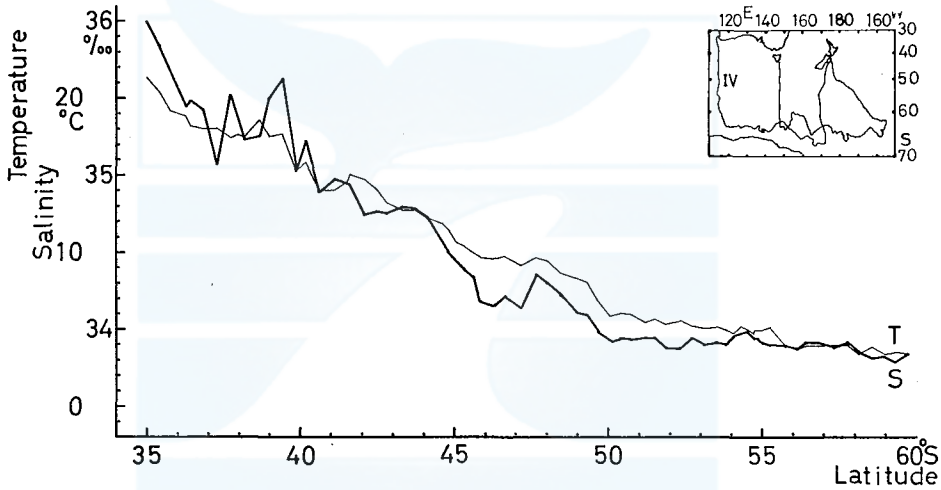


Fig. 6. Surface temperature and salinity along the traverse course IV in approximately 115°E (February 27–March 8, 1973).

Going north from the Antarctic Continent the surface temperature increases slowly untill the region between 50° and 49° S is reached where the relatively rapid increase of some 2°C occurs. Although the rapid increase in temperature and salinity suggests the Antarctic Convergence, the temperature 5° to 7°C in the zone seems to be relatively higher than ones of the convergence defined by previous works (Deacon, 1937; Mackintosh, 1964; Houtman, 1968). The high temperature may be partly caused by rare heating by the solar radiation. It may be defined here that the Anarctic Convergence existed between 50° and 49° S on this traverse cource.

The salinity change sharply from 34.7 to 34.2‰ between about 44.5° and 46° S south of the Subtropical Convergence. The center of the steep salinity gradient range is about 34.5‰ and locates at 45° S. The surface temperature range in the zone, however, is higher than that which is an indication of the Australasian Suban-

tarctic Front. The reason may be partly caused by unusual heating of the solar radiation as well as in the Antarctic Convergence region. The Australasian Subantarctic Front, therefore, is defined here to be located between 44.5° and 46° S.

Distribution of Pack-Ice, Icebergs and Patch of Krill

The information on the distribution of the Antarctic sea ice will be some help to the study of oceanic problems in the Antarctic Ocean. Although the available observation in old times are quite inadequete for a detailed account of the distribution and movements of the pack-ice and icebergs as a whole, there are some published works on the distribution of the pack-ice edge; papers by Hansen (1934) and Mackintosh and Herdman (1940) were vased on whaling factory ships and oceanograraphical research vesseles. Recent ones, however, have been established on photographs from satellites (Prehoehl, 1966; Sissalia *et al.*, 1972).

Records on the observed position of the northern limits of the pack-ice and icebergs at differnt times during the cruise are plotted in Figs. 1 and 2.

The observed pack-ice was the very close one and the melting drift ice. The very close pack-ice was encountered only in the vicinity of 64° S, 150° E on January 14 and 15. The melting drift-ice, on the other hand, were observed at different places.

As it is wellknown that icebergs are located up to about 60° S south of Australia and New Zealand, the northern limit of the distribution on icebergs are shown on only for traverse course across the Antarctic Ocean (Figs. 1 and 2). On the Course I a typical tabular iceberg was first encountered in 56° 02′ S, 148° 13′ E on January 12. The last iceberg observed on the traverse course II was in 62° 30′ S, 157° 00′ E south of the Antarctic Convergence on January 29. It was very large and typical tabular iceberg. On the Course III from New Zealand to the Balleny Islands an iceberg was sighted in 63° 50′ S, 171° 00′ E fruther south of the Antarctic Convergence on February 13. The northern limit of the distribution of iceberg on the traverse Course IV was in 60° 30 'S, 116° 20′ E on March 2, further south of the Antarctic Convergence.

As mentioned above, it seems that icebergs were not distributed across the Antarctic Convergence in the Australian and New Zeland sector between January and March, 1973.

The Antarctic krill, mainly *Euphausia superba*, have been recently regarded as the latent fishery resources, since its standing crop is vast. Its recources has been hoped for food ones as the world population has been gradually increasing.

The krill is often found in very dense concentrations at the surface. They are called patch and swarm. In this report the geographical distribution of the krill patch at the surface is shown (Figs. 1 and 2), but relationship between it and the oceanic conditions will be discussed in another report.

Patches of the krill were roughly distributed south of 63° S between 148° E and 155° W. In the region they were distributed in temperatures less than 2°C, which retains characters of the Anarctic Winter Water, and most of them were encountered in temperatures between −0.5° and 1.5°C.

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